



## ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD

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**PO Box 129**  
**WAUCHOPE NSW 2446**

### **ON-SITE DOMESTIC-WASTEWATER** **MANAGEMENT REPORT**

**DATE:** 14.9.15

**REPORT #:** E2148

**CLIENT DETAILS:**

- **NAME:** Mr Gavan Landini
- **POSTAL ADDRESS:** 27 Seams Road  
Kundabung  
NSW 2441
- **PROJECT ADDRESS:** Proposed 3 Lot subdivision  
of Lot 13 DP878784  
27b Seams Road  
Kundabung NSW

Dear Mr Landini,

At your request, Rosewood Environmental Services Pty Ltd carried out a site and soil evaluation of the above mentioned property on the 14<sup>th</sup> September, 2015. This report has been written to determine the suitability of the properties to sustain an on-site wastewater treatment system for residential dwellings after subdivision. The existing residence on proposed Lot 102 has not been included within this report as it has an existing septic system and area available for a replacement system, when required, after subdivision. The proposed Lots 101 & 103 are assumed to have 3-4 bedrooms (6 persons). The water supply is tank water.

The Wastewater Treatment Unit options for the dwellings on proposed Lots 101 & 103, based on the site & soil assessments are:

- ☐ An AWTS serving a surface or subsurface irrigation area;
- ☐ OR a septic tank & Reedbed serving a subsurface irrigation area
- ☐ OR a septic tank & sand filter serving a subsurface irrigation area.
- ☐ OR a Wet Composting System serving a subsurface irrigation area.
- ☐ OR a septic tank & mound system

And additional option for Lot 103 is:

- ☐ OR a septic tank & ETA trenches

The guidelines and Standards used for this report are:

- AS/NZS 1547:2000 & 2012 On-site Domestic-Wastewater Management.
- AS 1547: 1994 Disposal Systems for Effluent from Domestic Premises.
- Environment & Health Protection Guidelines: On-site Sewerage Management for Single Households.
- Local Council Code.

Thank you for using Rosewood Environmental Services Pty Ltd and if we can be of further assistance please feel free to call and discuss any of the following results that you may have queries about.

Yours Sincerely

*Lyn Richardson*

**LYN RICHARDSON**

**ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD**

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# **ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD**

## **CONTENTS PAGE**

<b>Reference</b>	<b>DESCRIPTION</b>	<b>PAGE #</b>
-	<b>INTRODUCTION</b>	1
-	<b>CONTENTS PAGE</b>	2
<b>SECTION 1</b>	<b><u>GENERAL INFORMATION</u></b>	3
<b>1.1</b>	<b>Location details</b>	
1.1.1	Locality	
1.1.2	Owner	
1.1.3	Address	
1.1.4	Phone	
1.1.5	Local Government	
<b>1.2</b>	<b>Daily Flow Rate</b>	
1.2.1	Intended Water Supply	
1.2.2	Source of wastewater	
1.2.3	Typical Wastewater flow allowance	
1.2.4	Total capacity of dwelling	
1.2.5	Total Daily Wastewater Flow Rate	
<b>1.3</b>	<b>Climate Information</b>	
<b>SECTION 2</b>	<b><u>SITE &amp; SOIL EVALUATION</u></b>	4
<b>2.1</b>	<b>Site Evaluation</b>	
2.1.1	Site Plan	
2.1.2	Site Information	
2.1.3	Site Assessment Table	
2.1.4	Limitations	
2.1.5	Remediations	
<b>2.2</b>	<b>Soil Evaluation</b>	
2.2.1	Soil Profile Information	
2.2.2	Soil Assessment Table	
2.2.3	Limitations	
2.2.4	Remediations	
<b>SECTION 3</b>	<b><u>DESIGN REPORT</u></b>	9
<b>3.1</b>	<b>Land Application System</b>	
3.1.1	Land Application System Chosen	
3.1.2	Size of area required	
3.1.3	Siting of System	
<b>3.2</b>	<b>Wastewater Treatment Unit</b>	
3.2.1	Wastewater Treatment Unit Chosen	
3.2.2	Capacity of Unit required	
<b>SECTION 4</b>	<b><u>CONSTRUCTION &amp; INSTALLATION</u></b>	11
<b>4.1</b>	<b>Construction Requirements</b>	
<b>4.2</b>	<b>Installation</b>	
4.2.1	Installation Requirements	
4.2.2	Installation Instructions	
<b>4.3</b>	<b>Commission &amp; Inspection</b>	
<b>SECTION 5</b>	<b>CONCLUSION</b>	12
<b>5.1</b>	<b>Report Summary</b>	
<b>5.2</b>	<b>Disclaimer</b>	
<b>5.3</b>	<b>Report Conditions</b>	
<b>APPENDIX</b>		
<b>A</b>	<b>SITE PLANS</b>	13
<b>B</b>	<b>LOT 103 –ETA TRENCH DIAGRAM</b>	16
<b>C</b>	<b>OPERATION &amp; MAINTENANCE INFORMATION</b>	17
<b>D</b>	<b>PLANT LIST FOR LAND APPLICATION AREA</b>	20

# **ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD**

## **SECTION 1** **GENERAL INFORMATION**

### **1.1 LOCATION DETAILS**

#### **1.1.1 Locality.**

The property is located at Kundabung on the NSW Mid North Coast.

#### **1.1.2 Owner.**

Gavan Landini owns the property and is the resident of the existing dwelling on proposed Lot 102.

#### **1.1.3 Project Address.**

Lot 13 DP878784 #27b Seams Road, Kundabung

#### **1.1.4 Phone number.**

0428587289

#### **1.1.5 Local Government.**

Kempsey Shire Council

### **1.2 DAILY FLOW RATE**

#### **1.2.1 Intended Water Supply**

The water supply to the residences will be tank water.

#### **1.2.2 Source of Wastewater**

Source is from all waste (Black & Grey water combined).

#### **1.2.3 Typical wastewater flow allowance.(AS1547:2012 APPENDIX H)**

(120L/person/day) Standard water reduction fixtures

#### **1.2.4 Total capacity of dwelling. (AS1547:2012 APPENDIX J1)**

Proposed Lot 101 & 103 = 3-4 Bedroom house = 6 persons

#### **1.2.4 Total Daily Wastewater Flow Rate.**

Proposed Lot 101 & 103 = 6 persons = 720L/household/day (Standard water reduction fixtures)

### **1.3 CLIMATE INFORMATION**

**SOURCE:** As per BOM

Location of Precipitation data: Kempsey

Location of Evaporation data: Kempsey

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## SECTION 2 SITE & SOIL EVALUATION

### 2.1 SITE EVALUATION

#### 2.1.1 Site Plan (As per AS/NZS 1547:2012 Figure D1)

See APPENDIX A

#### 2.1.2 Site Evaluator(s) (As per AS/NZS 1547:2012)

The principal evaluator: Lyn Richardson

Technician: Kevin Richardson

#### 2.1.3 Site Assessment Table

(As per AS/NZS 1547:2012-Table D1 /E & HP Guidelines Table 4/Local Council Code)

FEATURES	DESCRIPTION		LIMITATION CATEGORY (Minor/ Moderate/Major)	
PROPOSED LOTS	Lot 101	Lot 103	Lot 101	Lot 103
Flood Potential	NA		Minor	
Aspect Compass	South	South east	Minor	
Exposure	Full Sun/Prevailing Winds		Minor	
Slope (%)	5%	4%	Minor	
Landform	Hillslope		Minor	
Upslope Seepage	Possible		<b>Moderate</b>	
Run-on	Possible		<b>Moderate</b>	
Erosion Potential	High		<b>Moderate</b>	
Site Drainage	Good		Minor	
Fill	Not detected		Minor	
Groundwater	Not detected		Minor	
Buffer Distances	Minor		Minor	
Usable Land	Yes		Minor	
Surface Rocks	<10%		Minor	

DESCRIPTION	ALLOWABLE MINIMUM (m)		AVAILABLE DISTANCE (m)	
	Septic system	Secondary Treatment systems	Lot 101	Lot 103
Boundaries - up slope	6	3	3	6
- down slope	12	6	6	12
Waterways - Permanent	100		100	100
- Seasonal	40		40	40
Well / bores	250		250	250
Embankment / gully / dam	40		40	40
Buildings - up slope	6	3	3	6
- down slope	12	6	6	12
Driveways - up slope	6	3	3	6
- down slope	12	6	6	12
Swimming pool - up slope	6	3	3	6
- down slope	12	6	6	12
Other –	-	-	-	-



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## **2.1.4 Site Limitations**

(As per AS/NZS1547:2012/E & HP Guidelines Table 4/Local Council Code)

There are no major site limitations

The moderate site limitations are:

Both lots:

- ☒ Upslope seepage and run on is possible
- ☒ Erosion potential high if not vegetated

## **2.1.5 Site Remediations**

(As per AS/NZS 1547:2012 /E & HP Guidelines Table 4)

### **ALL LOTS**

- 1) All land application systems should be constructed on the contour so area of disposal system is level.
- 2) A diversion mound (all options) and cutoff drain for trenches (Option 7 - Lot 103) above the Land application area is required to divert surface water from higher areas flowing onto the application area.
- 3) The area must be vegetated immediately after installation to avoid erosion.

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## 2.2 SOIL EVALUATION

### 2.2.1 Soil Profile Information (As per AS/NZS 1547:2012)

Test Pit	Soil Horizon Depths (mm)	Texture	Colour	Organic Matter (OM) Fill(F) Natural Ground (NG)	Gravel/Cobbles	Moisture Content	Structure	Consistency
			(P) = Pale (D) = Dark (/) = Mottled (-) = combination		Low (L) <10 %> Moderate (M) <25 %> High (H)	Dry (D) Moist (M) Wet (W)	Strong (St) Moderate (M) Weak (W) Massive (MA) Structureless (SL)	See Below
Proposed LOT 101								
1	0-150	Topsoil	Brown	OM/NG	L	D	St	MD
	150-250	Silty CLAY	(P)Brown	NG	L	D	W	D
	250-600	Heavy CLAY	grey/orange	NG	H	D	St	VSt
	600	Refusal Rock						
2	0-150	Topsoil	Brown	OM/NG	L	D	St	MD
	150-250	Silty CLAY	(P)Brown	NG	L	D	W	D
	250-500	Heavy CLAY	grey/orange	NG	H	D	St	VSt
	500	Refusal Rock						
3	0-150	Topsoil	(D)Brown	OM/NG	L	D	St	MD
	150-500	Light CLAY	Brown-Orange	NG	L	D	W	D
	500	Refusal Rock						
Proposed LOT 103								
1	0-350	Topsoil	(D)Brown	OM/NG	L	D-M	St	F
	350-650	Light CLAY	Orange	NG	L	M	St	St
	650-1000	Light-Medium CLAY	Orange/Grey	NG	L	M	St	VSt
2	0-250	Topsoil	(D)Brown	OM/NG	L	D-M	St	F
	250-700	Light CLAY	(D)Orange	NG	L	M	St	St
	700-1000	Light-Medium CLAY	Orange/Grey	NG	L	M	St	VSt
3	0-250	Topsoil	(D)Brown	OM/NG	L	D-M	St	F
	250-700	Light CLAY	(D)Orange	NG	L	M	St	St
	700-1000	Light-Medium CLAY	Orange/Grey	NG	L	M	St	VSt

#### NOTE: CONSISTENCY TERMS.

COHESIVE SOILS	Very Soft (VS) ≤12 kPa	Soft (S) >12 ≤25 kPa	Firm (F) >25 ≤50 kPa	Stiff (St) >50 ≤100 kPa	Very Stiff (VSt) >100 ≤200 kPa	Hard (H) >200 kPa
NON-COHESIVE SOILS	Very Loose (VL) ≤15 kPa	Loose (L) >15 ≤35 kPa	Medium Dense (MD) >35 ≤65 kPa	Dense (D) >65 ≤85 kPa	Very Dense (VD) >85 kPa	-

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## **2.2.2 Soil Assessment Table** (As per AS/NZS 1547:2012/E & HP Guidelines Table 6/Local Council Code)

LOTS	Test pit assessment		Limitation Category <sup>1</sup> (Minor/Moderate/Major)	
	Lot 101	Lot 103	Lot 101	Lot 103
Soil Structure <sup>2</sup>	Strong		Minor	
Soil Texture <sup>3</sup>	Light CLAY	Light-Medium CLAY	Minor	
Soil Permeability Category <sup>4</sup>	5		Minor	
Indicative Permeability ( $K_{sat}$ ) (m/day) <sup>4</sup>	0.06		Minor	
Recommended DLR –(mm/day) <sup>5</sup>	Mound 6	Septic 8 use 5 Mound 8	Minor	
Recommended DIR(Irrigation area) (mm/week) <sup>6</sup>	20		Minor	
Course Fragments (%>2mm) <sup>7</sup>	0-20		Minor	
Depth to Episodic/seasonal watertable	>1m		Minor	
Depth to bedrock/hardpan	<1m (500-600 mm)	>1m	Major for trenches Moderate for irrigation	Minor
pH (CaCl <sub>2</sub> )	4.7	5.1	Moderate	Minor
Electrical Conductivity (dS/m)	4		Minor	
Dispersiveness (Modified Emerson Class) <sup>8</sup>	3		Minor	

### **SOURCES:**

- 1) “Environmental & Health Protection Guidelines” Section 4-Table 6 page 68 & AS/NZS 1547-2012
- 2) AS/NZS 1547-2012 (Table E4 – Assessment of Soil Structure)
- 3) AS/NZS 1547-2012 (Table E1 – Assessment of Soil Texture)
- 4) AS/NZS 1547-2012 (Table E1) - Based on soil texture result.
- 5) AS/NZS 1547-2012 (Table L1– trenches and beds) or Table N1- Mound).
- 6) AS/NZS 1547-2012 (Table M1 – Irrigation systems).
- 7) AS/NZS 1547-2012 (Table E.2 –Abundance of Course Fragments) & (Table E3 –Size of Course Fragments)
- 8) “Environmental & Health Protection Guidelines” Section 4-Table 6 page 68 Modified Emerson Aggregate Test  
Classifications are incorrect and the classification used is as per AS 1289.3.8.1and AS/NZS 1547-2012-Clause E7.

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### **2.2.3 Soil Limitations**

(As per AS/NZS 1547:2012/E & HP Guidelines Table 6/Local Council Code)

The major soil limitations are:

- **LOT 101:** The shallow soil depth (<1m) is not suitable for the septic tank & trench option

The moderate soil limitations are:

- **LOT 101:** The soil pH is slightly acidic
- **LOT 101:** The soil is <600mm deep in TP2 & 3.

### **2.2.4 Soil Remediations (As per AS/NZS 1547:2012 /E & HP Guidelines Table 6)**

- 1) **Both Lots:** Based on the above limitations, the chosen systems for these properties are considered suitable.
- 2) **LOT 101:** The septic tank and trench option is not a long term sustainable system due to the shallow soil depths present.
- 3) **LOT 101:** Additional >100mm of topsoil is required over the irrigation area to increase the depth to 600mm. The natural ground is to be ripped along the contour prior to adding the topsoil.
- 4) **LOT 103:** A DLR of 5 for the trenches has been used as a safety factor.
- 5) Soil improvement works will be required to promote optimum drainage, wastewater treatment and plant growth:
  - **Both Lots:** The ground is to be ripped along the contour to aerate the ground and improve absorption.
  - **LOT 101:** At the same time the following soil additives are to be ripped into the soil:

Due to acidic soils, the addition of agricultural lime is required. As a guide, in clay, the approximate amount of lime required to raise the pH by 1 unit = 250g (~1 cup) ag lime/m<sup>2</sup>/150mm soil depth.



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## **SECTION 3** **DESIGN REPORT**

### **3.1 WASTEWATER TREATMENT UNIT & LAND APPLICATION SYSTEM**

#### **3.1.1 Options suitable for site. (As per AS/NZS 1547:2012 APPENDIX 4.2A&B)**

##### **BOTH LOTS**

CONTRACTS			
OPTION	WASTEWATER TREATMENT UNIT	IRRIGATION TYPE	LAND APPLICATION
1	AWTS	SURFACE IRRIGATION	Natural ground
2		SUBSURFACE IRRIGATION	
3	Septic tank & Reedbed		
4	Septic Tank & Sand Filter		
5	Wet Composting System		
6	SEPTIC TANK	AQUATECH MOUND	
7 LOT 103 ONLY		EVAPOTRANSPIRATION ABSORPTION TRENCHES	

#### **3.1.2 Size of area required**

(Calculations as per AS1547:2012, E & HP guidelines, AS 1547:1994)

OPTIONS	Dimensions	Lot 101 6 person HOUSE	Lot 103 6 person HOUSE
1	Surface irrigation	450m <sup>2</sup>	
2-5	Subsurface irrigation Area	295m <sup>2</sup>	
6	AQUATECH Mound	20 x 6m To be confirmed by installer	15 x 6m To be confirmed by installer
OPTION	Dimensions	Lot 103 ONLY 6 person HOUSE	
7 LOT 103 ONLY	EVAPOTRANSPIRATION ABSORPTION TRENCHES	Trench Width Trench Depth Total Trench Length Suggested trenches Spacing between trenches	1000mm 600mm 80m total 4 x 20m trenches 1.0m

#### **3.1.3 Siting of system**

**Lot 101:** The area to the south of the existing house has been assessed for the land application area.

**Lot 103:** The area to the south of the proposed house site has been assessed for the land application area.

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## **3.2 WASTEWATER TREATMENT UNIT**

### **3.2.2 Capacity of Unit Options (As per Manufacturers recommendations)**

#### **LOTS 101 & 103**

##### **OPTION 1-2**

- AWTs = (No brand chosen) = To manufacturers instructions. 10 person max.

##### **OPTION 3**

“ROSEWOOD REEDBED” (Vertical Flow)  
= 16m<sup>3</sup> (2m x 8m OR 4m x 4m x 1m deep)

SEPTIC TANK CAPACITY = **3000L**

An outlet filter be installed into the septic tank outlet is also recommended.

##### **OPTION 4**

- SEPTIC TANK CAPACITY = 3900L  
With AERATED SAND FILTER for dimensions see contact.

##### **OPTION 5**

- WET COMPOSTING SYSTEM eg Wormfarm

##### **OPTION 6**

- SEPTIC TANK CAPACITY = 3900L  
With AQUATECH MOUND for dimensions see contact.

#### **LOT 103 ONLY**

##### **OPTION 7**

- SEPTIC TANK CAPACITY = All Wastes = **3000L min.**

Evapotranspiration trenches after septic tank. An outlet filter be installed into the septic tank outlet is also required.

### **3.2.3 Effluent Quality (As per AS/NZS 1547:2012)**

The quality of the wastewater from options 1-6 will be to a secondary treatment level i.e. AWTs/reedbed/sand filter/WCS/mound.

Option 7 will be to a primary treatment quality.

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## **SECTION 4** **CONSTRUCTION & INSTALLATION**

(AS PER AS/NZS 1547:2012 - N3)

### **4.1 CONSTRUCTION REQUIREMENTS**

#### **LOTS 101 & 103**

##### **4.1.1.1 Surface irrigation. AWTS only.**

##### **➤ Covered surface drip irrigation:**

As per AS/NZS 1547:2000 – App 4.5D2.2 – Adequate depth of topsoil (natural or imported) and mulch which covers the pipework then planted with plants included on plant list from AS1547:1994 & Environment & Health Protection Guidelines –1998.

##### **➤ Surface drip irrigation:**

As per AS/NZS 1547:2000 – App 4.5D2.3 – Adequate depth of topsoil (natural or imported) and vegetated with evergreen plants/vegetation included on plant list from AS1547:1994 & Environment & Health Protection Guidelines –1998.

##### **4.1.1.2 Subsurface irrigation.**

##### **➤ Natural ground**

- ☐ A diversion mound above the application area to divert surface and seepage water away is required.
- ☐ As per AS/NZS 1547-2000 App. 4.5C for clay soil/sloping site.
- ☐ Should be installed by a qualified person. Irrigation products should be suitable for wastewater (eg Geoflow, E-Flow etc).
- ☐ Pressure Compensated Subsurface irrigation is recommended.

##### **➤ Wet composting systems ie Worm Farm systems**

- ☐ A diversion mound above the application area to divert surface and seepage water away is required.
- ☐ A LPED irrigation system installed strictly in accordance with the requirements set out in Appendix M of AS/NZS 1547:2012; or
- ☐ Installer instructions via a sub-soil land application system of a type approved by the Local Council.

##### **4.1.1.3 Mound System.**

Dimensions and application to be provided by installer (See contact list)

#### **LOT 103 ONLY**

##### **4.1.1.4 Evapotranspiration Trenches.**

- ☐ As per AS/NZS1547-2000 Figure 4.5A5 Conventional bed OR Self supporting arch Trench.
- ☐ A cut off drain and diversion mound above the application area to divert surface and seepage water away is required.

##### **4.1.2 Wastewater treatment units.**

- ☐ AS/NZS 1546.1 & AS/NZS1547-2012.
- ☐ AWTS – Manufacturers instructions
- ☐ Reedbed – Rosewood Environmental Services
- ☐ Aquatech Sand Filters & mound - (See contact list)
- ☐ Wet Composting Systems –See contact list

### **4.2 INSTALLATION**

#### **4.2.1 Installation Requirements (As per AS/NZS 1547:2012)**

#### **4.2.2 Installation Instructions (As per AS/NZS 1547:2012)**

##### **4.2.2.1 Instructions (As per AS/NZS 1547:2012)**

##### **4.2.2.2 Repairs (As per AS/NZS 1547:2012)**

### **4.3 COMMISSION & INSPECTION (As per AS/NZS 1547:2012)**



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## **SECTION 5** **CONCLUSION**

### **5.1 REPORT SUMMARY**

- Both lots where the proposed and reserve land application areas are to be located have 7 main system design options available, under the guidelines:-

#### **LOTS 101 & 103**

- ☐ An AWTS servicing either surface or subsurface irrigation
- ☐ **OR** a Septic Tank with a secondary treatment unit in-line, ie reedbed or sand filter servicing a subsurface irrigation.
- ☐ **OR** a Wet composting System servicing a subsurface irrigation
- ☐ **OR** a septic tank with mound system

#### **And additional option for Lot 103 is:**

- ☐ OR a septic tank & ETA trenches

- Site and soil remediation involves:-

#### **LOTS 101 & 103**

- ☐ A diversion mound (all options) and cutoff drain for trenches (Option 7 - Lot 103) above the Land application area is required to divert surface water from higher areas flowing onto the application area.
- ☐ The area must be vegetated immediately after installation to avoid erosion.
- ☐ Standard AAA Water saving devices are to be installed if not already.
- ☐ A final plan should be completed by the installer at the conclusion of the project for Council's and client's reference.
- ☐ The long-term sustainability of the system relies on the occupier of the dwelling caring for their system. Appendix C provides information regarding the operation and maintenance of the system, which will greatly assist in prolonged performance.
- ☐ Soil improvement works will be required to promote optimum drainage, wastewater treatment and plant growth:
  - **Both Lots:** The ground is to be ripped along the contour to aerate the ground and improve absorption.
  - **LOT 101:** At the same time the following soil additives are to be ripped into the soil:  
Due to acidic soils, the addition of agricultural lime is required. As a guide, in clay, the approximate amount of lime required to raise the pH by 1 unit = 250g (~1 cup) ag lime/m<sup>2</sup>/150mm soil depth.
- ☐ **LOT 101:** The septic tank and trench option is not a long term sustainable system due to the shallow soil depths present.
- ☐ **LOT 101:** Additional >100mm of topsoil is required over the irrigation area to increase the depth to 600mm. The natural ground is to be ripped along the contour prior to adding the topsoil.
- ☐ **LOT 103:** A DLR of 5 for the trenches has been used as a safety factor.

### **5.2 DISCLAIMER**

Results and recommendations in this report are based on the information supplied by the client and conditions present at the time of testing. Any changes affecting the proposed land application area or alternate land application area will require a review of this report.

### **5.3 REPORT CONDITIONS**

- ☒ This report remains the property of "Rosewood Environmental Services Pty Ltd" and we reserve the right to withdraw this report at any stage until all payments have been received in full.
- ☒ This report is not to be copied except in full (exempting Appendices relating to general Maintenance/operations and Plantings).
- ☒ This report is not to be used for any property or persons other than those specified within the report, otherwise this may lead to a breach of copyright.
- ☒ **NOTE:** The information contained within this report is for wastewater purposes only and must not be used for any other purpose (especially Construction, Footing Designs, etc) as it is not considered relevant.

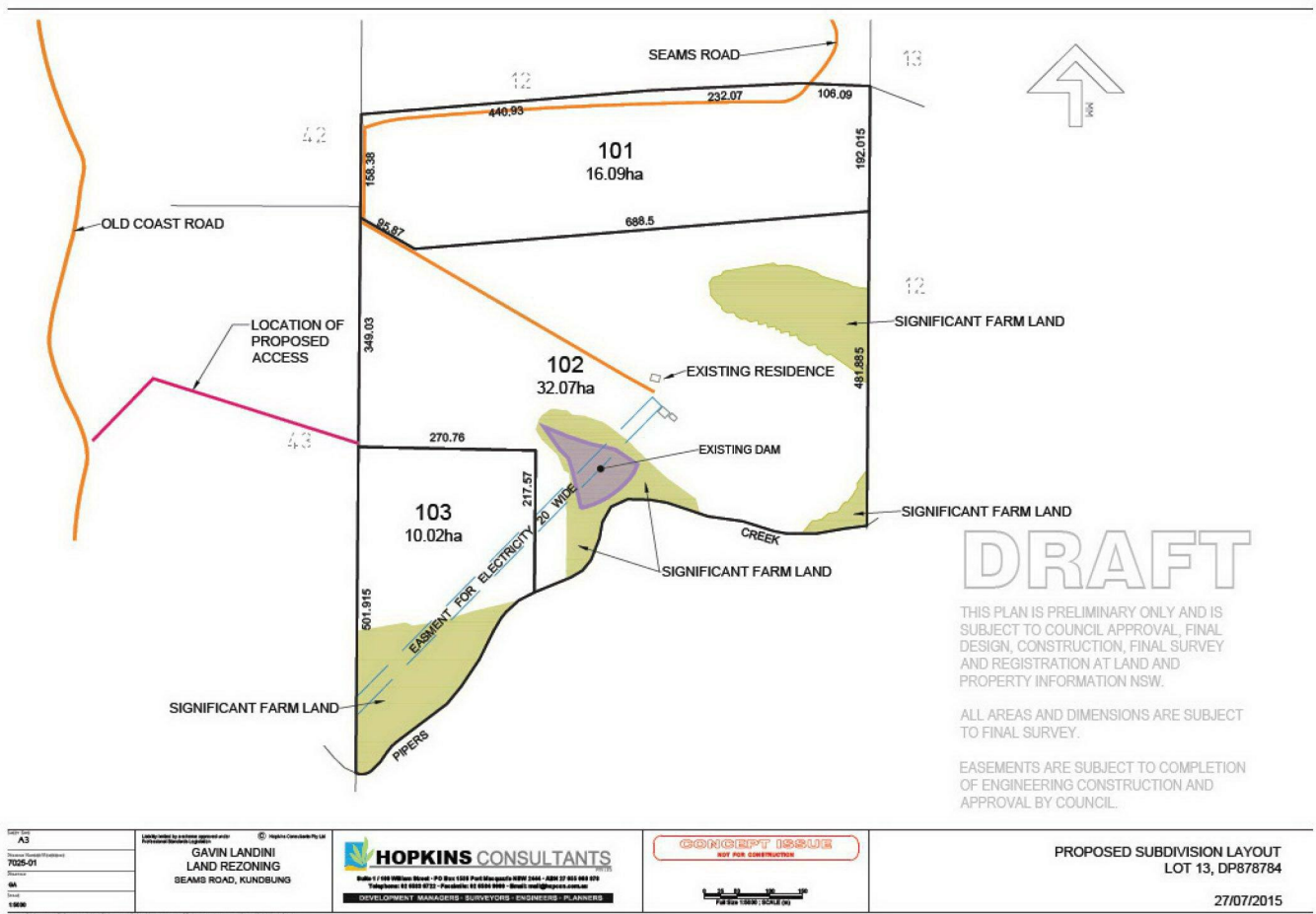


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## APPENDIX A Property Site Plan

NTS in pdf

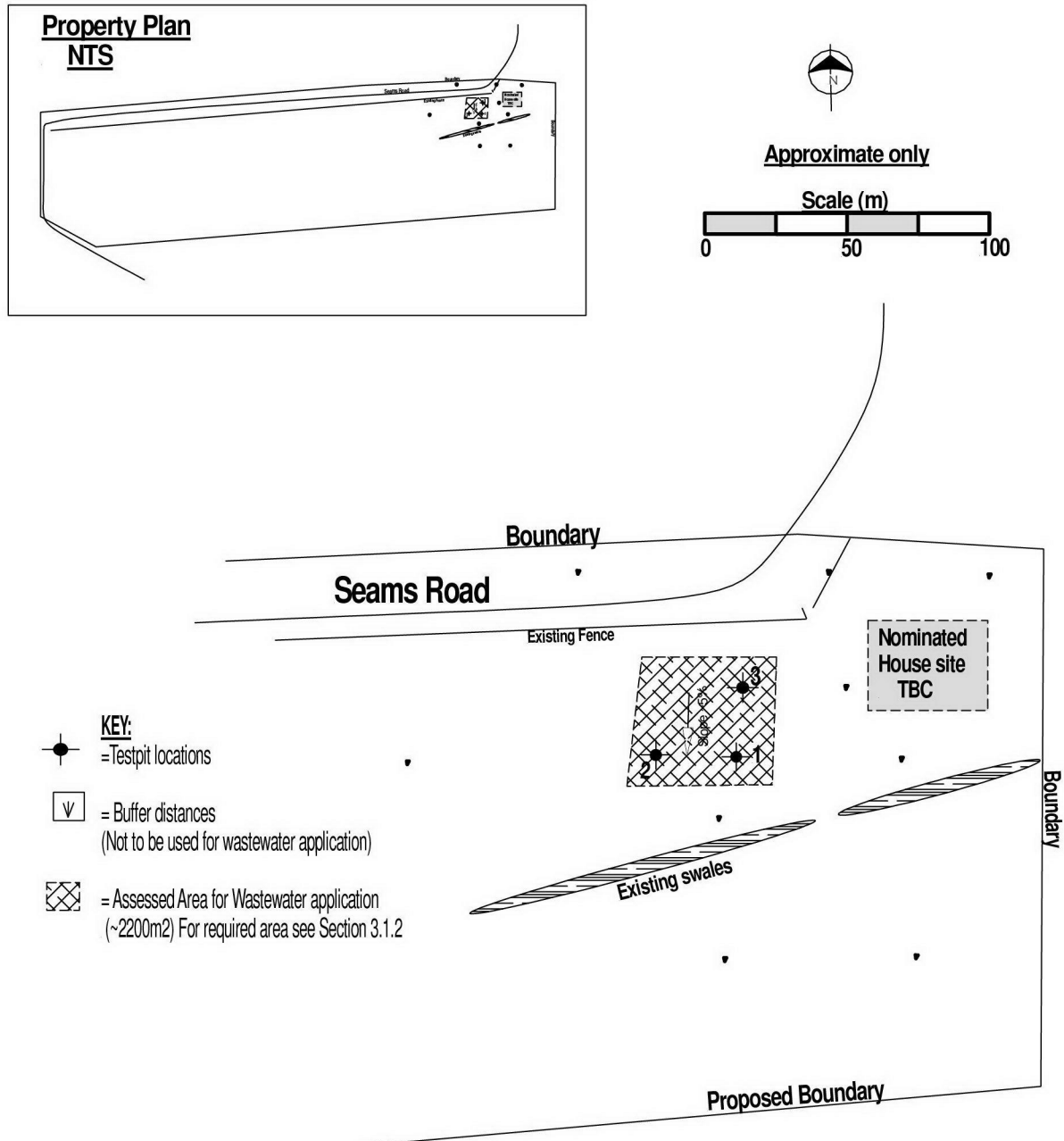
Source: Hopkins Consultants



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## APPENDIX A Site Plan for Lot 101

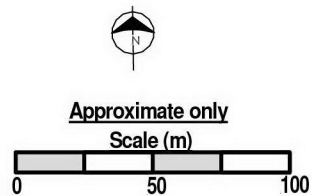
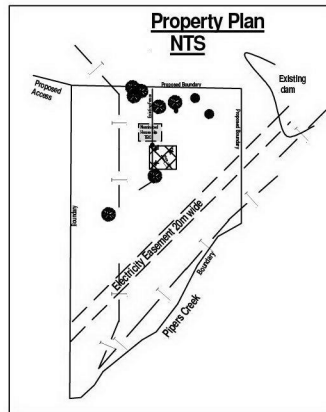
NTS in pdf



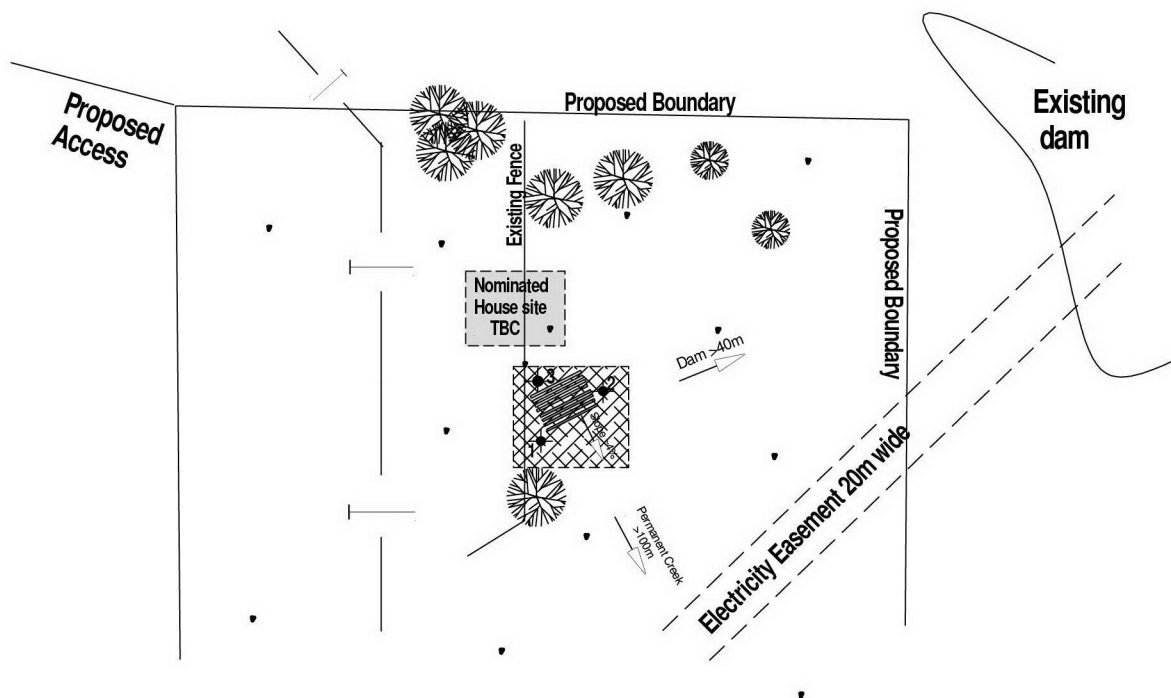
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## APPENDIX A Site Plan for Lot 103

NTS in pdf



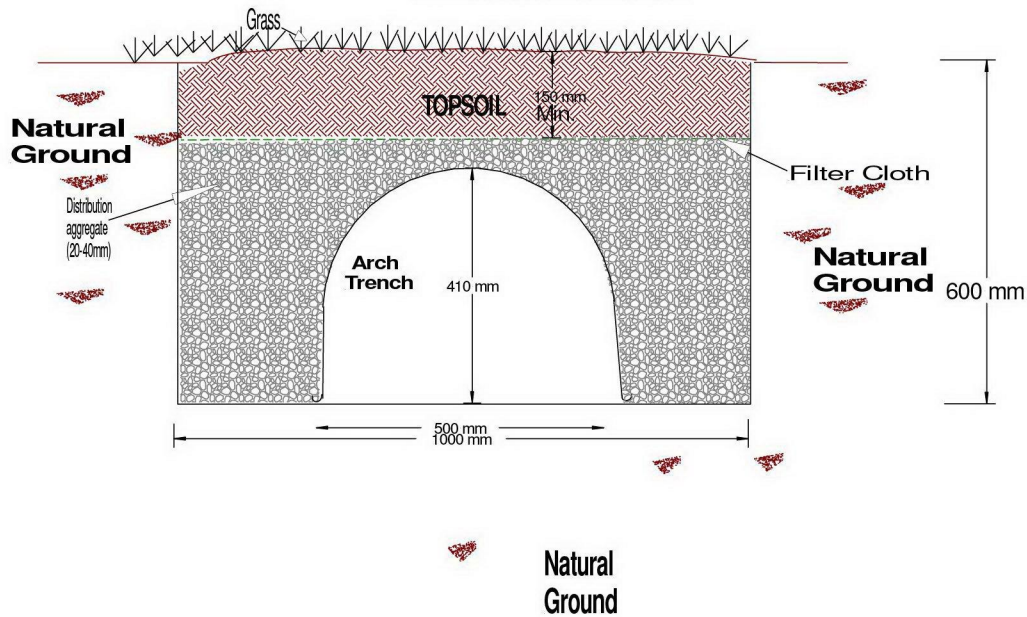
- KEY:**
- ✦ = Testpit locations
  - = Buffer distances  
(Not to be used for wastewater application)
  - ▨ = Assessed Area for Wastewater application  
(~1560m<sup>2</sup>) For required area see Section 3.1.2
  - = Suggested location for Trenches (if chosen)
  - = Suggested location for reserve trenches (if required)



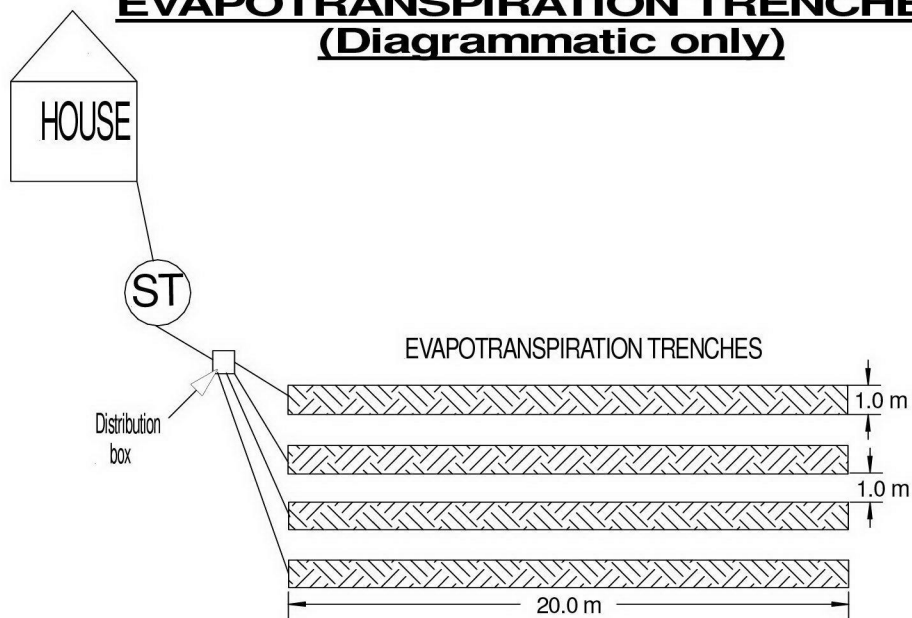
**APPENDIX B**  
**LOT 103 ONLY**

**SELF-SUPPORTING ARCH TRENCH**

Source: AS/NZS 1547:2012



**EVAPOTRANSPIRATION TRENCHES**  
**(Diagrammatic only)**





# **ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD**

## **APPENDIX C**

### **OPERATION & MAINTENANCE INFORMATION**

**(As per AS/NZS 1547:2012 APPENDIX T)**

➤ **General.**

Long-term sustainability of the on-site wastewater system will depend on the Operation and Maintenance (O & M) management procedures that the user undertakes. Regular O & M in the form of understanding the basic mechanics of the system, so that the system can function properly through the correct use and care by the user, is essential. A systematic monitoring program is also required to reduce the risk of failure and inefficiency.

➤ **O & M Guidelines.**

The O & M guidelines for the wastewater treatment system should be supplied by the manufacturers of the system in question.

A copy of these guidelines should be kept in an accessible location and made available to any person that is involved with the specific system ie. Home owners, tenants/occupiers, and on change of ownership or tenancy.

➤ **Monitoring.**

- All systems should be monitored to ensure they are complying with regulations.
- Frequency should take into consideration:
  - Age of system;
  - Experience with other on-site system performances;
  - Recent history of poor maintenance on site or similar site;
  - Approval conditions;
  - Type of system.
- A regular schedule for maintenance checks on individual on-site wastewater systems should be organised. These checks should be carried out by an accredited organisation and a "Maintenance Certificate" should be issued.
- Record sheets should be filled out for every maintenance check or action carried out on the system. They should be available to any agency or local regulatory authority who need to certify that the system is being operated and maintained properly. The report sheets should be kept for at least 10 years.
- "Maintenance Certificates" should be kept for at least 10 years. The owner and/or occupier are responsible for commissioning the maintenance check and carrying out any remedial works as recommended by the "Maintenance Certificate", and paying any costs involved. The "Maintenance Certificate" should include:
  - Certification by a qualified and experienced person that the wastewater system is operating and performing effectively.
  - Specific O & M attention due.
  - Identification of any O & M problems, their likely cause and recommended remedial action.
  - Any evidence of system capacity being exceeded.
  - Results of effluent quality testing where secondary treatment is being used.
  - Actions and results, achieved following recommendations for remedial work after previous routine inspections, are noted.
  - Desludging time frame recommended.
  - Other relevant matters.
- Maintaining records, certificates and guidelines are the responsibility of the home owner or occupier.
- Registration of on-site wastewater system is to keep track of change of ownership, change in size and use of premises or demolition of premises.
- All persons carrying out O & M activities should ensure that, at all times, precautions are taken to protect their own health and the health of all other people at risk from the activity.

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## **APPENDIX C (cont.)** **OPERATION & MAINTENANCE INFORMATION** **(As per AS/NZS 1547:2012 APPENDIX T)**

### ➤ **O & M Requirements.**

#### • **Advice on use of the system.**

- Reduce sludge build up in tank:
  - 1) Scrape all dishes to remove fats, grease, etc. before washing.
  - 2) Keep all possible solids out of the system.
  - 3) Don't use a garbage grinder unless system has been specially designed to carry the extra load. Note: Conventional septic tanks are not designed for this purpose and this report has not been designed for one.
  - 4) Don't put sanitary napkins and other hygiene products into the system.
- Keep bacteria active in tank and land application area:
  - 1) Use biodegradable, low phosphorous soaps and detergents.
  - 2) Use a low-sodium detergent in dispersive soil areas.
  - 3) Use detergents in recommended quantities.
  - 4) Use liquid detergents in preference to powders.
  - 5) Don't use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants.
  - 6) Don't put chemicals or paint down the drain.
- Water conservation measures to promote sustainability and performance:
  - 1) Install water saving devices such as shower roses.
  - 2) Take showers rather than baths.
  - 3) Wash clothes only when there is a full load.
  - 4) Only use dishwasher when there is a full load.
- Avoid overloading the system by spacing out water use as evenly as possible.
  - 1) Don't do washing all on one day.
  - 2) Don't run dishwasher and washing machine at the same time.

#### • **Advice on maintenance.**

- Primary wastewater-treatment unit (septic tank)
  - 1) Desludge regularly ie every 3-5 years or when scum and sludge occupy 1/3 of the volume of the tank (or first stage of a two-stage system).
  - 2) Protect from vehicles.
  - 3) Clean grease trap, if any, out regularly.
  - 4) The vent and/or access cover of tank kept exposed.
  - 5) Have any outlet filter inspected and cleaned.
- The land-application area needs protection as follows:
  - 1) Land application areas are not play areas for children and access should be restricted.
  - 2) No vehicles or stock allowed on land application areas.
  - 3) Deep rooting plants should not be grown near absorption trenches or pipes.
  - 4) The diversion drains above the area should be kept clean.
  - 5) Baffles and valves in distribution box should be periodically (monthly or seasonally) changed to direct effluent into alternative trenches or beds, as required by the design.

# **ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD**

- Plants  
Evapo-transpiration and irrigation areas should have their grass mowed and plants maintained to ensure that these areas take up nutrients with maximum efficiency.
- Signs  
Spray irrigation areas require appropriate warning signs that are always visible to persons undertaking activities near an irrigation area.
- Equipment
  - 1) Follow the manufacturer's instructions for maintaining and cleaning pumps, siphons and septic tank filters.
  - 2) Clean discs filters or filter screens on irrigation-dosing equipment periodically by rinsing back into the primary wastewater-treatment unit.
  - 3) Flush drip irrigation lines periodically to scour out any accumulated sediment.

- **Advice on operating problems.**

- Warning signs:
  - 1) Absorption field is wet or soggy with wastewater ponding on the surface of the ground.
  - 2) Smells of "Sewage" near the septic tank or absorption area.
  - 3) The drains and toilet run slowly.
  - 4) The grease trap is full or blocked.

- **Advice on consequences of failure.**

- Serious health and environmental hazards:
  - 1) Spread of infectious diseases.
  - 2) Breeding of mosquitoes and attraction of flies and rodents.
  - 3) Nuisance and unpleasantness.
  - 4) Pollution and infection of waterways, beaches, streams and shellfish beds.
  - 5) Contamination of bores, wells and groundwater.
  - 6) Alteration of the local ecology.

- **Advice on home owner/occupier responsibilities.**

The homeowners and occupiers are *legally* responsible to keep their on-site wastewater system in good working order. If any warning signs (as described above) are evident, the homeowner or occupier must contact their council immediately.

- **Advice on alternate on-site wastewater systems.**

Specific O & M measures will be required for alternative on-site wastewater treatment units, equipment, facilities and land application system beyond what has been outline above.

These should be obtained from:

- The designer and installer  
(i.e. Design basis; operating requirements; enhancement of factors of safety)
- Equipment suppliers  
(i.e. Regular maintenance schedule; spare parts list; call-out contact details; operational instructions).
- Local government  
(i.e. inspections schedule; reporting defects).
- The regional environmental control agency  
(i.e. monitoring requirements; flow records; reporting environmental incidents).



# ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD

## APPENDIX D VEGETATION SUITABLE FOR LAND APPLICATION AREAS (Source: Environment & Health Protection Guidelines-1998)

Botanical Name	Approximate Height	Common name or Variety
<b>Grasses</b>		
- Carex spp.		
- Lomandra longifolia **		
- Microlaena stipoides		
- Oplismenus imbecillis		
- Pennisetum alopecuroides	40-80cm	Available as lawn turf
- Poa lab		
- Stipa spp.		
<b>Ground cover/climbers</b>		
- Hibbertia scandens **		
- Hibbertia stellaris		Snake vine
- Isotoma fluviatilis		
- Kennedia rubicunda	Prostrate	
- Scaevola albida	Climber	Dusky Coral Pea
- Scaevola ramosissima		
- Veronica plebeia		
- Viola hederacea **		Native Violet
<b>Sedges/grasses/small plants</b>		
- Anigozanthus flavidus	2m	Kangaroo Paw
- Baumea acuta		
- Baumea articulata	Sedge	
- Baumea juncea	Sedge	
- Baumea nuda	Sedge	
- Baumea rubignosa	Sedge	
- Baumea teretifolia	Sedge	
- Blandfordia grandiflora	30-90cm	Christmas Bell
- Blandfordia nobilis	30-90cm	Christmas Bell
- Brachyscome diversifolia	Clump	Native Daisy
- Carex appressa	Sedge	
- Cotula coronopifolia	10-20cm	Waterbutton
- Crinum pedunculatum **	<2m	Swamp lily
- Cyperus polystachyos	Sedge	
- Dianella caerulea **	Low plant	Blue Flax Lily
- Epacris microphylla	50cm-1m	
- Ferns		
- Gahnia spp.	Tall grass	
- Juncus spp.	0.5m Rush	
- Lobelia trigonocaulis	5-10cm	
- Lomandra spp. **	Grass	
- Patersonia fragilis		Native Iris
- Patersonia glabrata		Native Iris
- Patersonia occidentalis		Native Iris
- Ranunculus graniticola	5cm	
- Restio australis	Reed	
- Restio tetraphyllus	1m	
- Sowerbaea juncea	Sedge	Rush Lily
- Tetratheca juncea	<30cm	
- Xyris operculata	<1m	Tall Yellow Eye



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Botanical Name	Approximate Height	Common name or Variety
<b>Shrubs</b>		
- Agonis flexuosa nana		
- Baekea linifolia	1-2.5m	
- Baekea utilis	1-2.5m	
- Baekea virgata	<4m	
- Banksia aemula	1-7m	
- Banksia robur	0.5-2m	
- Bauera rubroides	0.5-1.5m	
- Callistemon	2-3m	Burgundy
- Callistemon	2-4m	Eureka
- Callistemon	3-4m	Harkness
- Callistemon	3-4.5m	Kings Park Special
- Callistemon	2-3m	Mauve Mist
- Callistemon	1-2.5m	Red Clusters
- Callistemon	2-3	Reeves Pink
- Callistemon citrinus	50-80cm	Austraflora Firebrand
- Callistemon citrinus	2-4m	Splendens
- Callistemon cirinus	60cm-1m	White Ice
- Callistemon linearis	1-3m	
- Callistemon macropunctatus	2-4m	
- Callistemon pachyphyllus	2-3m	
- Callistemon pallidus	1.5-4m	
- Callistemon paludosus	3-7m	
- Callistemon pinifolius	1-3m	
- Callistemon rigidus	1.5-2.5m	
- Callistemon salignus	3-10m	
- Callistemon shiresii	4-8m	
- Callistemon sieberi	1.5-2m	
- Callistemon sieberi	50-80cm	Austraflora Little Cobber
- Callistemon subulatus	1-2m	
- Callistemon viminalis	1-2m	Captain Cook
- Callistemon viminalis	5-10m	Dawson River
- Callistemon viminalis	3-5m	Hannah Ray
- Callistemon viminalis	50cm-1m	Little John
- Callistemon viminalis	1.5-2m	Rose Opal
- Callistemon viminalis	2-3m	Western Glory
- Goodenia ovata **	1-1.5m	
- Hibiscus diversifolius **	1-2m	Swamp Hibiscus
- Kunzea capitata	1-2m	
- Leptospermum flavescens	<2m	Tea-tree
- Leptospermum juniperinum	1m	Tea-tree
- Leptospermum lanigerum	1-2m	Woolly tea-tree
- Leptospermum squarrosum	<2m	Tea-tree
- Melaleuca alternifolia	4-7m	
- Melaleuca decussata	1-2m	Cross-leaved honey myrtle
- Melaleuca lanceolata	4-6m	
- Melaleuca squamea	1-2m	
- Melaleuca thymifolia		

## ROSEWOOD ENVIRONMENTAL SERVICES PTY LTD

Botanical Name	Approximate Height	Common name or Variety
<b>Trees</b>		
- Acacia elongata	>2m	
- Acacia floribunda **	2-4m	Gossamer wattle
- Agonis flexuosa	5-6m	Willow myrtle
- Allocasuarina diminuta	1.5m	
- Allocasuarina paludosa	0.5-2m	
- Angophora floribunda	Large tree	
- Angophora subvelutina	Large tree	
- Callicoma serratifolia **	<4m	
- Casuarina cunninghamiana	10-30m	River she-oak
- Casuarina glauca	6-12m	Swamp oak
- Elaeocarpus reticulatis **	Large tree	Blueberry Ash
- Eucalyptus amplifolia	Large tree	
- Eucalyptus botryoides (coastal areas)*	10-30m	
- Eucalyptus camaldulensis (west of ranges)*	15-20m	River red gum
- Eucalyptus deanei	Large tree	Blue Mountains Blue gum
- Eucalyptus elata	Large tree	River Peppermint
- Eucalyptus grandis *	10-20m	Flooded gum
- Eucalyptus longifolia	20m	Woollybutt
- Eucalyptus pilularis *	30-40m	Blackbutt
- Eucalyptus punctata *	<35m	Grey gum
- Eucalyptus robusta	20-30m	Swamp Mahogany
- Eucalyptus saligna (coastal) *	30-50m	Sydney blue gum
- Eucalyptus tereticornis *	30-40m	Forest red gum
- Eucalyptus viminalis (ranges)	20-40m	Ribbon gum
- Acmena smithii **	10-20m	Lilli pilli
- Flindersia australis	<40m	Native teak
- Hymenosporum flavum **	3-6m	Native frangipani
- Melaleuca armillaris	3-4m	Bracelet Honey Myrtle
- Melaleuca decora	4-7m	
- Melaleuca ericifolia	6m	
- Melaleuca halmaturorum	4-6m	
- Melaleuca hypericifolia	2-3m	
- Melaleuca linariifolia	4-8m	Snow in Summer
- Melaleuca quinquenervia	5-7m	Broad paper bark
- Melaleuca squarrosa	6m	
- Melaleuca stypheloides	6-15m	
- Melia azedarach **	15-20m	White Cedar
- Pittosporum spp. **		
- Syzygium paniculatum **	8-10m	Bush cherry
- Tristania laurina **	5-15m	Kanuka (Water Gum)
- Viminaria juncea	2-3m	Golden spray

**NOTE:** - *Callistemon, Melaleuca & Leptospermum burn well due to their high oil content.*

- \* = Banksia & Eucalyptus are fire hardy but generally do not retard fire.

Eucalypts with\* are better because of their smooth bark.

- \*\* = Indicates plants that have fire resistance or are hard to burn properties and may assist in bushfire protection as well as suitability for wastewater uptake.