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**ON-SITE EFFLUENT MANAGEMENT REPORT**  
**FOR A SHED WITH AMENITIES**

Lot 1, DP 123290.  
550 Coorabell Scenic Drive, Coorabell.

PREPARED BY: SEWAGE SOLUTIONS.

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## Summary

- A shed with toilet and bathroom amenities is proposed. Effluent management system design is based upon effluent loading from 2 Equivalent Persons (EP) generating 56L/d
- A septic tank with 3000L capacity is to be installed to treat shed effluent to a primary quality. An outlet filter is to be fitted in this septic tank.
- A LAA consisting of one 13.1m [long] × 1m [wide] Evapotranspiration (ETA) bed is to be constructed to assimilate treated effluent into the environment.
- A document detailing required maintenance procedures, and a maintenance record table has been provided with this report.
- Constraints are addressed in Table 1 of this report.

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## LIST OF ACRONYMS

EP	Equivalent Persons
ETA	Evapotranspiration, Absorption
LCC	Lismore City Council
LAA	Land Application Area
L/d	Litres / Day
L/p/d	Litres / Person / Day
OSMS	Onsite Sewage Management System
ST	Septic Tank

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## 1 INTRODUCTION

The proposal contained herein has been prepared to support an application for approval of an on-site effluent management system under Section 68 of the Local Government Act 1993.

This system has been designed following a site & soil and desktop assessment and in consultation with, G & C Wijnberg. Site assessment and design have been conducted in accordance with the Australian & New Zealand Standard for on-site domestic wastewater management and the Byron Shire Council Design Guidelines for On-site Sewage Management (AS1547, 2012, BSC, 2004).

### 1.1 Proposed development

A new on-site effluent management system is required for a proposed shed with amenities. Amenities include a shower, toilet and handwash basin. The development is located at 550 Coolamon Scenic Drive, Coorabell. System design is based upon the assumption of 2EP generating 56L/d.

## 2 SITE AND SOIL CHARACTERISTICS

Site and soil data was gathered during site assessment on the 29/6/21 and via desktop assessment as detailed below.

### 2.1 Site Characteristics

Site characteristics are shown in Appendix 1.

#### 2.1.1 Site Constraints

Table 1 lists constraints and ameliorations.

**Table 1.** Constraints and ameliorations

Site Feature	Constraint(s)	Amelioration(s)
<b>Slope %</b>	20% Slope at LAA makes shallow distribution of effluent impossible with standard 2m wide ETA beds.	1m wide ETA bed is to be installed to distribute effluent within the root zone.
<b>Slope Type</b>	Waning convergent slope slows and concentrates run-on.	An upslope diversion drain is to be installed to divert run-on around the LAA.
<b>Erosion potential</b>	The site slope increases the potential for sheet erosion.	Erosion mitigation measures are to be implemented during construction and disturbed soil is to be seeded to shorten rehabilitation time.

### 2.2 Soil characteristics

Soil profile characteristics are shown in Appendix 2. Soil at this site is characteristic of the Coolamon (co) soil landscape (Morand, D.T., 1994) and has been classified as a Red Basaltic Soil in accordance with the Byron OSMS Design Model (BSC, 2018).

Aggregate stability was determined using the first part of Emerson's soil test (AS1289.3.8.1, 2006). This test showed that soil at the proposed LAA has an Emerson's class of 4, 5 or 6 – Slaking; No dispersion.

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### **2.2.1 Soil permeability**

Design calculations have adopted the default percolation rate of 5mm/day, in accordance with the Byron OSMS Design Model (BSC, 2018).

## **3 EFFLUENT MANAGEMENT SYSTEM**

The effluent management system is shown in Appendix 4.

### **3.1 Treatment train**

All shed effluent is to be plumbed to drain to a septic tank with outlet filter, where primary treatment will take place. Primary treated effluent will then drain to an ETA bed LAA.

### **3.2 Septic tank**

A 3000L septic tank is to be installed to treat shed effluent to a primary quality, in accordance with Table J1 of AS1547 (AS1547, 2012). This septic tank is to be accredited by NSW Health (NSWHEALTH, 2021). A suitable outlet filter is to be installed at the outlet to prevent the flow on of solids to the LAA.

### **3.3 Evapotranspiration bed LAA**

The Byron OSMS Design Model (BSC, 2018) was used to calculate the size of the required LAA, which consists of three 15.2m long × 2m wide ETA beds. Design calculations are shown in Appendix 6. The LAA is to be installed in accordance with L5 – L13 of AS1547 (AS1547, 2012).

## **4 CONCLUSIONS**

The proposed effluent management system can achieve Performance Objectives in Chapter 4 of Australian & New Zealand Standard for on-site domestic wastewater management (AS1547, 2012).

The requirements of Byron Shire Council Design Guidelines for On-site Sewage Management (BSC, 2004) can also be met, with constraints ameliorated in accordance with Table 1.

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## 5 REFERENCES

AS1289.3.8.1. (2006) Australian Standard 1289.3.8.1. Methods for testing soils for engineering purposes. Method 3.8.1: Soil classification tests - Dispersion - Determination of Emerson class number of a soil. Standards Australia. Homebush, NSW.

AS1547. (2012) Australian Standard 1547. On-site Domestic Wastewater Management. Standards Australia and Standards New Zealand. Strathfield, NSW.

BSC. (2004) Byron Shire Councils Design Guidelines for On-site Sewage Management for Single Households. Byron Shire Council. Mullumbimby, NSW.

BSC. (2018) Byron OSMS Design Model (Byron\_e201821531-byron-osms-design-model). Byron Council. Mullumbimby, NSW.

Morand, D.T. (1994) Soil Landscapes of the Lismore-Ballina 1:100 000 Sheet. Soil Conservation Service of NSW. Sydney.

NSWHEALTH. (2021) Septic tanks and collection wells - Register certificates of accreditation. NSW Government - Health.  
<https://www.health.nsw.gov.au/environment/domesticwastewater/Pages/stcw.aspx>.

## Appendix 1. Site characteristics

<b>SITE DETAILS</b>	
<b>Client Name Details of Proposed Development</b>	Geoff & Catherine Wijnberg. Shed with amenities (2EP) Treatment train = Septic tank – Outlet filter – ETA bed LAA.
<b>Address Lot, DP Number</b>	550 Coolamon Scenic Drive, Coorabell. Lot 1 DP 123290.
<b>Local Government Area</b>	Byron Shire Council.
<b>Date of assessment</b>	29/6/21.
<b>Proposed Water Supply</b>	Rain water tank.
<b>Recent Weather Conditions</b>	Wet.
<b>Land Application Area (LAA)/SITE DESCRIPTION (red = Limitation, refer to report)</b>	
<b>Allotment Size</b>	1.8ha
<b>Existing Vegetation</b>	Recently cleared lantana and woody weeds.
<b>Slope (%)</b>	20%.
<b>Slope Type</b>	Waning convergent.
<b>Aspect</b>	Northeast.
<b>Exposure</b>	High.
<b>Boulders/Floaters/Rock Outcrops</b>	No boulders/Few floaters /No rock outcrop.
<b>Buffer Distance</b>	Achieves regulation buffers.
<b>Run on and Upslope seepage</b>	Landform concentrates run-on. No evidence of upslope seepage.
<b>Flooding Potential</b> <small>Above 1 in 20 year for LAA Above 1 in 100 year for treatment system</small>	None.
<b>Site Drainage</b>	Well drained soil.
<b>Vegetation indicating waterlogging</b>	No evidence of sedges or other vegetation that would indicate prolonged waterlogging.
<b>Surface Condition</b> <small>Bare ground, cracking etc</small>	Bare patches due to recent clearing of woody weeds.
<b>Fill</b>	Positioned downslope of shed pad fill.
<b>Erosion/mass movement</b> <small>Rills, slips etc</small>	Sheet erosion potential.
<b>Limitations</b>	The site has limitations refer to Table 1 in report.
<b>Depth to Ground Water</b>	Estimated to be in excess of 2m.

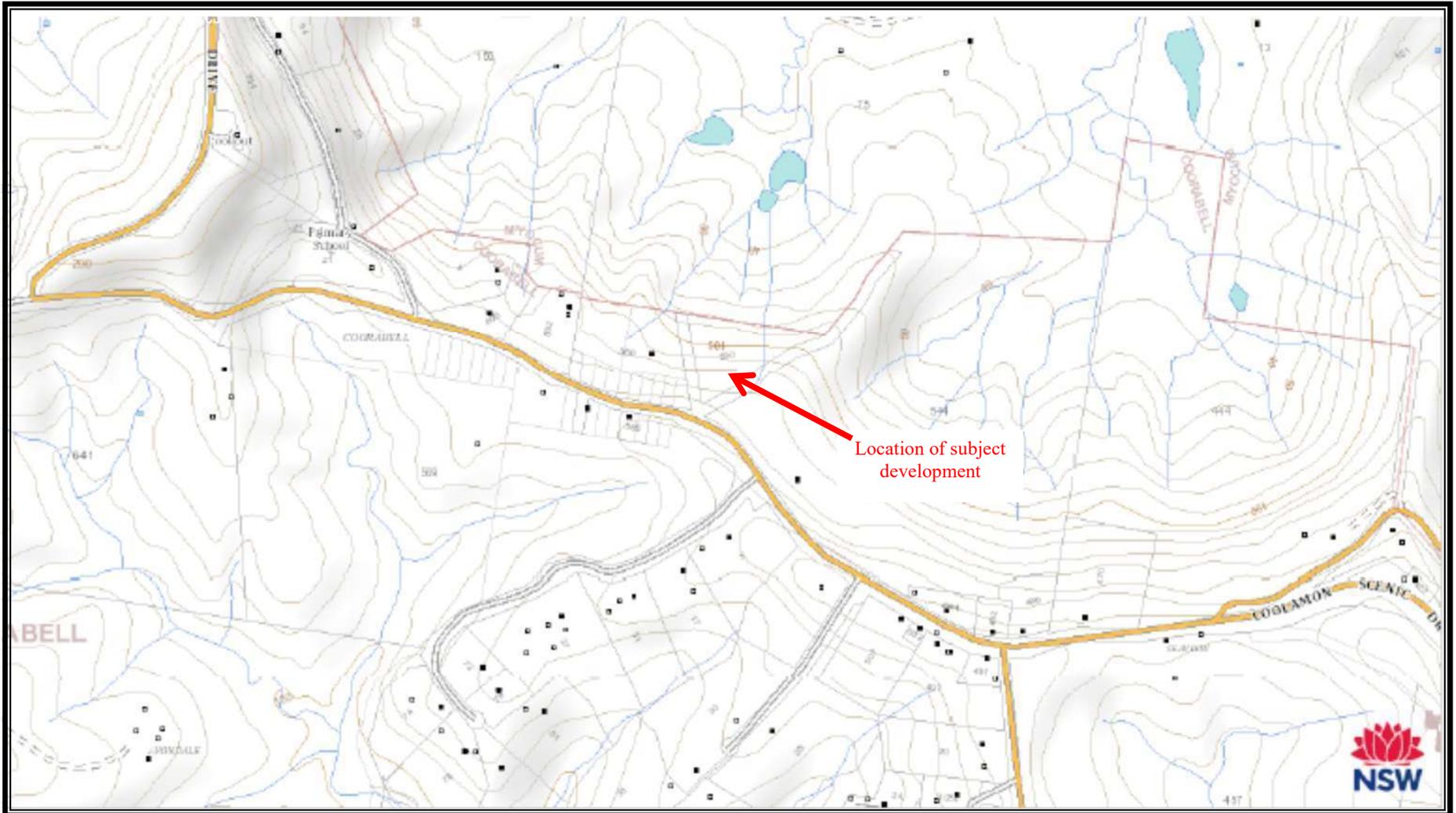
## Appendix 2. Soil Assessment

<b>Borehole no. 1 Located in proposed LAA</b>							
<b>Soil Unit</b> (Morand, 1994)		Landscape: Coolamon (co) Soil materials co1= A1 & A2 horizons, Unknown = B horizon					
<b>SOIL DESCRIPTION</b>							
<b>Horizon</b>	<b>Depth (mm)</b>	<b>Texture (ribbon length)</b>	<b>Structure (Pedality)</b>	<b>Colour</b>	<b>Coarse Fragments (Size &amp; %)</b>	<b>pH</b>	<b>Dispersive Class (Description)</b>
A1	0-350	Clay loam (45mm)	Moderate to Strong (Polyhedral peds breaking to crumbs)	Brown	@ 300 ext. weathered Basalt (6-20mm <2%)	6	4, 5 or 6 (Slaking no dispersion)
A2	350-700	Light clay (70mm)	Strong (Blockyl peds breaking to crumbs)	Brown	@ 400 ext. weathered Basalt (6-20mm 2-10%)	6	4, 5 or 6 (Slaking no dispersion)
B	700-1000	Light clay (75mm)	Moderate to Strong (Polyhedral peds breaking to crumbs)	Greyish brown With iron stain (red colour) occupying 20%	@ 800 ext. weathered Basalt (6-20mm 20-50%)	5	4, 5 or 6 (Slaking no dispersion)

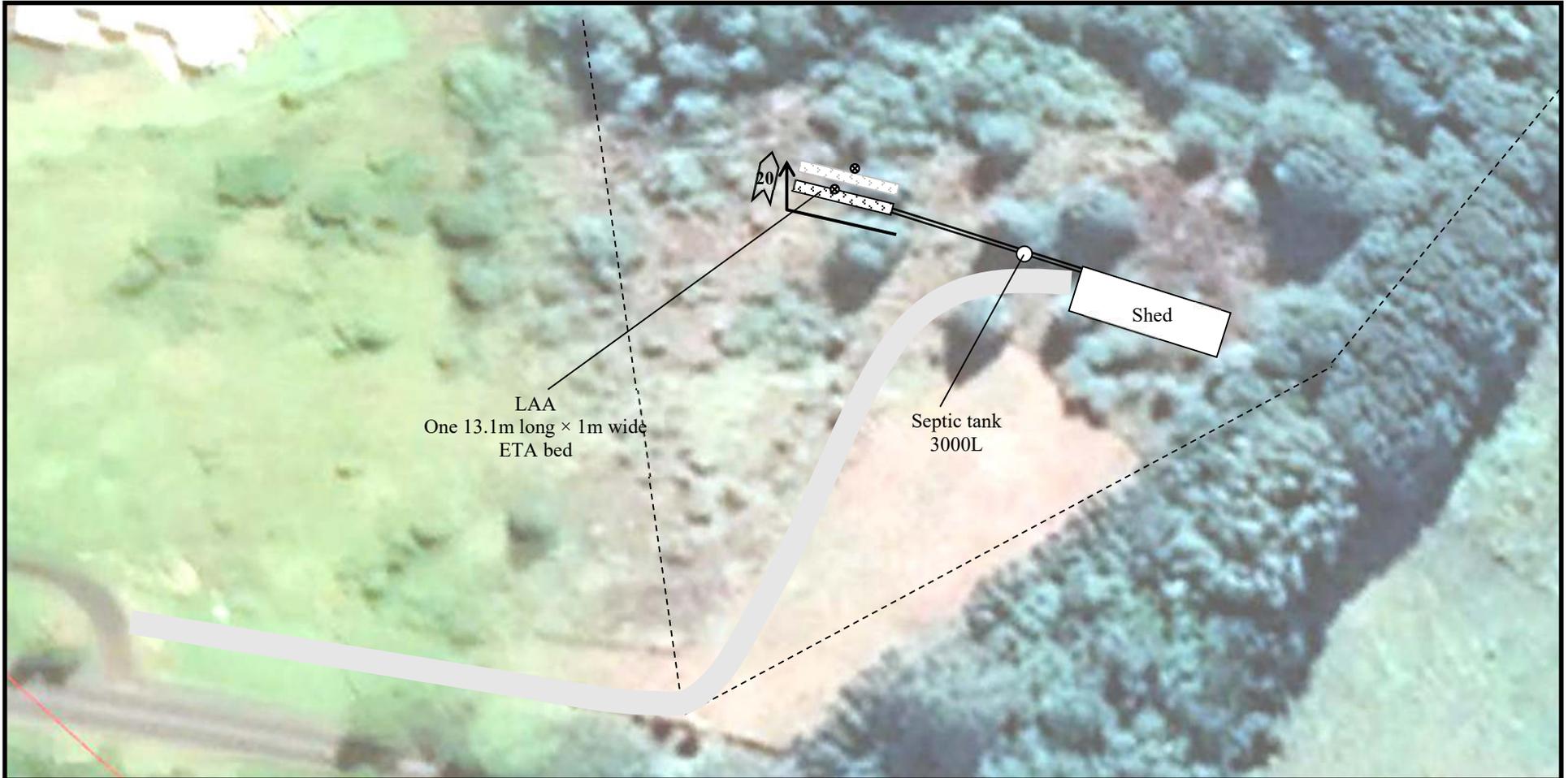
<b>Borehole no. 2 Located in Reserve LAA</b>							
<b>Soil Unit</b> (Morand, 1994)		Landscape: Coolamon (co) Soil materials co1= A1 & A2 horizons, Unknown = B horizon					
<b>SOIL DESCRIPTION</b>							
<b>Horizon</b>	<b>Depth (mm)</b>	<b>Texture (ribbon length)</b>	<b>Structure (Pedality)</b>	<b>Colour</b>	<b>Coarse Fragments (Size &amp; %)</b>	<b>pH</b>	<b>Dispersive Class (Description)</b>
A1	0-350	Clay loam (45mm)	Moderate to Strong (Polyhedral peds breaking to crumbs)	Brown	@ 300 ext. weathered Basalt (6-20mm <2%)	6	4, 5 or 6 (Slaking no dispersion)
A2	350-900	Light clay (70mm)	Strong (Blockyl peds breaking to crumbs)	Brown	@ 400 ext. weathered Basalt (6-20mm 2-10%)	6	4, 5 or 6 (Slaking no dispersion)
B	900-1000	Light clay (75mm)	Moderate to Strong (Polyhedral peds breaking to crumbs)	Greyish brown With iron stain (red colour) occupying 20%	@ 800 ext. weathered Basalt (6-20mm 20-50%)	5	4, 5 or 6 (Slaking no dispersion)

### Appendix 3 Topographic map

Map source Six Maps (2021) (<http://maps.six.nsw.gov.au/>). The subject development is located at Grid ref. 5483\*\*E, 68330\*\*N (GDA94-MGA56).

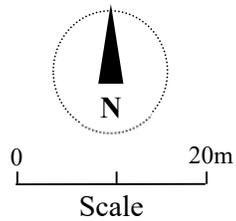


## Appendix 4 Site Plan



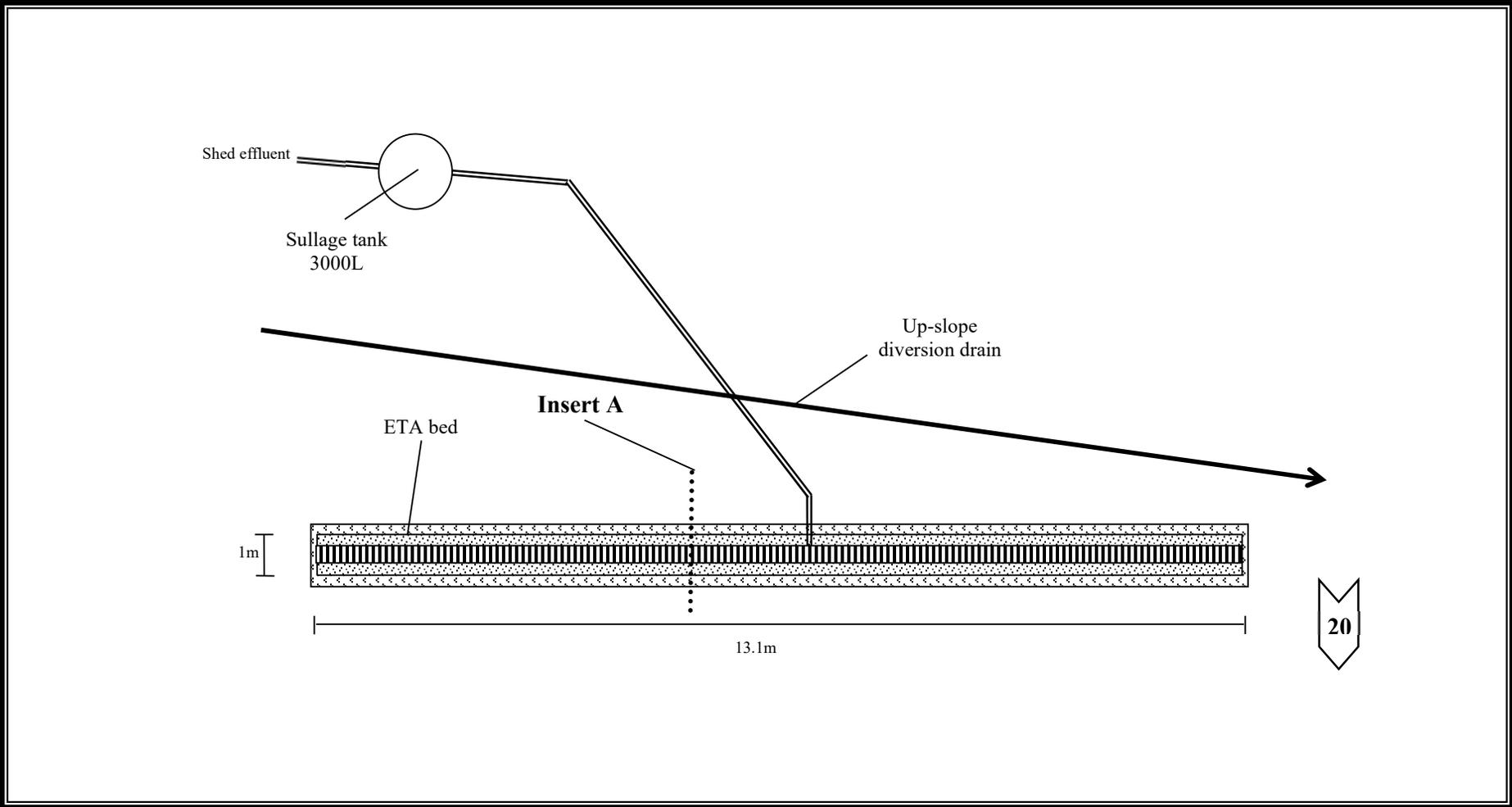
### **LEGEND**

Note: This map has been produced by Sewage Solutions using a GPS system with +/- 3m accuracy, and aerial base map (CNES/Airbus 2021)  
 Author: JJ Bruce 0419420362  
 Date: 14/2/22.



LAA		Property boundary	
100mmØ DWV pipe		Driveway; Upslope diversion drain	
Slope; % & direction		Soil borehole	

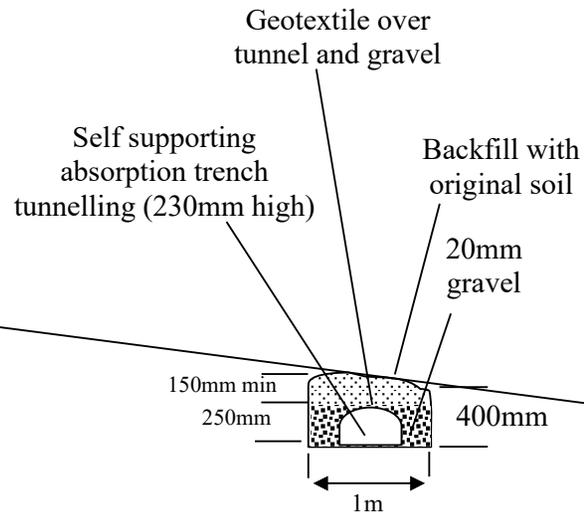
Appendix 4 cont. Treatment System and LAA Layout (not to scale)



Appendix 4 cont. Insert A - Elevation View of LAA.

Construction specs

Excavate ETA bed 1m (wide) × 0.4m (deep), along the contour, ensuring that the excavated base of the trench is flat. Insert 230mm high absorption trench tunnelling centrally along the base of the excavated trench. Cover the base of the trench with a 200mm thick layer of 20mm Ø gravel. Cover tunnel and gravel with geotextile, to prevent soil incursion. Backfill with original soil.



# Appendix 5. Byron OSMS Design Model

**Byron OSMS Design Model** Version: DEDM\_Byron\_e201821531-byron-osms-design-model.xlsm

**STEP 1** Set Defaults

bedroom persons (STEP 1) # persons (Grp 1) **2** (STEP 2) # persons (Grp 2) **0** (STEP 3)

**STEP 4** Block size (m<sup>2</sup>) **18170**

**STEP 5** Daily effluent flow accord. water supply type

- Reticulated supply (bore, spring, creek) 180L/p
- Reticulated + std. water saving devices 145L/p
- Roof water harvesting 140L/p
- Roof water harvesting + std. water sav. 115L/p

**STEP 6** Wastewater stream

- Grp 1:  Toilet,  Bathroom,  Laundry,  Kitchen
- Grp 2:  Toilet,  Bathroom,  Laundry,  Kitchen

**STEP 7** Treatment system

- Septic (primary treatment only)
- AWTS
- Septic + single pass sandfilter (SPF)
- Septic + SPF, 25% septic return flow
- Septic + recirculating sandfilter
- Septic + reedbed

**STEP 8** P soil sorption accord. soil type

- Alluvial Soils 1 (dp,mu,my,te) 10,000 kg/ha/m
- Alluvial Soils 2 (cr) 2,000 kg/ha/m
- Red Basaltic Soils (bg,ca,co,el,ew,mb,ro,wo) 10,000 kg/ha/m
- Duplex Soils (ba, bi, bu, mi, ni) 8,000 kg/ha/m
- Podzol Soils (ab,bo,br,eb,fh,ki,ku,og,po,ty,wy) 1,000 kg/ha/m

**STEP 9** Soil texture & structure beneath system

- Gravels, Sands Ksat > 3
- Sandy loams - weakly structured Ksat > 3.
- Sandy loams - massive Ksat 1.4 - 3.1
- Loams - high/moderate structured Ksat 1.5 - 3.1
- Loams - weakly structured or massive Ksat 0.5 - 1.5
- Clay loams - high/mod structured Ksat 0.5 - 1.5
- Clay loams - weakly structured Ksat 0.12 - 0.5
- Clay loams - massive structured Ksat 0.06 - 0.12r
- Light clays - strongly structured Ksat 0.12 - 0.5
- Light clays - moderately structured Ksat 0.06 - 0.12i
- Light clays - weak. structured or massive Ksat < 0.01
- Med. to heavy clays - strong. struct. Ksat 0.06-0.5r
- Med. to heavy clays - mod. structured Ksat < 0.0
- Med. to hvy clays - weak. struct. or massive Ksat < 0.0e
- DISPERSIVE soil (Modified Emerson Aggregate test)

**STEP 10** Nitrogen Report

P uptake by plants (Hp) (kg/ha/yr)	10	N plant uptake (kg/yr)	0.42	Total N-load	5.02kg/yr
P soil sorption (Ps) (kg/ha/m depth)	10000	N load exceedence	0.00		
Water Table/ Bedrock Depth (m)	2.00	N load percolated (kg/yr)	4.60		
Buffer to Water Table (Bwt) (m)	0.5	N released (perc+exceed.) (kg/yr)	4.60		
Time for accumulation of P (years)	50	Enviro.N limit (kg/yr)	8.37		

**STEP 11** % Effective Rainfall

- Mounded bed
- Level bed with grass

**STEP 12** Soil texture in root zone

- Coarse Sand
- Fine sand, Sandy loa
- Loams, Clay loams, Sil
- Clay (light, med, heav)

**STEP 13** Land Application Type

- SSI
- ETA

**STEP 14** Calculate (or Cntl- q)

Lateral seepage width (m) **0.300**

**STEP 15** Print Council Page

ETA trench separation **2.00**

ETA bed separation **1.00**

Permissible percentile exceedence **5.00%**

ETA trench width (m) **1.00**

Minimum effluent application (mm/day/m<sup>2</sup>) **2.67**

Exceedence (L) **0.00000** (94.52%)

**Final area (m<sup>2</sup>)** **21**

**Phosphorus area (m<sup>2</sup>)** **16**

**Water balance area (m<sup>2</sup>)** **21**

Specific Crop Coeff.(grass=1.00) **1.00**

% Effective Rainfall **65%**

Percolation (mm/ d) **5**

Avg depth of root zone (m) **0.15**

Avg depth bluemetal (etc) in trench below root zone (m) **0.15**

Soil Moisture Holding Capacity: saturation & AWC (mm) **110.05** **27.37**

Effective porosity of root zone **0.34**

Avail. Water Capacity (AWC) of root zone **0.13**

Effective porosity of bluemetal in trench below root zone **0.43**

Default AWC of bluemetal in trench below root zone **0.00**

beds total plus separating spaces: X Y dimensions = 13.1m x 1.6m Area = 21 m<sup>2</sup>

ETA bed separation **1.00**