

On-site Sewage Management Assessment Proposed Dwelling

Location:

132 Mafeking Road
Lot 11 DP 1202684
Goonengerry NSW

Byron Shire Council

Prepared for:

Eco Essence Homes

Report No:

2022.943

May 2022



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RE: 132 Mafeking Road, Lot 11 DP 1202684, Goonengerry, NSW.

HMC Environmental Consulting Pty Ltd is pleased to present our revised report for On-site Sewage Management Assessment for the abovementioned site.

We trust this report meets with your requirements. If you require further information, please contact HMC Environmental Consulting directly on the numbers provided.

Yours sincerely



Helen Tunks
(B.Env.Sc.)

Document Control Summary		
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ABBREVIATIONS

AWTS	Aerated Wastewater Treatment System
BOD ₅	Biochemical oxygen demand over 5-day period
CFU	Colony forming unit
DIR	Design irrigation rate
DLR	Design loading rate
ETA	Evapo-Transpiration Absorption (ETA) ETA beds will be used in reference to the construction of shallow sub surface effluent disposal trenches that utilise the principles of evaporation, transpiration and absorption. The method of construction for the ETA bed referred to in this report is in accordance with a “Conventional Bed” provided in Figure L5 of AS/NZS 1547: 2012.
LAA	Land application area
LTAR	Long term acceptance rate
OSMS	On-Site Sewage Management System
SDI	Sub-surface drip irrigation
TN	Total nitrogen
TP	Total phosphorus
TSS	Total suspended solids

1 INTRODUCTION

HMC Environmental Consulting Pty Ltd has been commissioned to prepare an on-site sewage management system (OSMS) assessment for a proposed 3-bedroom dwelling located on an undeveloped lot at 132 Mafeking Road, Lot 11 DP 1202684, Goonengerry, NSW, within Byron Shire Council. To provide additional system capacity for future development, which will be subject to separate Council development consent, the proposed on-site sewage management system (OSMS) has been designed on a 7.5 persons capacity.

A site inspection was carried out by Helen Tunks & Taylah Richards of HMC on the 3rd May 2022. During the site inspection site and soil characteristics were assessed in terms of wastewater treatment and disposal methods. The property lies within the Wilsons River drinking water catchment area and is subject to Rous Water On-site Wastewater Management Guidelines (RW, 2008).

It is proposed to install an aerated wastewater treatment system (AWTS) for secondary treatment of effluent with subsurface disposal through 3 x ETA beds on the moderately sloping grassed site. Reserve effluent land application area (LAA) remains available on the property, subject to vegetation removal.

The ETA beds are proposed to be located under an overhead power line and 5m from a power pole. An application has been submitted by HMC to Essential Energy seeking permission for the proposed location encroaching this infrastructure (see Appendix 7). Based on previous experience the application is expected to be approved as existing cleared path to the power pole remains available for maintenance purposes and the ETA beds are below ground.

2 PROPOSAL

Proposal	Proposed On-site Sewage Management System
Property	132 Mafeking Road Lot 11 DP 1202684 Goonengerry NSW
Council Area/Approvals:	Byron Shire Council
Area of Property	~1.03 ha
Water Supply	Non-reticulated roof water supply
Design Daily Hydraulic Load & Design Occupancy	862.5L/day Based on 7.5 persons @ 115L/p/day wastewater design flow allowance as per Byron Shire Council OSMS Design Model
Water Saving Devices	Expected in proposed dwelling

3 SUMMARY OF RECOMMENDED SEWAGE WORKS

On-site Sewage Management System
<ul style="list-style-type: none"> Install an AWTS with NSW Health accreditation for minimum 79% reduction in total nitrogen (TN) Connect all sanitary drainage to the proposed AWTS Install 3 x pump dosed ETA beds each 2m wide x 14m long x 0.45m deep sited on native soil with effluent disposal through 2 x 25mm lilac punched poly pipe inside 100mm slotted PVC pipe laterals, capped 1m from the end of the bed Install a 6-port automatic indexing valve to split effluent evenly to proposed ETA bed laterals Install upslope surface water diversion bund & intercept drain

Table 1 Variation to Byron OSMS Design Model/Strategy

Byron Shire Council OSMS Design Model/Strategy Default	Change Displayed on Design Model/ Specification	Justification
<ul style="list-style-type: none"> 20% nitrogen reduction 	<ul style="list-style-type: none"> 79% reduction assumed 	<ul style="list-style-type: none"> Minimum 79% reduction in TN recommended NSW Health accreditation for nutrient reduction, examples <ul style="list-style-type: none"> Fuji Clean ACE 1200 Advanced (STS-AWTS054) Ozzi Kleen RP10A+ (AWTS014)
<ul style="list-style-type: none"> 150mm deep gravel layer in ETA bed 	<ul style="list-style-type: none"> 300mm deep gravel layer used in modelling 	<ul style="list-style-type: none"> Maximises sub-soil effluent storage volume within the gravel bed. Increases vertical barrier and minimises risk of human exposure. Minimises risk of effluent surcharge to surface.

4 SITE & SOIL INVESTIGATION

Should conditions vary from those described during any stage of installation HMC is to be notified to ensure the recommendations of this report remain valid or alternative recommendations be made.

The information relates to the general site but more specifically to the proposed effluent land application area (LAA).

Inspected by	Helen Tunks & Taylah Richards
Date & Time of Inspection	Tuesday 3 rd May 2022. See Appendix 1 & 2 for site location, Appendix 6 for photos.
Weather	Weather – warm, rainfall recorded on morning of site inspection. BOM Stn 58070 Rosebank (Repentance Creek). ~41mm rainfall for the week preceding site inspection. ~155mm rainfall recorded for the month preceding site inspection.
Soil Type & Category	Soil Category 4 (Table 5.1 AS/NZS1547:2012) 0-200mm: Light Clay 200-1000mm: Clay Loam soil
Climate	Average Annual rainfall: 1515mm, Alstonville (1980 – 2001) Annual evaporation: 1000-1200mm/year Warm, temperate. High volume, seasonal rainfall typical of region.
Terrain	Ridge, lower slope
Slope & Drainage:	Moderate slope ~20%; Linear planar
Aspect & Shading	North-western aspect Part shading expected
Ground cover/vegetation	90% pasture grass cover 10% juvenile vegetation to be removed

4.1 Site Compliance

SITE CONSTRAINT/FEATURE	SETBACK DISTANCE/DESCRIPTION	Recommended (BSC, 2004)	COMPLYING
Setback to Boundary	~7m to across slope property boundary ~18m to downslope property boundary	6m 12m	YES YES
Setback to Dry Gully	~55m to gully/ephemeral stream	40m	YES
Setback to Watercourse	>100m to watercourse	100m	YES
Setback to Water Bore	>250m to nearest registered groundwater bore	>250m	YES
Setback to Building Features	>6m to buildings	>6m	YES
Reserve LAA	100% available		YES
Slope Gradient	~20% moderately sloping	<30%	YES
Slope Stability	Not mapped		YES
Flood Liability	Nil		YES
Aquaculture	Not mapped		YES
Water Catchment	Wilson's River Drinking Water Catchment	Proposed OSMS achieves medium suitability (RW, 2008)	

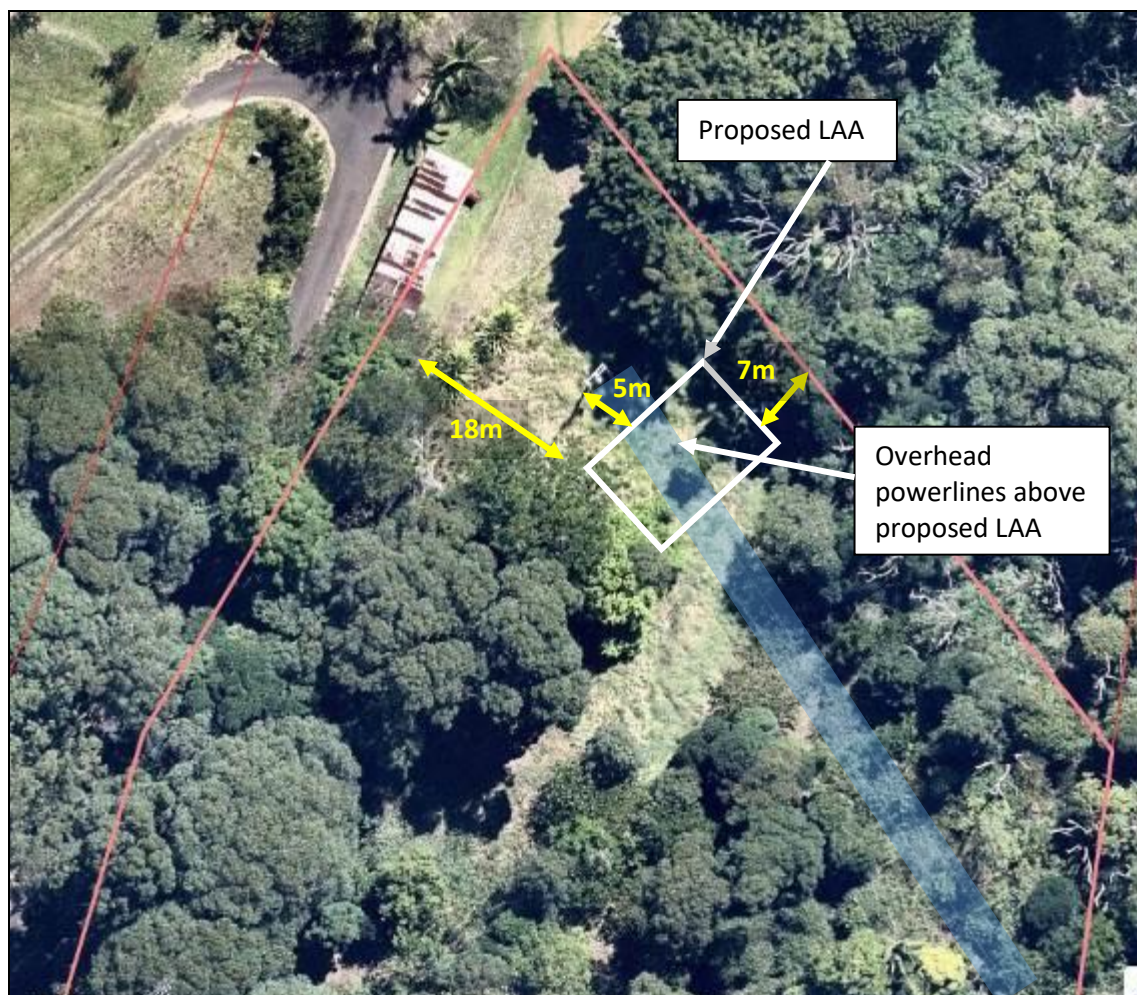


Figure 1: Site features and setback distance from Land Application Area (LAA) to drainage lines.

4.2 Setback Distance Risk Assessment

The setbacks from the proposed on-site sewage management system for this residential development were adopted from the recommendations within the following guidelines:

- Byron Shire Council – Design Guidelines for On-site Sewage Management for Single Households (BSC,2004)
- Rous Water Onsite Wastewater Management Guidelines (RW, 2008)
- AS/NZS1547: 2012

The proposed land application area complies with the recommended setback distances from land application areas (LAAs) as mentioned within the above guidelines.

5 LAND APPLICATION AREA SIZING AND DESIGN

5.1 Assessed Design Inputs

Model Used: Byron OSMS Design Model. Daily Time Step	
Climate Data	Alstonville Rainfall & Evaporation Record: 1/7/1980 – 30/6/2001
Design Occupancy	Proposed 3-bedroom dwelling

	7.5 persons design occupancy assumed
Wastewater Design Flow Allowance	115L/p/day
Wastewater Design Hydraulic Load	862.5L/day <i>Byron Shire Design Modelling Calculations</i>
Nitrogen (TN)	4.2 kg/person/year.
TN System Nutrient Reduction	Secondary Effluent –Minimum 79% reduction to be achieved by AWTs with NSW Health accreditation.
Vegetation Removal of TN	200 kg/ha/year.
Phosphorus (TP)	0.6 kg/person/year.
Vegetation Removal of TP	10 kg/ha/year
Phosphorus Adsorption	~10000 kg/ha/ based on field texture and work carried out by Morand, 1996
Maximum Design Loading Rate (DLR)	30mm/day (Table M1 AS/NZS1547:2012)
Proposed DLR	7.7mm/day (<i>BSC Design Model</i>)

5.2 Summary of Land Application Area Sizing

Analyte	Land Application Area Minimum Requirement Hydraulic Load (Q) = 862.5L/day	
	BSC OSMS Design Model	LAA Method & Configuration
Hydraulic Area	32m ² (capped @ 113m ²)	Install 3 x pump dosed ETA beds each 2m x 14m x 0.45m + 300mm seepage area
Nitrogen (TN)	0m ²	
Phosphorus (TP)	88m ²	
DLR	7.7mm/day	

No permeability tests were undertaken in the field. To provide a realistic assessment of permeability multiple tests are required. It is considered that the conservative loading rates based on soil texture (AS/NZS 1547:2012) are adequate for design inputs in this case for a domestic situation.

6 DISCUSSION/REASON FOR APPROVAL

The property exhibits multiple site constraints for effluent disposal with limited cleared available area for land application, high volume seasonal rainfall, and overhead powerlines. The proposed LAA was chosen for the gentle slope and cleared area, minimising the tree removal required for the proposed development.

The proposed LAA complies with the recommended setback distance guidelines for land application areas. A minimum 5m setback distance to the downslope power pole is to be maintained, and appropriate signage is recommended to delineate the pump-dosed ETA beds to prevent vehicle damage.

Secondary treated effluent is proposed, and 100% reserve effluent land application area remains available on the property, subject to tree removal. A medium suitability rating is achieved when assessed under the Rous Water Onsite Wastewater Management Guidelines (RW, 2008).

7 RECOMMENDATIONS

Based on the information presented in this report, it is considered that the recommendations listed below are sufficient to attain an acceptable level of environmental impact from the design wastewater flow generated by the occupation of the proposed dwelling.

DESIGN HYDRAULIC LOADING	
<ul style="list-style-type: none"> 862.5L/day Assumed 7.5 persons design occupancy 	<ul style="list-style-type: none"> Proposed 3-bedroom dwelling Roof water supply
RECOMMENDED ON-SITE SEWAGE MANAGEMENT SYSTEM	
<p>Refer to Site Plan & ETA bed construction detail in Section 7.1</p> <ul style="list-style-type: none"> Install an AWTs with NSW Health accreditation for nutrient reduction of >79% TN. See following NSW Health approved systems, <ul style="list-style-type: none"> ✓ Fuji Clean ACE 1200 Advanced (STS-AWTs054) ✓ Ozzi Kleen RP10A+ (AWTs014) Connect all sanitary drainage to proposed AWTs <p>Land Application Area:</p> <ul style="list-style-type: none"> Install HDPE pipe, buried @ minimum 150mm depth (300mm depth for trafficable), to distribute effluent from AWTs to proposed Land Application Area (LAA) Install 3 x pump dosed ETA beds each 2m wide x 14m long x 0.45m deep sited on native soil with 2 x 25mm lilac poly with 5mm holes punched @ 1m centres inside 100mm slotted PVC pipe laterals per bed Three monitoring ports to be installed in each bed, two as an elbow connection to the 100mm slotted PVC lateral and one in opposite corner through the gravel layer, capped flush with ground surface Install an upslope surface water diversion bund & intercept drain to divert surface water run-on away from the proposed LAA Install vehicle barriers and appropriate signage to delineate the proposed LAA and prohibit access onto the trenches <p>ETA bed construction</p> <ul style="list-style-type: none"> Level base across width and length, and light scarification of base prior to placement of gravel. A 300mm deep gravel (20-40mm aggregate) layer is to be provided supporting the PVC pipe at the top with 50mm gravel cover, then overlain by the geotextile (filtercloth) and a 100-350mm layer of topsoil. The finished surface of the final topsoil layer is to be smooth, not compacted, and have a grade to promote sheet flow of rainfall. The surface is to be turfed or densely sown with lawn grasses to provide a vigorously growing and durable cover able to be mowed and that will promote sheet flow of rainfall off the bed Agricultural lime (calcium carbonate) and gypsum (calcium sulfate) are to be incorporated into the native topsoil applied to the surface of the ETA bed and to the lightly scarified, levelled base at a rate of 0.5kg/m² (guide only). 	
OPERATION & MAINTENANCE	

- A contract with an authorised AWTS service agent for quarterly service inspections is to be current and remain current always during the operation of the system.
- The occupants are to practice water conservation and follow the chemical usage recommendations provided by the AWTS Manufacturer to maximise performance and longevity of the on-site sewage management system.

ESSENTIAL ENERGY – PERMISSION TO ENCROACH
<ul style="list-style-type: none">• Written permission from Essential Energy is required prior to installation.

7.1 Site Plan & ETA Bed Construction Detail

SEE FOLLOWING PAGES

SHEET 1 - PLAN

COMPONENTS

- AWTS with NSW Health accreditation for min 79% TN reduction
- 6-port k-rain valve in valve box
- 3 x ETA beds (2m x 14m x 0.45m)
- Upslope surface water diversion bund and drain
- Vehicle barrier
- 100mm DWV PVC pipe
- Lilac HDPE pipe (32-50mm) approx 80m length
- 9 x inspection ports

All drainage work is to be undertaken by a licensed plumber/drainier.
Plumber to check all levels on site and adjust layout where necessary

CAUTION: OVERHEAD POWERLINES IN VICINITY

PROPOSED LAA HAS BEEN STAKED ON SITE - ALL OTHER LOCATIONS ARE GENERAL ONLY AND ARE TO BE CONFIRMED ONSITE

Job: HMC2022.943
DWG: HMC2022.943
Date: May 2022
Version: B - 20.02.2024 - TR
Drawn: KH
Base: Nearmap October 2021
Council: Byron Shire Council

Lot 11 DP 1202684
132 Mafeking Road
Goonengerry



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PROPOSED vehicle barrier

PROPOSED k-rain indexing valve (6-outlet)

PROPOSED location of 100kL rainwater tank.
Final positioning to be determined by installer.

PROPOSED pumped lilac HDPE buried @ min 150mm (300mm trafficable)
Route to be determined by installer

PROPOSED Land Application Area (LAA)
3 x Pump-dosed ETA Beds
2m x 14m x 0.45m
each with 2 x distribution laterals

PROPOSED upslope surface water diversion bund and drain

PROPOSED AWTS with NSW Health accreditation for min 79% TN reduction
Final placement to be determined by installer

PROPOSED 100mm DWV PVC pipe
Route to be determined by installer

PROPOSED 3-BR dwelling

ACCESS TO POLE

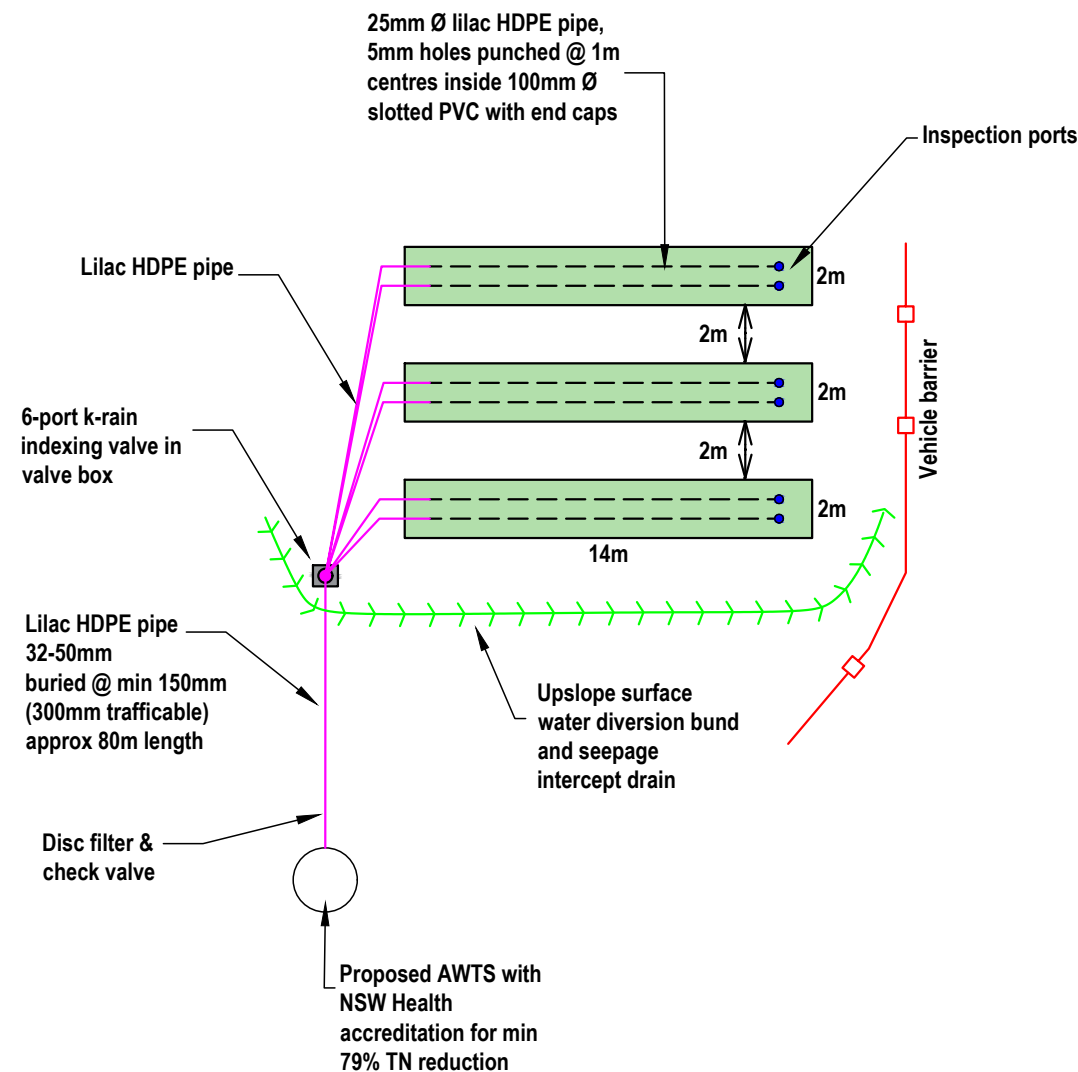
EXISTING UNFORMED CLEARED PATH

O/H Power lines

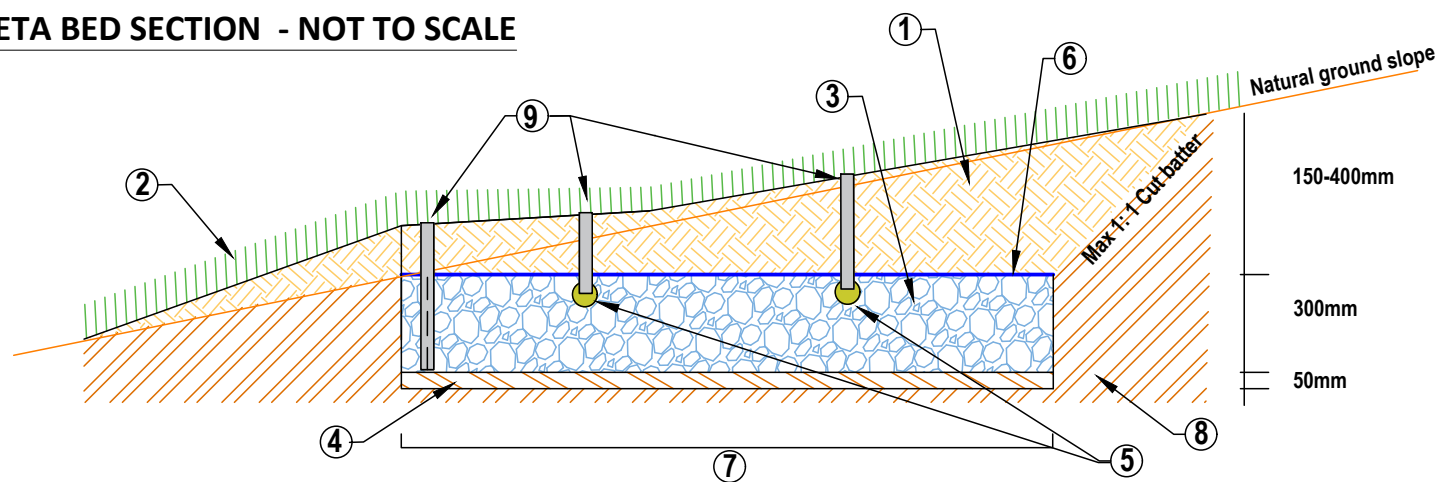
Driveway



OSSM System and ETA Bed Layout - Detail - Not to scale



ETA BED SECTION - NOT TO SCALE



ETA Beds - Minimum Components and Design Requirements

1. 100-200mm of topsoil or backfilled local soils, mounded or graded to maximise sheet flow runoff of rainfall
2. Grass cover, suitable condition for mowing.
3. 300mm thick layer of up to 20-40mm clean aggregate.
4. Level base ETA bed, base and sidewalls raked to 5-10mm depth prior to placing gravel.
5. Laterals: (25mm Ø PE lilac pipe, 5mm holes punched @ 1m centres inside 100mm pre-slotted sewer-grade PVC pipe. End caps required)
6. Geotextile filter cloth.
7. ETA bed width (2m)
8. Existing soil.
9. Inspection ports (100mm PVC slotted) capped flush with the bed surface

Typical Installation Notes

- a. Sub-surface pipes as per manufacturers specifications, all pipework and fitting should comply with the Australian Standard 2698 "Plastic Pipes and Fittings for Irrigation and Rural Application". Effluent grade pipe work must be used.
- b. Distribution box to be built from pre-cast concrete. Distribution box must be placed and leveled on 600mm x 600mm pre-cast slab or bedded in concrete.
- c. In heavy clay soils, addition of gypsum at 0.5kg/m² is recommended at the base of the disposal trench. (See report for recommendations)
- d. In acid soils, addition of lime at 0.5kg/m² is recommended at the base of the disposal trench (See report for recommendations)
- e. For dispersive soils addition of gypsum at 1kg/m² is recommended at the base of the bed/trench. (See report for recommendations)
- f. The commissioning of the piped dispersal system should include a test run/check for leaks and poorly distributed areas.
- g. Shrubs to be planted no closer than 1m from the sidewall of the ETA bed. Small trees should be no closer than 5m and large trees should be at least 20m from the ETA system.
- h. The base of the ETA Bed must be at least 500mm from highest seasonal groundwater table.

Maintenance and Management

- If effluent ponds on the surface or soils become soggy, seek advice from Council or a plumber immediately
- The ETA Beds must be maintained in such a manner as to prevent any run-off of effluent to adjoining allotments, public places and watercourses.
- The system operator should maintain the ETA Beds regularly to ensure adequate cover of the pipe work, elimination of weeds, maintenance and regular mowing.

Licensing, Notification & Inspection

- Plumbing and drainage works must be performed by trades persons licensed by NSW Dept of Fair Trading. A notice of work is required to be submitted to Council minimum of 2 days prior to work. Council inspection is required prior to backfilling and at completion. Plumber is to provide a Certificate of Compliance and Drainage Diagram to Council at completion of works.

PROPOSED ONSITE SEWAGE MANAGEMENT DESIGN LAND APPLICATION AREA

SHEET 2 - DETAIL

COMPONENTS

- AWTS with NSW Health accreditation for min 79% TN reduction
- 6-port k-rain valve in valve box
- 3 x ETA beds (2m x 14m x 0.45m)
- Upslope surface water diversion bund and drain
- Vehicle barrier
- 100mm DWV PVC pipe
- Lilac HDPE pipe (32-50mm) approx 80m length
- 9 x inspection ports

All drainage work is to be undertaken by a licensed plumber/drainier. Plumber to check all levels on site and adjust layout where necessary

CAUTION: OVERHEAD POWERLINES IN VICINITY

PROPOSED LAA HAS BEEN STAKED ON SITE - ALL OTHER LOCATIONS ARE GENERAL ONLY AND ARE TO BE CONFIRMED ONSITE

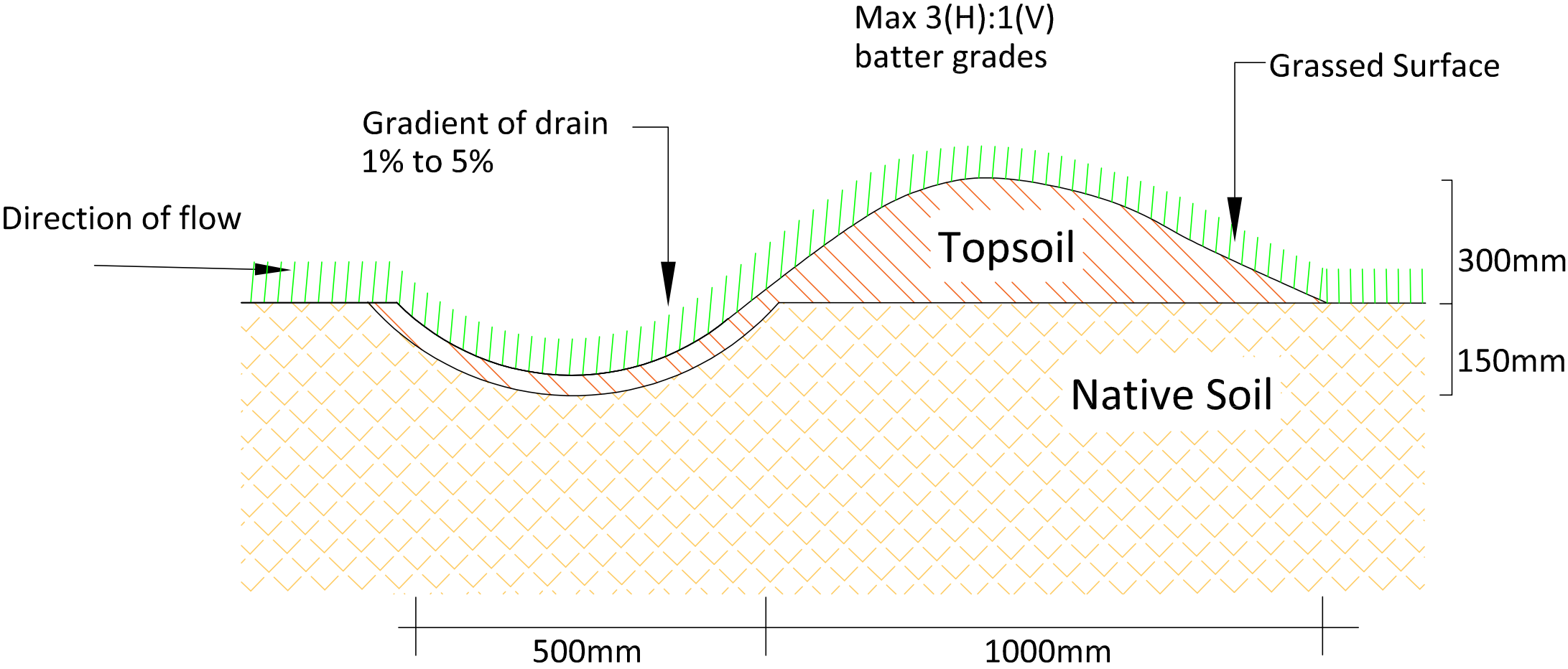
Job: HMC2022.943
DWG: HMC2022.943
Date: May 2022
Revised:
Base: Near Map Oct 2021
Council: Byron Shire Council
Drawn: KH

Lot 11 DP 1202684
132 Mafeking Road
Goonengerry

7.2 Upslope Surface Water Diversion Bund & Intercept Drain Detail

SEE FOLLOWING PAGE

CROSS SECTION: DIVERSION BUND



Source: Sydney Catchment Authority, 2013: Standard Drawing 8A

8 LIMITATIONS

The information within this document is and shall remain the property of HMC Environmental Consulting Pty Ltd. This document was prepared for the sole use of client and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of HMC Environmental Pty Ltd and client. The report and conclusions are based on the information obtained at the time of the assessment. Your report assumes that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary.

Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time, natural processes and the activities of man. Changes to the subsurface, site or adjacent site conditions may occur subsequent to the investigation described herein, through natural processes or through the intentional or accidental addition of imported material, and these conditions may change with space and time.

The findings of this report are based on the objectives and scope of work outlined within. HMC performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environment assessment profession. No warranties or guarantees, expressed or implied, are made. Subject to the scope of work, HMC's assessment is limited strictly to identifying typical environmental conditions associated with the subject property and does not include evaluation of any other issues. This report does not comment on any regulatory obligations based on the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of the work stated and does not relate to any other works undertaken for the Client. All conclusions regarding the property area are the professional opinions of the HMC personnel involved with the project, subject to the qualifications made above.

While normal assessments of data reliability have been made by HMC, HMC assume no responsibility or liability for errors in any data obtained from regulatory agencies, or information from sources outside HMC's control, or developments resulting from situations outside the scope of this project.

9 REFERENCES

References/legislation utilised in the preparation of report:

- Australian/New Zealand Standard AS 1547: 2012 - *On-site domestic wastewater management*, February 2012
- Byron Shire Council, "*On-site Sewage Management Strategy*", 2001.
- Byron Shire Council, "Design Guidelines for On-site Sewage Management for Single Households". 2004
- Byron Shire Council, "Information and Assessment Guide for owners of On-site Sewage Systems", 2006
- Martens & Associates P/L, On-site Sewage Management for Single Households. Standard Component Designs Prepared for North Coast Councils, ETA Design Final Draft, 25.3.2004.
- Morand, D.T., *Soil Landscapes of the Lismore-Ballina 1:100 000 Sheet*, 1994
- Munsell Soil Color Charts, GretagMacbeth, New Windsor, NY, USA, 2000.
- NSW Department of Local Government, EPA (NSW), NSW Health, Land and Water Conservation and Department of Urban Affairs and Planning, *Environment & Health Protection Guidelines – On-site Sewage Management for Single Household*", February 1998
- Rous Water Regional Water Supply, "Rous Water Onsite Wastewater Management Guidelines", June 2008.
- WaterNSW, "Designing and Installing On-site Wastewater Systems. A WaterNSW Current Recommended Practice", WNSW, 2019

10 APPENDICES

APPENDIX 1 Site Location

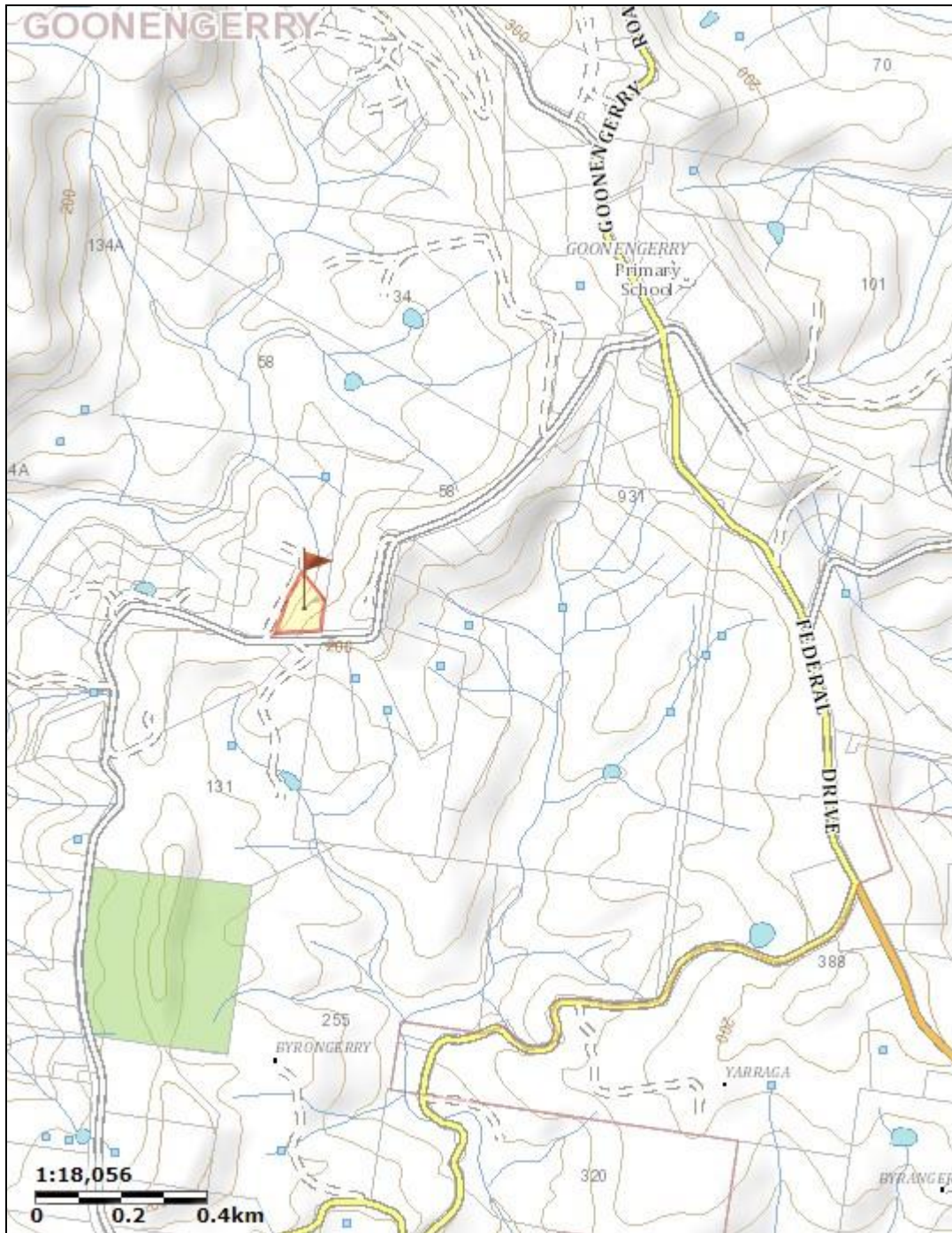


Figure 2 - Site Location & property boundary, as shown in yellow (NSW LPI Viewer, SIX Maps)

APPENDIX 2 Property Boundary



Figure 3: Property Boundary & Site Features (Byron Shire Council Online Mapping).

APPENDIX 3 Modelling

SEE FOLLOWING PAGES

Byron OSMS Design Model

Version: LAA - AWTs + ETA.xlsm

Period of Rainfall & Evaporation Record: 01/07/1980 - 30/06/2001

Set Defaults

bedrooms
persons

STEP 1

persons (Grp 1) 7.5

persons (Grp 2) 0

STEP 2

STEP 3

Buffer to permanent water
Buffer to intermittent water

Block size (m²)

STEP 4

10000

100

115

4.20

79%

STEP 5

Daily effluent flow accord. water supply type

Retculated supply (bore spring, creek) 180L/p/d

Retculated + std. water saving devices 145L/p/d

Roof water harvesting 140L/p/d

Roof water harvesting + std. water sav. 115L/p/d

Grp 1

☒ Toilet

☒ Bathroom

☒ Laundry

Grp 2

☐ Toilet

☐ Bathroom

☐ Laundry

Source: AS/NZS1547:2000

Wastewater stream

☒ Kitchen

☐ Kitchen

STEP 6

Source: Jeppesen & Solley (1994) and Wilt et al (1974)

TN production per year (kg/year) 31.50

N prod. per capita (kg/person/yr) 4.20

N loss in treatment system (% reduction) 79%

20%

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

Source: N prod. (person/yr) Aust. & local & overseas studies (Davison 2002)

Current total TN load 250 mg/L

Source: Morand 1994 soil units, SCU data in LCC 2000

N calculations

Phosphorus in effluent (lp) (kg/yr) 4.50

P prod. per person per yr (kg/person/yr) 0.60

wastewater in a full system: TP 40%

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, bl, 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

Source: P prod. (person/yr) Aust. & local studies (Davison, 2002)

Total yearly flow

P uptake by plants (Hp) (kg/ha/yr) 10

P soil sorption (Ps) (kg/ha/m depth) 10000

STEP 10

Water Table/ Bedrock Depth (m) 3.00

Buffer to Water Table (Bwt) (m) 0.5

Time for accumulation of P (years) 50

Enviro. N limit (kg/yr) 6.32

Nitrogen Report

N plant uptake (kg/yr) 2.25

Total N-load 5.29kg/yr

N load exceedence 0.00

N load percolated (kg/yr) 3.04

N released (perc+exceed.) (kg/yr) 3.04

STEP 9

Soil texture & structure beneath system

Gravels/Sands Ksat > 3.0m/d

Sandy loams - weakly structured Ksat > 3.0m/d

Sandy loams - massive Ksat 1.4 - 3.0m/d

Loams - high/moderate structured Ksat 1.5 - 3.0m/d

Loams - weakly structured or massive Ksat 0.5 - 1.5m/d

Clay loams - high/mod structured Ksat 0.5 - 1.5m/d

Clay loams - weakly structured Ksat 0.12 - 0.5m/d

Clay loams - massive structured Ksat 0.06 - 0.12m/d

Light clays - strongly structured Ksat 0.12 - 0.5m/d

Light clays - moderately structured Ksat 0.06 - 0.12m/d

Light clays - weak, structured or massive Ksat < 0.06m/d

Med. to heavy clays - strong, struct. Ksat 0.06-0.5m/d

Med. to heavy clays - mod. structured Ksat < 0.06m/d

Med. to hvy clays - weak, struct. or massive Ksat < 0.06m/d

DISPERSIVE soil (Modified Emerson Aggregate test)

Wetted depth (m) 0.50

TN's removal 50.0%

Root bed area (m²) 17.0

BOD target of 20mg/L is

Current Outlet BOD

Soil texture structure Source: AS/NZ 1547:2000

Tot flow infiltr. L/yr

Effect effluent ratio

TN infiltrating kg/yr is same as volume infiltrating (mg/L)

ETA

N conc. in effluent kg/L

Volume percolated L/yr

Mass load perc+ plant

N uptake in hydraulic

Actual Mass load perc

N conc in perc'd kg/L

Source: LCC (1999)

% Effective Rainfall

Mounded bed

Level bed with grass

STEP 11

Source: Dunne & Leopold (1978)

Soil texture in root zone

Coarse Sand

Fine sand, Sandy loams

Loams, Clay loams, Silt

Clay (light, med, heavy)

Source: Dunne & Leopold (1978)

N area

Avg depth of root zone (m) 0.15

Effective porosity of root zone 0.37

Avail Water Capacity (AWC) of root zone 0.15

Avg depth bluemetal (etc) in trench below root zone (m) 0.30

Effective porosity of bluemetal in trench below root zone 0.43

Default AWC of bluemetal in trench below root zone 0.00

Trench under root zone <

Soil Moisture Holding Capacity: saturation & AWC (mm) 179.77 34.32

STEP 13

Land Application Type

SSI

ETA

Lateral seepage width (m) 2.00

STEP 14

Calculate (or Cntl- q)

ETA trench separation 0.300

STEP 15

2.00

ETA bed separation 1.40

Permissible percentile exceedence 5.00%

ETA trench width (m) 2.00

Minimum effluent application (mm/day/m²) 7.67

Exceedence (L) 0.00000

94.52%

15

10

5

0

0 5 10 15

Effluent Irrigation Rate (mm/day)

Actual Soil Moisture (mm)

Exceedence (mm)

7.66667

7.67

187.44

0.00000

0.00000

29.84

1.733770

2797.97

Effluent Irrigation Rate (mm/day)

Actual Soil Moisture (mm)

Exceedence (mm)

APPENDIX 4 Soil Investigation

NSW DLWC 1:100,000 Soil Landscape Map (Morand, 1994)	Rosebank (ro) soil landscape (expected) <100cm well drained Krasnozems and brownish red Krasnozems on crest margins. >100cm Krasnozems and brownish red well drained Krasnozems on slopes.
Geology	Lamington volcanic: Lismore Basalts- Tertiary Basalt with bole and minor agglomerate.

Soil profile – BH1 & BH2 within proposed LAA							
Bore Hole No.	Approx. Depth (mm)	Field Texture Determination (AS1547 Soil Category)	Structure	Colour Moist (MUNSELL)	pH	Coarse Fragments	Modified Emmerson Aggregate Test
1	0- 200	Light Clay Category 5	Moderate	Dark Brown 10YR 3/3	6.0	Fine gravels, <20%	Class 4
	200-1000	Clay Loam Category 4	Strong	Dark Brown 10YR 3/3	5.5	Nil	Class 3
2	0- 400	Light Clay Category 5	Moderate	Dark Brown 10YR 3/3	5.5	Fine gravels, <20%	Class 4
	400-800	Clay Loam Category 4	Strong	Dark Brown 10YR 3/3	5.5	Nil	Class 3
Top dressing of the disposal area may be required, especially for the first 6-12 months due to settling of the soil. Topsoil should be of a loam to sandy loam texture with a neutral pH.							

APPENDIX 5 Modified Emersion Aggregate Test

As described within the *Design Guidelines for On-site Sewage Management for Single Households* (BSC, 2004).

Soil Class	Description
Class 1	Material disperses completely
Class 2	Aggregates disperse (clouds solution appreciably)
Class 3	Aggregates slake - smaller aggregates/particles fall off the original aggregate
Class 4:	No change to aggregate, therefore non-dispersive

APPENDIX 6 Photographic Log

Photo No. 1	Date 03/05/2022			
Description: View NE and across slope overlooking proposed dwelling location.				

Photo No. 2	Date 03/05/2022			
Description: View S and upslope showing rock retaining wall (house pad) and downslope existing cleared path.				

Photo No. 3	Date 03/05/2022			
Description: View N showing staked location of proposed AWTs, to be confirmed by installer.				

Photo No. 4	Date 03/05/2022			
Description: View S and upslope along existing cleared path from dwelling location to proposed LAA.				

Photo No. 5	Date 03/05/2022			
Description: View N and downslope along existing cleared path towards proposed LAA.				

Photo No. 6	Date 03/05/2022			
Description: View NW and downslope overlooking proposed LAA, as staked onsite.				

Photo No. 7	Date 03/05/2022		
Description: View SE and upslope overlooking proposed LAA, as staked onsite.			

Photo No. 8	Date 03/05/2022		
Description: View SE and upslope overlooking proposed LAA, as staked onsite. Vegetation within proposed LAA to be removed.			

Photo No. 9	Date 03/05/2022		
Description: View SW and across slope overlooking proposed LAA.			

Photo No. 10	Date 03/05/2022		
Description: View N showing location of proposed LAA, as staked onsite.			

Photo No. 11	Date 03/05/2022		
Description: Soil profile (BH1) exposed by hand auger to 1m depth within proposed LAA.			

Photo No. 12	Date 03/05/2022		
Description: Soil profile (BH2) exposed by hand auger to 1m depth within proposed LAA.			

APPENDIX 7 Application to Encroach Infrastructure – Essential Energy Receipt

Mark Tunks

From: support@cybersource.com
Sent: Wednesday, 18 May 2022 10:25 AM
To: helen@hmcenvironment.com.au
Subject: Tax Receipt - Essential Energy DAEP-220500007



Receipt

Date: 18-05-2022
Order Number: DAEP-220500007

TAX RECEIPT, Essential Energy Pty Ltd. ABN 37 428 185 226

Billing Information

Helen Tunks
132 Mafeking Road
Goonengerry
NSW
AU
2482

helen@hmcenvironment.com.au
0755368863

Order Items

DAEP-220500007	x 1	AUD 109.67
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Payment Details

Visa
xxxxxxxxxxxx6602

Order Total

Total amount AUD 120.64

Essential Energy Bill Enquiries: 132391
