On-Site Wastewater Management Assessment

To support the LEP Amendment for varying the Minimum Lot Size Lot 1 DP 832781, 1443 Bangalow Road, Clunes

For:	J. Clemmett
Report no:	21484_ww.docx
Date:	30 June 2021

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EXECUTIVE SUMMARY

Greg Alderson and Associates have been commissioned by John Clemmett prepare an assessment regarding the management for sewage at Lot 1 DP 832781, 1443 Bangalow Road , Clunes. This report is to accompany the planning proposal to allow for an amendment to the Local Environment Plan (LEP) to vary the minimum lot size to allow for a dwelling entitlement at the site.

The assessment has determined that there are no limiting constraints at the site that would prevent a dwelling from being constructed and having an on-site wastewater management system. The assessment has shown that it is feasible to install a passive wastewater management system at the site in accordance with Lismore Council's Wastewater Strategy (2013) . The feasibility assessment has been based on a loading from a potential 5 bedroom dwelling.

It is concluded that a the variation to the LEP to allow for a reduced minimum lot size, thus allowing a dwelling entitlement is possible as on-site wastewater management can be undertaken in accordance with Council requirements.

1. INTRODUCTION

Greg Alderson and Associates have been commissioned by John Clemmett prepare an assessment regarding the management for sewage at Lot 1 DP 832781, 1443 Bangalow Road , Clunes. This report is to accompany the planning proposal to allow for an amendment to the Local Environment Plan (LEP) to vary the minimum lot size to allow for a dwelling entitlement at the site.

This report describes the site, the tests and calculations undertaken and recommends an effluent treatment and land application method which will minimise the environmental impact of the proposed planning proposal and is in accordance with Lismore Council's On-Site Sewage Management Strategy (2013).

The report is based on a peak loading using the following components:

- Potential for a 5-bedroom (6 people);
- reticulated water supply with full water saving devices;
- Passive wastewater comprising:
    - Septic tank for primary treatment;
    - Wetland cells to provide partial secondary treatment;
    - ETA beds for land application;
- 1.8 ha block size;

1.1 Site Constraints

The following constraints are presented at the site:

- Drinking water catchment – Rous Guidelines (2008) to be addressed;
- A ground water bore is located on the neighbouring allotment;
- Moderate gradient

SITE DESCRIPTION

The property is located to the south of Bangalow Road, and is a relatively small rural allotment. The site contains two sheds, one being a former motor vehicle repair station towards the front (north) of the site, and a shed to the south of the motor vehicle repair station.

The site has a moderate grade to the south of about 18 % in the area where the on-site wastewater management system would be situated. The area has been recently cleared of tall vegetation in the proposed location of the wastewater management area, however, the area is surrounded by relatively dense vegetation. It is not proposed that vegetation will be removed for the wastewater management area.

The existing sheds are serviced by a septic tank and trench. It is proposed that any future dwelling will have an on-site wastewater management system in accordance with Council's requirements and the existing system will not be suitable for use for a dwelling.

A locality plan attached as Exhibit No. 1 shows the subject property in its regional context.

1.2 Proposed Disposal Area

The proposed disposal field is located to the south of the southern most shed, in the open area of the site. The area identified for disposal in this report was chosen for the following reasons:

- It allows for a passive, low-tech, gravity fed system to be installed;
- All setbacks can be achieved;
- It contains visibly smaller rock floaters than other areas of the site;
- It has a gradient acceptable for installing ETA beds on.

Table 1 provides a summary of the site description and characteristics of the proposed disposal area.

Table 1: Summary of Site Assessment

SITE ASSESSMENT		
Details of Proposed Development	Planning proposal – variation to minimum lot size to allow for a dwelling entitlement	
Address	Lot 1 DP 832781, 1443 Bangalow Road , Clunes	
Local Government Area	Lismore City Council	
Date of assessment	30/4/2021	
Proposed Water Supply	Reticulated water supply	
Recent Weather Conditions	Rain	
SITE CHARACTERISTIC	**DESCRIPTION**	**LIMITATION**
Allotment Size	1.8 ha	Low
Existing Vegetation	Pasture grass, no trees in proposed disposal field – dense vegetation to the south	Low
Slope (%)	18% in disposal area	Medium
Slope Type **Convex/Concave**	Convex	Low
Aspect	South	Medium
Exposure	Open	Low
Boulders/Floaters/Rock Outcrops	Some rock floaters, but not numerous and would not impede wastewater mangaement	Medium
Run on and Upslope seepage	To be diverted via catch drain	Low
Flooding Potential	None due to elevation	Low
Site Drainage	Light clays	Low
Surface Condition	Seems to be in good condition, good vegetation cover, no erosion evident in proposed disposal area	Low
Fill	None observed in the proposed disposal area	Low
Erosion/mass movement	none observed in disposal area	Low

Depth to Ground Water	Estimated to be in excess of 5m	Low
Distance to Permanent Water	>100m	Low
Distance to other water bodies or groundwater bores	Groundwater bore about 250m to south west as per LCC Lismaps (see figure 1 below)	Low
Rous Drinking Water Catchment	Within Wilsons River catchment	Medium

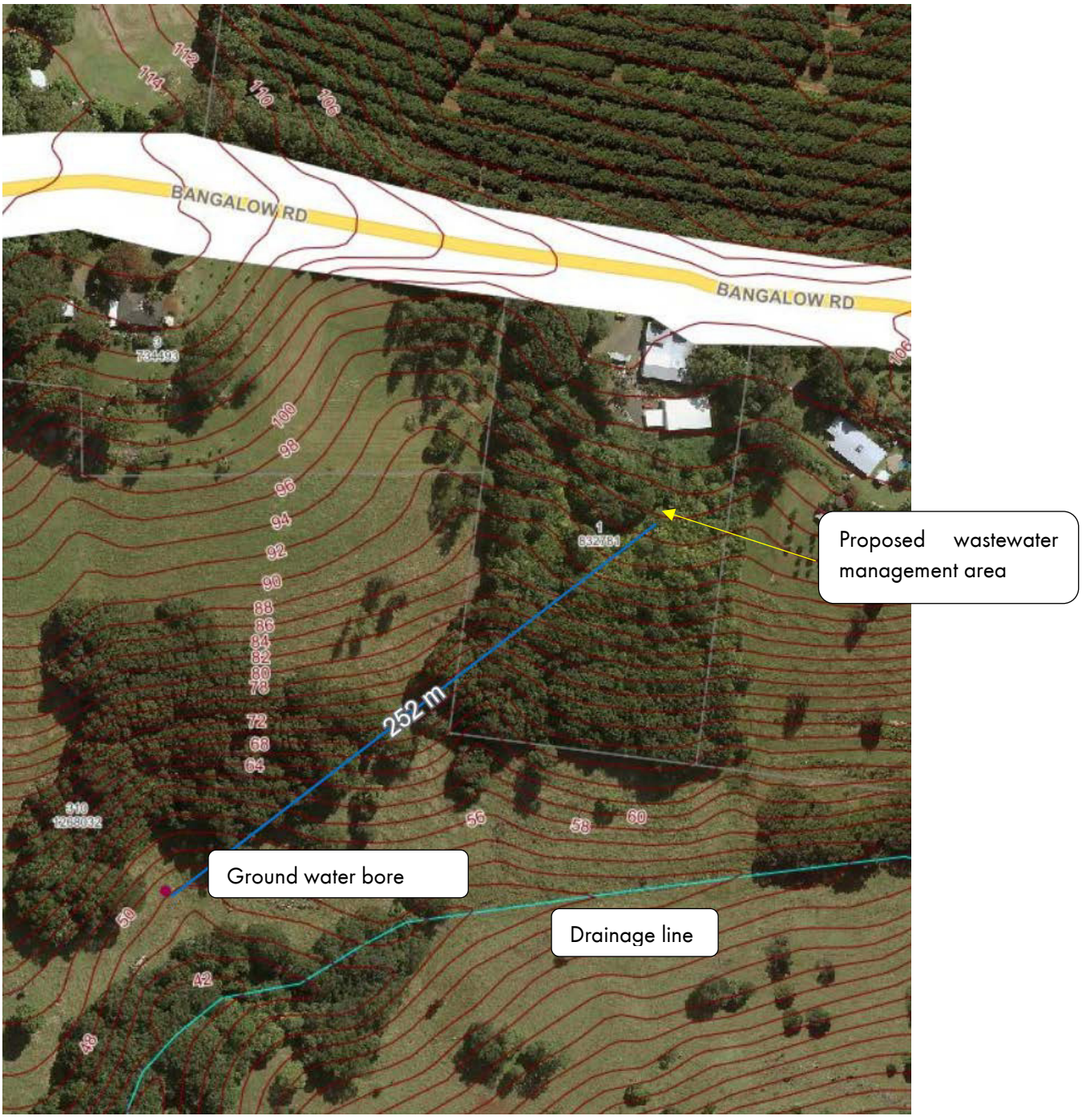


Figure 1: Groundwater Bore Location (LISMAPS 2021)

1.3 Soil

The soils of the site are dark reddish clay loams, overlying light clays being red krasnozem soils in accordance with the Great Soil Group classification. The site lies within the Rosebank Soil Landscape as located in the maps described in Morand (1994). The soil depth is estimated to be 2.0m in the proposed disposal area location.

The following is a summary of the soil landscape description by Morand (1994, p97).

Soil Landscape: Rosebank Soil Landscape

Soils:	Moderately deep to deep (>100 cm), Krasnozems and brownish red well drained Krasnozems on slopes.
Geology:	Lamington volcanics: Lismore Basalts – Tertiary basalts, with bore and minor agglomerate
Limitations:	Very acid soils with high aluminium toxicity potential. Steep slopes and mass movement and localised rock outcrop.
Permeability:	moderate to high.

All of the limitations as outlined in Morand (1994) were not evident in the site assessment except for the localised rock outcrop. The site is not subject to mass movement in the vicinity of the proposed on-site wastewater management system. Amelioration of the pH through the addition of lime can improve the conditions for plant growth.

Two boreholes were excavated on the property, and in the proposed disposal field it was found that soils were reddish brown light clays with rock floaters present. A description of the boreholes is given in Tables 2 & 3.

Table 2: Borelog 1 soil profile description.

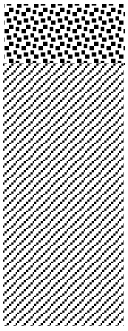
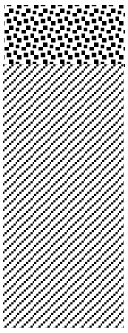
SOIL DESCRIPTION							
Horizon	Depth (mm)	Texture	Structure	Colour	Coarse Fragments	Soil pH	Dispersive Class
	0 300 1000	Clay loam Light clay	Moderate Strong	Reddish brown throughout	Rock floaters on the surface and throughout the profile	6.0 (Morand, 1994)	Not tested although Morand (1994) states low dispersive class in this soil landscape

Table 3: Borelog 2 soil profile description.

SOIL DESCRIPTION							
Horizon	Depth (mm)	Texture	Structure	Colour	Coarse Fragments	Soil pH	Dispersive Class
	0 300 1000	Clay loam Light clay	Moderate Strong	Reddish brown throughout	Rock floaters on the surface and throughout the profile	6.0 (Morand, 1994)	Not tested although Morand (1994) states low dispersive class in this soil landscape

The following table (Table 4) is an assessment for the proposed disposal system in accordance with the *Environment and Health Protection Guideline On-site Sewage Management for Single Households* (EPA et al 1998).

Table 4: Soil Assessment for Wastewater Disposal in accordance to EHPG

SOIL FEATURE	COMMENT	LIMITATION RATING		
		Minor	Moderate	Major
DEPTH OF SOIL	Soil depth is estimated to be in excess of 2000mm in depth	✓		
DEPTH TO HIGH EPISODIC/ SEASONAL WATERTABLE	The water table was not intersected during borehole tests & no springs/water discharges were observed. A water table depth of 3.0m was used in order to size the disposal area	✓		
SOIL PERMEABILITY	The sites soils were light clays which have an acceptable permeability.	✓		
COARSE FRAGMENTS	High percentage of stones (100-300 mm diameter) encountered.		✓	
pH	Soil pH is generally acidic (4.5-5.5), and will require lime to be incorporated into the disposal area.	✓		
ELECTRICAL CONDUCTIVITY (dS/m)	Morand (1994) states that the Rosebank soil landscape has a very low electrical conductivity, there was no evidence of vegetation being affected by salt	✓		
PHOSPHOROUS SORPTION (kg/ha)	Morand (1994) states that the Rosebank soil landscape has a moderate to high phosphorous sorption rate of greater than 600mg/kg which is equivalent to greater than 10000kg/ha/year. 10000kg/ha/year was used for the design of the disposal area	✓		
MODIFIED EMERSON AGGREGATE TEST	Morand (1994) states that the Rosebank soil landscape has a low dispersive percentage, there were no signs of dispersiveness when soil at site was examined	✓		

Overall, the EHPG (1998) would class the soil as being a minor limitation for disposal of wastewater.

1.3.1 Improvements to Soil

Increased acidity affects cation exchange capacity and can lead to deficiencies in calcium and magnesium while mobilising aluminium, which is toxic to plant growth. Lime can be added to the soil profile when preparing the area for disposal to increase the pH to a range between 6.5 – 8.5, which will enable plants to take up nutrients, which will be within the wastewater. Gypsum will be added to the soil on an annual basis at the rate of 0.5 tonne/hectare to prevent the soil from degrading from sodium application, which is contained in the wastewater.

1.3.2 Permeability Rates

The Lismore Council On-site wastewater model was used for sizing the disposal area for the proposed development. Strongly structured light clays are used for OSMS modelling which have a default Long-Term Acceptance Rate (LTAR) of 12mm/day.

1.4 Site Constraints

Table 1 presented an assessment of the proposed disposal area as per the requirements of the Lismore On-site Wastewater management Strategy (2013) and the Environment and Health Protection Guideline On-site Sewage Management for Single Households (1998). It can be seen from the desktop and site assessment that the site is generally not constrained regarding wastewater, with the exception of being located within the Rous Water drinking catchment and moderately steep slope.

1.4.1 Rous Water Guidelines

Lismore City Council's OSMS Guidelines (2013) states that the Rous Water On-Site Wastewater Management Guidelines (2008) are to be followed when a proposed OSMS is within a mapped drinking water catchment. Five steps for evaluation & documentation for complying with the Rous Water Guidelines have been developed in Ballina Shire Council's wastewater guidelines (2017) and are a useful guide for addressing the Rous Water Guidelines. These five steps are addressed below.

Step 1. Identify the pathogen removal capabilities of the proposed OSSM system (refer to Rous Guidelines, section 4.1 – table 2).

- septic tanks are rated as having a LOW pathogen removal capability;
- constructed reed beds are rated at MEDIUM, and ETA beds as HIGH.

Step 2. State the level of risk of pathogens entering a watercourse based on the location of the OSSM system relative to that specific watercourse (refer to Rous Guidelines, section 4.2 – table 4).

- Based on the location category being "WWMS located greater than 100m from a water course and the land between the WWMS and water course is vegetated with pasture".
- Pathogen risk rating is MODERATE.

Step 3. Select the appropriate table from Appendix A within the Rous Guidelines that is to be used for assessment; based on the location of the OSSM system relative to a water course and the type of vegetation between the OSSM system and a water course.

- Based on the "WWMS located greater than 100m from a water course and the land between the WWMS and water course is vegetated with pasture",
- Use Table A2

Step 4. State the suitability of the OSSM system and likelihood of approval, which is based on assessing the combined pathogen risk, treatment train and pathogen removal capacity of the system (refer to Rous Guidelines, Appendix A).

- "Septic tank with constructed reed bed (reed bed) and ETA/absorption bed or subsurface drip irrigation land application area" is stated as having a
- MEDIUM likelihood of approval.

Step 5. Based on the "Suitability" rating, confirm if the application needs to be referred to Rous Water (refer to Rous Guidelines section 5.3, table 5).

Given that the proposed OSMS is given a MEDIUM rating, the application does not need to be referred onto Rous Water. Table 5 of the Rous Guidelines stated that a 'medium' rated OSMS does not require referral... '*Provided Council is satisfied that the application comprehensively addresses the requirements of Rous Water and Council, there is no need to refer the application to Rous Water*'.

1.4.2 Slope

The slope of the site is constraining to the disposal of wastewater via ETA beds as 15% is the recommended maximum slope for their use. The proposed disposal area has been chosen to allow for a passive, gravity fed OSMS but does has slopes greater than 15%, being about 18 % however, it is considered that special design requirements are not required and that standard ETA width of 2 m is suitable for this site.

In Council's Strategy Section 5.3 outlines the guiding principles for designing an OSMS. Selecting a passive low-tech design is given as the first principle, hence although a slope of greater than 15% is present in the proposed disposal area, the use of ETA beds is still considered as the first preference for providing wastewater disposal.

WASTEWATER MANAGEMENT

The characteristics of the wastewater coming from the proposed development are described in this section.

1.5 Volume of Effluent

Table B1 of the Lismore On-Site Sewage and Wastewater Management Strategy shows that a household with standard water saving devices on a reticulated water supply has a predicted hydraulic loading of 150L/person per day. Hydraulic loading for the number of people is calculated per dwelling as the number of bedrooms plus one person. It is assumed that a 5 bedroom dwelling could be constructed at the site.

Therefore, the predicted volume of wastewater is:

- Potential Five-bedroom dwelling (150L/person/day x 6 people) = 900 L/day

Therefore, the total hydraulic loading the proposed OSMS is designed to manage is **750 L/day.**

1.6 Nutrient Loadings

The Environment and Health Protection Guidelines (1998) state that wastewater disposal systems are to be designed on the most limiting factor of either hydraulic, BOD or nutrient loadings. The nutrients of concern include phosphorus and nitrogen.

1.6.1 Nitrogen

The expected chemical forms of nitrogen include ammonia, nitrite and nitrate. Prior to treatment, the main source of nitrogen will be ammonia, however through the wastewater treatment system process, denitrification will occur leading to nitrite then nitrate generation. Nitrate is readily taken up by plants although it is very mobile, and will move through the soil profile and has the potential to leach to groundwater.

Total Nitrogen (TN) Generated 4.2kg/person/year

Using a 65 % TN reduction for the subsurface flow wetland allows for a reduction of BOD to 20 mg/L due to the size of the subsurface flow wetland required, being 22.4 m2 (assuming wetland height of 0.6 m). This surface area would require four Graham's concrete wetland cells of 7.2 m2 each, however, allowing for only 3 Graham's concrete wetland cells would achieve a surface area of 21.6 m2 and allow for 63 % TN reduction, and theoretically reduce BOD to 22 mg/L.

The 63% reduction is 2% lower than the generic 65% TN reduction and achieves a theoretical reduction of 22 mg/L BOD versus 20 mg/L and both of these comparisons are considered insignificant. Although Four subsurface flow wetland cells can be accommodated at this site, it is considered that three subsurface flow wetland cells would treat the wastewater adequately from a 5 bedroom house, with no significant reduction in nutrients or BOD gained from having an additional wetland cell. It is considered that the 2% reduction to TN removal is negligible in terms of creating risks of nutrient movement off-site. This is particularly true as the disposal area is sized based on hydraulics which required a larger footprint than nutrient loadings.

1.6.2 Phosphorous

The forms of phosphorous within the wastewater post treatment within the septic tank are orthophosphate, polyphosphate and organic phosphate. EPA (1995) states that the orthophosphates are available immediately for biophysical reactions in the soil/plant system, the availability of polyphosphates is limited by their hydrolysis which proceeds very slowly in most soils. Organic phosphates are broken down biologically to polyphosphates and then to orthophosphates. Phosphorous is removed from effluent through biological, chemical and physical process in soil, with minor uptake by vegetation.

TP Generated 0.52kg/person/year

No reduction has been provided for the loss of TP through the septic tank or wetland cells, although some may occur.

ON-SITE DISPOSAL OF WASTEWATER

The potential on-site wastewater management location is situated in the cleared area of the site, below the southern most shed. This location achieves the required setbacks and is the most suitable on the site.

1.7 Disposal Area

In order to ascertain the size of the disposal area required, the Lismore City Council On-Site Wastewater Model (single rural households) (2014) was used. This model determines the required area in accordance to the most limiting factor, being nitrogen, phosphorous or hydraulic loadings.

Based on the Lismore City Council On-Site Wastewater Model (single rural households) using the following parameters:

- Block of 18000 m^2;

- Buffers achieved from water courses;
- 150L/person/day for water conserving devices and reticulated water supply;
- 6 people;
- Total wastewater flow of 900 L/day;
- Partial secondary treatment via reedbeds;
- 65% Nitrogen removal;
- Evapotranspiration/absorption beds for land application;
- Depth of gravel layer in ETA bed increased to 300mm;
- Red basaltic soils;
- Depth to water table or bedrock 3m;
- Light clay strongly structured soil;
- LTAR of 12mm/day.

The area required for each of the loadings is as follows:

Area Required for Hydraulics:	**86.1 m²**
Area Required for TN:	0.0 m²
Area Required for TP:	60.0 m²
Area for reed beds:	22.4 m²

Hence the size of the disposal field required is to be 86.1 m² which will be provided by the installation of ETA beds.

1.8 Septic Tank

A septic tank is proposed for providing primary treatment for all the wastewater generated on the dwelling and shop. Table A1 of Council's strategy (2013) states that for an 'all wastewater' flow and 1 to 5 persons a minimum septic tank volume of 4500L is required. It is recommended that a 5000L NSW Ministry of Health approved septic tank will be installed to meet the septic tank requirements at the site. The septic tank is to be fitted with an outlet filter to improve performance.

1.9 Subsurface Flow Wetland

A wetland treatment area of 22.4m² has been used for the modelling of the wastewater management system and it is recommended that **four** Grahams Concrete wetland cells are used to provide the required wetland treatment area. As these cells are 3m x 2.4m x 0.8m a total surface area of 22.4m² will be provided. Construction of each wetland cell is to be in line with the following:

In general, blue metal aggregate will be placed within the wetland to a height of 0.7 m and the inlet will be set at a height of 520mm, and outlet of 500mm;

- The inlet area should contain coarse gravel/cobble with a diameter of 40mm to 60mm, the remainder of the bed should consist of gravel or aggregate of between 10 - 20mm in diameter. The gravel will create a substrate for plants and will provide for filtering of wastewater before entering the land application field.
- The media should be washed before placing in the cells to dispose of any fines that may cause components of the trough to clog.

- The wetlands are to be planted with soft tissue macrophytes such as *Phragmites australis* (common reed) and sedges or similar species, a species list is contained in **Exhibit No. 3**.
- The required fall of the Subsurface Flow Wetland was determined through Manning's Equation as less than 0.01% slope. It is proposed that the slope of the bottom of the bed will be **0.1%**.
- height control mechanism shall be installed in the wetland cell to allow the reduction of the water level within the wetland cell by 200mm. A detail of a standard level control mechanism is provided in **Exhibit No.4**, other mechanism styles may be used dependent on the approval of council officers or this office.

Exhibit No. 4 presents construction details and cross sections of the wetland.

1.10 EvapoTranspiration/Absorption Beds

The pipe layout of the beds is briefly described as follows in accordance with ETA Bed Design 2 provided in the Lismore City Council On-Site Sewage and Wastewater Management Strategy. Exhibit No. 5 presents a cross section of the ETA bed design sourced from the strategy. Using the Lismore City Council On-Site Wastewater Model (single rural households), it is determined that **three** ETA beds are required, being 14.3 m in length, 2 m in width and 0.45 m in depth on the lower wall.

- The soils within the evapotranspiration/absorption beds should be removed to a depth of 0.45m on the lower wall.
- The base of the trench is to be ripped prior to filling to provide greater absorption in to the soil profile.
- A base of 50mm gravel is to be placed in the bed.
- A 250mm trench arch is to be placed down the centre of the bed.
- 20mm diameter gravel is to be placed on the base of the bed and over the trench arch to a height of 300mm.
- The 100mm diameter slotted pipe is to be installed centrally within trench arch.
- The trench gravel is then to be covered by geotextile fabric to prevent root intrusion into the pipe.
- The original site soil is then to be adequately disturbed and broken up prior to backfilling in the trench.

Normally the trench is to have a mounded shape, which will enable shedding of rainwater however, it is considered due to the slope of the site a minor terrace will be formed by the installation of the ETA bed. A catch drain is to be installed above the land application area to divert surface water from flowing into the land application area.

1.11 Suspended Solids

Suspended solids will be reduced due to the use of a baffled septic tank for primary wastewater treatment and an effluent filter is required to be installed on the outlet. Further filtration of suspended solids will occur within the wetlands.

MAINTENANCE PLANS

The following is a maintenance check list to be undertaken by the client.

1.12 General

- Bleach, bleach-based products, whiteners, nappy soakers and spot removers shall not be disposed of into the on-site system. They shall be disposed of on a disused area of a garden, well away from the disposal area.
- Hygiene products, condoms, tampons, sanitary napkins, disposable nappies and cotton buds shall not be disposed of via the on-site disposal system. They should be disposed of into garbage bins in sealed plastic bags.
- Only the recommended amounts of disinfectants should be used. Biodegradable products for septic systems are recommended.

1.13 Septic System

The septic tank should be regularly checked and is to be pumped every 3 to 5 years or as required, with wastes being removed by a licensed septic pumping company. At this time the effluent filter should also be cleaned.

1.14 Plan of Management for the Subsurface Flow Wetland

It is proposed that the system be checked regularly for adequate plant growth, that plants have no signs of disease and there is a full vegetated cover in the system. Revegetation of wetland cells is required if vegetation dieback occurs. Plants should be cutback at least every three months. Up to 1/3 of the plant material can be removed which will encourage new plant growth which will in turn encourage additional uptake of water and nutrients.

Checking for blockages near the inlet and outlet of the system should be undertaken regularly, such as every three months. Gravel around the inlet and outlet can become clogged over time leading to surface ponding and surcharging from the wetland cells. If this occurs gravel will require replacement or removal and washing before being reinstated. Gloves should be worn when cleaning the system.

1.15 ETA beds

The disposal system is designed in a manner that will allow the system to be maintained and repaired quickly if part of the system happens to fail.

- Runoff diversion banks to be inspected annually and maintenance as required undertaken to ensure that surface runoff is diverted around each of the disposal areas;
- No vehicular, stock or regular pedestrian access should be made across the disposal field.
- Vegetation will be harvested frequently up to 2 times a year can be undertaken, this will encourage regrowth and in turn will increase uptake of nutrients and water;
- Plant clippings shall be removed from the site to decrease amount of nutrients returning to the wastewater system;
- Effluent from disposal system should not be discharged to the stormwater system or over the ground;
- The effluent distribution pipes are to be inspected for blockage etc. when the aggregate is cleaned and flush cleaned or replaced as required.

Some signs of the disposal system failure are listed below, if any of these occur contact the plumber who installed the system and arrange for immediate pump out of the septic tank to relieve the need for effluent disposal to the disposal area.

- Surface ponding and run-off of treated wastewater;
- Degradation of soil structure - eg. sheet and rill erosion, surface crusts, or hard surfaces are evident;
- poor vegetation growth;
- Unusual odours.

CONCLUSION

This report describes has determined that the site has the capacity for a dwelling to be serviced by an on-site wastewater management system. Assumptions have been made of allowing for a five bedroom dwelling to be constructed and having a passive wastewater management system in accordance with the Lismore City Council On-Site Sewage and Wastewater Management Strategy (2013) and it is concluded that there are no restrictions at the site to accommodate a dwelling and on-site wastewater management system.

A development application will need to be lodged for a future dwelling at the site, with the accompanying s68 on-site wastewater management application to detail the specific requirements of the wastewater management system for the proposed dwelling.

References

Australian Standard AS 1547 - 2012 *Onsite Domestic Wastewater Management.*

Environment Protection Authority, Dept. of Local Government, Department of Land & Water Conservation and NSW Department of Health (1998). *Environment and Health Protection Guidelines - On-Site Wastewater Management Systems for Domestic Households*.

Lismore City Council (2013). *On-Site Sewage and Wastewater Management Strategy*. Lismore City Council Planning and Development Group mew model Jan 28, 2005.

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

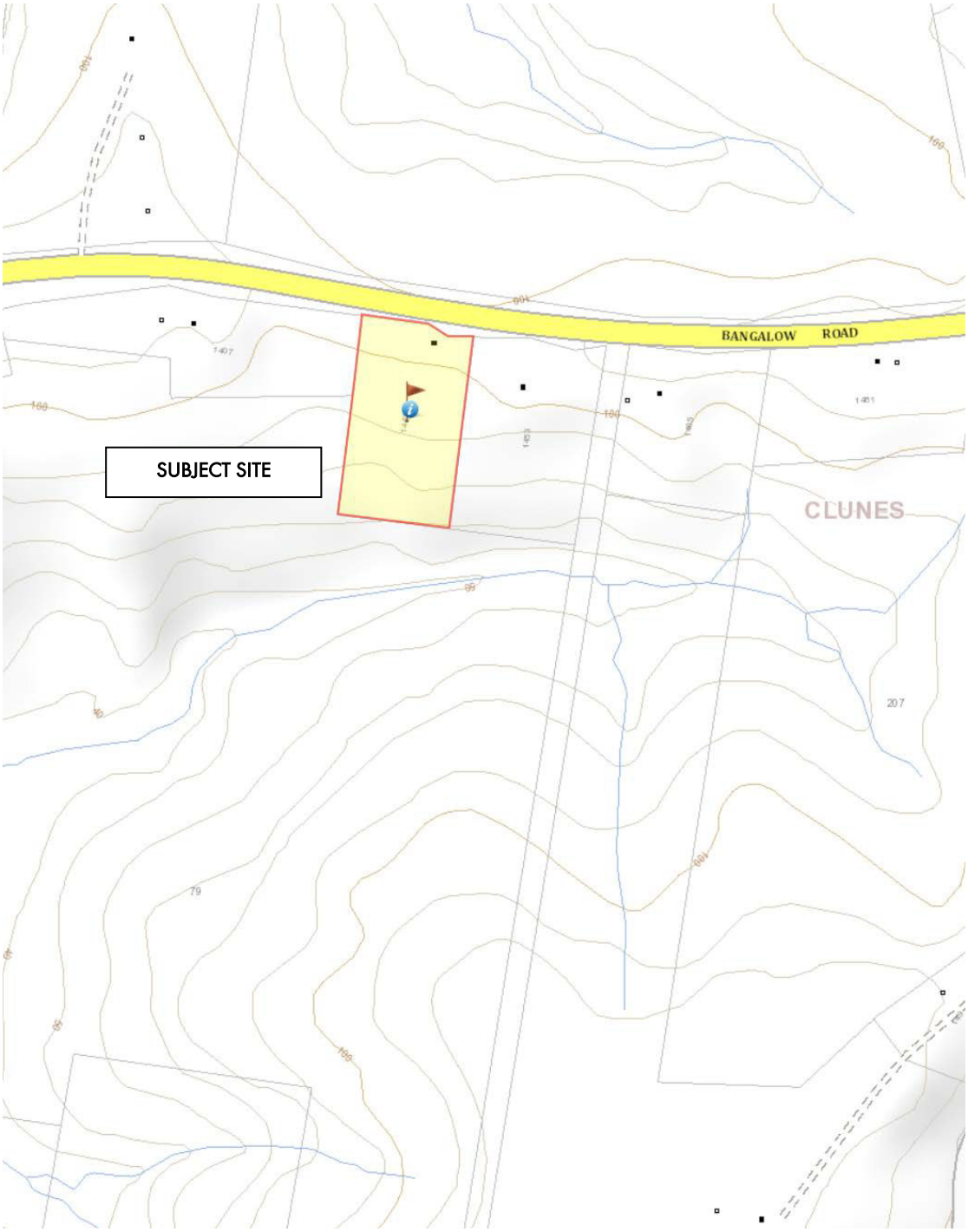
End of Report

Greg Alderson & Associates

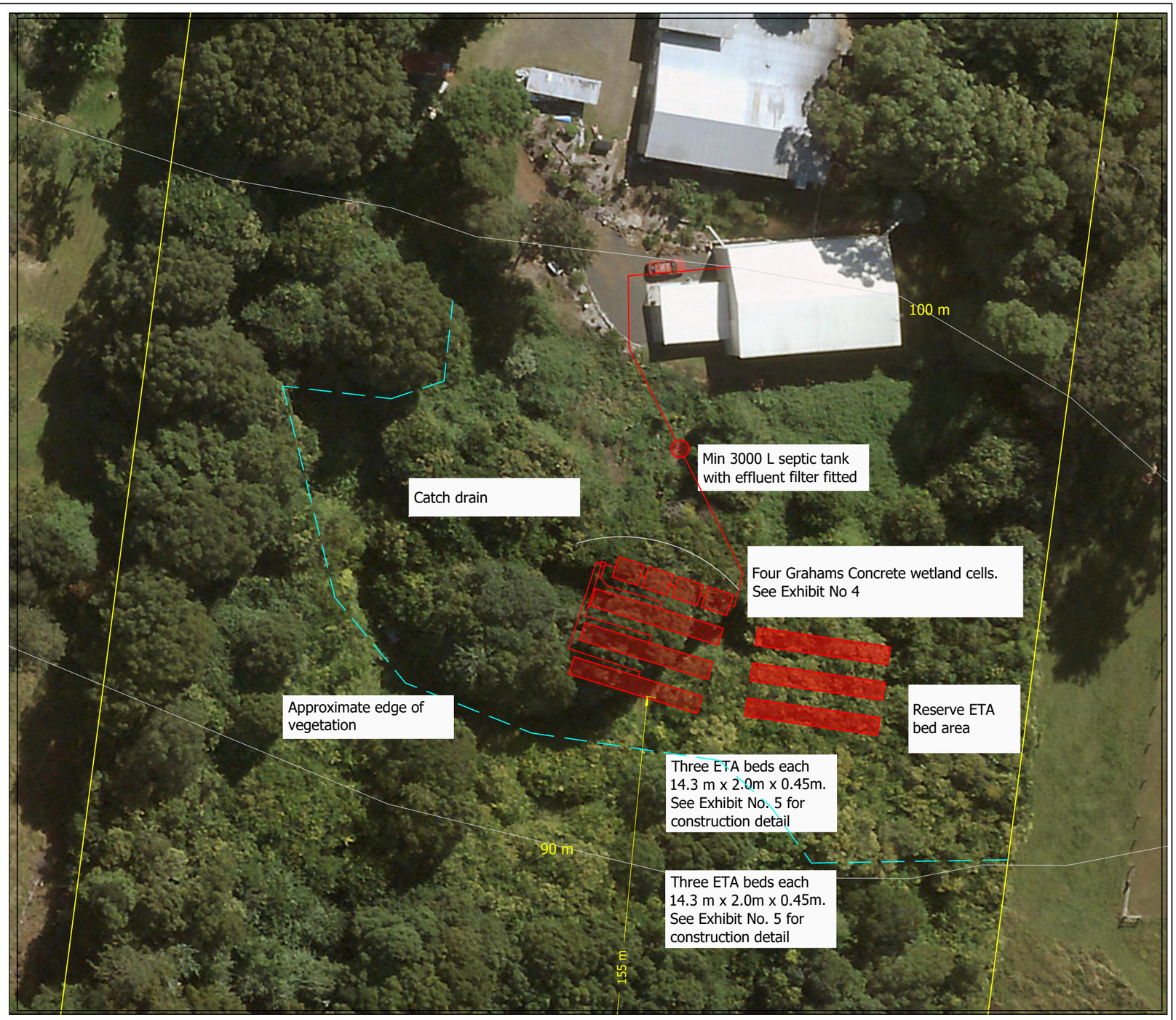
Chartered Professional Engineers

OSMS Model spreadsheet

Exhibit No. 3



Source: NSW LPI Spatial Information Exchange (2021) Date July 16, 2021 Project No. 21484_ww.docx Scale: NTS	GREG ALDERSON AND ASSOCIATES ABN 58 594 160 789 43 Main Street, Clunes NSW 2480 Phone: (02) 6629 1552 Email: office@aldersonassociates.com.au	Exhibit No. 1. SITE LOCATION Lot 1 DP 832781, 1443 Bangalow Road , Clunes



Wastewater Upgrade Notes:

Design based on the potential of the site supporting a five bedroom dwelling. System components would consists of:

1. Septic tank of minimum 3000L capacity
2. Four Graham's Concrete wetland cells, each 7.2m² to treat wastewater from the septic tank. See detail.
3. Three evapotranspiraion/absorption beds each 14.4 m in length, 2.0m wide. See detail. With 2.0m separation.
4. Catch drain to be maintained above disposal field.
5. A future DA for a dwelling will require a S68 application to be lodged for on-site wastewater

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Client: s. Hans and J. Clemmett

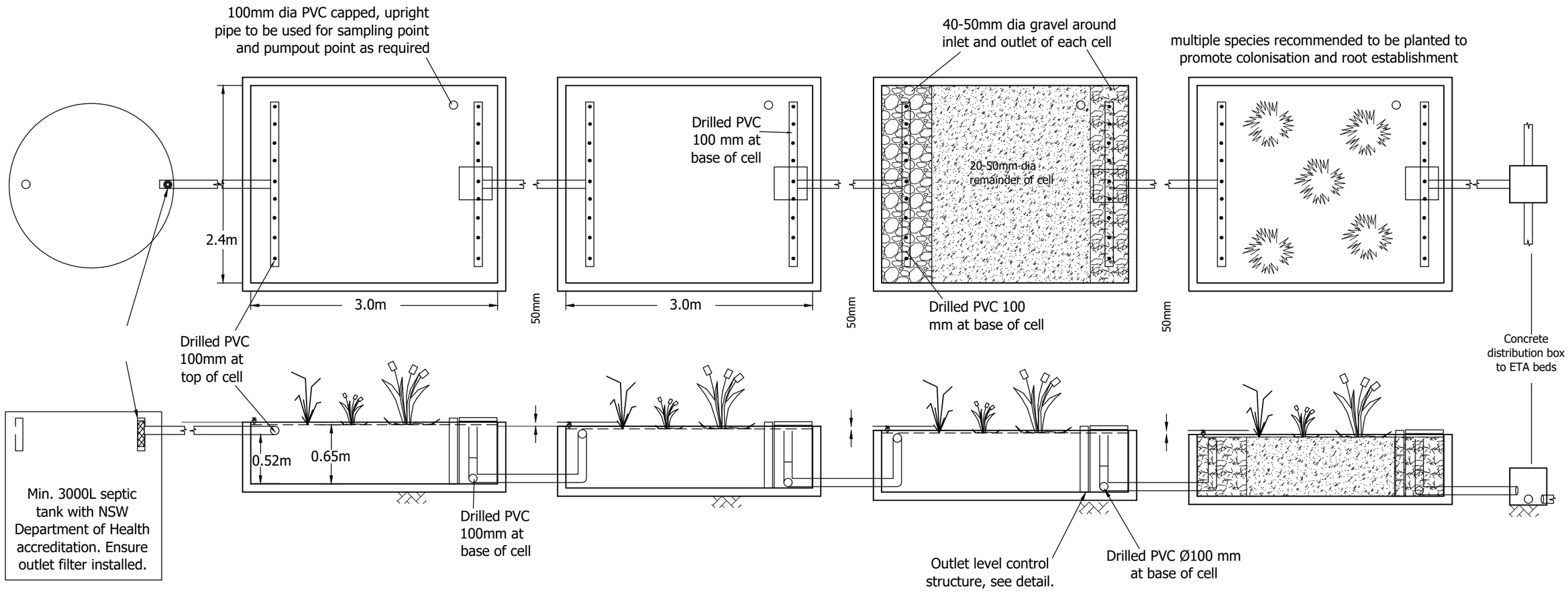
Site address: Lot 1 DP 832781
1443 Bangalow Road, Clunes

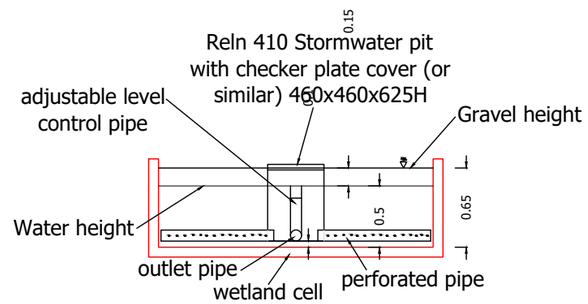
PROPOSED WASTEWATER MANAGEMENT SYSTEM

Drawn: WA	Source: SIX Spatial, Metro Maps	EXHIBIT NO: 2	Date: 12-7-21
Scale: 1:400	Original Size: A3	Project: PLANNING PROPOSAL	Revision: -
Job Number: 21484			

Species suitable for wetland cells

Grasses /Reeds/Groundcovers	
Alocasia brisbanensis	Cunjevoi
Baumea acuta	Sedge
B. articulata	Sedge
B. juncea	Sedge
B. nuda	Sedge
B. rubignosa	Sedge
B. teretifolia	Sedge
Brachyscome diversifolia	Native Daisy
Carex appressa.	Tussock Sedge
Cyprus spp.	Sedge
Juncus articulatus	Jointed rush
J. polyanthemos	Sedge
J. prismatocarpus	Sedge
J. usitatus	Common rush
Lomandra longifolia	Lomandra
Phragmites australis	Bull Rushes
Schoenoplectus spp.	Sedge





A-A Water Level Control Box Detail

1. Installer to ensure all fittings are watertight.
2. Interchangable pipe lengths to allow water level reduction of 200mm.
3. Ensure box is set on a stable base.
4. Ensure top of box is above the gravel level within the wetland cell.

Reedbed Notes:

1. Prefabricated concrete cells to be positioned with fall of less than 0.1% from inlet to outlet of each cell.
2. Each cell to be positioned 50mm below previous cell.
3. Distribution of wastewater at top of bed using slotted Ø100mm PVC pipe.
4. Concrete prefabricated cells recommended and depicted in drawing shown.
5. Pump out of wetlands facilitated through PVC inspection points in each bed.
6. Water height in each cell is to be set below gravel surface to ensure water is not contactable.
7. distance between cells can be determined on site.
8. 4-8 plants to be planted per cell.

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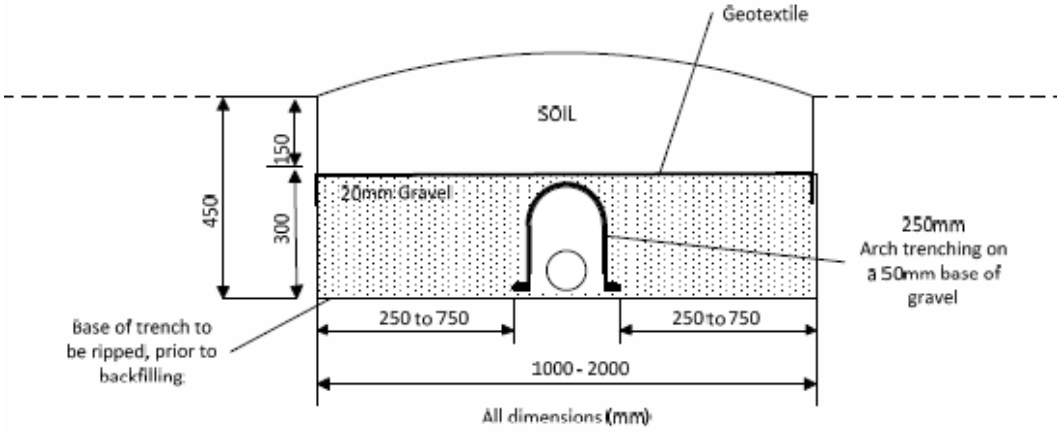
SUBSURFACE FLOW WETLAND DETAIL

Drawn: WA	Source:	EXHIBIT NO: 4	Date: 12-7-21
Scale: NTS	Original Size: A3	Project: PLANNING PROPOSAL	Revision: -
Job Number: 21484			



DESIGN 2
EVAPO-TRANSPIRATION AND ABSORPTION (ETA) BED

NOT TO SCALE

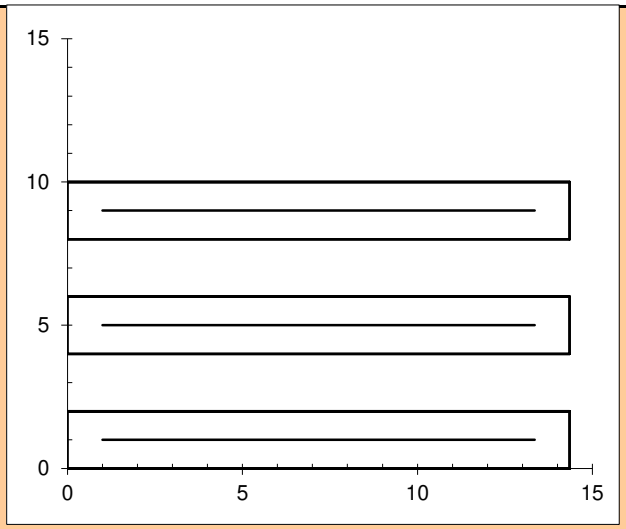
- ETA Beds are to be centrally fed
- Maximum bed length is 20m
- Only suitable on slopes less than 15%
- ETA Bed is to be grassed
- Vehicles and livestock are to be excluded from ETA Bed area
- Base of the ETA Bed must be level and ripped prior to backfilling
- Swales/bunds/diversion drains must be used to prevent run on/run off
- Sites with heavy clays/puggy or sandy soils will require special design features

GREG ALDERSON AND ASSOCIATES ABN 58 594 160 789 43 Main Street, Clunes NSW 2480 Phone: (02) 6629 1552 Email: office@aldersonassociates.com.au			Drawing Title: **EVAPOTRANSPIRATION/ABSORPTION TRENCH DETAIL** Lot 1 DP 832781, 1443 Bangalow Road , Clunes	
Design: Lismore City Council (2013)	Drawn:	Date: 16/07/2021	Project No. **21484_ww.docx**	Sheet No. **Exhibit No. 5.**
Scale: nts	Datum: N/A	Approved:		

Lismore CC On-site Wastewater Model (Single Rural Households)
OSmodel300614.xls Printed 15-7-2021

		Default	User-defined
Client			
Address	1443 Bangalow Road Clunes		
Site	Block size (m2)		18000
	Buffer (m) from land application area to gully	>40	
	Water (L/p.d) from Reticulated + full water saving devices	150	
	Persons		6
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components per system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	900	
Treatment system	Secondary: Reed bed		
	Nitrogen removal % (reed bed BOD outlet conc=20 mg/L)	65%	
	Wetted depth of reed bed (m)	0.5	0.6
	Reed bed area if different from calculated (m2)		
Land application	Land application type ETA beds	Slope%	
	Depth of soil above gravel layer (= root zone) (mm)	150	
	Depth of gravel layer (mm)	250	300
Soil information	Morand code Red Basaltic Soils = bg, co, el, ew, mb, ro, wo		
	Phosphorus sorption (kg/ha.m)	10000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure Light clays - strongly structured		
	Maximum deep drainage rate (mm/d)	12	
Area calculations	Hydraulic area (m2)	86.1	
	Nitr. area (m2) [N perc.granted/plant.avail:14.93 / 7.13kg/yr]	0.0	
	Phos. area (m2)	60.0	
	Required land application area (m2)	**86.1**	
	Reed bed area (m2)	22.4	
	Reed bed hydraulic retention time (days)	6.0	

Rectangular Trench Layout



		Default	User defined
Land Application Area (LAA) (m2)		86.1	
Number of trenches		3	
Trench width (m)		2.0	2.0
Trench separation (m)		2.0	2.0

List of dimensions

Trench length (m)	14.3
Trench width (m)	2.0
Number of trenches	3
Trench separation (m)	2.0
Trench area / LAA (m2)	86.1
LAA including trench separation: length (m)	as for trench length
LAA including trench separation: width (m)	10.0
LAA including trench separation: area (m2)	143.5

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