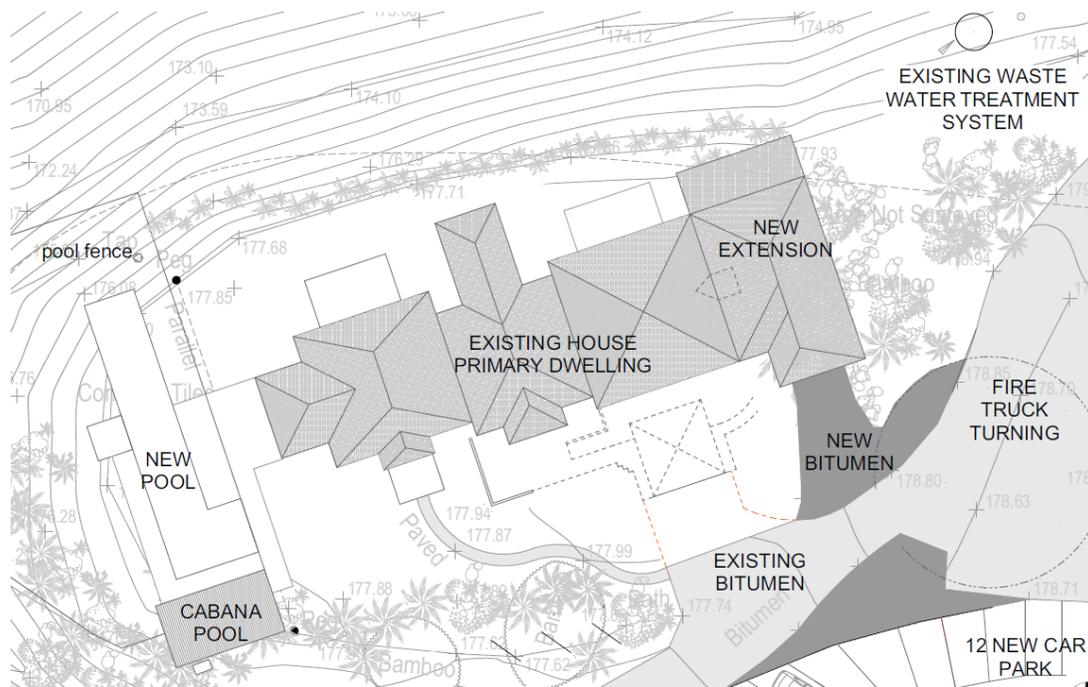




On-Site Wastewater Management REPORT FOR

Additions and alterations to existing dwelling at 461 Goonengerry Rd, Montecollum (Lot 2 DP1231141)



The purpose of this report is to address wastewater treatment and disposal matters to assist Council in determining the s68 Application

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FOR: Tania De Jong & Peter Hunt

REPORT NO: 2303-11
Date: 1 July 2023

EXECUTIVE SUMMARY

North Coast Wastewater Solutions (NCWS) was commissioned by the property owner to investigate and assess the condition and capacity of the existing on-site sewage management (OSSM) system, and if required design suitable upgrades of the OSSM system, to service a proposed dwelling extension at 461 Goonengerry Rd, Montecollum, Lot 2 DP1231141.

The existing dwelling has 4 bedrooms and is proposed to be extended to 7 bedrooms. The dwelling is currently serviced by a primary treatment septic tank with unknown land application area.

The investigations included desktop studies, site and soil evaluation and design of a suitable OSSM system to service the proposed dwelling based on the expected wastewater load and site constraints.

Assessment Summary

An assessment of the existing OSSM system servicing the dwelling at 461 Goonengerry Rd, Montecollum was undertaken by NCWS on 17 June 2023. The OSSM system comprises a septic tank and absorption trench disposal area. However, the location and size of the absorption trenches is unknown.

There were no signs of failure or effluent discharge however the house was vacant at the time of inspection with no loading on the system. Given the damage to the distribution box it is possible and likely that the absorption trenches may be blocked and effluent could discharge above ground under normal loading conditions.

The existing primary treatment septic system is undersized to service the proposed extended dwelling. Generally, dwellings larger than 4 bedrooms require a secondary treatment system be provided for on-site sewage management in the Byron Shire due to the excessively large land application requirements needed for a primary treatment system.

The most cost-effective option is to replace the existing OSSM system with a secondary treatment OSSM system. The design of the upgraded system is detailed in this report.

Site Constraints

The key constraints on the subject property include slope, proximity to groundwater bores, minor upslope run-on potential and drinking water catchment. Site photos are included in Appendix A.

| Site Constraints | Description | Comment/Management Response |
|---------------------------------|---|--|
| Slope | Proposed land application area (LAA) has slope of 18% | Minor limitation. LAA to be conservatively sized. ETA beds to be terraced into slope with suitable batter as per detailed cut plan. |
| Groundwater Bores/Wells | A search of the Bureau of Meteorology (BOM) Australian Groundwater Explorer identified two bores (GW308187, GW307458) associated with the neighbouring Crystal Castle within 250m of the proposed land application area | The proposed effluent land application area has been located as far west from the reported bore location as possible at approximately 180m setback. Secondary treatment with disinfection will be adopted to mitigate the risk of contamination of the groundwater source. |
| Run-on/Upslope Seepage | Minor run-on potential | A shallow drain to be constructed on the upslope side of the land application area |
| Drinking Water Catchment | Within Wilson River drinking water catchment | Assessed suitability of proposed system against Rous Water guidelines as MEDIUM – refer Section 3.2. No referral to Rous Water required. |

Soil Constraints

The most limiting soil layer in the boreholes for wastewater disposal is a **strongly structured light clay (Category 5)** which occurs from 300mm below surface in the proposed land application area. The adopted Design Loading Rate (DLR) for secondary treated effluent is 12mm/day.

There were some coarse fragments present but not in sufficient quantity or size to impede the flow of water into the soil. The pH is within the suitable range for effluent disposal and it is recommended lime to be added to the soil at the base of the land application area at the time of construction at a rate of 1kg/m² to maintain the pH above 5.5. The soil is not dispersive.

There was no evidence of springs or groundwater. Bedrock is assumed to be 3m deep. Groundwater is assumed to be at least 5m below surface.

OSSM System Design

The proposed dwelling has 7 bedrooms and is supplied with rainwater. The number of equivalent persons (EP) in the dwelling for the purposes of wastewater loading, is taken to be the number of bedrooms x 1.5. A wastewater allowance of 115L/person/day has been adopted which is in accordance with the Byron OSSM Strategy.

| OSSM System | Bedrooms | EP | Effluent Volume (L/day) |
|--------------------|----------|------|-------------------------|
| 7 bedroom dwelling | 7 | 10.5 | 1207.5 |

An Aerated Wastewater Treatment System (AWTS) and ETA beds have been adopted to provide a robust, low profile and cost-effective solution for effluent disposal and to address the site and soil constraints.

Sizing of the land application area is shown in the table below.

| OSSM System | Water Balance (Hydraulic) (m ²) | Nitrogen (m ²) | Phosphorus (m ²) |
|--------------------|---|----------------------------|------------------------------|
| 7 bedroom dwelling | 148 (158 capped) | 0 | 124 |

The Byron Shire Council OSSM Model requires an ETA bed area of 117.55m² using three ETA beds to meet the land application area requirements for the dwelling. This allows for 300mm lateral seepage to achieve the land application area. **The adopted size of the ETA Beds will be 120m².**

The wastewater management systems required to treat and dispose of the hydraulic and nutrient wastewater loads is as follows:

- Ozzikleen RP10A+ AWTS
- Three ETA beds measuring 20m x 2m each (120m²)

Wastewater model results are included in Appendix B. Refer to design plans included in Appendix D.

Summary

The proposed OSSM system constructed in accordance with the design plans and detail provided in this report and maintained in accordance with the operation and maintenance guidelines will provide a suitable wastewater management system for the proposed extended dwelling at 461 Goonengerry Rd, Montecollum, Lot 2 DP1231141, that is consistent with the performance objectives of the Byron Shire Council On-Site Wastewater Management Strategy (2001) and AS1547:2012.

Prior to installation, the proposed on-site sewage management system must be approved by the local Council. The property owner is to lodge a *Section 68 Application for Approval to Install* the on-site sewage management system to their local Council to seek this approval.

OWNERS ACKNOWLEDGEMENT

I _____, the owner of 461 Goonengerry Rd, Montecollum,
have read and understood the requirements of this report, understand the general
operating concepts and physical attributes of the proposed wastewater management
systems being nominated and agree to undertake the operation and maintenance schedule
contained in this report.

Signed: _____ Date: _____

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1. INTRODUCTION

North Coast Wastewater Solutions (NCWS) was commissioned by the property owner to investigate and assess the condition and capacity of the existing on-site sewage management (OSSM) system, and if required design suitable upgrades of the OSSM system, to service a proposed dwelling extension at 461 Goonengerry Rd, Montecollum, Lot 2 DP1231141.

The existing dwelling has 4 bedrooms and is proposed to be extended to 7 bedrooms. The dwelling is currently serviced by a primary treatment septic tank with unknown land application area.

The investigations included desktop studies, site and soil evaluation and design of a suitable OSSM system to service the proposed dwelling based on the expected wastewater load and site constraints. Figure 1 below shows the location of the property.

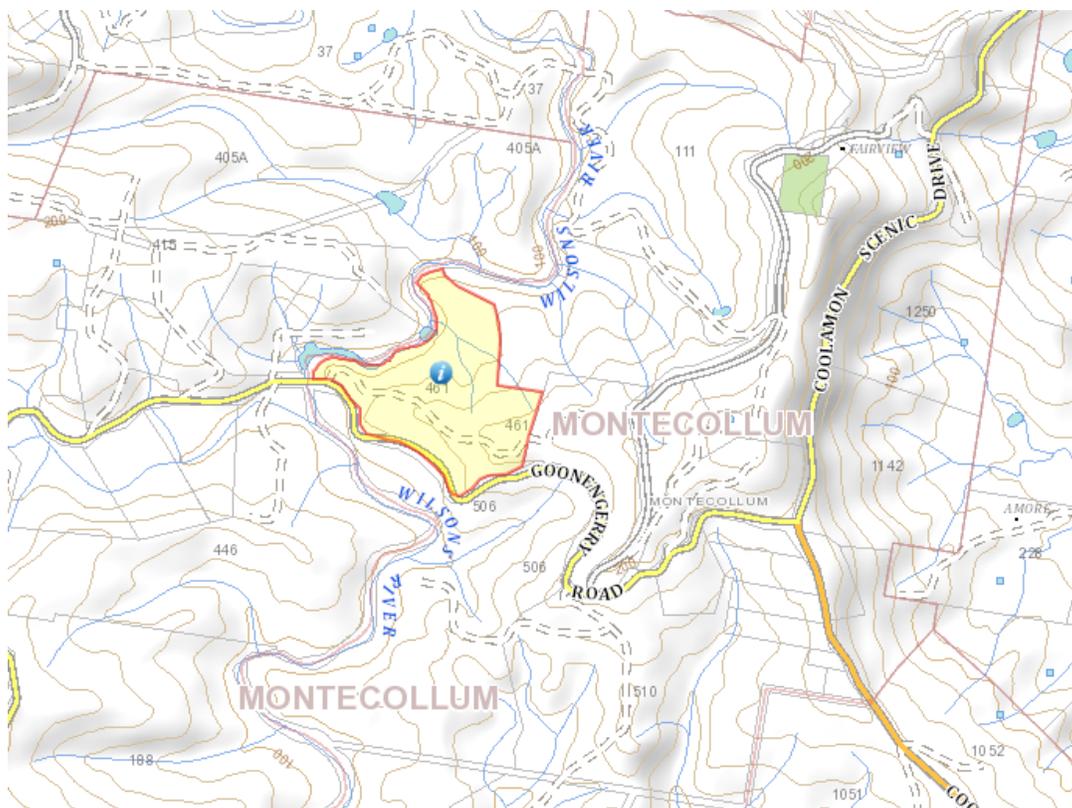


Figure 1 - Location map (source: SIX MAPS)

The on-site wastewater management system has been assessed and upgrades designed in accordance with the Byron Shire Council On-Site Sewage and Wastewater Management Strategy (2001), Australian Standard AS1547-2012 On-Site Domestic Wastewater Management and the NSW Government guidelines On-Site Sewage Management for Single Households (1998) (“Silver Book”).

Figure 2 below presents the lower and upper floor plans of the proposed extended dwelling.

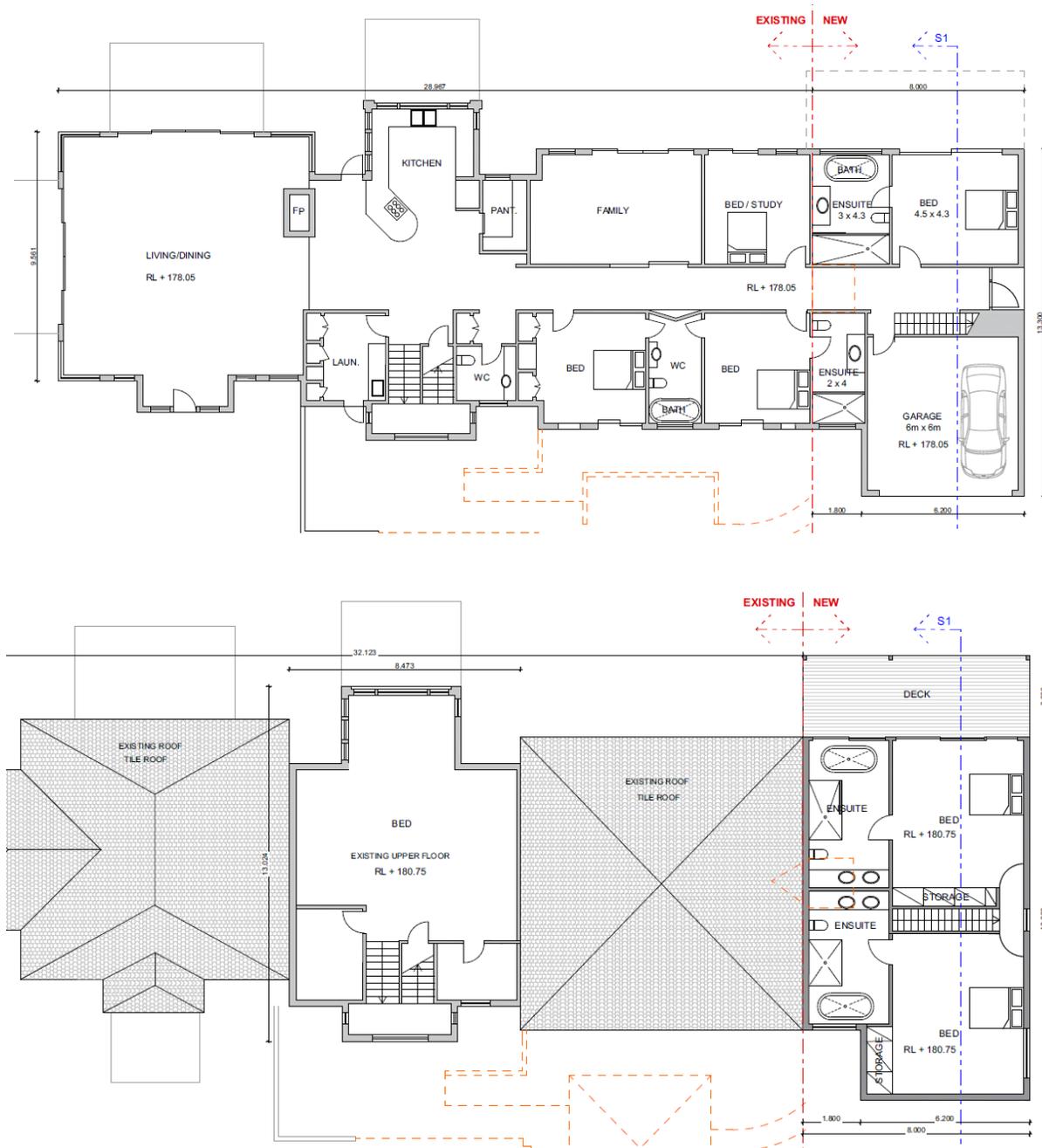


Figure 2 – Lower and upper floor plans (source: Drew Heath Architect Associates)

2. ASSESSMENT OF EXISTING OSSM SYSTEM

2.1. Details of Existing OSSM System

The existing OSSM system servicing the dwelling at 461 Goonengerry Rd, Montecollum was inspected by NCWS on 17 June 2023.

The OSSM system comprises a septic tank, distribution box and absorption trenches. The septic tank is in relatively good condition with only minor issues observed. The distribution box was broken and full of dirt.

The absorption trenches were unable to be located however an extensive search of the area downstream of the septic tank and within the tree line identified no signs of failure or discharge. However it is noted the house was vacant at the time of inspection with no loading on the OSSM system so the system performance has not been assessed under load.

An approximate layout of the existing system is shown below in Figure 3.



Figure 3 – Diagram of existing OSSM system (aerial image: NCWS 17.06.23)

2.2. Assessment of Existing OSSM System

Table 1 below details the assessment of the OSSM system servicing the property. Photos of the existing OSSM system are shown in Appendix A.

Table 1 - Assessment of Existing OSSM System

| | |
|---|--|
| Inspection Date | 17/06/2023 |
| Recent Weather | Mild/sunny. Nil rain in previous week |
| Type of treatment system | Septic tank |
| Type of Land Application Area (LAA) | Absorption trench (assumed) |
| OSSM System Inspection | Observations |
| SEPTIC TANK (complete for septic tanks only) | |
| Estimate volume of septic tank > 1800L | 5000L |
| Does tank have T or baffled outlet? | Yes |
| Does tank have effluent filter? | No |
| Does tank have T or baffled inlet? | Yes |
| Does tank need a pump out? (check sludge and scum levels) | No |
| Are pumps and float switches working? (if applicable) | n/a |
| Is high level alarm working in pump well (if applicable) | n/a |
| GENERAL | |
| Condition of tank/above ground components | Septic tank in good condition |
| All system components >100mm above ground? | Yes |
| Are there any cracks in system? | No |
| Are lids and inspection points intact, accessible and insect proof? | Yes |
| Any roots inside system? | None observed. |
| Any signs of overflow from system inlet or outlet? | None observed |
| Is there any pipework exposed? | No |
| LAND APPLICATION AREA | |
| Check distribution box/indexing valve working correctly (if applicable) | Distribution box damaged and full of dirt |
| Was wastewater discharging above ground from LAA? | None observed. However may be possible given state of distribution box |
| Degradation of soil – erosion/crusts? | No |
| Poor vegetation growth? | No |
| Unusual odours? | None observed |

| | |
|--|--------------------|
| Wastewater backing up? | No reported issues |
| Waste drains gurgling from air? | No reported issues |
| Other comments? | nil |
| System performing satisfactorily? | No |

2.3. Assessment Summary

An assessment of the existing OSSM system servicing the dwelling at 461 Goonengerry Rd, Montecollum was undertaken by NCWS on 17 June 2023. The OSSM system comprises a septic tank and absorption trench disposal area. However, the location and size of the absorption trenches is unknown.

There were no signs of failure or effluent discharge however the house was vacant at the time of inspection with no loading on the system. Given the damage to the distribution box it is possible and likely that the absorption trenches may be blocked and effluent could discharge above ground under normal loading conditions.

The existing primary treatment septic system is undersized to service the proposed extended dwelling. Generally, dwellings larger than 4 bedrooms require a secondary treatment system be provided for on-site sewage management in the Byron Shire due to the excessively large land application requirements needed for a primary treatment system.

The most cost-effective option is to replace the existing OSSM system with a secondary treatment OSSM system. The design of the upgraded system is detailed in this report.

3. SITE ASSESSMENT

3.1. Site Characteristics

A desktop study and site assessment of the proposed effluent land application area was undertaken to assess constraints and other environmental factors relating to on-site sewage treatment and disposal. Table 2 below provides a summary of the desktop study and site assessment and highlights specific limitations. Further discussion and review of specific limitations follows. Site photos are included in Appendix A.

Table 2 – Results of desktop study/site assessment

| Property Details | | | | |
|---------------------------------|---|---|---|---|
| Address | 461 Goonengerry Rd, Montecollum | | | |
| Title | Lot 2 DP1231141 | | | |
| Lot size | 17.06ha | | | |
| Date of site assessment | 17/06/2023 | | | |
| Recent weather conditions | Mild/sunny. Nil rain in previous week. | | | |
| Site Feature | Limitation Guideline | | Description | Comment/Management Response |
| | No limitation | Limitation | | |
| Slope | <15% | >15% | Proposed land application area (LAA) has slope of 18% | Minor limitation. LAA to be conservatively sized. ETA beds to be terraced into slope with suitable batter as per detailed cut plan. |
| Landform | Divergent (drainage-spreading) land shape e.g. hill crests | Convergent (drainage-concentrating) land shape | Divergent ridge | No limitation |
| Exposure/Aspect | Facing within NW or NE quadrant, and high sun-wind exposure | Facing within SW or SE quadrant, and sheltered from sun-wind | Northern aspect with good sun and wind exposure. | No limitation |
| Watercourses and Drainage Lines | >100m to perennial and intermittent watercourse >40m to gullies | <100m to perennial and intermittent watercourse <40m to gullies | Watercourse – >100m to closest watercourse | No limitation |

| | | | | |
|---|---|---|---|--|
| | | | Gullies – >40m from closest gully | |
| Groundwater Bores/Wells | > 250m to downstream or cross-gradient domestic groundwater well, and at least 50m from upstream groundwater well. | < 250m to downstream or cross-gradient domestic groundwater well, and at least 50m from upstream groundwater well. | A search of the Bureau of Meteorology (BOM) Australian Groundwater Explorer identified two bores (GW308187, GW307458) associated with the neighbouring Crystal Castle within 250m of the proposed land application area | The proposed effluent land application area has been located as far west from the reported bore location as possible at approximately 180m setback. Secondary treatment with disinfection will be adopted to mitigate the risk of contamination of the groundwater source. |
| Setback Distances | In the case of SDI, spray or dripper under mulch >6m if up-gradient and >3m if down-gradient of property boundaries, swimming pools, driveways and buildings. (In the case of ETA beds: >12m if up-gradient and >6m if down-gradient of property boundaries, but 6m/3m as above for pools, dwellings etc), >10m to powerlines | In the case of SDI, spray or dripper under mulch <6m if up-gradient and <3m if down-gradient of property boundaries, swimming pools, driveways and buildings. (In the case of ETA beds: <12m if up-gradient and <6m if down-gradient of property boundaries, but 6m/3m as above for pools, dwellings etc), <10m to powerlines | All local setback distances can be achieved | No limitation |
| Run-on/upslope seepage | Minor | Major, where diversion not practical | Minor run-on potential | A shallow drain to be constructed on the upslope side of the land application area |
| Flooding Potential | Disposal system above 1 in 20 year flood contour Treatment system above 1 in 100 year flood contour | Disposal system below 1 in 20 year flood contour Treatment system below 1 in 100 year flood contour | Proposed land application area or treatment system not subject to flooding | No limitation. |
| Site Drainage | No visible signs of surface dampness | Signs of surface dampness | No signs of dampness | No limitation |
| Vegetation indicating waterlogging | Absence of sedges etc that indicate waterlogged soil | Presence of sedges etc that indicate waterlogged soil | No signs of vegetation indicating waterlogging | No limitation |
| Surface Condition | No bare ground or cracking | Bare ground or cracking | Grass cover | No limitation |
| Fill | Disposal area not on fill | Disposal area contains fill | No fill observed in proposed land application area | No limitation |

| | | | | |
|--|---|--|--|--|
| Erosion/mass movement | No sign of rills, slips | Rills, slips | No signs of erosion or slips | No limitation |
| Boulders/floaters/rock outcrops | No exposed rock or rocks on ground | Areas of exposed or rock or rocks on ground | No rock identified in land application area or in soil test boreholes | No limitation |
| Drinking Water Catchment | Not within drinking water catchment | Within drinking water catchment | Within Wilson River drinking water catchment | Assessed suitability of proposed system against Rous Water guidelines as MEDIUM – refer Section 3.2. No referral to Rous Water required. |
| Coastal Wetland | Not within Coastal Management SEPP area or proximity area | Within Coastal Management SEPP area or proximity area | Not within Coastal Management SEPP area or proximity area | No limitation |
| Oyster Aquaculture | Not within zone of influence | Zone of influence - within 100m of the riverbank or tributary and within 10km upstream or downstream (measured along the river) to the nearest Priority Oyster Aquaculture | Not within zone of influence | No limitation |
| Acid Sulfate Soils | No acid sulfate soils present | Acid sulfate soils present (class 1-5) | Not mapped as acid sulfate soils. No signs of acid sulfate soils present on site | No limitation |

3.2. Further Review of Site Limitations

Groundwater Bores/Wells

There are two registered bores on the neighbouring Crystal Castle property. The bores are registered for water supply and stock and domestic purposes. The registered location of the bores has not been confirmed. It is not possible to achieve the 250m setback distance to these bores. However, the proposed effluent land application area will be located downslope of the groundwater bores so the risk of contamination is significantly reduced.

To mitigate the risk of contamination the proposed effluent land application area has been located as far to the west as possible at approximately 180m setback as shown in Figure 4 below. To further mitigate the risk a AWTS secondary treatment system with disinfection will be adopted to reduce nutrient and pathogen loading of the effluent.



Figure 4 – Groundwater bores in relation to proposed LAA (BOM AGW, Google Maps)

Drinking Water Catchment

The subject property drains into gullies and creeks which form part of the Wilson River drinking water catchment. The closest watercourse is greater than 100m to the north. The treatment system and land application area must comply and be evaluated in accordance with the Rous Water On-Site Wastewater Management Guidelines. This evaluation is presented below in Table 3.

Table 3 - Drinking Water Catchment Evaluation

| Evaluation Criteria | Description | Rous Guidelines |
|--|---|------------------------|
| Proposed OSSM system | AWTS and ETA beds - dwelling | <i>n/a</i> |
| Pathogen removal capability | MEDIUM - AWTS HIGH – ETA Beds | <i>Table 2</i> |
| Level of risk of pathogens entering a watercourse | LOW – more than 100 metres of native vegetation between the WWMS and water course | <i>Table 4</i> |
| Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train) | MEDIUM | <i>Table A1</i> |
| Referral to Rous Water required? | NO | <i>Table 5</i> |

4. SOIL ASSESSMENT

4.1. Soil Landscapes

A desktop review of soil landscape was undertaken using the NSW Soil Landscapes Web Portal.

Table 4 – Soil Landscape

| | |
|----------------------------|--|
| Soil Landscape | Rosebank (eSPADE, 2023). |
| Description | Dominant soils: ro1- Reddish brown clay loam. Moderate to strong. pH 4.5-5.5 ro2- Reddish brown clay. Strong. pH 4.5-5.0 |
| Typical Limitations | Strongly acid Aluminium toxicity potential Localised stoniness |

4.2. Soil Tests

Soil tests were conducted in the area identified for potential land application. Soil test photos are included in Appendix A.

Two 1000mm deep boreholes were constructed and sampled on 17 June 2023 within or adjacent to the proposed land application area. Boreholes results are presented in Table 5 and Table 6 below with their locations marked on the site plan. Soil limitations are assessed in Table 7.

Groundwater is assumed to be at least 5m below surface. Bedrock is assumed to be 3m deep.

The soils found at the location of the proposed disposal area are generally consistent with the description of the soil landscape from Morand (1994).

Table 5 – Soil Borehole 1

| SOIL ASSESSMENT | | | | | | | | |
|-----------------|------------|---------------------------|-----------|-----------|---------------|------------------|----------|----------------------|
| | | SOIL UNIT (Morand, 1994): | | | | | Rosebank | |
| Horizon | Depth (mm) | Texture | Structure | Colour | Soil Category | Coarse Fragments | Soil pH | Dispersive Class |
| A | 0-300 | Light clay (55mm ribbon) | Strong | Red Brown | 4 | 5% up to 10mm | 6.0 | Class 2 (slake only) |
| B | 300-1000 | Light clay (50mm ribbon) | Strong | Red | 5 | 5% up to 10mm | 5.5 | Class 2 (slake only) |

Table 6 – Soil Borehole 2

| SOIL ASSESSMENT | | | | | | | | |
|-----------------|------------|---------------------------|-----------|-----------|---------------|------------------|----------|----------------------|
| | | SOIL UNIT (Morand, 1994): | | | | | Rosebank | |
| Horizon | Depth (mm) | Texture | Structure | Colour | Soil Category | Coarse Fragments | Soil pH | Dispersive Class |
| A | 0-300 | Light clay (55mm ribbon) | Strong | Red Brown | 4 | 5% up to 10mm | 6.0 | Class 2 (slake only) |
| B | 300-1000 | Light clay (50mm ribbon) | Strong | Red | 5 | 5% up to 10mm | 5.5 | Class 2 (slake only) |

Table 7 - Soil Limitations

| Soil Feature | Limitation Guideline | | Description | Comment / Management Response |
|------------------------------|---|---|---|-------------------------------|
| | No limitation | Limitation | | |
| Soil Category | Receiving soils for primary treated effluent: Soil Categories 1-5 excluding mod. or weakly structured light clays. Receiving soils for secondary treated effluent: Soil Categories 1-5 | Receiving soils for primary treated effluent: Soil Categories 5,6 excluding strongly structured light clays Receiving soils for secondary treated effluent: Soil Category 6 (as noted: dispersive or shrink-swell soils are to be considered as Soil Category 6 soils) | Category 5 – strongly structured light clay | No limitation |
| Limiting soil texture | Sands to strong/mod structured light clays | Weakly structured light clays, medium/heavy clays, shrink-swell & dispersive soils | Strongly structured light clay | No limitation |
| Coarse fragments | Occupies <20% of soil volume | Occupies >20% of soil Volume (Need to increase Soil Category by one class) | Coarse fragments occupy <20% of soil volume | No limitation |
| Field pH | >5.5 | <5.5 | pH 5.5-6.0 | No limitation |
| Dispersiveness | Class 1 or 2 | Class 3 or 4 | Class 2 | No limitation |
| Depth to groundwater | Soil depth of >1m before groundwater is encountered | Soil depth of <1m before groundwater is encountered | Assumed >5m | No limitation |
| Depth to bedrock | Soil depth of >1m before bedrock is encountered | Soil depth of <1m before bedrock is encountered | Assumed >3m | No limitation |

4.3. Soil Assessment Summary

The most limiting soil layer in the boreholes for wastewater disposal is a **strongly structured light clay (Category 5)** which occurs from 300mm below surface in the proposed land application area. The adopted Design Loading Rate (DLR) for secondary treated effluent is 12mm/day.

There were some coarse fragments present but not in sufficient quantity or size to impede the flow of water into the soil. The pH is within the suitable range for effluent disposal and it is recommended lime to be added to the soil at the base of the land application area at the time of construction at a rate of 1kg/m² to maintain the pH above 5.5. The soil is not dispersive.

There was no evidence of springs or groundwater. Bedrock is assumed to be 3m deep. Groundwater is assumed to be at least 5m below surface.

5. OSSM AND LAND APPLICATION AREA MODELLING

5.1. Introduction

This section of the report models the required OSSM system including land application area requirements to service the proposed extended dwelling.

The guiding principles of the OSSM system design are:

- Protection of public health and the environment
- Maximise opportunity for nutrient and water re-use by vegetation uptake
- Efficient utilisation of resources

5.2. Design Considerations

The following constraints, opportunities, and issues were considered in the design and selection of an appropriate treatment system for this site.

- The key constraints on the subject property include slope, proximity to groundwater bores, minor upslope run-on potential and drinking water catchment.
- The most economical, robust and reliable for on-site wastewater management is an Aerated Wastewater Treatment System (AWTS) with Evapotranspiration-Absorption (ETA) beds.
- The proposed AWTS must have advance nutrient reduction with nitrogen reduction of at least 80% due to the large number of bedrooms and potential occupants in the dwelling.
- To minimise the required plumbing changes, it is proposed to install the new AWTS in place of or immediately adjacent to the existing septic tank. Power will be supplied from the dwelling.
- The effluent land application area (LAA) will be located as far west as possible to maximise the setback to the groundwater bores and locate the LAA on a more gentle slope suitable for ETA beds.
- The existing septic tank will be decommissioned in accordance with NSW Health Advisory Note 3.

5.3. Volume of Effluent

The proposed dwelling has 7 bedrooms and is supplied with rainwater. The number of equivalent persons (EP) in the dwelling for the purposes of wastewater loading, is taken to be the number of bedrooms x 1.5. A wastewater allowance of 115L/person/day has been adopted which is in accordance with the Byron OSSM Strategy.

Therefore, the design effluent volume is as follows:

| OSSM System | Bedrooms | EP | Effluent Volume (L/day) |
|--------------------|----------|------|-------------------------|
| 7 bedroom dwelling | 7 | 10.5 | 1207.5 |

5.4. Treatment System

The proposed treatment system for the dwelling is an Aerated Wastewater Treatment System (AWTS). The proposed AWTS unit is the NSW Health accredited **Ozzikleen RP10A+** which has stated nitrogen reduction capacity >80%. This tank has capacity for up to 2000L/day.

5.5. Land Application Area Modelling

To ascertain the size of the land application area required, the On-Site Wastewater Model (single rural households) was used. This model determines the required land application area (LAA) in accordance with the most limiting factor, being nitrogen, phosphorous or hydraulic loadings. The model performs an iterative water balance to determine the LAA required to adequately dispose of the hydraulic load. The water balance considers the allowable infiltration rate of the soil and local rainfall and evapotranspiration rates.

5.5.1. Model Parameters

Land application area model parameters adopted for this assessment are as follows:

- Lot size – the property lot size is 17.06ha (from NSW Spatial Services)
- Distance to gully – >40m (from NSW Spatial Services)
- Soil type is Red Basaltic (from soil tests)
- Depth to bedrock has been assumed at 3m (assumed based on location and soil tests)
- Limiting soil layer is light clay with strong structure (12mm/day DLR)
- Secondary treatment with >80% total nitrogen reduction by Ozzikleen RP10A+ AWTS
- Land application via ETA beds

5.5.2. Nutrient Loadings

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

NITROGEN

The expected chemical forms of nitrogen include ammonia, nitrite and nitrate. 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.

TN Generated/person per year= 4.2kg

Household TN Generated = 4.2kg/person/year x 10.5 people = 44.1kg/year

Allowing for losses of 80% in the AWTS and 20% to atmosphere.

Land Application Area for N = 0.0m²

PHOSPHORUS

Phosphorous is removed from effluent through biological, chemical and physical processes in soil, with minor uptake by vegetation.

P_{sorp} = Phosphorus Sorption Capacity of Red Basaltic Soils is 10000kg/ha.m.yr

Depth to bedrock is assumed at 3m for this site.

The land application area required for the soil to be saturated with Phosphorus over a 50-year time period.

TP Generated/person per year= 0.6kg

Household TP Generated = 0.6kg/person/year x 10.5 people = 6.3kg/year

Land Application Area for P = 124m²

5.5.3. Land Application Area Required

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

| OSSM System | Water Balance (Hydraulic) (m ²) | Nitrogen (m ²) | Phosphorus (m ²) |
|--------------------|---|----------------------------|------------------------------|
| 7 bedroom dwelling | 148 (158 capped) | 0 | 124 |

The Byron Shire Council OSSM Model requires an ETA bed area of 117.55m² using three ETA beds to meet the land application area requirements for the dwelling. This allows for 300mm lateral seepage to achieve the land application area. **The adopted size of the ETA Beds will be 120m².**

The wastewater management systems required to treat and dispose of the hydraulic and nutrient wastewater loads is as follows:

- Ozzikleen RP10A+ AWTS
- Three ETA beds measuring 20m x 2m each (120m²)

Wastewater model results are included in Appendix B. Refer to design plans included in Appendix D.

6. ON SITE SEWAGE MANAGEMENT SYSTEM

6.1. Aerated Wastewater Treatment System (AWTS)

The treatment system shall be an NSW Health accredited AWTS with 2000L/day (10EP) minimum capacity for secondary treatment of the wastewater. All wastewater will gravity feed from the dwelling to the AWTS. Power will be supplied from the dwelling.

The AWTS must have a visible and audible high-water alarm. The AWTS must have a minimum 30-minute chlorine contact time.

Effluent from the AWTS taken in any random grab sample shall comply with the following secondary treated effluent standard:

- BOD5 less than 20 mg/L
- TSS less than 30 mg/L
- E. coli less than 100 cfu/100 ml
- Free residual chlorine greater than 0.2 and less than 2.0 mg/L

The proposed AWTS unit is a Ozzikleen RP10A+. The NSW Health Certificate of Accreditation and information on the operating principles of the system is included in Appendix C. Use of an alternative AWTS must be approved by the designer of the wastewater management system.

The Ozzikleen RP10A+ has a TN reduction rate of over 80% stated in the NSW Health Certificate of Accreditation.

6.2. Submersible Pump

A submersible pump, suitable for effluent, will be installed in the AWTS to dispose of the secondary effluent to the ETA beds. The pump must have minimum flow rate of 25L/min @ 20m head. The pump will be operated by a float switch tether set for 120-150L doses. A suitable pump is the Davey 42A/B (or equivalent).

6.3. Filter

A 130-micron (120 mesh) filter (such as Arkal Red or Amiad Tagline) must be installed immediately downstream of the effluent pump. The filter must be installed above ground or in a valve box to allow regular cleaning by the servicing agent. The filter must have a maximum head loss of 1.0m.

6.4. Indexing Valve

Where more than 1 ETA bed installed, an indexing valve will distribute the pumped wastewater doses to the proposed ETA beds. This intermittent dosing will create aerobic/anaerobic processes in the ETA beds which will further improve treatment efficiency. The indexing valve shall operate at 10m head and 20L/min flow. This valve shall be purchased with the light gauge stem/disk assembly to operate properly at these flows.

6.5. Evapotranspiration/absorption (ETA) beds

The construction of the ETA beds is briefly described below, and design plans are included in Appendix D.

ETA beds shall be installed along a contour to achieve a flat base. Incorporate lime (1.0kg/m²) into the soil at base of ETA bed. Install 20mm gravel and 100mm slotted pipes for effluent distribution. Install geotextile over gravel and backfill with soil from site.

The beds will be installed on sloping ground and may be required to be terraced into the slope. The maximum batter slope between beds shall be 20 degrees (1 in 3). The surface of the bed shall have fall towards the downslope side to avoid water ponding on the bed surface.

A minor catch drain and berm is required to be maintained upslope of the ETA beds to redirect overland flow away from the disposal area.

6.6. Pipework

All gravity pipework shall be 100mm PVC buried at a minimum depth of 300mm (500mm minimum for trafficable areas) at minimum grade of 1 in 60.

The pumped pipework shall be 32mm PN12.5 PE100 (lilac stripe poly pipe) buried at a depth of 300mm (500mm minimum for trafficable areas) unless shown otherwise on the site plan.

All plumbing works to be in accordance with AS3500.

6.7. Reserve Area

A 100% reserve area has been nominated on the design plans for future upgrade or replacement.

7. OPERATION AND MAINTENANCE

7.1. Roles and Responsibilities

On site wastewater management systems undertake treatment and disposal of wastewater to ensure the risks to public health and the environment are minimised. It is important the installed system is operated and maintained in accordance with these guidelines and any other operations and maintenance manuals provided for the system to ensure the system is working as intended. Proper operation and maintenance will help achieve a long lifetime of service.

Table 8 below outlines the roles and responsibilities of the persons involved in the ongoing management of the wastewater management system to ensure its effective and sustainable performance.

Table 8 - Roles and Responsibilities for Operation and Maintenance

| Role | Responsibilities |
|----------------|--|
| Property Owner | <ul style="list-style-type: none"> • Ensure they are fully aware of the function, operation and maintenance of the wastewater management system installed on their property • Ensure other persons and visitors at the property are aware of good kitchen and laundry practices and what can and can't enter the wastewater system • Ensure they keep a copy of this report and the operation and maintenance manuals available on the property for the life of the system • Ensure the operation and maintenance activities are carried out by a suitably qualified Service Agent in accordance with this report, other operation and maintenance manuals provided with the system and Council requirements • Ensure records of system maintenance are maintained for at least 10 years |
| Service Agent | <ul style="list-style-type: none"> • Ensure all field staff have undertaken appropriate training, including training specific to the wastewater management system being installed (where applicable) • Ensure operation and maintenance activities are undertaken in accordance with the recommendations in this report and operation and maintenance manuals provided with the system and Council requirements • Ensure the Property Owner and Council are advised of unusual circumstances or wastewater management system defects found during servicing • Ensure a service report is provided to the Property Owner and Council covering all maintenance carried out by the Service Agent • Ensure service reports are kept for at least 10 years • Ensure alarms and emergency call outs are attended to and the system returned to normal operation in a timely manner |

| | |
|---------------------|--|
| Equipment Suppliers | <ul style="list-style-type: none"> • Ensure they maintain an appropriate on call or support operation and available spares for the life of the system |
| Council | <ul style="list-style-type: none"> • Ensure the system is managed and monitored in accordance with Council's On-site Wastewater Management Strategy |

7.2. System Function

All persons involved in the ongoing management of the wastewater management system should have basic knowledge of the function of the system and a general understanding of how each stage of the treatment and disposal works. This will assist in understanding the importance and reasoning for maintenance activities and may assist in early identification of issues.

The proposed wastewater management system for this site is as follows:

- Secondary Treatment: Aerated Wastewater Treatment System (AWTS), Disinfection
- Land Application: Evapotranspiration (ETA) Beds

Details on each stage of the wastewater management system are provided below in Table 9.

Table 9 - Wastewater Management System Function

| Stage | Function |
|------------------|---|
| AWTS | <p>Wastewater from the dwelling flows by gravity into the AWTS.</p> <p>The AWTS uses an Intermittently Decanted Extended Aeration (IDEA) and activated sludge treatment process. The process has 4 stages to treat the effluent: aeration, settling, decanting and disinfection. The treatment solids are drawn off for further thickening and breakdown.</p> <p>The secondary treatment plant process significantly reduces the organic loading and biological oxygen demand (BOD) of the wastewater. High BOD in wastewater effluent can have detrimental impacts as the wastewater will pull oxygen from the receiving environment which can impact on ecosystems.</p> <p>This treatment stage also reduces part of the nutrient (nitrogen and phosphorus) loading.</p> <p>The wastewater contains many types of bacteria and organisms that can cause illness and are associated with water borne diseases. Disinfection of the wastewater is achieved through dosing of chlorine in a chlorine contact tank. Disinfection will destroy the majority of the disease causing organisms in the wastewater effluent to protect public health.</p> <p>The secondary treatment plant and tertiary treatment plant are controlled by a Programmable Logic Controller (PLC). This has been programmed to effectively treat the wastewater generated from this site. The PLC monitors the function of all key components and processes and will send alarm if a function or component has failed.</p> |
| Land Application | <p>The treated and disinfected effluent from the treatment plant is discharged to the land application area. The land application area for this site is</p> |

| | |
|--|---|
| | <p>Evapotranspiration Absorption (ETA) Beds.</p> <p>Where multiple beds are installed, the beds are divided into separate dosing zones and are supplied through an indexing valve. The indexing valve automatically switches to the next zone on each dosing cycle. This process allows the beds to cycle through aerobic/anaerobic phases allowing for further denitrification.</p> <p>These beds are designed to dispose of the wastewater through evapotranspiration through the top of the beds and absorption through the soil in the base. The effluent is discharged underground to protect public health.</p> <p>The ETA Beds have been designed to effectively dispose of the peak hydraulic loading and are specifically sized and located to suit the constraints of this site. The land application area which includes both the ETA Beds and the land surrounding the ETA beds marked on the plans is allocated to dispose of the nutrient load. This is achieved primarily through the vegetation (grass, shrubs, etc) and the sorption capacity of the soil.</p> <p>The pipework and pump (where applicable) supplying the ETA Beds has been designed considering the pressure loss through the system and including allowance for fouling of the secondary effluent filter.</p> |
|--|---|

7.3. System Limitations

The proposed system has been designed to adequately treat and dispose the wastewater volume and quantity outlined in this report. Short term spikes or long-term variances from these design parameters may impact the ability of the wastewater system to treat the effluent to the required quality. Should there be a change in operation of the property that may alter the wastewater volume or quality be discharged to the wastewater system, the property owner should consult a suitably qualified wastewater consultant prior to making the change.

7.4. System Operation and Management

The proposed wastewater management system for this site is designed to run automatically with minimal operator input. The key operational requirements of the system include performing routine inspections and maintenance, replenishing treatment chemicals, and monitoring the alarms for system failures or faults.

The general requirements for operation include regular visual inspections to be undertaken by the property owner for early identification of issues, regular servicing and operational inspection of the system undertaken by a suitably qualified service agent and ongoing monitoring and responding to system alarms. Further details on specific maintenance activities are included in the following section.

The owner will receive an Operation and Maintenance Manual upon installation of the AWTS. The manual will contain specific information on the operation and maintenance of the AWTS and ancillary components installed.

All persons undertaking maintenance and operation activities shall always ensure that precautions are taken to protect their own health and the health of other persons at risk from the activity.

To help ensure trouble free operation of the system the property owner should adhere to the following kitchen, laundry and general water use practices, provided below in Table 10, and ensure this information is provided to all occupants at the property.

Table 10 - Good water use practices

| Good Water Use Practices for On-Site Wastewater Management Systems |
|--|
| Minimize the amount of fats, oils and grease disposed of into the on-site disposal system (e.g. scrape food and excess oils from dishes into the bin prior to washing) |
| Bleach, bleach-based products, whiteners, nappy soakers and spot removers shall not be disposed of into the on-site system |
| 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 and detergents should be used. Biodegradable, low sodium and phosphate-free and products specifically designed for on-site disposal systems are recommended |

7.5. Maintenance Schedule

Table 11 below contains the maintenance checklist to be undertaken on the wastewater treatment and disposal system by the property owner and service agent.

Maintenance records and log sheets must be completed by any person performing maintenance or inspection on the system. Maintenance records shall be readily available to any person involved in the management, operation or maintenance of the system and to any person auditing or certifying the system is being operated and maintenance properly and, if required, to the regulatory authority.

Table 11 - Maintenance Checklist

| Component | Activity | Maintenance Description | Responsibility | Frequency |
|--------------|-------------------|---|----------------|-----------|
| General | Service Agreement | The owner of the AWTS unit must enter into a maintenance agreement for 3 monthly servicing of the AWTS by an approved Service Agent | Property Owner | Ongoing |
| | Plant shutdown | If the dwelling will be vacated for more than 6 months contact your Service Agent to discuss the appropriate measures to take before vacating the premises. | Property Owner | Ongoing |
| | Reserve Area | The reserve area should be reserved for future wastewater upgrades and should not be developed or built on | Property Owner | Ongoing |
| | Landscaping | Do not plant trees or shrubs on top or too close to the land application area. | Property Owner | Ongoing |
| | Housekeeping | Keep the area around the AWTS and ETA Beds in a clean state, to avoid damage from vehicles, debris and fire. | Property Owner | Ongoing |
| | Drain cleanout | Empty kitchen sink and bathroom drain strainers into bin | Property Owner | Daily |
| Whole system | Visual Inspection | <p>Inspect the tanks and ETA beds to provide early identification of issues including leaks, discharges, overflows and noisy equipment. Signs of failure include:</p> <ul style="list-style-type: none"> • surface ponding and run-off of treated wastewater; • degradation of soil structure - e.g. sheet and rill erosion, surface crusts, or hard surfaces are evident; • poor vegetation growth; • unusual odours; • slow running drains and toilets <p>Any issues identified should be immediately reported to the Service Agent</p> | Property Owner | Weekly |
| | Scheduled Service | <p>The servicing agent shall service the AWTS in accordance with the details set out in the operation and maintenance manual supplied with the unit.</p> <p>Each three-monthly service shall include a check on all mechanical, electrical and functioning parts of the system including:</p> <ul style="list-style-type: none"> • The chlorinator and replenishment of the disinfectant, • Effluent pump and air blower, • The alarm system, • Built up of biosolids in aeration/sedimentation chamber, • Operation of the decanting cycle, • The land application area, • On-site testing for free residual chlorine, pH and dissolved oxygen. | Service Agent | 3 Monthly |

| | | | | |
|----------|---------------------|--|----------------|---------|
| | | <ul style="list-style-type: none"> The effluent filter should also be cleaned out at this time. <p>A service report sheet, in triplicate, shall be completed for each service. The original shall be given to the owner, the duplicate forwarded to the Council and the triplicate retained by the service contractor.</p> | | |
| AWTS | Alarms | <ul style="list-style-type: none"> If an alarm is sounding or flashing, first consult the Owner's Manual to troubleshoot the issue. If no solution is found, contact the service agent | Property Owner | Ongoing |
| | Chlorine tablets | <ul style="list-style-type: none"> The chlorine tablets supplied should be enough for the period between services. If the tablets have been consumed before the next service contact the service agent for replacement tablets | Property Owner | Ongoing |
| ETA Beds | Routine Maintenance | <ul style="list-style-type: none"> Runoff diversion banks to be inspected and maintenance as required undertaken to ensure that surface runoff is diverted around each of the disposal areas No vehicular or stock access should be made across the disposal field Plant lawn 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 storm water system or over the ground Maintain grass cover on the surface of the trench to allow uptake of nutrients. | Property Owner | Ongoing |

8. CONCLUSION

This report details the investigations undertaken in accordance with the Byron Shire Council On-Site Sewage and Wastewater Management Strategy (2001), to design an upgraded OSSM system to service the proposed extended dwelling at 461 Goonengerry Rd, Montecollum. The investigations included desktop studies, site and soil evaluation and modelling and design of a suitable OSSM system that will address the site and soil constraints.

The key constraints on the subject property include slope, proximity to groundwater bores, minor upslope run-on potential and drinking water catchment. The on-site wastewater system has been designed with priority given to protecting public health, the environment, community amenity and efficient utilisation of resources.

The system and owner requirements are summarized below:

- Effluent volume of 1207.5L/day based on up to 7 bedroom dwelling with rainwater supply
- Install Ozzikleen RP10A+ AWTS
- Install three x ETA beds measuring 20m x 2m each (120m²)
- Decommission existing septic tank

A shallow catch drain is to be maintained to direct overland run-off around the disposal areas. The maintenance program listed in this report will be undertaken by the householder or servicing agent as detailed. Disposal areas to be turfed immediately following construction to prevent erosion, and where required, fenced to prevent vehicle and livestock damage.

The proposed OSSM system constructed in accordance with the design plans and detail provided in this report and maintained in accordance with the operation and maintenance guidelines will provide a suitable wastewater management system for the proposed extended dwelling at 461 Goonengerry Rd, Montecollum, Lot 2 DP1231141, that is consistent with the performance objectives of the Byron Shire Council On-Site Wastewater Management Strategy (2001) and AS1547:2012.

Prior to installation, the proposed on-site sewage management system must be approved by the local Council. The property owner is to lodge a *Section 68 Application for Approval to Install* the on-site sewage management system to their local Council to seek this approval.

9. REFERENCES

Australian Standard AS 1546.1 - 2008 *On-site domestic wastewater treatment units – Part 1: Septic Tanks*

Australian Standard AS 1546.3 - 2008 *On-site domestic wastewater treatment units – Part 3: Aerated wastewater treatment systems*

Australian Standard AS 1547 - 2012 *Disposal Systems for Effluent from Domestic Premises*

Bureau of Meteorology, *Australian Groundwater Explorer*,
www.bom.gov.au/water/groundwater/explorer/map.shtml

Byron Shire Council (2004), *Design Guidelines for On-Site Sewage Management for Single Households*

Byron Shire Council (2001), *On-Site Sewage Management Strategy*

Crites, R., & Tchobanoglous, G. (1998). *Small and decentralized wastewater management systems*. Boston: WCB/McGraw-Hill.

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Metcalf & Eddy, Inc. (2003). *Wastewater engineering: treatment and reuse*. Boston. McGraw-Hill

NSW Office of Environment and Heritage, eSPADE v2.0, *Soil Landscapes*,
<http://www.environment.nsw.gov.au/eSpade2Webapp>

Rous Water (2008). *On-Site Wastewater Management Guidelines*.

10. APPENDICES

10.1. Appendix A – Site and Soil Photos



Existing septic tank & proposed location of AWTS



Existing broken and damaged distribution box



Proposed land application area – looking south east



Proposed land application area – looking north west



Proposed land application area – looking north east



Borehole spoil



Ribbon test (Top: Horizon A, Bottom: Horizon B)



Modified Emerson Aggregate Test (Left: Horizon A, Right: Horizon B)

10.3. Appendix C – AWTS NSW Health Accreditation



Certificate of Accreditation

Sewage Management Facility

Advanced Aerated Wastewater Treatment

System with Nutrient Reduction

This Certificate of Accreditation is issued by the Secretary of the NSW Ministry of Health pursuant to Clause 41(1) of the Local Government (General) Regulation 2005.

System: *Ozzi Kleen RP10A+ AWTS*

Manufacturer: *Suncoast Waste Water Management*

Of: *59 Industrial Ave, Kunda Park, QLD, 4556*

The Ozzi Kleen RP10A+ Advanced NR AWTS as described in Schedule 1, has been accredited as a sewage management facility for use in single domestic premises in NSW. This accreditation is subject to the conditions of accreditation and permitted uses specified in Schedule 2.

*Director, Environmental Health
for Secretary (delegation PH335)*

Issued: *11/8/22*
Certificate No: *STS-AWTS061*
Expires: *31 December 2026*

Schedule 1: Specification

Ozzi Kleen RP10A+ Aerated Wastewater Treatment System

Name and Model of STS: Ozzi Kleen RP10A+

The STS is designed to treat sewage from a residential dwelling occupied by a maximum of 10 persons. The STS is contained in a septic tank/collection well with design capacity of 4150 L. NSW Health Accreditation Number STCW041

| Chamber | Design capacities |
|---------------------------------|-------------------|
| Secondary treatment | |
| • Aeration chamber | 4150 L |
| • Irrigation chamber | 300 L |
| Emergency storage | 1000 L |
| Operational water level (depth) | |
| • secondary | 1600mm |

The emergency storage capacity is achieved by the decanting system holding water in the aeration chamber. This activates a high-water level alarm, and the PLC steps the cycle to the settling and decant cycle to remove excess water.

The Ozzi Kleen Treatment Process

The Ozzi Kleen sewage treatment units work with a cyclic aeration process built into a single tank designed to accept and treat the sewage. The waste products in the sewage are completely consumed by naturally occurring bacteria in the oxygen-rich environment in the aeration tank. The system treats the organic waste to produce treated water of a high standard. The unit consists of a round polyethylene tank with an internal effluent compartment and pumping system. The sewage is treated in a "Bioreactor" which is a suspended growth activated sludge process using Cyclic Extended Aeration process with intermittent decanting. It is treated in a series of batch phases within the Bioreactor to achieve the desired effluent quality. The treatment operation in the bioreactor is automatically controlled by the PLC system in a pre-determined cycle. The treatment can be operated at different cycle times to enable operational flexibility. For normal operation, the operation consists of the following cycles:

Feed and Aeration Cycle

Incoming sewage flows into the bioreactor and is mixed with the biomass held in the aeration tanks. This is aerated and oxygenated by diffused air supplied from an air blower. Aeration is provided to meet the process oxygen demand for carbonaceous oxidation, nitrification and for mixing. As aeration takes place and continues, an ideal aerobic environment for micro-organisms and a humus type activated sludge is formed. With this balanced aeration and a good healthy activated sludge, digestion and oxidation of the organic waste occurs. A balance of aeration in relation to the organic / hydraulic load is maintained for a good steady reliable treatment process. BOD oxidation and nitrification also occurs during this phase of operation. In this phase of operation Alum is dosed into the system to aid the reduction of phosphorus by chemically bonding the phosphorus into the biomass / SS for removal in the sludge wasting process

Settling Cycle

Immediately after the aeration cycle, a settling condition is created to provide solids-liquid separation, which allows a quiet period where the biomass has time to settle. As the biomass is settling it acts as a filter blanket trapping all the waste that is in suspension in the mixed liquor of the aerobic biomass and settles it to the floor. This provides for further carbonaceous oxidation (anoxically), clarification, and denitrification. A zone of clear water is generated at the surface of the aeration tank, which is now acting as a clarifier.

Decant Cycle

After a predetermined settling period a decanting cycle takes place. The floating decanter draws off water from just under the surface to a predetermined level. During the decanting cycle the anoxic treatment process continues carbonaceous oxidation, clarification, and denitrification, and automatically decants highly treated clarified effluent which flows into the chlorinator for disinfection by gravity. The decanting cycle continues drawing off effluent until the electronic process control puts the system back into the aeration cycle. At the end of the decanting cycle which is the start of

the next aeration cycle the blower on timer starts the blower again causing air pressure to purge the liquid from the decanter and an air-lock is created in the decanter's bladder, thus stopping any flow of water and the decanting procedure. Variable duration for each cycle can be chosen for optimum treatment.

Automatic Sludge Wasting and Storage

Waste sludge is pumped from the bioreactor at the beginning of each aeration cycle by the PLC controlled sludge pumps into a 350 litre sludge holding tube. The sludge that is wasted from the aeration tanks moves on to digestion in the sludge tube. As sludge is settling and thickening a separation of water and sludge occurs. The concentrated solids (waste sludge) are eventually pumped out for disposal, and the supernatant from the sludge tube flows into the main aeration tank for further treatment. The sludge wasting programme will not need to be activated until there is sufficient biomass which would be determined at the time of each service.

Basket Strainer

The decanted effluent from the aeration tank will flow through a sock strainer to remove the scum from the decanted effluent.

Chlorination

The treated effluent from the RP10 will be disinfected through the chlorinator and an effluent chlorine contact tank. Although the effluent is treated, it contains many types of human enteric organisms that are associated with various waterborne diseases. Disinfection can selectively destruct the disease-causing organisms in the sewage effluent. The chlorinator and the chlorine contact tank are designed to meet the disinfection requirements. A disinfection process of effluent is carried out using chlorination equipment to treat the final water before discharge. The chlorinator uses tablet chlorine (TICA Trichloroisocyanuric Acid) and is self-compensating for variations in flow. The bottom tablet is always submerged and during periods of low flow this ensures sufficient chlorine is released, and during periods of high flow the water level in the chlorinator increases and more tablets are exposed as these are dissolved, more chlorine is released in sufficient quantities to ensure disinfection. A dose rate residual chlorine is maintained in the effluent of between 0.5-to 2.0 mg/l free chlorine prior to being delivered to the effluent storage or disposal area.

Effluent Pump and Controls

The effluent storage compartment of the unit holds approximately 300 litres of water which gives sufficient storage. The effluent storage compartment has a submersible pump controlled by a float switch that is part of the submersible pump.

Effluent Discharge

When the liquid has reached the predetermined level in the chlorine contact tank, the effluent pump will operate and pump out the effluent to the irrigation or disposal system. The effluent pump is controlled by a float switch which is hardwired to the pump. This is held on the side of the pump handle in a special groove designed to hold the float's cable. If the float cable is removed from the groove and left to hang without any support, the float will not turn the pump off due to the float cable being longer than the length of the pump body causing the pump to constantly run dry causing premature failure of the pump. If it is noted that the float has become dislodged from its groove, the pump will need to be removed and the float cable returned to the groove. When installing the cable, ensure that the head of the float hangs vertically before it reaches the bottom of the pump housing to ensure that the pump will turn off before the effluent reaches the bottom of the pump.

Schedule 2: Conditions of Accreditation

1. General

- 1.1 Prior to installation the owner/occupier of the premises shall make an application, in accordance with Clause 26 of the *Local Government (General) Regulation 2021*, to the local authority for approval to install and operate the Ozzi Kleen RP10A+ AWTS as a Sewage Management Facility in accordance with Section 68, Part C of the *Local Government Act 1993*.

- 1.2 The local authority shall apply those Conditions of Accreditation, appropriate to the owner / occupier, to any approval to operate the Ozzi Kleen RP10A+ AWTS issued under Clause 45(4), *Local Government (General) Regulation 2021*.
- 1.3 In accordance with Clause 36 of the *Local Government (General) Regulation 2021*, the Ozzi Kleen RP10A+ AWTS shall have an expected service life of 5 years in the case of mechanical and electrical components and 15 years in the case of other components.
- 1.4 The owner / occupier shall ensure that the Ozzi Kleen RP10A+ AWTS is installed or constructed:
- in accordance with the accredited specifications of the type tested unit and in accordance with good trade practice, and
 - to allow ease of access for maintenance, and
 - regarding the health and safety of users, operators and persons maintaining the facility, and
 - must be installed or constructed to make appropriate provision for access to, and removal of, contents in a safe and sanitary manner, and
 - must, if it is intended to be a permanent fixture, be anchored to prevent movement.
- 1.5 The manufacturer / supplier shall ensure that the Ozzi Kleen RP10A+ AWTS is supplied, constructed and installed in accordance with the design (including the disinfection unit) as submitted and accredited by the NSW Ministry of Health. The Ozzi Kleen RP10A+ AWTS shall not be modified or altered except that alternate individual mechanical and electrical components such as pumps, PLCs, etc, may be substituted provided that the component meets the accredited design specification.
- 1.6 Any permanent modification or variations to the accredited design of the Ozzi Kleen RP10A+ AWTS shall not be permitted.
- 1.7 Each Ozzi Kleen RP10A+ AWTS shall be permanently and legibly marked by the manufacturer in accordance with section 3 of AS1546.3:2017.
- 1.8 The manufacturer shall supply with each Ozzi Kleen RP10A+ AWTS an owner's manual, which sets out the care, operation, maintenance and on-going management requirements of the system. The owner's manual prepared by the manufacturer shall specifically contain a plan for the on-going management of the Ozzi Kleen RP10A+ AWTS. The plan shall include details of:
- the treatment process,
 - procedures to be followed in the event of a system failure,
 - emergency contact numbers,
 - maintenance requirements,
 - inspection and sampling procedures to be followed as part of any on-going monitoring program developed by the local authority.
- 1.9 The manufacturer shall provide the following information to each local authority where it is intended to install an Ozzi Kleen RP10A+ AWTS in their area once Ministry Accreditation has been obtained:
- | | |
|-----------------------------------|---|
| • Statement of warranty | • Manufacturer's Service Report Form |
| • Statement of service life | • Engineering Drawings |
| • Quality Assurance Certification | • Specifications |
| • Installation Manual | • A4 Plans |
| • Service Manual | • Certificate of Accreditation documentation from NSW Health. |
| • Owner's Manual | |

The manufacturer need not provide the above information to the local council where the information or document is contained on the manufacturer's web site.

2. Installation and Commissioning

- 2.1 The owner / occupier shall have the Ozzi Kleen RP10A+ AWTS inspected and checked by the manufacturer or the manufacturer's agent. The manufacturer or the agent is to certify that the system has been installed and commissioned in accordance with its design, conditions of accreditation and any additional requirements of the local authority.
- 2.2 The owner / occupier shall ensure that all electrical work is carried out on the Ozzi Kleen RP10A+ AWTS by a licensed electrician and in accordance with the relevant provisions of AS/NZS 3000.
- 2.3 The owner / occupier shall not commission the Ozzi Kleen RP10A+ AWTS unless the land application system has been completed.

3. Maintenance

- 3.1 The owner / occupier of the premises shall enter into a minimum 12-month contract or agreement with a service agent and ensure that the Ozzi Kleen RP10A+ AWTS is serviced:
 - in accordance with the manufacturer's / supplier's service manual and using the manufacturer's / supplier's service sheet; and
 - by a service agent who
 - has completed a course on the servicing and maintenance of STS; and has some supervised servicing experience or extensive un-supervised experience;
 - is employed or authorised by the manufacturer / supplier of the Ozzi Kleen RP10A+ AWTS;
 - uses replacement parts which meet the minimum specification of the Ozzi Kleen RP10A+ AWTS;
 - has advised of their name, contact details and credentials to the local authority;
 - submits a completed NSW Health "Local Council Service Report" (template attached) to the local authority immediately after every service;
 - shall report to the local authority any instances where the owner / occupier refuses to authorise repairs, replacement of parts or maintenance; and
 - does not perform electrical work or enter confined spaces unless trained and is suitably qualified to do so.
- 3.2 The owner/occupier shall not service the Ozzi Kleen RP10A+ AWTS unless they are an authorised agent of the manufacturer.
- 3.3 The Ozzi Kleen RP10A+ AWTS once installed and commissioned shall be serviced at three (3) monthly intervals. At each service it shall be determined if sludge removal from the sludge tube is needed.
- 3.4 The manufacturer / supplier of the Ozzi Kleen RP10A+ AWTS shall place on its web site a copy of the service manual, service sheet or form and specifications for the Ozzi Kleen RP10A+ AWTS to facilitate servicing, maintenance and repairs. Commercial-in-confidence documents may be provided directly to the service agent without uploading to the web site.
- 3.5 Each three-monthly service shall, as a minimum where provided, include a check on all mechanical, electrical and functioning parts of the system including:
 - The chlorinator and replenishment of the disinfectant,
 - The replacement of Alum in the chemical dosing tank
 - Pump and air blower,
 - The alarm system,
 - Slime growth on the filter media,
 - Operation of the sludge return system,
 - The effluent irrigation area,
 - On-site testing for free residual chlorine, pH and dissolved oxygen at the appropriate check points.

4. Verification

4.1 Effluent from the Ozzi Kleen RP10A+ AWTS taken in any random grab sample shall comply with the following standard:

- BOD⁵ less than 30 mg/L
- TSS less than 45 mg/L
- E. coli less than 100 cfu/100 ml
- Free residual chlorine greater than 0.2 and less than 2.0 mg/L

5. Permitted uses

5.1 The effluent is suitable for re-use for garden purposes by way of any of the forms of irrigation as described in AS/NZS 1547:2012:

- above ground spray irrigation; and/or
- surface drip irrigation covered by mulch; and/or
- sub-surface drip irrigation installed at around 100 mm depth; and or
- any form of sub-soil application.

Each of the forms of irrigation or application is subject to the approval of the local authority.

6. Advanced Secondary Treatment System

6.1 The Ozzi Kleen RP10A+ AWTS when tested by a Product Certification Body in accordance with AS1546.3:2017 was found to comply with the Advanced Secondary Effluent Criteria as follows:

**TABLE 2.1 (Abrev) AS1546.3:2017
ADVANCED SECONDARY EFFLUENT COMPLIANCE CRITERIA FOR A STS**

| Parameter | Advanced secondary effluent | |
|------------------|-------------------------------|--------------|
| | 90% of Samples | Maximum |
| BOD ₅ | ≤ 10mg/L | 20 mg/L |
| TSS | ≤ 10 mg/L | 20 mg/L |
| <i>E. coli</i> * | ≤ 10 cfu/100mL | 30 cfu/100mL |
| FAC ρ | Minimum 0.5 mg/L \dagger | N/A |
| Turbidity ρ | N/A | 10 NTU |

* Where disinfection is required.

ρ Where chlorine disinfection is used.

\dagger Minimum level, not 90% of samples.

ρ Where UV light is used for disinfection.

7. Reduction in nutrient levels

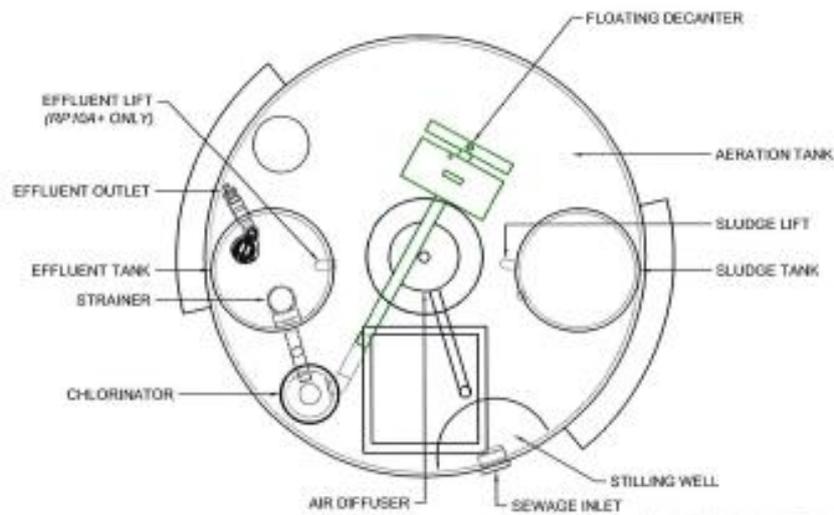
A separate testing program of the Ozzi Kleen RP10A+ AWTS for total Nitrogen (TN) and total Phosphorus (TP) reduction by the addition of an Alum dosing tank and a modified Programmable Logic Controller (PLC) was conducted.

Testing and analyses reported a TN reduction of 82.18% and a TP reduction of 48.91%.

Therefore, the local council shall ensure that the Ozzi Kleen RP10A+ is installed with an Alum dosing Unit and a modified PLC.

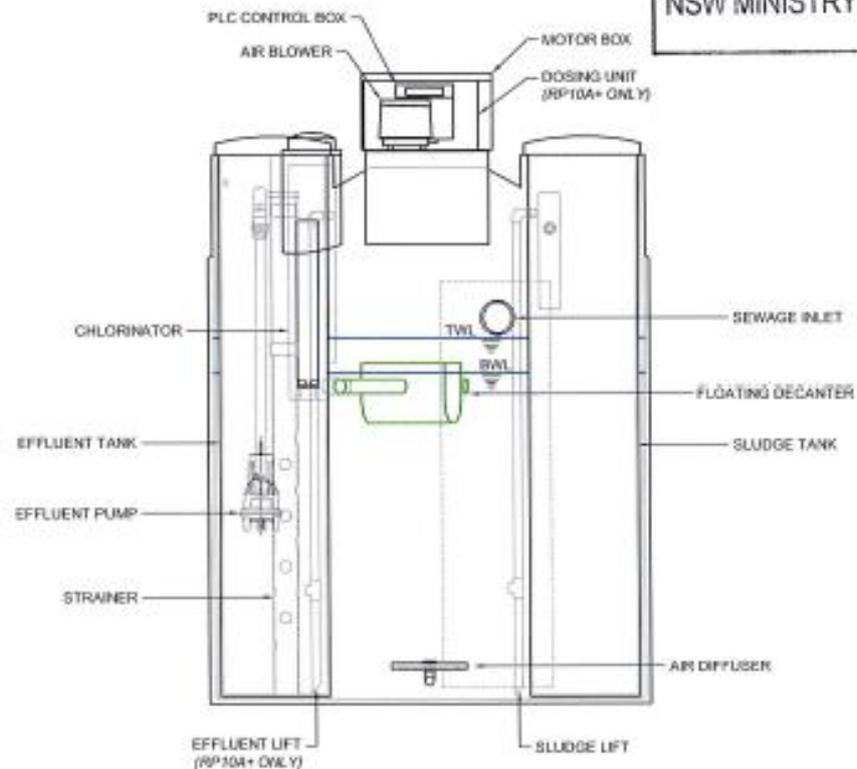
| Local Council STS (DGTS) Service Report: February 2018 | | |
|--|-----------------------------------|-------------------------------------|
| Owner's Name: | Local Council: | |
| Installation Address: | | |
| System Brand & Model: | <input type="checkbox"/> Domestic | <input type="checkbox"/> Commercial |
| Date of this service: / / | Date of last Service: / / | Next service due: / / |
| Has the STS/DGTS been serviced in accordance with the manufacturer's / supplier's requirements and using the service sheet? <input type="checkbox"/> Yes <input type="checkbox"/> No If "No" why not? | | |
| STS/DGTS functioning correctly? <input type="checkbox"/> Yes <input type="checkbox"/> No If "No" why not? | | |
| According to sludge-judge or other methodology is de-sludging needed? <input type="checkbox"/> Yes <input type="checkbox"/> No If "Yes" what action is recommended? | | |
| Offensive odours? <input type="checkbox"/> Yes <input type="checkbox"/> No If "Yes" what action is recommended? | | |
| Alarms tested and functional? <input type="checkbox"/> Yes <input type="checkbox"/> No If not "functional" what action is recommended? | | |
| Final Effluent Quality Tested? <input type="checkbox"/> Yes <input type="checkbox"/> No Disinfected? <input type="checkbox"/> Yes <input type="checkbox"/> No Chlorine tablets remaining? <input type="checkbox"/> Yes <input type="checkbox"/> No Quality? <input type="checkbox"/> Satisfactory <input type="checkbox"/> Unsatisfactory On what evidence is this judgement made? If "Unsatisfactory" what action was recommended? | | |
| Land Application Area Surface ponding? <input type="checkbox"/> Yes <input type="checkbox"/> No Run off? <input type="checkbox"/> Yes <input type="checkbox"/> No Excess plant growth? <input type="checkbox"/> Yes <input type="checkbox"/> No Effluent leaving premises. <input type="checkbox"/> Yes <input type="checkbox"/> No High risk areas contaminated? * <input type="checkbox"/> Yes <input type="checkbox"/> No * Patio, play areas, BBQ, etc Operating satisfactorily? <input type="checkbox"/> Yes <input type="checkbox"/> No If "Not operating satisfactorily" what action was recommended? | | |
| Overall Condition of STS? <input type="checkbox"/> Excellent <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments / Action Recommended / Repairs Needed / Repairs Performed: Has the owner / occupier taken recommended actions? <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| Service Agent: | Contact Details: | |
| Signature: | Date: | |

Source: Adapted from "Checklist 4.2: Operational AWTS inspection report for use by service providers and Council inspectors" in *Designing and Installing On-Site Wastewater Systems*, Sydney Catchment Authority, May 2012



PLAN VIEW

ACCREDITED
11 AUG 2022
NSW MINISTRY OF HEALTH



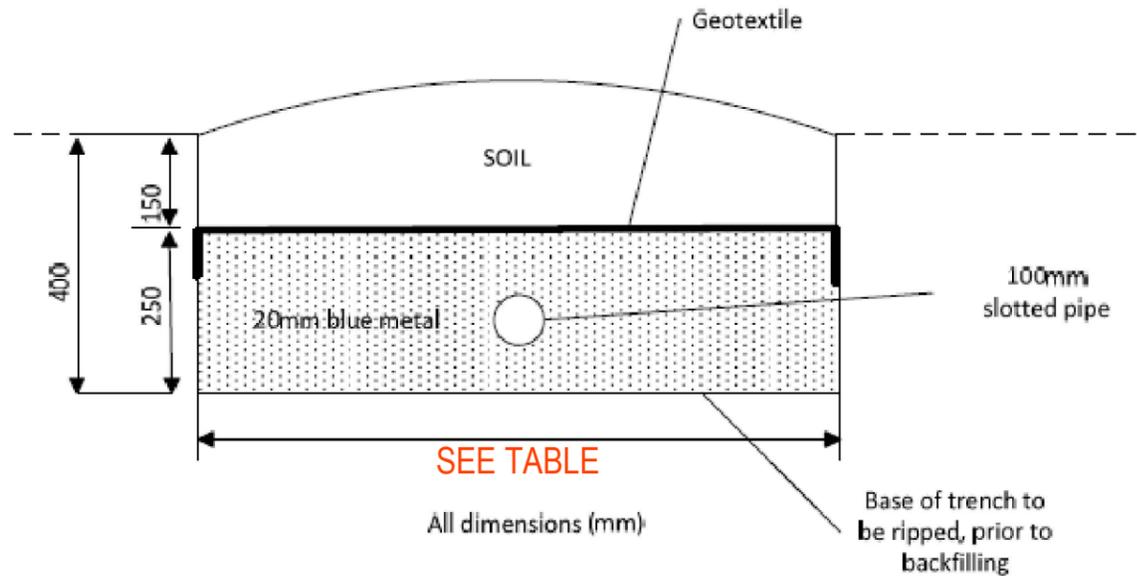
ELEVATION

| | | | | | | | | | | |
|----------|-------------|-----|----|--|---|---------|----------------------|-----------------------------|----------|----|
| | | | | | 88 INDUSTRIAL AVE KUNDA PARK Q.L.D 4355 PH +61 7 5422 4900 FAX +61 7 5456 4877 www.ozzi-kleen.com.au | | CLIENT | GENERAL | DESIGN | MS |
| | | | | | Suncoast Waste Water Management | | PROJECT | OZZI KLEEN RP10/RP10A+ AWTS | DRAWN | TH |
| 14/08/21 | RESUBD | | | | | TITLE | SYSTEM DETAILS | DATE | 14/08/21 | |
| DATE | DESCRIPTION | REV | BY | | | DWG NO. | GD-RP10/RP10A+-H10.B | SCALE | NTS | |

10.4. Appendix D – OSSM System Design Plans

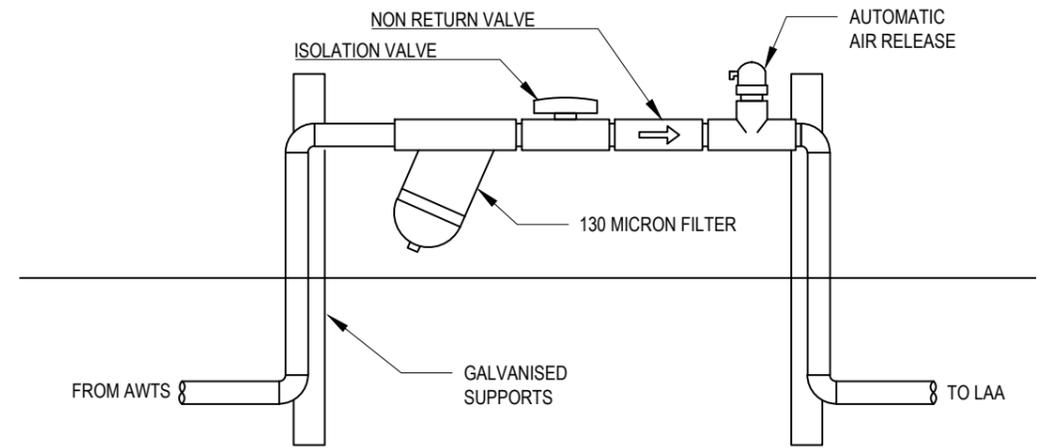
NOTES

- LAND APPLICATION AREA AND RESERVE AREA MUST BE MINIMUM 6m FROM PROPERTY BOUNDARIES (12m FROM DOWNSLOPE PROPERTY BOUNDARIES), 10m FROM POWERLINES, 3m FROM DRIVEWAYS, BUILDINGS AND SWIMMING POOLS (6m FROM DOWNSLOPE DRIVEWAYS, BUILDINGS AND SWIMMING POOLS)
- GAP BETWEEN ETA BEDS TO BE MINIMUM 2m
- WHERE MORE THAN ONE ETA BED INSTALLED, EFFLUENT IS TO BE EVENLY DISTRIBUTED ACROSS ALL BEDS THROUGH DISTRIBUTION BOX OR INDEXING VALVE AS SHOWN ON SITE PLAN
- EFFLUENT FROM TREATMENT SYSTEM TO BE DIRECTED INTO THE CENTER OF EACH BED OR INTO END OF EACH BED FOR PUMPED SYSTEMS ONLY
- ETA BEDS TO BE CONSTRUCTED ALONG CONTOURS AND HAVE LEVEL BASE
- INCORPORATE LIME (1.0kg/m²) INTO BASE OF TRENCHES
- INSTALL 20mm GRAVEL WITH 100mm SLOTTED OR DRILLED PVC IN EACH ETA BED. SLOTS AT 90 AND 180 DEGREES.
- INSTALL INSPECTION PORT IN EACH ETA BED
- INSTALL GEOTEXTILE LAYER BETWEEN GRAVEL AND BACKFILL SOIL TO PREVENT MOVEMENTS OF FINES INTO FILTER MEDIA
- SOIL TO BE ADEQUATELY DISTRIBUTED/BROKEN UP PRIOR TO BACKFILLING TRENCH
- SURFACE TO BE GRASSED AND SUITABLE FOR MOWING
- SURFACE OF ETA BEDS TO BE SLIGHTLY MOUNDED TO SHED RAINWATER
- MINOR VEGETATION CAN BE PLANTED A DISTANCE AWAY FROM EDGE OF ETA BEDS EQUAL TO THE MATURE HEIGHT OF THE VEGETATION
- INSTALL A SHALLOW CATCH DRAIN UPSTREAM OF THE ETA BEDS TO DIVERT RUN-ON FLOWS
- MAXIMUM BED LENGTH IS 20m. FOR LONGER LENGTHS REFER TO WASTEWATER CONSULTANT
- HOMEOWNER TO INSTALL FENCING AROUND LAA TO PREVENT LIVESTOCK ACCESS IF REQUIRED
- HOMEOWNER TO BROADCAST GRASS SEED OR INSTALL TURF ON ETA BEDS AS SOON AS POSSIBLE FOLLOWING INSTALLATION

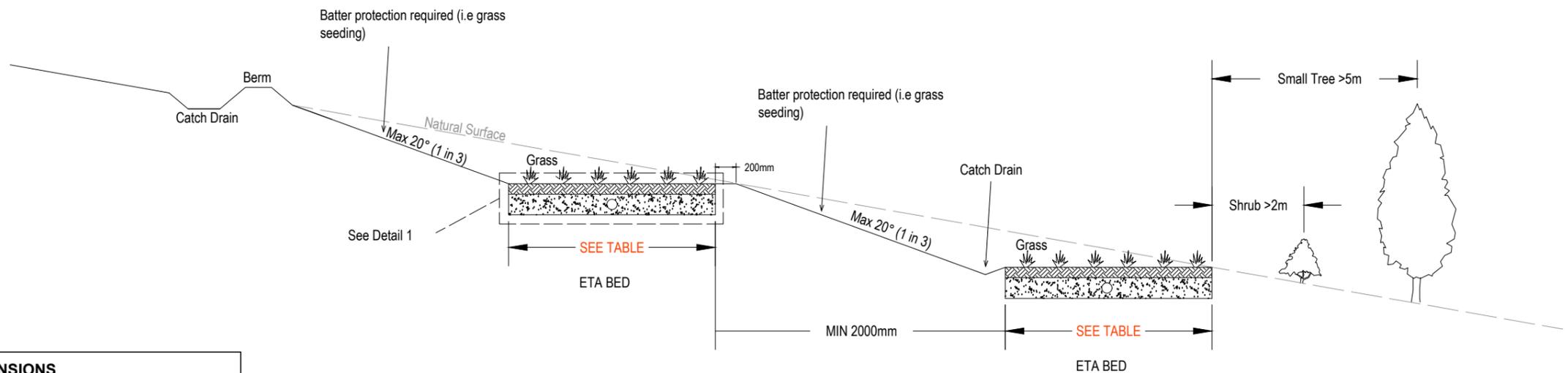


LCC OSSM STRATEGY - ETA BED DESIGN NO.1

- ETA Beds are to be centrally fed (or fed from one end - PUMPED SYSTEM ONLY)
- 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
- Heavy clays/puggy or sandy soils require special design features



AWTS OUTLET FILTER DETAIL



TYPICAL SLOPE DETAIL (1:50 @ A3)

| ETA BED DIMENSIONS | | | | |
|--------------------|-----------------------|--------------------|------------|-----------|
| OSSM SYSTEM | ETA BED AREA REQUIRED | NUMBER OF ETA BEDS | BED LENGTH | BED WIDTH |
| 7-BEDROOM DWELLING | 120m ² | 3 | 20m | 2m |

| No. | Revision | Date | Drawn | Checked | No. | Revision | Date | Drawn | Checked |
|-----|----------|------|-------|---------|-----|----------|------|-------|---------|
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NORTH COAST WASTEWATER SOLUTIONS

RESPONSED SC DRAWN SC
 REF NO: 2303-11
 info@ncws.com.au
 www.ncws.com.au

CLIENT:
 Tania De Jong & Peter Hunt
 461 Goonengerry Rd, Montecollum

Wastewater Management System
 461 Goonengerry Rd, Montecollum

SCALE: AS SHOWN @ A3

PLAN NUMBER: 2303-11.2
 PLAN IN SET: 2 of 2
 DATE: 1.07.23