

# SEPTIC SOLUTIONS AUSTRALIA

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## ON-SITE SEWAGE MANAGEMENT SYSTEM DESIGN REPORT

**PREPARED FOR:**

Ballina Shire Council

**ADDRESS:**

Killen Falls Reserve  
Killen Falls Drive  
TINTENBAR NSW 2478

Lot 1, DP 251994

**DATE:**

19<sup>TH</sup> March 2018



## INTRODUCTION

This report has been prepared at the request of Ballina Shire Council (BSC), who wish to install a unisex toilet, hand basin & drinking fountain and associated on-site sewage management system (OSSMS) at Killen Falls Reserve. The popularity and use of Killen Falls Reserve has increased sharply over the past few years and Council has a temporary site toilet in place. Council wants to install a permanent toilet for the long term sustainability of the site.

This report will assist Ballina Shire Council in determining the installation of the OSSMS under Section 68 of the Local Government Act 1993. An onsite inspection was conducted on the 25.01.2018. The inspection was to evaluate all options for the installation of the OSSMS; including which system would be cost effective & have the least impact environmentally.

The overall system performance, site evaluation and specific site conditions have been considered and will be detailed further in this report to support this proposal. All calculations are based on Ballina Shire Council's OSSMS Guidelines & Strategy & AS1547:2012. All drainage must be carried out in accordance with AS3500.

## SYSTEM SUMMARY

A summary of the proposed upgrade is listed below. See the installation details & conclusion sections of this report for detailed information.

	<b>PROPOSED DETAILS</b>
<b>Unisex Toilet with Hand Basin &amp; Drinking Fountain</b>	One unisex toilet with hand basin and One drinking fountain
<b>Treatment System</b>	7100 litre Krystel Kleer septic tank + 7100 litre Krystel Kleer AWTS
<b>Disposal Field</b>	280 square metre drip irrigation field
<b>Filtration</b>	130 micron disc filter with 40mm tech filter
<b>Water Conservation Devices</b>	Full water saving devices
<b>Water Supply</b>	Town Water



## SITE DESCRIPTION

Lot 1, DP 251994 is located at the end of Killen Falls Drive and consists of approximately 1.3 hectares. Killen Falls is surrounded by Emigrant Creek Dam to the west, residential properties to the south and macadamia plantations to the north and east. Emigrant Creek boundaries Killen Falls to the north. Killen Falls Reserve is an environmentally sensitive area with a dense tree canopy and only a small area of cleared land. The property has an average slope of 4% at the land application area and is approx 65 metres AHD.



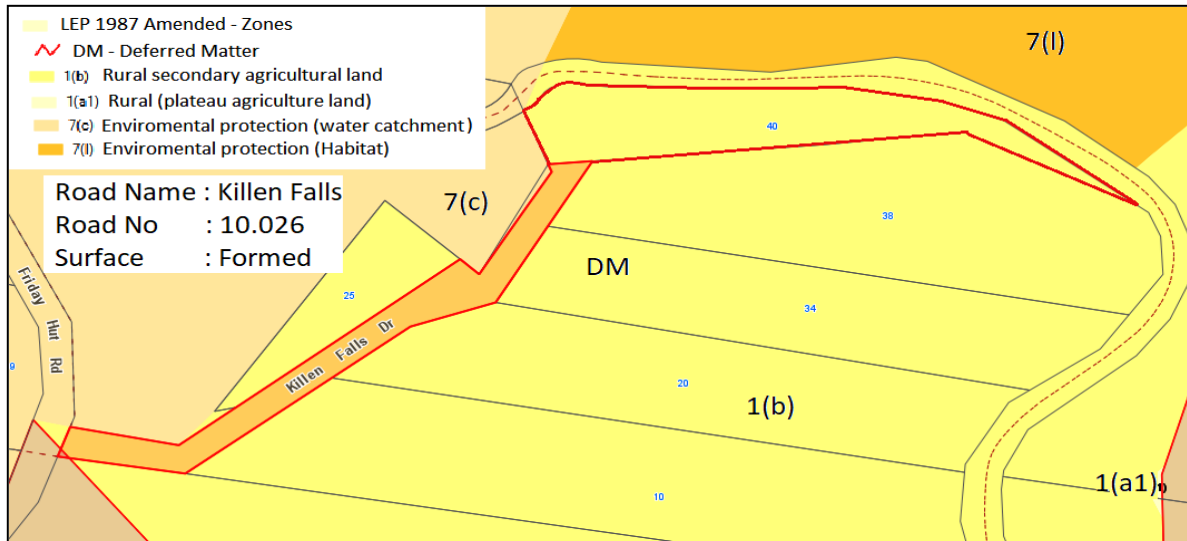
## DESKTOP STUDY

The subject property is zoned DM or 1(b) rural secondary agricultural land under the 1987 LEP amended zones. The site is not located within the Rous Water catchment or within Ballina Shire Council's flood planning area. There are no registered water bores on surrounding properties as per information obtained from the Dept of Primary Industries. The soil type is colluvial as per BSC's intra maps - soil landscapes. The proposed land application area has good exposure to sun and wind. There was evidence of surface rocks (approx 60%) but no areas of erosion. Weather conditions were sunny and dry on the day of inspection with some recent rain.

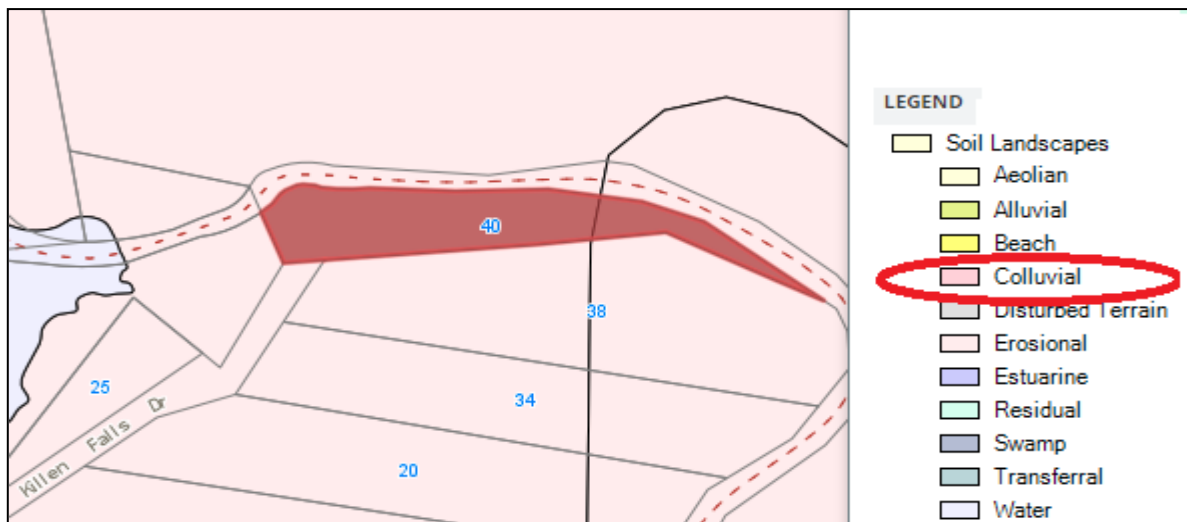
The proposed land application area (LAA) is situated on the road reserve number 10.026. There are power lines located above the proposed LAA. Permission must be sought from the relevant authorities for the road reserve & power lines prior to approval of OSSMS. The mean annual rainfall for the Alstonville area is 1867mm; taken from D T Morand table 2.1 page 6. The evaporation data is taken from Alstonville's Agriculture Research Station.



## LAND USE ZONING



## SOIL LANDSCAPE MAP



## PROPOSED TOILET LOCATION



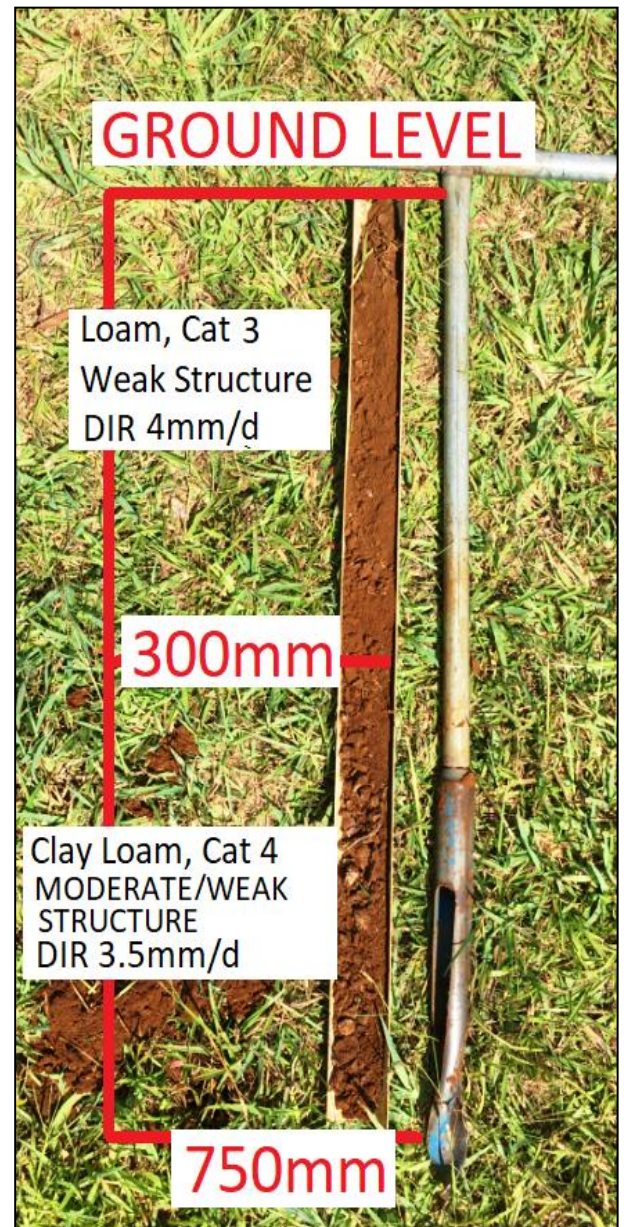
## SOIL DETAILS

Field work involved numerous hand augured soil samples. Due to the number of surface rocks encountered a soil sample to 750 mm in depth within the proposed land application area (LAA) was achieved. No ground water was encountered when conducting soil testing. The soil samples were taken within the proposed LAA as shown as BH1 & BH2 on the site plan. The soil samples had the following characteristics.

Horizon A is from ground level to 300mm – the topsoil is a loam with a weak structure and dark red in colour. When manipulated the soil formed ribbons 20mm - 30mm in length. The soil in horizon B is taken from 300mm to 750mm. The soil is reddish brown clay loam with a moderate to weak structure, is coherent and formed a ribbon 30 - 40mm in length. A pH test of soils obtained an average reading of 6.5 being slightly acidic.

The soil classification is Bangalow (bg), moderately deep to deep well drained ferosol soils. The landscape is low rolling hills on basalt, extensively cleared. The soil has been evaluated using Soil Landscape Series by D T Morand page 82. The calculations have been based on horizon A; category 3, loam with a weak structure and a DIR of 4mm per day. The DIR has been calculated using table M1, page 160 in AS1547:2012 & onsite soil testing.

During testing of the soil's performance, the soil peds showed slight slaking after six hours. After 24 hours testing results showed slightly more slaking with no dispersion. The soil dispersive class is 3 to 6 and a slake class 1 which has no limitations, see page 6. It is important to condition clay soil to ensure optimum performance is achieved. Gypsum and lime is to be added to the base of the LAA at 1kg per square metre which will assist with the amelioration of the soil.





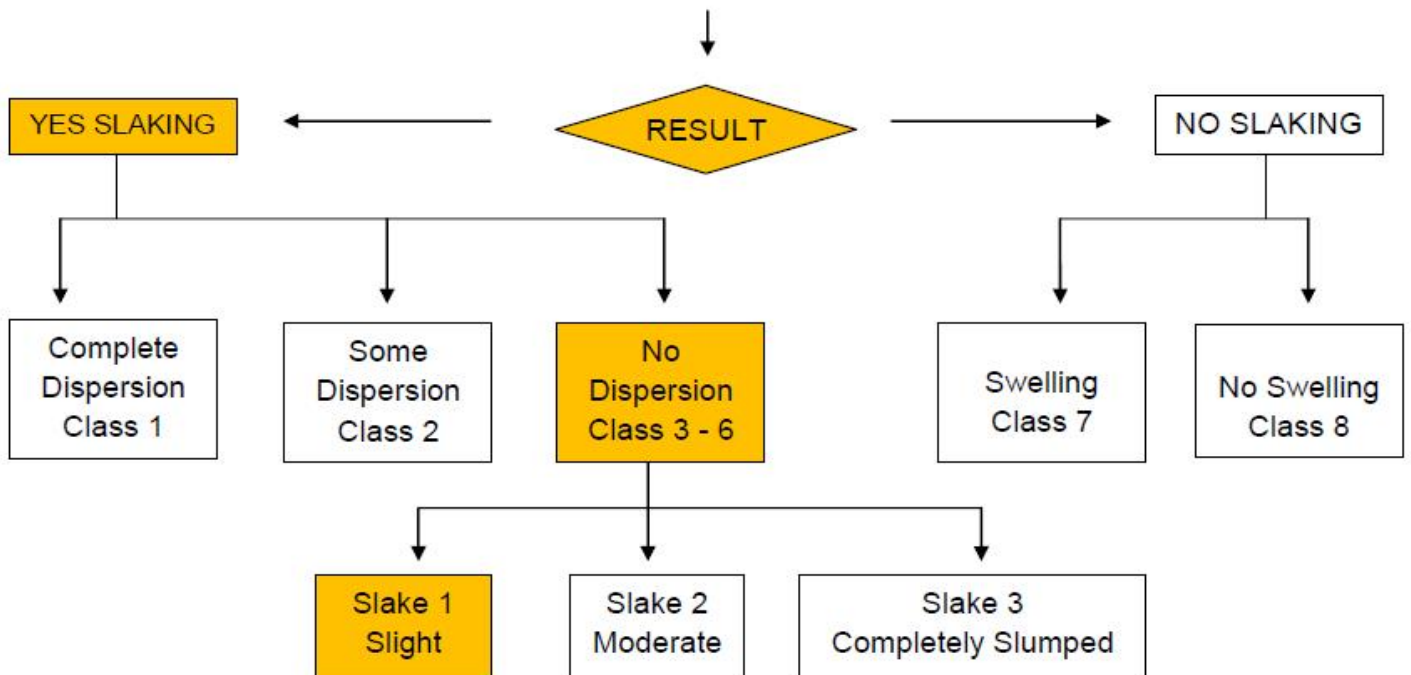
## MODIFIED AGGREGATE STABILITY



6 hours



24 hours



**Class 1** – Severe dispersion. Soils Have major limitations for wastewater application due to reduced permeability.

**Class 2** – Moderate dispersion. Amelioration may be effective.

**Classes 3 – 6** – No dispersion. Slake 1, 2 and 3 have no limitation to wastewater application.

**Classes 7 & 8** – these soils are water stable & have no limitation to wastewater application.

## HYDRAULIC CALCULATIONS

The litres per day has been based on table 4, page 33, Victorian Code of Practice Onsite Waste Water Management (Public Toilets), Ballina Shire Council & Mike Svikis Planning.

A unisex public toilet with hand basin was installed at Pat Morton Lookout, Lennox Head, NSW, in July 2013 as shown in floor plan below. The recent average daily water consumption at Pat Morton Lookout was 525 litres per day. These are conservative figures as the water meter reading is based on all plumbing fixtures and not the waste water generated.

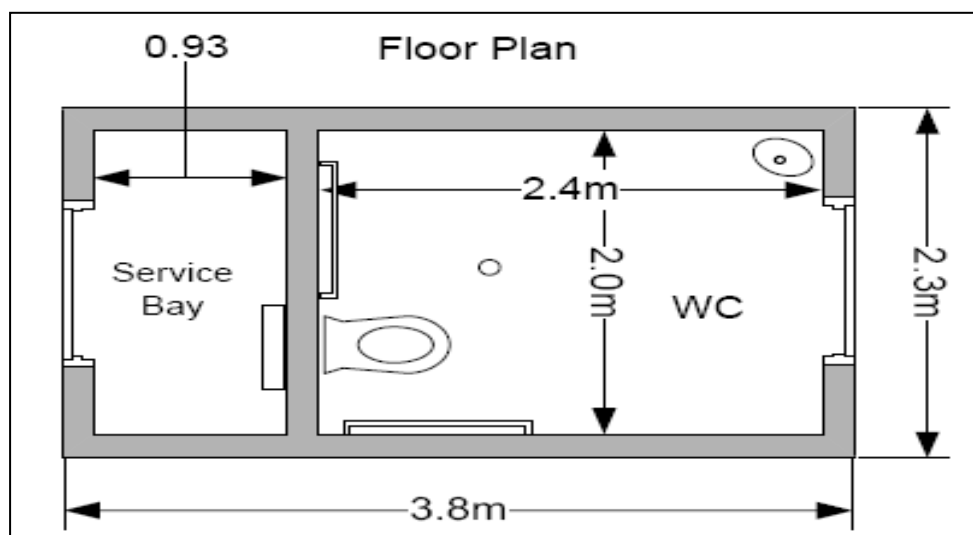
The figure of 525 litres plus a safety factor of 75 litres per day has been used to calculate the proposed hydraulic load at Killen Falls:-

- Water saving devices are a requirement with on-site sewage management systems. This is to reduce the quantity of wastewater entering the environment.
- All fixtures are to be fitted with full water saving devices. 4.5/3 litre flush toilet and a 1 litre per minute faucet with a spring loaded turnoff.
- A DIR of 4mm per day, Table M1, page 160, AS1547:2012.
- Serviced by town water, 6 litres per person per day.

One person - 1 EP will use 4.5 litres per flush  
- 1 hand wash will use 1 litre per use  
- 1 drink from the water fountain will use half a litre per use

- 10 EP per hour x 6 litres per person over a 10 hour period = 600 litres per day.  
*Public toilet only, no shower or café.*

Should the daily water usage exceed the parameters in this report causing an increase in the hydraulic loading, the OSSMS may require re-sizing and upgrading.



## Code of practice - onsite wastewater management

**Table 4: Minimum daily wastewater flow rates and organic loading rates <sup>1,10</sup>**

Source	Design hydraulic flow rates for all water supplies <sup>2,4,5</sup> (L/person.day)	Organic material loading design rates (g BOD/person.day) <sup>7</sup>
Households with extra wastewater producing facilities <sup>6</sup>	220	60
Households with standard water fixtures	180	60
Households with full water-reduction fixtures <sup>3</sup>	150	60
Motels/hotels/guesthouse		
- per bar attendant	1000	120
- bar meals per diner	10	10
- per resident guest and staff with in-house laundry	150	80
- per resident guest and staff with out-sourced laundry	100	80
Restaurants (per potential diner) <sup>9</sup>		
- premises <50 seats	40	50
- premises >50 seats	30	40
- tearooms, cafés per seat	10	10
- conference facilities per seat	25	30
- function centre per seat	30	35
- take-away food shop per customer	10	40
Public areas (with toilet, but no showers and no café) <sup>8</sup>		
- public toilets	6	3
- theatres, art galleries, museum	3	2
- meeting halls with kitchenette	10	5
Premises with showers and toilets		
- golf clubs, gyms, pools etc. (per person)	50	10
Hospitals - per bed	350	150
Shops/shopping centres		
- per employee	15	10
- public access	5	3
School - child care		
- per day pupil and staff	20	20
- resident staff and boarders	150	80
Factories, offices, day training centres, medical centres	20	15
Camping grounds		
- fully serviced	150	60
- recreation areas with showers and toilets	100	40

1. Based on EPA Code of Practice for Small Wastewater Treatment Plants, Publication 500 (1997).

2. When calculating the flow rate for an existing commercial premise, use this table or metered water usage data from the premise's actual or pro-rata indoor use.

3. WELS-rated water-reduction fixtures and fittings - minimum 4 Stars for dual-flush toilets, shower-flow restrictors, aerator taps, flow/pressure control valves and minimum 3 Stars for all appliances (e.g. water-conserving automatic clothes washing machines).

4. These flow rates take into consideration the likelihood of a reliable water supply being currently provided to a premises or in the future (e.g. from groundwater, surface water or reticulated water supply, or a tankered water supply).

5. Where Council is satisfied a household or premises is unlikely to be provided with a reliable water supply (e.g. a rural farming property where groundwater or surface water is unavailable or used only for stock) the design flow rates for Onsite Roof Water Tank Supply listed in the most current version of AS/NZS 1547 may be used.

6. Extra water producing fixtures include, but are not limited to, spa baths.

7. Based on Crites & Tchobanoglous (1998) and EPA Publication 500 (1997).

8. For premises such as public areas, factories or offices that have showers and toilets, use the flow rates for 'Premises with showers and toilets' in the calculations.

9. Number of seats multiplied by the number of seatings i.e., may include multiple seatings for breakfast, morning and afternoon teas, lunch and/or dinner.



## ONSITE SEWAGE MANAGEMENT SYSTEM SIZING

### AERATED WASTEWATER TREATMENT SYSTEM SIZING

Commercial premises with peak daily flows into the treatment system of less than 5000 litres per day; need to consider the hydraulic aspects and the capacity of the system to deal with high & irregular loadings. The provision of an additional septic tank may provide the additional capability for the higher loading. Best practice may be a septic tank followed by a secondary treatment system\*.

The required sludge accumulation for a residential dwelling using 600 litres per day; requires a collection well with a capacity of 2150 litres as per BSC's OSSM Guidelines, page 30.

This design is based on 600 litres per day in a public situation, with the hydraulic loading is within the domestic parameters, however consideration needs to be taken into account with people on antibiotics, cancer treatments and other unforeseen products which may enter the system.

*It is recommended that a twin tank Krystel Kleer ADV6000 is installed.* This consists of a 7100 litre holding tank before a 7100 litre aerated wastewater tank with controlled dosing. This will help control contaminants before entering the AWTS for treatment.

\* Environment Protection Authority Victoria, Code of practice – onsite wastewater management.

### LAND APPLICATION AREA SIZING

The sizing of the land application area is based on the hydraulic loading, nutrient balance and water table balance calculations.

Calculated hydraulic loading = 150 square metres.

Calculated nutrient balance = phosphorous is 275 square metres.

Calculated water balance = 280 square metres.

*It is recommended that a drip irrigation field of 280 square metres as the land application area.*

This is based on the water table balance with 51mm storage which is the most limiting factor with a zero buffer. The phosphorous sorption within the LAA has a life span of 52 years.

Calculations based on figures from pages 10 and 11.

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## NUTRIENT BALANCE WORKSHEET

Nutrient Balance							
Summary - Land application area required based on the most limiting balance =						275	m <sup>2</sup>
Input Data							
<b>Wastewater Loading</b>				<b>Nutrient Crop Uptake</b>			
Hydraulic Load (Q)	600	L/day	Crop N Uptake	240	kg/ha/yr	which equals	66 mg/m <sup>2</sup> /day
Effluent N Concentration (N) (prim 54 sec 30)	30	mg/L	Crop P Uptake	30	kg/ha/yr	which equals	8 mg/m <sup>2</sup> /day
% Loss to Soil Processes (Geary & Gardner 1996)	0.2	decimal	<b>Phosphorus Sorption</b>				
Total N Loss to Soil (Q x N) x 0.2	3600	mg/day	P-sorption Result	300	mg/kg	which equals	3360 kg/ha
Remaining N Load after soil loss	14400	mg/day	Bulk Density	1.4	g/cm <sup>3</sup>	1400	kg/m <sup>3</sup> depend on soil
Effluent P Concentration(prim 12 & sec 10)	8	mg/L	Depth of Soil	0.8	m	site specific	
Design Life of System	50	yrs	% of Predicted P-sorp	0.5	decimal	silver bullet	
Method 1: Nutrient Balance Based on Annual Crop Uptake Rates							
Minimum area required with zero buffer				Determination of buffer zone size for a nominated land application area (LAA)			
Nitrogen	219	m <sup>2</sup>	Nominated LAA size	280	m <sup>2</sup>		
Phosphorus	275	m <sup>2</sup>	Predicted N export from LAA	-1.46	kg/yr		
			Predicted P export from LAA	-0.03	kg/yr		
			Phosphorus longevity for LAA	52	years		
			Minimum buffer required for excess nutrient	-5	m <sup>2</sup>		

Note: Effluent phosphorus concentration is based on 8mg/litre per day as this is not a household situation.



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## WATER TABLE BALANCE WORKSHEET

### Sub-surface Irrigation Water Balance & Storage Calculations

Site Address:		Killen Falls, Tintenbar																
Input Data																		
Wastewater flow	Q	600	L/day	Flow l/day	6												Recommended coefficients in Water Balance: Pan Evap/Crop: = 0.75 (eg grass) Retained Rainfall Fraction: Sand = 0.8, Medium Clay = 0.75, Heavy Clay = 0.7	
Daily DIR	DIR	4	mm/day	No: EP	100													
Crop factor	C	0.75	unit less	Total L/d	600													
Retained rainfall coefficient	RRC	0.75	unit less	(L) Nominated land application area		280		sq/m										
Rainfall data	Ballina																	
Evaporation data	Alstonville																	
Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total		
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	1748		
Rainfall	R		mm/month	177	192	213	187	162	202	114	86	61	94	122	138	1748		
Evaporation	E		mm/month	177	140	133	105	84	72	84	109	132	155	162	183	1535		
Crop factor	C			0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75			
<b>Outputs</b>																		
Evapotranspiration	ET	Exc	mm/month	133	105	100	79	63	54	63	81	99	116	122	137	1151		
Percolation	B	DIRxD	mm/month	124	112	124	120	124	120	124	124	120	124	120	124	1460		
Outputs		ET+B	mm/month	256.525	217	223.975	198.75	186.775	174	186.775	205.375	219	240.25	241.5	261.175	2611		
<b>Inputs</b>																		
Retained rainfall	RR	RxRRC	mm/month	132.75	144	159.75	140.25	121.5	151.5	85.5	64.5	45.75	70.5	91.5	103.5	1311		
Effluent irrigation	W	(QxD)/L	mm/month	66.4	60.0	66.4	64.3	66.4	64.3	66.4	66.4	64.3	66.4	64.3	66.4	782		
Inputs		RR+W	mm/month	199.2	204.0	226.2	204.5	187.9	215.8	151.9	130.9	110.0	136.9	155.8	169.9	2093		
<b>Storage Calculation</b>																		
Storage remaining from previous month			mm/month	0	0.0	0.0	2.2	8.0	9.1	50.9	16.1	0.0	0.0	0.0	0.0			
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-57.3	-13.0	2.2	5.8	1.2	41.8	-34.8	-74.4	-109.0	-103.3	-85.7	-91.2	-518		
Cumulative storage	M		mm	0.0	0.0	2.2	8.0	9.1	50.9	16.1	0.0	0.0	0.0	0.0	0.0	86		
Maximum storage for nominated area	N	mm		51														
Storage	V	NxL (litres)		NA														
Water balance-to achieve maximum 50mm storage for worst month				280														
			m <sup>2</sup>															
<b>Effluent Land Application Area</b>																		
Required Based On Hydraulic loading	A = Q/DIR (mm/day)		150	m <sup>2</sup>														

## SETBACK DISTANCES FOR LAND APPLICATION AREAS

Unable to meet the buffer distances to upgradient property boundaries and power poles/lines as per Ballina Shire Council's OSSMS Guidelines or AS1547:2012. The viral & bacterial die off calculations have been assessed for the boundary setback distances for this OSSMS design.

### BALLINA SHIRE COUNCIL MINIMUM SETBACK DISTANCES

- 100 metres to permanent surface waters (river, stream, lake).
- 250 metres to domestic groundwater well or bore.
- 6 metres to recreational areas & swimming pools.
- 12 metres down slope to property boundaries.
- 6 metres up gradient to property boundaries.
- 40 metres to gullies, dams & intermittent waterways.
- Essential Energy require 10 metres from existing power poles and lines (where possible).

The required buffer distance to power poles cannot be met. The proposed land application is located within 5 metres of a power pole and directly under power lines. Written permission must be sought prior to approval and/or installation from the relevant authority.

The proposed land application area is 1 metre from Lot 9, DP 635047. This property has a plantation of established native trees adjacent to the land application area. The nearest dwelling is approximately 250 metres down slope from the proposed LAA.

The viral & bacterial die off calculations illustrate a setback distance of less than half a metre (480mm) over 21.3 days. The installation of a holding tank along with an AWTs with chlorine disinfection, combined with the subsurface application of effluent within a drip irrigation field, will be similar to tertiary treatment. By installing a surface run off drain/mound around the LAA, combined with the planting of lomandra along the boundary of Lot 9 will help minimise the risk of viruses & bacteria entering the surrounding landscape.



## VIRAL & BACTERIAL DIE OFF CALCULATIONS

<b>CALCULATE TIME FOR VIRAL &amp; BACTERIAL DIE-OFF</b>												
<b>DETERMINE DAYS REQUIRED FOR VIRAL REDUCTION</b>												
Step A - Equation 1												
<p><math>M_t/M_o = e^{-kt}</math>                      where <math>M_t/M_o</math> is a dimensionless ratio between the viral concentration in the groundwater at any time <math>t</math> (<math>M_t</math>) and the viral concentration in the effluent at the time of its application to the subsurface (<math>M_o</math>)  <math>t</math> is the travel time (days) of the viruses in the groundwater  <math>k</math> is the first order rate of die-off and is dependent on temperature where <math>k=(T-8.5)/20</math>  <math>T</math> is groundwater temperature (<math>^{\circ}C</math>)</p>												
<p>The order of magnitude values for wastewater treatment are:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 35%;">Primary treatment - septic</td> <td style="width: 35%;">7 order of magnitude</td> <td style="width: 30%;">Mt/Mo = 0.0000001</td> </tr> <tr> <td>Greywater</td> <td>5 order of magnitude</td> <td>Mt/Mo = 0.00001</td> </tr> <tr> <td>Secondary treatment</td> <td>3 order of magnitude</td> <td>Mt/Mo = 0.001</td> </tr> </table>				Primary treatment - septic	7 order of magnitude	Mt/Mo = 0.0000001	Greywater	5 order of magnitude	Mt/Mo = 0.00001	Secondary treatment	3 order of magnitude	Mt/Mo = 0.001
Primary treatment - septic	7 order of magnitude	Mt/Mo = 0.0000001										
Greywater	5 order of magnitude	Mt/Mo = 0.00001										
Secondary treatment	3 order of magnitude	Mt/Mo = 0.001										
<b>Input</b>	0.001	Mt/Mo (dimensionless ratio of viral concentrations)										
	15	T (groundwater temperature, $^{\circ}C$ )										
<b>Calculate k:</b>	$k = (T-8.5)/20$											
	0.325	calculated automatically										
<b>Calculate t:</b>	$M_t/M_o = e^{-kt}$											
therefore	$t = \ln(M_t/M_o) / -k$											
	21.3	days calculated automatically										
<b>CALCULATE SETBACK DISTANCE</b>												
Step B - Equation 2: Correcting Travel Time for Vertical Infiltration												
The time required for groundwater (containing viruses) to move a given distance in saturated material is estimated by using the formula below:												
<p>Formula: <math>d_g = (t - d_v \cdot P/K)/(P/K \cdot i)</math>  <math>d_g</math> = horizontal distance from effluent land application area to where virus die-off occurs (m)  <math>d_v</math> = vertical distance to groundwater (m)  <math>t</math> = travel time (days)  <math>P</math> = porosity soil (fraction e.g. 0.3) - clay 40-70%, silt 35-50%, sand 25-50%, gravel 25-40%  <math>K</math> = permeability saturated hydraulic conductivity in (m/day)  <math>i</math> = groundwater gradient (fraction e.g. 0.02 if slope of groundwater 1:50)</p>												
<b>Input</b>	4	$d_v$ (vertical distance to the water table in metres)										
	0.4	P (effective porosity of the soil)										
	0.12	K ( AS1547 2012 table N1 weakly structured minimum m/day)										
	0.1	I (groundwater gradient - the steeper, the more conservative the answer)										
Calculate $d_g$ :	0.24	metres calculated automatically										
Recommended Safety Factor: allow a safety factor of 2												
<b>Setback Revised</b>	0.48											

## PROPOSED AWTS SPECIFICATIONS

A Krystel Kleer ADV6000 is a two tank aerated wastewater treatment system designed for a capacity of up to a 3500 litres per day. This is made up of a purpose built 7100 litre concrete cylindrical collection well will act as a primary septic tank in front of a 7100 litre Krystel Kleer aerated wastewater treatment system with chlorine disinfection. This will give a primary treatment of effluent onsite of a total capacity of 10 100 litres for both tanks and will give a de-sludging capacity of three years.

A 7100 litre septic holding tank is proposed before the AWTS to help control contaminants before entering the AWTS for treatment. It is recommended that the septic holding tank is to be pumped out every 12 months and the AWTS every year as well or when required. This must be monitored quarterly in conjunction with the servicing of the AWTS.

An additional Davey 120G grinder pump is to be installed within the sediment chamber of the primary holding tank to control dose the AWTS at approximately 200 litres per cycle. The outlet from the primary tank must be connected to the inlet of the AWTS with 100 mm PVC in case this pump fails. A high water level alarm must be installed within this chamber as well.

A visual & audible alarm and strobe light are to be installed which will reduce the service response time when triggered. The alarm and air pump are to be installed within a service room away from public access. The lids on the septic tank and AWTS are to be secured and locked to prevent public access and vandalism. All wastewater lines are to be connected to the new AWTS treatment system as per AS3500.

Effluent in any random grab sample of disinfected effluent should comply with the standard as set out in the NSW Dept of Health 2005 and Sewage Treatment Accreditation Guideline, Part 4, clause 43(1) Local Government (Approvals) Regulation 1999.

- BOD5 < 30mg/L
- TSS < 45 mg/L
- Free residual chlorine > 0.2 and < 2.0 mg/L
- Thermotolerant coliforms < 100 cfu/100mL





## TREATMENT TRAIN PROCESS

Incoming → Primary Chamber → Controlled Pump Dosing Chamber → Primary Separation Chamber → Secondary Separation Chamber → Contact Aeration Chamber → Sedimentation Chamber → Chlorine Disinfection Chamber → Discharge

## FUNCTION OF THE TANK

PRIMARY TREATMENT – the first stage of treatment is to separate the solids from the liquids. The solids mainly from toilet waste remain in the first compartment where the digestion process takes place. The digestion process is accelerated by the presence of anaerobic micro organisms which multiply & ensure faecal solids are turned into inert waste within this chamber. The microbial action should not be hindered by the discharge of chemicals via household cleaning products.

SECONDARY TREATMENT – the subsequent treatment stages are with the aeration of the liquid waste. The more microbes present in the liquids, the more they will thrive, multiply & assist in the aeration process. The air is supplied by a small blower and it is important that a constant air supply is maintained at all times.

SETTLING – following aeration the liquid wastes are allowed to settle under quiescent conditions. Any solid particles which are suspended in the aerated effluent will settle out & are returned automatically to the first or second treatment stage. The clarified water, although it looks reasonably clean, may still contain some bacteria which will have to be removed.

TERTIARY TREATMENT – the bacteria are removed by a chlorine process. The clarified effluent flows through the chlorine chamber it comes into contact with a disinfecting agent. Chlorine disinfection will ensure the final effluent meets the criteria set by regulating bodies.

OPERATION – once the drainage & power have been connected and the land application area is installed as per council specifications, the AWTS can be used as intended. Only an authorised service contractor can make adjustments to the air supply or pumping equipment.

## PROPOSED LAND APPLICATION AREA (LAA)

Due to site limitations at Killen Falls Reserve, the proposed land application area is a 280 square metre drip irrigation field which is to be installed on the cleared land which is situated on the road reserve number 10.026.

The proposed LAA is 500mm lower on the northern end due to the topography of the site. See plans on pages 19 and 21.

The field must be raised 200mm above the road surface & surrounding ground level to prevent stormwater flowing onto the LAA.

Ensure the flush pit lid and inspection points are above ground level and clear of debris.

Plant lomandra along the boundary of Lot 9 at 1.5 metre spacings. Plant an area of native trees and shrubs down slope of the LAA on the northern side to help reduce nutrient run off.

A certified irrigation design is being prepared by Thinkwater Alstonville and approval is required by BSC prior to the commencement of work.

There are very limited alternative sites for future land application areas.

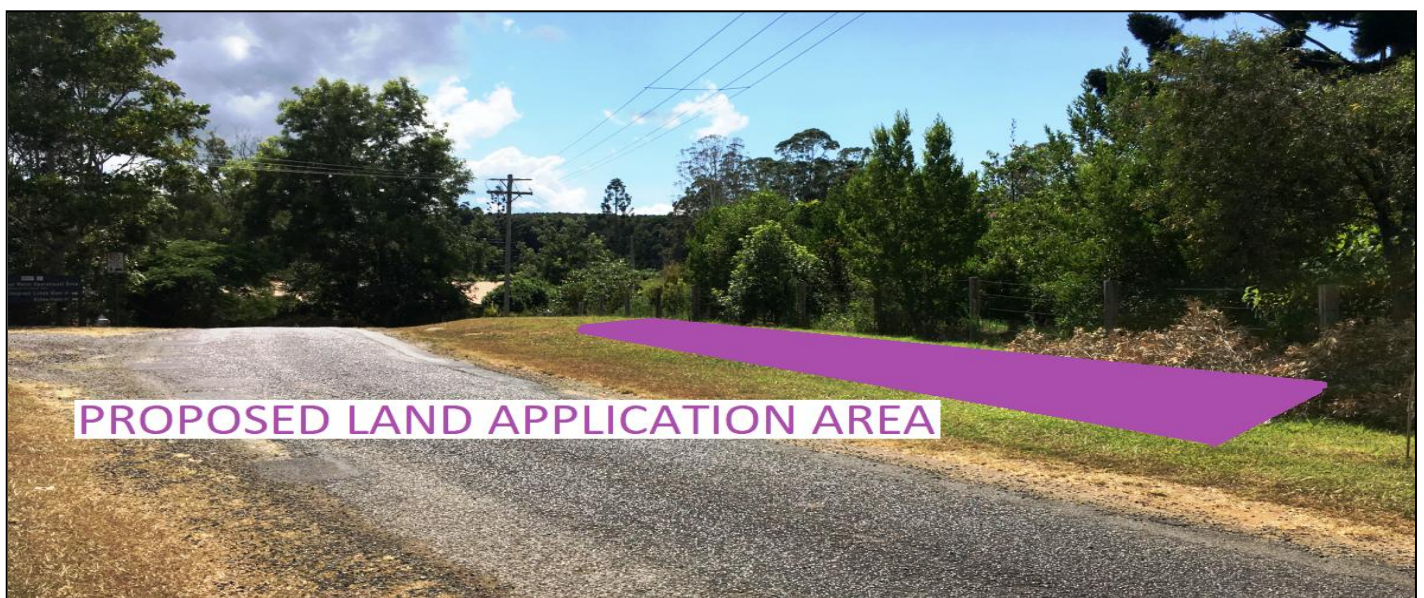
A surface water diversion drain/mound must be installed around the LAA to divert all water runoff.

The LAA must not be used for growing of fruit and vegetables. Gardens that require regular watering are not to be planted within the disposal area.

The LAA and the waste disposal tanks must be fenced off from vehicle traffic and the public.

Only domestic lawn care equipment is allowed within the LAA.

Do not construct structures or paths on the LAA.





## PROPOSED INSTALLATION DETAILS

All underground services must be located prior to the commencement of work.

It is recommended that a concrete Krystel Kleer ADV6000 advanced twin secondary treatment system which is disinfected by chlorination is installed (or equivalent). This is an ADV5000 with a holding tank before it and is known as the ADV6000. It is important not to over excavate the inlet pipework to the AWTS. The tank inlet is to be positioned against a firm excavated wall to prevent the inlet pipe from sagging when backfilling. If this is not possible then the excavated soil beneath the inlet pipe must be compacted every 100mm. The lid of the AWTS must be 100 – 150mm above finished ground height.

The AWTS must be installed on a level blue metal base, backfilled with excavated soil to the manufacturer's installation specifications and then filled with water on the day of installation. After a period of time the soil around the tank will subside. It is the responsibility of the owner to place soil around the tank back to ground level when this occurs.

An additional Davey 120G grinder pump is to be installed within the baffle chamber of the primary tank; it is to be positioned at a height to dose the AWTS at approximately 200 litres per cycle. The outlet from the primary tank must be connected to the inlet of the AWTS with 100 mm PVC in case this pump fails. A high water level alarm must be installed within this chamber as well. See page 32.

Connect all drainage to the 7100 litre holding tank including an overflow relief gully (ORG) as per AS3500.

A 50mm 130 micron inline disc filter along with a 40mm tech filter is to be installed on the pump out line to the land application area. These filters along with an alarm indicator must be installed within the service room to prevent vandalism. A 50mm swing check valve and a 50mm lever ball valve are to be installed on the pump out line after the filter. A small drainage valve is to be installed after the ball valve to allow the main pump line to be drained when required. See filter configuration on page 30.

An additional strobe light is to be installed on the amenities block and protected from vandals. Signage needs to be clearly placed advising the public to call BSC/service agent and the relevant details when the light is flashing.

## PROPOSED INSTALLATION DETAILS CONTINUED

The pump out line is to be excavated from the AWTS/service room to the LAA as per site plan. The pump out line must be 50mm lilac poly PN12.5 & installed to a minimum of 500mm depth. A lilac identification tape is to be installed 200mm below ground level above the pump out line. If power is to be laid within the same trench it must be installed with the minimum separation distance required of 600mm as per AS3500.

A sign located on the entrance to the car park may have to be removed. If the road has to be dug through, seek written permission from the relative authority. Directional drilling may be the preferred option for both the power and effluent line.

The LAA must be prepared in the location as shown on the site plan. The grass and rocks/floaters must be removed from the LAA. Gypsum & lime at a rate of 1 kg per square metre must be added to the land application area this will assist in neutralising the pH & conditioning the soil. Imported sandy loam top soil is to be added to the LAA to raise it above the road level to approximately 200mm. This will assist with directing the stormwater around the LAA.

A certified irrigation design must be sought and approved by BSC prior to the commencement of work. Pipework is to be installed within the LAA area as per the certified irrigation design. A flush pit is to be constructed by installing one length of 350mm reln trench. Install a flush valve on the end of the manifold and set up so the flow of effluent can be viewed. Cover with a heavy duty lilac valve box.

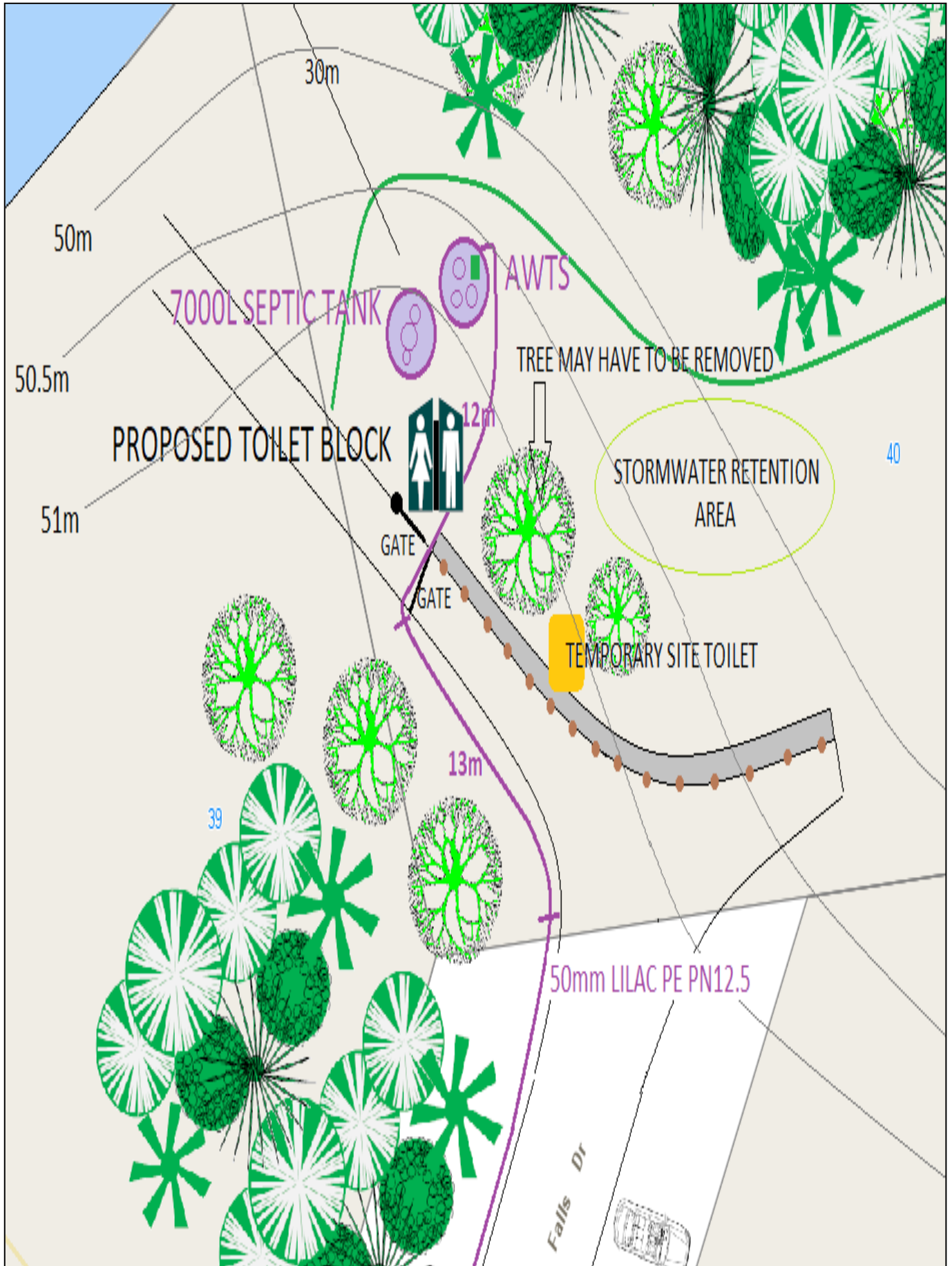
Construct a surface run off drain/mound completely around the LAA to divert water away. Cover the entire land application area with turf and water daily until the turf is established. Lomandra is to be planted along the boundary of Lot 9 at 1.5 metre spacings as per plan. Native trees and shrubs are to be planted down slope on the northern side of the LAA to reduce nutrient run off.

Keep all machinery & vehicles off the LAA at all times after to prevent compaction. The LAA must be fenced off from the public and vehicular traffic at all times.





## SITE PLAN OF TOILET BLOCK AREA





## GENERAL MAINTENANCE GUIDE

It is the responsibility of the owner/tenant to ensure that the following points below are adhered to at all times.

Monitor the toilet and tapware daily to avoid the over loading of the OSSMS if they are dripping.

Use septic friendly cleaning products such as bio-degradable soaps & low phosphorus detergents.

Do not put hair dyes, oils, paint, thinners, fuel, pesticides, bleach, chemicals & disinfectants down the drain.

Do not dispose of foreign items into toilets such as condoms, sanitary napkins, tampons, cotton buds or disposable nappies.

The LAA is to be mowed/whipper snipped weekly to keep the grass short for maximum exposure to the sun and wind for evaporation.

Trim or cut back the lomandra at LAA every twelve months.

Ensure the septic tank/ lids/inspection points are above ground level.

The LAA is to be fenced off & kept clear of vehicle traffic, farm equipment, livestock and the public *at all times*.

Learn the layout of your LAA. Conduct a weekly visual inspection of the OSSMS to ensure everything is in full working order at all times.

If any aspect of the OSSMS including the LAA show signs of failure a licenced plumber is to be contacted immediately.

Maintenance of the septic tank & AWTS should consist of pumping out every 12 months or as required.

Keep a record of desludging, inspections and any maintenance.

Clean filters & flush irrigation field every quarter or when required.

The OSSMS is a living fragile ecosystem & it's the responsibility of the tenant and/or owner to adhere to the maintenance of the system as specified to ensure its longevity.

It is the responsibility of the owner to ensure all aspects of the LAA are maintained and in full working order at all times including water surface drain/mound.



## MAINTENANCE SCHEDULE

To ensure that sewage treatment plants perform to the high standards set by the regulating bodies, a maintenance programme is required in the interest of environmental health & safety. Failure to have the stipulated servicing carried out could result in a breach of public health legislation and subsequent legal proceedings.

Every three months a service will be carried out & the following will be undertaken.

- Adjustments to air intake where necessary.
- Adjustments to sludge return where necessary.
- Clean the septic tank & AWTS from debris, spiders etc.
- Cleaning of filters.
- Monitoring & maintaining the balance of the purifiers.
- Check sludge levels.
- Replenish chlorine holders.
- Check the dosing pump is operating.
- Check all alarms & strobe lights are working.
- Flush the manifold within the LAA.
- Visual check of the LAA that it is being maintained.
- Reports forwarded to the local council by an authorised service contractor.

## CONCLUSION

Following a site inspection it has been ascertained that it is possible to install an on-site sewerage management system (OSSMS) using a combination of criteria from Ballina Shire Council's OSSMS Guideline & Strategy, AS1547:2012 and viral & bacterial die off calculations.

Council needs to take into account that this is an existing popular recreation area for locals and tourists which is located within a highly restrictive sensitive environmental area. Buffer distances to neighbouring boundaries & power poles/lines cannot be met. These constraints have been addressed in detail on page 12.

This proposal recommends the installation of a new Krystel Kleer ADV6000 twin tank advanced aerated wastewater treatment system with chlorine disinfection & controlled dosing. This will help to minimise any contamination to the surrounding environment. A certified irrigation design from Thinkwater Alstonville is to follow in approx 4 weeks. The land application area must be fenced off from vehicular traffic and the public at all times. The LAA has been designed to utilise the most practical available area. There are limited alternative areas for a future LAA should it fail.

The OSSMS is to be constructed and designed exactly as specified in this design including the 280 square metre detailed land application area from Thinkwater Alstonville. Calculations have been based on the maximum available cleared land area with a design flow of 600 litres per day for 100 people.

All fixtures must be full water saving devices with one litre per minute tapware with spring loaded shut off. This will further reduce the amount of wastewater entering the on-site sewage management system. During the installation of the OSSMS photographs are to be taken & retained as a record that the OSSMS has been installed as per this OSSMS design.

Only an experienced contractor in installing on site sewerage management systems is to be engaged for this installation.

A works as executed plan is to be submitted to Ballina Shire Council upon completion.

Once an OSSMS has been approved by Council it must be installed exactly as specified as stated in this design including any conditions imposed by Council. Following the installation an approval to operate will be granted by Ballina Shire Council.

## SUMMARY OF WORK TO BE CARRIED OUT

- Submit a notice of works prior to the commencement of work.
- Ensure the relevant authorities have granted permission in writing for the installation of OSSMS.
- Liaise with Council for inspections.
- Install a new Krystel Kleer ADV6000 twin tank system as per plan.
- Install a 280 square metre drip irrigation field as per certified design.
- Connect all drainage to the new ADV6000 as per AS3500.
- Construct a surface water runoff drain/mound around the entire LAA.
- Lomandra & native shrubs to be planted around & down slope of the LAA as per plan.
- Submit works as executed plans & commissioning certificate to council upon completion.

## REFERENCES

- AS1547:2012 On-Site Domestic Wastewater Management.
- Ballina Shire Council's OSSMS Strategy.
- Ballina Shire Council's OSSMS Guidelines.
- Ballina Shire Council's zoning maps.
- Ballina Shire Council's flood planning maps.
- Ballina Shire Council's soil landscape maps.
- NSW Department of Primary Industries – groundwater maps.
- Rous Water Onsite Wastewater Management Guidelines June 2008.
- Soil Landscapes of the Lismore - Ballina area; D T Morand.
- Bureau of Meteorology.
- Victorian Code of Practice Onsite Waste Water Management (Public Toilets).
- Environment Protection Authority Victoria, Code of practice OSSM.
- Quality Tanks, Yatla.
- Mr J Brideson, Mr J Bruce & Mr N McCowan, Ballina Shire Council.
- Mr Ian Jackson, Septic Solutions Australia.



## DISCLAIMER

This report has been based on information supplied by the client specifically for the proposed installation of an OSSMS at Killen Falls Reserve, Killen Falls Drive, Tintenbar. It is the role of the owner to ensure accurate information has been supplied for the purposes of designing a suitable domestic OSSMS. Septic Solutions Australia takes no responsibility if the details supplied are incorrect including the drip irrigation design.

Two hand augured soil samples were taken to a depth of 750mm only due to rock floaters. Soil types and conditions can vary within a small area. Should the hydraulic loading exceed the parameters in this report an upgrade of the OSSMS may be required. Investigations made have been limited by time & economic restraints.

All underground services must be located prior to the commencement of work.

All relevant written permission is to be sought & gained from the appropriate regulatory authority(s).

Calculations have been based on the maximum available cleared land area with a design flow of 600 litres per day.

All drainage installations, including changes to drainage must have overflow relief gullies and must comply with AS3500.

All installations must be carried out by a licensed plumber with experience in installing septic systems. The installing plumber must read and familiarise themselves with this design and all installations must be installed exactly as specified.

Numerous factors are taken into consideration when designing an OSSMS including the size of the dwelling, soil type, number of persons, water saving devices etc. The designer takes no responsibility for the failure of the OSSMS in any way if any of the information supplied was incorrect and/or if the maintenance of the OSSMS is not adhered to.

This report is not to be used by any other person(s) or corporation in anyway.

During the installation of the on-site sewage management system, photographs are to be taken & retained as a record that the OSSMS has been installed exactly as per this OSSMS design.

Septic Solutions Australia accepts no responsibility for any loss or damage whatsoever to any person(s) or corporation who contravene the recommendations in this report.

## OSSMS ACKNOWLEDGEMENT

I/we \_\_\_\_\_

As the owner(s)

On behalf of the owner

acknowledge the contents of the attached report and agree that the information provided is correct for the purposes of designing this on-site sewage management system. I/we agree with the recommendations in this report and will adhere to the maintenance in this report as required by the Local Authority.

Signed: \_\_\_\_\_

Signed: \_\_\_\_\_

Date: \_\_\_ / \_\_\_ / \_\_\_\_\_

## SUBMERSIBLE GRINDER PUMPS

**Model Numbers:** D120G, D120GA, D150G, D150GA, DT12G, DT15G, DT22G & DT37G

DEPEND ON  
**DAVEY**

**WATER PRODUCTS**

## SUMP PUMPS



Grinder and shredder ring

## PRODUCT DESCRIPTION

Submersible pump consisting of a solids handling grinder inlet with a high head open impeller to pump waste water containing soft solids in suspension.

## APPLICATIONS

- Grey & Black Water Pumping
- Sump Emptying
- Septic effluent & sewage disposal
- Pumping of waste water with soft solids in suspension

## DESIGN FEATURES

### PUMP

Heavy duty shredding and grinding ring at inlet. Centrifugal design, open impeller. Double Mechanical shaft seal in oil bath. Hard faced Silicon Carbide / Ceramic seal on pump side. Sand slinger lip seal for added protection. Oring casing sealing. Corrosive resistant stainless steel and quality heavy duty powder coated cast iron pump parts.

### MOTOR

2 pole, 2900rpm 50Hz 240 volt single phase or 415 volt three phase. Submersible with IPx8 enclosure. 10 metre HO7RN-F oil resistant power lead and seal sensor lead fitted with bared wire lead ends for easy connection to power supply terminations. Class E insulation. Protected against both high operating temperatures and high current by a built in automatically resetting thermal overload.

## BENEFITS

- Able to pump soft organic solids, sanitary products, thin rubber products and even some textiles in suspension, by shredding to a slurry
- Open impeller prevents blockage of the pump by small solids in the slurry
- High heads and small solids allow connection to small discharge pipe systems, especially suited to pumping waste water to pressure sewer mains
- Silent operation
- Quick and easy installation
- Hose tail supplied with every pump
- Low maintenance
- Fully repairable
- Mounting feet with rubber cushions fitted for a firm and stable positioning during installation and operation for D120G/A, D150G/A, DT12G & DT15G.
- Adaptable to slide rails - see accessories

## OPERATING LIMITS

Capacities	290 lpm
Head to	38m
Max. submergence	25m
Max. operating temperature	50°C

### Suitable Fluids

Sewage or "Grey Water" of neutral pH containing up to 20% soft organic solids (some wear should be expected while pumping hard solids in suspension).

## ACCESSORIES

These optional accessories are available:

- Slide rail kit - P/No SR50
- Seal Sensor relay, allows connection to contactor warning system - Part No. 49076
- Auto float switches are fitted to D120GA & D150GA models
- Separate automatic control panels available for single or multiple pump installations







**FILTMASTER**

## Manual Plastic Filters

### 2" and 3" Disk and Screen

#### Key Properties

- 10 bar rating
- Available with 2" or 3" inlet/outlet
- BSP threads or roll groove\* (3" only) connections
- Stainless steel 304 locking flange
- 1/4" take-off on inlet/outlet
- 1" BSP outlet on cover
- 2" model is 632 mm high and 310 mm wide
- 3" model is 750 mm high and 310 mm wide
- Disks are manufactured from polypropylene
- Disks are available in 130 and 200 micron
- Screens are manufactured from 304 stainless steel
- Screen is available in 130 micron

#### Features & Benefits

- Body and cover manufactured from glass reinforced nylon to provide a 10 bar (1000 kPa) pressure rating to suit a wide range of applications
- Locking flange allows easy removal of the cover to allow the cartridge to be cleaned
- Locking flange made from stainless steel to prevent corrosion
- Access points on both the inlet and outlet to allow pressure measurements to be made
- Reinforced threaded outlet on cover to allow air relief valve to be installed
- Two outlets are standard – inline and at 90° to inlet, for flexibility of installation
- Cap with O-ring is provided as standard to allow choice of outlets
- FilMaster disk and screen filters are manufactured in Spain by Jimten under a certified quality management system to ISO9001 standard to ensure a quality product.

#### Models Available

Code	Description
I97008	2" Disk Filter – 130 micron, BSP connections
I97022	2" Disk Filter – 200 micron, BSP connections
I97050	2" Screen Filter – 130 micron, BSP connections
I97260	3" Disk Filter – 130 micron, BSP connections
I97274	3" Disk Filter – 200 micron, BSP connections
I97266	3" Disk Filter – 130 micron, roll groove* connections
I97302	3" Screen Filter – 130 micron, BSP connections

\*Roll groove is also referred to as Victaulic®



FiltMaster by Jimten

**Philmac**

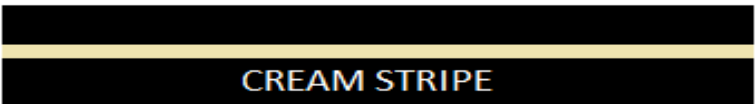
The connection you can trust.

## PIPE IDENTIFICATION CHART

Colour Identification	Application
-----------------------	-------------



Recycled Water



Pressure Sewer

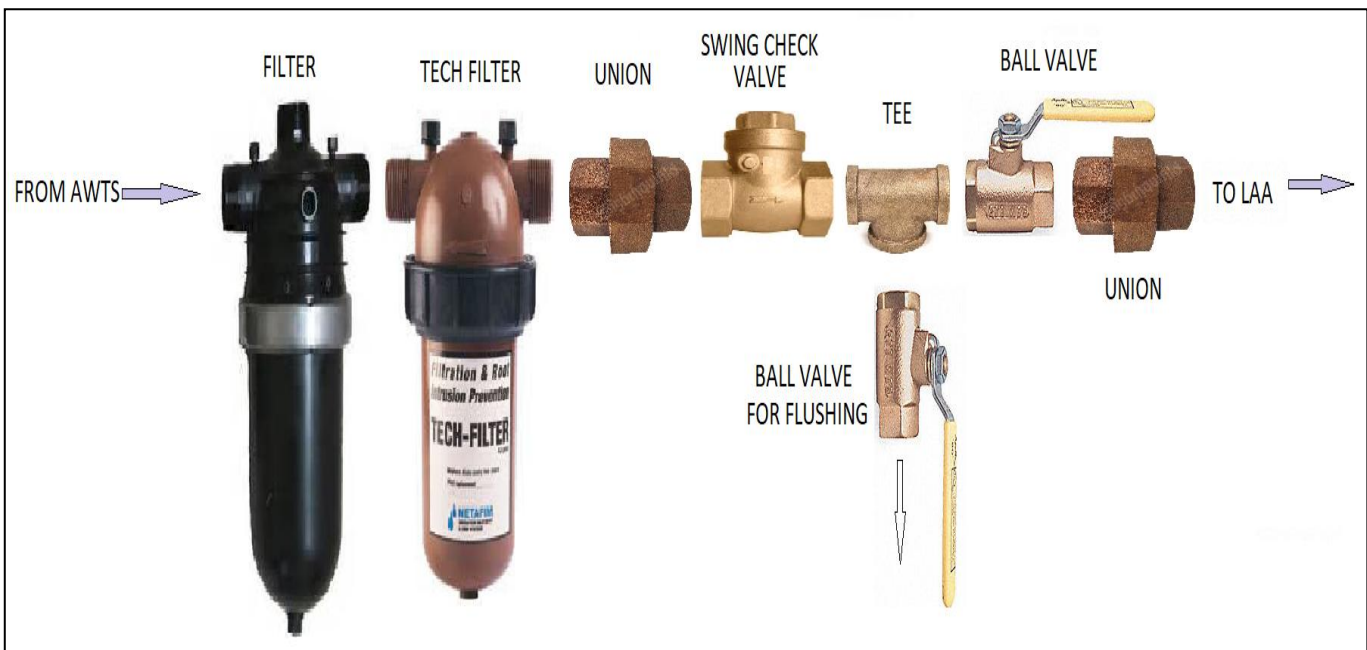


Recycled Water

Underground Identification Tape AS2648.1

**RECLAIMED RECYCLED WATERLINE BURIED BELOW  
DO NOT DRINK**

## FILTER CONFIGURATION





QLD Pty Ltd  
ABN 60 834 863 374

59 Commerce Circuit | Yatala

Queensland | 4207 | Australia

PO Box 5168 | Gold Coast MC

Queensland | 9726 | Australia

● 07 3382 7666 ● 07 3382 6411

● sales@qualitytanks.com.au

● www.qualitytanks.com.au

QUALITY MANUFACTURERS OF RAINWATER TANKS • DOMESTIC AND COMMERCIAL WASTE WATER SYSTEMS

### To Whom It May Concern.

Quality Tanks wishes to advise that on properties that require a Wastewater Treatment that is required to treat over 10 EP, (ie 6 bedrooms or more) and up to 15EP we have a Treatment Plant that is called our ADV 6000.

This treatment plant is a twin tank system, the treatment tank is our approved ADV 5000, and this is coupled up to an All Purpose Septic Tank which then becomes our Krystel Kleer Model ADV 6000 twin tank system.

This system can treat 3500L per day

Should you require any further information in relation to any of the above you can contact Ken Gray 0408 765 507.

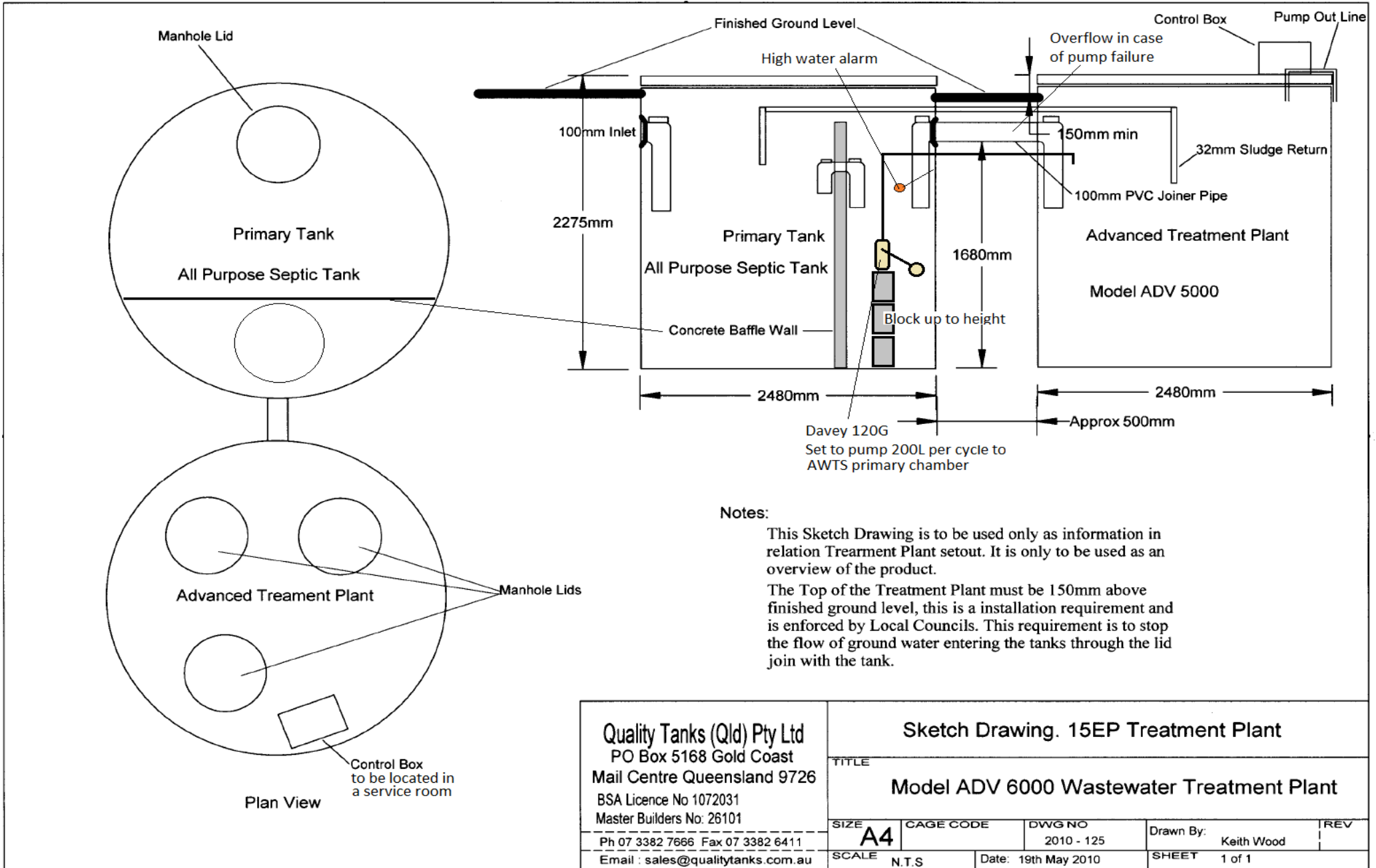
Kind Regards

Ken Gray

Managing Director – Krystel Kleer Pty Ltd



# SEPTIC SOLUTIONS AUSTRALIA



<b>Quality Tanks (Qld) Pty Ltd</b> PO Box 5168 Gold Coast Mail Centre Queensland 9726 BSA Licence No 1072031 Master Builders No. 26101 Ph 07 3382 7666 Fax 07 3382 6411 Email : sales@qualitytanks.com.au		<b>Sketch Drawing. 15EP Treatment Plant</b> TITLE <b>Model ADV 6000 Wastewater Treatment Plant</b>		
SIZE	CAGE CODE	DWG NO	Drawn By:	REV
A4		2010 - 125	Keith Wood	
SCALE	Date:	SHEET		
N.T.S	19th May 2010	1 of 1		





Health

## Certificate of Accreditation Sewage Management Facility Aerated Wastewater Treatment System

*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: Krystel Kleer ADV5000 AWTS (Concrete)*

*Manufacturer: Krystel Kleer Pty Ltd*

*Of: 59 Commerce Circuit, Yatala, QLD, 4027*

*The Krystel Kleer ADV5000 AWTS (Concrete) as described in Schedule 1, has been accredited as a sewage management facility for use in a 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: 16 January 2018*

*Certificate No: AWTS 034*

*Expires: 31 December 2020*

## Schedule 1: Specification

### Krystel Kleer ADV5000 Concrete AWTS

#### Description of the Krystel Kleer model ADV5000 system

The Krystel Kleer model ADV5000 AWTS is designed to treat the wastewaters from a residential dwelling occupied by a maximum of 10 persons. The Krystel Kleer model ADV5000 system is contained in a single vertical axis type cylindrical precast concrete collection well with a design capacity of 6000 litres and manufactured by Quality Tanks (Qld) Pty Ltd. The treatment tank of the Krystel Kleer model ADV5000 system contains the following components:

- **Primary sedimentation chambers 1 and 2** – The total volume of the 2 chambers is 2740 litres. Chamber 2 contains a rectangular block of filter media measuring 550 mm long x 550 mm wide x 1120 mm high with an effective surface area of 34 m<sup>2</sup>. The chambers are designed to physically separate foreign material such as fat, grease or scum and solids from the incoming wastewater.
- **Contact aeration chamber** – Effective volume of the chamber is 2520 litres. The chamber contains a rectangular shaped block of filter media measuring 1650 mm long x 550 mm wide x 1120 mm high with a surface area of 78 m<sup>2</sup>. Micro-organisms grown on the surface of the filter media assist the biological aerobic treatment process and capture the suspended solids. Aeration is continuous over the whole of the media through air diffusers located at the bottom of the chamber.
- **Sedimentation/clarification chamber** – Effective volume of the chamber is 878 litres. Solids captured on the bottom of the chamber are returned to the inlet of the first primary chamber at regular intervals.
- **Disinfection chamber** – Effective volume of the chamber is 465 litres. The treated effluent is stored in the chamber after making contact with the solid chlorine tablets stored in the polyethylene canister. Contact with the chlorine tablets can be controlled by adjusting the cylinder's opening area.
- **Pump out chamber** – Effective volume of the chamber is 465 litres. The chamber contains a submersible irrigation pump such as a Davey 16 metre head pump or equivalent to direct treated effluent to the land application system.
- Air is supplied to the contact aeration chamber by a Thomas model LP-80H air blower with an output of 80 litres/minute or equivalent.

## Schedule 2: Conditions of Accreditation

### 1.0 General

- 1.1 For each installation the owner/occupier of the premises shall make an application to the local council to install a Krystel Kleer model ADV5000 AWTS as a waste management facility in accordance with Section 68, Part C of the Local Government Act 1993 and Clause 26 of the Local Government (General) Regulation 2005.
- 1.2 The Krystel Kleer model ADV5000 AWTS shall be supplied, constructed and installed in accordance with the design as submitted and accredited by the NSW Ministry of Health.
- 1.3 Any modification or variations to the accredited design of the Krystel Kleer model ADV5000 AWTS shall be submitted for separate consideration and variation of the Certificate of Accreditation by the Secretary of the NSW Ministry of Health.
- 1.4 Each Krystel Kleer model ADV5000 AWTS shall be permanently and legibly marked on a non-corrosive metal plaque or equivalent, attached to the lid with the following information:
  - The brand name of the system;
  - The manufacturer's name or registered trademark;
  - The month and year of manufacture.



- 1.5 The manufacturer shall supply with each Krystel Kleer model ADV5000 AWTS an owner's manual, which sets out the care, operation, and maintenance and on-going management requirements of the system.
- 1.6 The manufacturer shall provide the following information to each local authority where it is intended to install an AWTS in their area once Ministry accreditation has been obtained:
  - Statement of warranty
  - Statement of service life
  - Quality Assurance Certification
  - Installation Manual
  - Service Manual
  - Owner's Manual
  - Service Report Form
  - Engineering Drawings on A3 format
  - Detailed Specifications
  - A4 Plans
  - Accreditation documentation from NSW Health.

## **2.0 Installation and Commissioning**

- 2.1 The local council should require that on completion of the installation of the Krystel Kleer model ADV5000 AWTS, the system is 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 council.
- 2.2 The local council should require that all electrical work must be carried out by a licensed electrician and in accordance with the relevant provisions of AS/NZS 3000.

## **3.0 Maintenance**

- 3.1 The local council shall require the owner/occupier of a premises to enter into an annual service contract with a representative of Krystel Kleer Pty Ltd.
- 3.2 The Krystel Kleer model ADV5000 AWTS shall be serviced at three monthly intervals in accordance with the details set out in the owner's and service manual.
- 3.3 Each three monthly service shall include a check on all mechanical, electrical and functioning parts of the system including:
  - Pump and air blower,
  - The control panel and alarm system,
  - Slime growth on the filter media,
  - Operation of the sludge return system,
  - Sludge build up in the Sedimentation Chamber,
  - Chlorine disinfection unit
  - The effluent irrigation area,
  - On-site testing for free residual chlorine and dissolved oxygen.
- 3.4 The local Council should require that a service report sheet, in triplicate, is 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.

## **4.0 On-going Management**

- 4.1 The owner's manual prepared by the manufacturer shall contain a plan for the on-going management of the Krystel Kleer model ADV5000 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 the on-going monitoring program developed by the local council.

4.2 At each anniversary of the accreditation date the manufacturer shall submit to NSW Health a list of all Krystel Klear model ADV5000 AWTS installed in NSW during the previous twelve months. NSW Health will randomly select up to 10% of the installed Krystel Klear model ADV5000 AWTS from each year of installation. The manufacturer, at its own cost, shall arrange for the selected Krystel Klear model ADV5000 AWTS to be inspected and sampled. Sampling is to be organised by an independent JAS/ANZ accredited agency. Samples for BOD<sub>5</sub>, SS, and Thermotolerant coliforms are to be determined by a NATA registered laboratory, and samples for disinfectant concentration, if applicable, are to be determined on site. The results are to be reported to NSW Health by:

- address of premises,
- date inspected and sampled,
- sample identification number,
- BOD<sub>5</sub>,
- SS,
- Thermotolerant coliforms,
- disinfectant concentration and
- service history (if available)

4.3 Effluent from the Krystel Klear model ADV5000 AWTS taken in any random grab sample shall comply with the following standard:

- |                            |  |
|----------------------------|--|
| • BOD <sub>5</sub>         | less than 30 mg/L  |
| • SS                       | less than 45 mg/L  |
| • Thermotolerant coliforms | less than 100 cfu/100 ml   |
| • Free residual chlorine   | greater than 0.2 and less than 2.0 mg/L, where chlorination is the disinfection process. |

## 5.0 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 1547:2000:

- above ground spray irrigation; or
- surface drip irrigation covered by mulch; or
- sub-surface drip irrigation installed at around 100 mm depth.

Each of the three forms of irrigation is subject to the approval of the local council.



# SEPTIC SOLUTIONS AUSTRALIA

