CHAPTER 3.8 ON SITE EFFLUENT DISPOSAL IN NON SEWERED AREAS

1.0 INTRODUCTION

As a region of natural beauty with a significant tourist industry it is important to protect our lakes, rivers and creeks from pollution. As Council is a regulatory stakeholder in this area it is legally obliged to ensure that development does not detrimentally impact on the environment. Many waterways suffer environmental damage as a result of incremental pollution rather than from one pollution event. Both groundwater and surface water influenced by discharged effluent are a prime example of this.

This policy describes Council's requirements for on-site disposal of effluent from residential premises. The policy has been developed after considering legislative requirements of the Local Government (General) Regulation 2005 (LG Regulation), The On-site Domestic Wastewater Management AS/NZS 1547-2012, and relevant experience.

Over recent years, Council has become increasingly concerned with the cumulative environmental impacts and local public health risk of failing or inadequately designed on-site sewage management systems for effluent in non-sewered areas. On-site sewage management systems often fail because of the inability of the site to cope with effluent absorption due to impermeable clay soils, overloading of the systems with large volumes of wastewater, inappropriate design and lack of proper maintenance.

Where connection to a reticulated sewerage system is not practical, installation of an on-site sewage management system is an acceptable alternative only if site conditions are suitable for effluent disposal. Pump-out systems are no longer approved for new dwellings, and are not considered an alternative system due to improper use of these systems and the unsustainable nature of their operation.

Not all sites have natural characteristics suitable for on-site disposal of effluent, such as sites with excessive slope, flood potential, high ground water and those features considered as site limitations when undertaking the site report. In these cases, the site will need to be improved, or an alternative system employed (see section 3.7).

The development of land for residential purposes in areas not serviced with a reticulated sewerage system can present potential environmental and public health risks as a result of inadequate on-site disposal of effluent**.**

This Chapter is a resource tool as well as a working document that aims to protect our waterways from pollution and in particular pollution from on site effluent disposal, by setting minimum standards for the disposal of effluent on site in conjunction with relevant guidelines and legislation.

This Chapter aims to protect the health of people within Wyong Shire through proper on site effluent disposal and to minimise the impacts from on site effluent disposal on the natural environment by preventing the spread of disease by micro-organisms, spread of foul odours, contamination of water, degradation of soil and vegetation, and implementing measures to discourage insects and vermin.

1.1 Objectives of this Chapter

- To ensure that persons do not come into contact with untreated sewage or effluent (whether partially treated or not) in their ordinary activities on the premises concerned
- To encourage the re-use of resources (including nutrients, organic matter and water)
- To minimise any adverse impacts on the amenity of the land on which it is installed or constructed and other land in the vicinity of that land
- To ensure, when approving new and upgraded systems, the potential impacts of climate change and general improvements on information with regard to flooding potential are considered, including the location of the system

1.3 Relationship to other Legislation

This Chapter should be read in conjunction with the relevant provisions of

- **Wyong Local Environmental Plan 2012 (WLEP 2012):** WLEP outlines the requirements for the use of land and the operating standards for development within the Shire.
- **The Local Government Act 1993 (LG Act):** The Local Government Act Section 68 Table item C5 requires that the approval of Wyong Shire Council is to be granted prior to the installation, construction or alteration of a waste treatment device or a human waste storage facility or a drain connected to any device.
- **The Local Government (General) Regulation 2005 (LG Regulation):** Part 2 Division 4 of the regulations to the Local Government Act set out the requirements relating to the approval for the management of waste. Part 2 Division 4 subdivisions 6 and 7 outlines the requirements required to operate a sewerage management system. Details regarding the latter are also outlined in Council's On Site Sewage Management Strategy.
- **The Environmental Planning and Assessment Act 1979 (EP&A Act):** In relation to on site sewage management systems (OSSMS) the EP&A Act identifies procedures for assessment of certain activities identified as "Designated Development" in its accompanying Regulation. These activities must be assessed via the submission of a Development Application accompanied by an Environmental Impact Statement (EIS).
- **The Environmental Planning and Assessment Regulation 2000 (EP&A Regulation):** Schedule 3 of the Regulation defines certain types of sewerage systems or works on land as "Designated Development". These are sewerage systems or works which:

  a Treat sewage and:

    i Have an intended processing capacity of more than 2500 persons equivalent capacity or 750 kilolitres per day, or

    ii Have an intended processing capacity of more than 20 persons equivalent capacity or 6 kilolitres per day and are located:

      - on a flood/plain, or
      - within a coastal dune field, or

- within a drinking water catchment, or
- within 100 metres of a natural water body or wetland, or
- within 250 metres of a dwelling not associated with the development.

b Incinerate sewage or sewage products.

c Sewer mining systems or works that extract and treat more than 1,500 kilolitres of sewage per day.

d This clause does not apply to:

i the pumping out of sewage from recreational vessels, or

ii sewer mining systems or works that distribute treated water that is intended to be used solely for industrial purposes.

- **Protection of the Environment Operations Act 1997 (POEO Act):** Schedule 2 of the POEO Act outlines the licensing requirements prescribed by the Environment Protection Authority for sewage treatment systems.

1.4 Relationship to other Chapters and Policies

This Chapter should be read in conjunction with other relevant Chapters of this Development Control Plan and other Policy Documents of Council, including but not limited to:

- Chapter 2.1 –Housing and Ancillary Structures
- Chapter 2.2 – Bed and Breakfast Accommodation
- Chapter 2.3 - Dual Occupancy Development
- Chapter 3.2 – Floodplain Management
- Part 4 – Subdivision
- Council's Civil Works Design Guideline and Construction Specification

1.5 Other Standards that Apply

Other standards that apply include:

- **AS/NZS 1547-2012 (On Site Domestic Waste Water Management) – On-site Sewage Management for Single households:** This Combined Australian New Zealand Standard provides guidelines for designing maintaining and installing disposal systems.
- **Environment & Health Protection Guidelines for single Households (1998) (EHPG):** These guidelines produced by the NSW Department of Local Government also provide guidelines for the design, installation and maintenance of disposal systems.
- **AS/NZS 3500 National Plumbing and Drainage:** This Combined Australian New Zealand Standard provides guidelines for the design and installation of sanitary plumbing and drainage within buildings.

1.6 Abbreviations

AWTS – Aerated Wastewater Treatment System

BOD – Biological Oxygen Demand

DCP – Development Control Plan

DDR – Design Disposal Rate

EHPG – Environment and Health Protection Guidelines for Single Households

EIS – Environmental Impact Statement

EP&A Act – Environmental Planning and Assessment Act, 1979

EP&A Regulation – Environmental Planning and Assessment Regulation, 2000

ETA – Evapo-Transpiration Area

ETR – Evapo-Transpiration Rate

LAA – Land Application Area

LG Act – Local Government Act 1993

LG Regulation – Local Government (General) Regulation 2005

OSSMS – On Site Sewage Management System

POEO Act – Protection of the Environment Operations Act, 1997

RSF – Recirculating Sand Filter

RTF – Recirculating Textile Filter

SSD – Sub Surface Disposal

TSS – Total Suspended Solids

WLEP – Wyong Local Environmental Plan 2012

2.0 PERFORMANCE CRITERIA

An Application to install an OSSMS must be primarily assessed against the performance objectives outlined in the following table. The performance objectives stipulate a standard at which an OSSMS must operate and be maintained.

It should be noted that a system designed and maintained to meet the prescriptive requirements in Sections 3 and 5 are deemed to meet the performance objectives in this section. While the objectives are designed to give flexibility in the selection of appropriate treatment systems for specific localities, there are situations where on site sewage management is not possible such as below the 1 in 100 year flood level in water supply catchments or on steep and shallow soils.

Performance Measures	Performance Objectives To Be Met *							
	A	B	C	D	E	F	G	H
It's design being appropriate to the site and soil conditions, having also considered the potential for mass movement or slope failure	✓	✓	✓	✓		✓		✓
Maintaining the system to enable operation in accordance with the manufacturer's specifications, NSW Health's accreditation and the approvals to install and operate issued by Council.	✓	✓	✓	✓	✓	✓	✓	✓
Managing liquid and solid inputs so as to not affect the viability and sustainability of the sewage management system.	✓	✓	✓	✓		✓	✓	✓
Treating effluent in an accredited sewage management system appropriate to the intended loading of the system.	✓	✓	✓	✓	✓	✓		✓
Conveying sewage to a suitable area for disposal of effluent appropriate to the intended loading of the application area.	✓	✓	✓	✓	✓	✓	✓	✓
Providing adequate erosion and sedimentation controls before, during and after construction/installation of the sewage management facility.				✓				✓
Ensuring the system is specifically designed and is considered consistent with its function and its use.	✓	✓	✓	✓	✓	✓	✓	✓
Installing appropriately positioned diversion drains around the land application area.	✓	✓	✓	✓		✓	✓	✓
Carefully identifying and selecting areas for the disposal of effluent whilst taking into account the local climate, surface and ground water hydrology, soil characteristics and vegetation types.	✓	✓	✓	✓	✓	✓	✓	✓

Table 1 Performance Criteria

*** OBJECTIVES:**

A – Prevent the Spread of Disease by Micro-organisms
B – Prevention of the Spread of Foul Odours
C – Preventing Contamination of Water
D – Preventing Degradation of Soil & Vegetation
E – The Discouragement of Insects and Vermin
F – Ensure that persons do not come into contact with Untreated Sewage or Effluent (whether treated or not) in their ordinary activities on the premises concerned
G – The re-use of Resources (including nutrients, organic matter and water).
H – The minimisation of any adverse impacts on the amenity of the land.

3.0 SYSTEM SELECTION

3.1 What Current Technologies are Available to me to Dispose of Effluent on Site?

The following is a summary of some of the more commonly known on-site wastewater treatment technologies on which these guidelines are based. Included are general operating and sizing requirements for each particular system for domestic applications. It should be noted that when investigating the system solution for your property that the treatment tank/ holding device be located above the 1 in 100 flood contour and land application area above that 1 in 20 flood contour except in Wyong's drinking water catchment where no component of the system will be permitted in any flood land below the 1 in 100 flood contour. In addition, the general site, environmental and soil conditions of the allotment must not constitute more than a low hazard limitation in terms of the systems effects. Section 4 of this document will assist you in determining the liabilities of your site whilst appendix D will allow you to hazard categorise your land.

3.2 Conventional Septic Tank and Absorption Systems

Traditionally, in unsewered areas, effluent from dwellings has received primary treatment in a conventional septic tank before being absorbed in underground trenches. This system has relied on the soil completing the treatment process as the effluent moves through the strata. Not all soils or sites are suitable for absorption trenches, particularly in village areas with small blocks and soils with poor soil structures. In some areas, Council has had to provide a pump-out system whereby the effluent is pumped out by a road tanker, transported and treated at one of Council's sewage treatment works. Such systems are no longer considered acceptable given their misuse and maintenance problems.

Even on large allotments, the soils must have the correct characteristics to satisfactorily treat the effluent. Unsuitable landscapes may cause effluent to reach the surface and/or groundwater and adversely affect receiving water bodies. Certain landscapes within the Wyong LGA do not have the characteristics necessary to treat effluent from septic tank systems without having a cumulative adverse impact on the receiving environment.

Areas of this nature may be limited in terms of development density, due to the environmental characteristics and the outlined objectives.

3.2.1 How does a Septic Tank Work?

A Septic Tank system usually comprises two chambers. These chambers can be separate or within the one tank. The first or primary chamber allows some of the solids to settle to the bottom of the tank and oils and fats to rise to the surface to form a scum layer.

The solids that have settled to the bottom of the primary chamber undergo anaerobic bacterial digestion producing sludge. During this bacterial process the composition of the effluent changes producing lower levels of chemicals and pathogens.

The second chamber or holding well accumulates smaller amounts of solids and scum prior to the effluent leaving the tank for discharge to the land application area (LAA). To ensure that solids do not reach the LAA an approved in-tank filter must be installed in such a manner to enable easy removal for cleaning on a regular basis. The tank must provide a retention time of at least 24 hours so that the effluent undergoes adequate anaerobic bacterial digestion and the flow of effluent to the LAA is controlled to avoid flooding. A cross section of a septic tank is depicted in Figure 1, below.

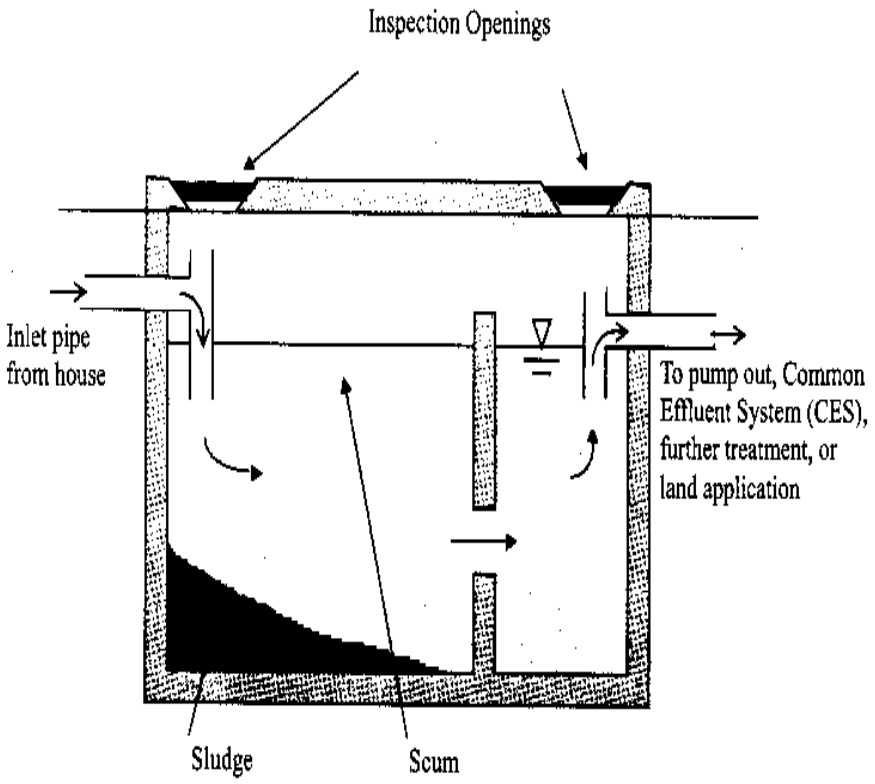

Figure 1 Cross-section of a septic tank

The wastewater from a septic tank is not disinfected and has high nutrient levels; therefore it poses a health risk and is environmentally hazardous. Table 1 provides a general overview of the expected effluent quality from a septic tank before it is discharged to the LAA. As the discharge is hazardous all primary treated effluent is disposed of below ground. It is therefore important to maintain and monitor your LAA to ensure that water from the trench or transpiration area does not resurface.

Parameter	Concentration
Biochemical Oxygen Demand (BOD)	150 mg/l
Suspended Solids (SS)	50mg/l
Total Nitrogen (N)	55 - 60mg/l
Total Phosphorous (P)	10 - 15 mg/l
Faecal Coliforms	1000000-100000000 cfu / 100ml

Table 2 Septic tank expected effluent quality (Source: EHPG 1998)

For Council to be able to approve the installation of a septic tank the applicant must supply the NSW Department of Health's (NSW Health) certificate of accreditation. In addition the tank itself must clearly indicate the day, month and year of manufacture, the manufacturers name or registered trademark and the capacity of the unit in litres.

3.2.2 What Size Does My Septic Tank Have to Be?

The minimum size of a domestic septic tank accredited in NSW is 2300 litres. The Hunter and Central Coast Regional Organisation of Councils requires a 3000 litre tank as a minimum for a three-bedroom dwelling. The following equation can be used to determine a specific tank size relevant to the number of persons (max) residing in your dwelling:

$$STC = HLR \times N + BA$$

Where:
STC = Septic Tank Capacity (litres)
BA = Basic Allowance for sludge = 1550 litres
HLR = Hydraulic Loading Rate (litres/person/day)
N = Number of Persons (max) in dwelling

3.2.3 Do I Need a Filter in My Septic Tank?

To ensure that solids do not reach the LAA an approved in-tank filter must be installed in such a manner to enable easy removal for cleaning on a regular basis. A number of in-tank filters are currently available on the market. The preferred type of device is a conical filter that has an aperture of not greater than 3mm and is fitted to the outlet square of the tank. It is recommended that the filter be cleaned at 6 monthly intervals.

3.2.4 Soil Absorption Systems

There are two types of soil absorption systems commonly used to dispose of effluent from a septic tank. They are Absorption Trenches and Evapo-transpiration areas. These are outlined below.

3.2.5 How does an Absorption Trench Work?

The absorption or sullage trench receives primary treated effluent from the septic tank. The role of the trench is to evenly discharge this effluent to the subsoil. The subsoil then filters the effluent as it percolates through. It is therefore essential that the permeability of the soil in the LAA is limited to between 5mm/day (silty Clay) and 80mm/day (sandy loam). If a seasonal or permanent water table is within 1 metre of the surface of the proposed LAA the land is not suitable for absorption trenches. If the site conditions are not within these parameters the effluent may impact on the health and amenity of the environment.

3.2.6 What Size does my Absorption Trench have to be?

The following equation sourced from AS / NZS 1547:2012 shall be used to determine the length of an absorption trench in lineal metres.

$$L = \frac{HLR}{DLR \times W}$$

Where:
L = Length of trench (metres)
HLR = Hydraulic Loading Rate (litres)
DLR = Design Loading Rate (litres)
W = Width of trench (metres)

Note: Appendix A (AS/NZS 1547:2012) outlines the hydraulic loading rate. The DLR figure can be found in AS/NZS 1547:2012.

A depiction of a typical absorption trench is shown in Figure 2, below.

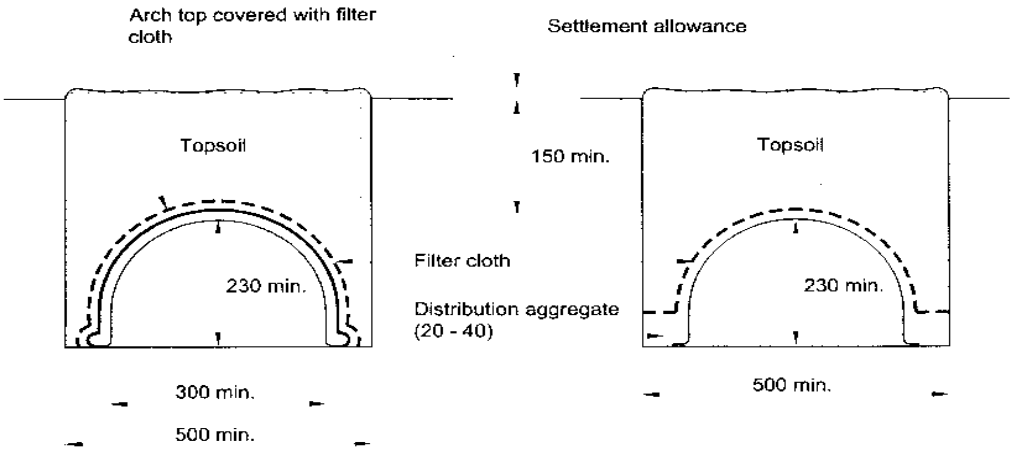

Figure 2 Typical absorption trench design

3.2.7 How does an Evapo-Transpiration Area Work?

An Evapo-Transpiration Area (ETA) is a LAA of a predetermined size that is surrounded on all sides by impervious bunding usually consisting of clay. The base of the ETA is also lined with impervious clay.

Across the high side of the ETA is a distribution trench which discharges along its length to the bed of the ETA. The base of the bed has a minimum cross fall of 1%. On top of the base is a layer of 40mm to 50 mm diameter stones. Over this is laid geo-textile fabric on which sandy loam is placed. This top layer is then planted out with a nutrient tolerant grass.

The effluent enters the ETA via the distribution trench and from there into the bed. The hydraulic content of the effluent is evaporated or transpirated by the grass into the atmosphere.

3.2.8 What Size does my Evapo-Transpiration Area have to be?

The following equation shall be used to determine the size of an ETA in square metres.

$$A = HLR \div ETR$$

Where:

A = Area in square metres
HLR = Hydraulic Loading Rate (L/Person/Day)
ETR = Evapo-Transpiration Rate (L/Square Metre/Day)

Note: An additional 93 square metres shall be added to the calculated size of the ETA if an automatic washing machine is installed in the dwelling. In addition concession may be granted should water saving technologies be installed in the dwelling.

Based on:

The HLR is calculated using Appendix A (AS/NZS 1547:2012) of this document and the ETR using a standard figure of 4.25 litres/ square metre/day. It should be noted that the standard ETR figure given is conservative. If it is considered by the designer that the local conditions in conjunction with the vegetation chosen for the ETA will provide a better ETR then a water balance analysis over a twelve month cycle must be undertaken.

A standard detail of an ETA is shown in Figure 3 below.

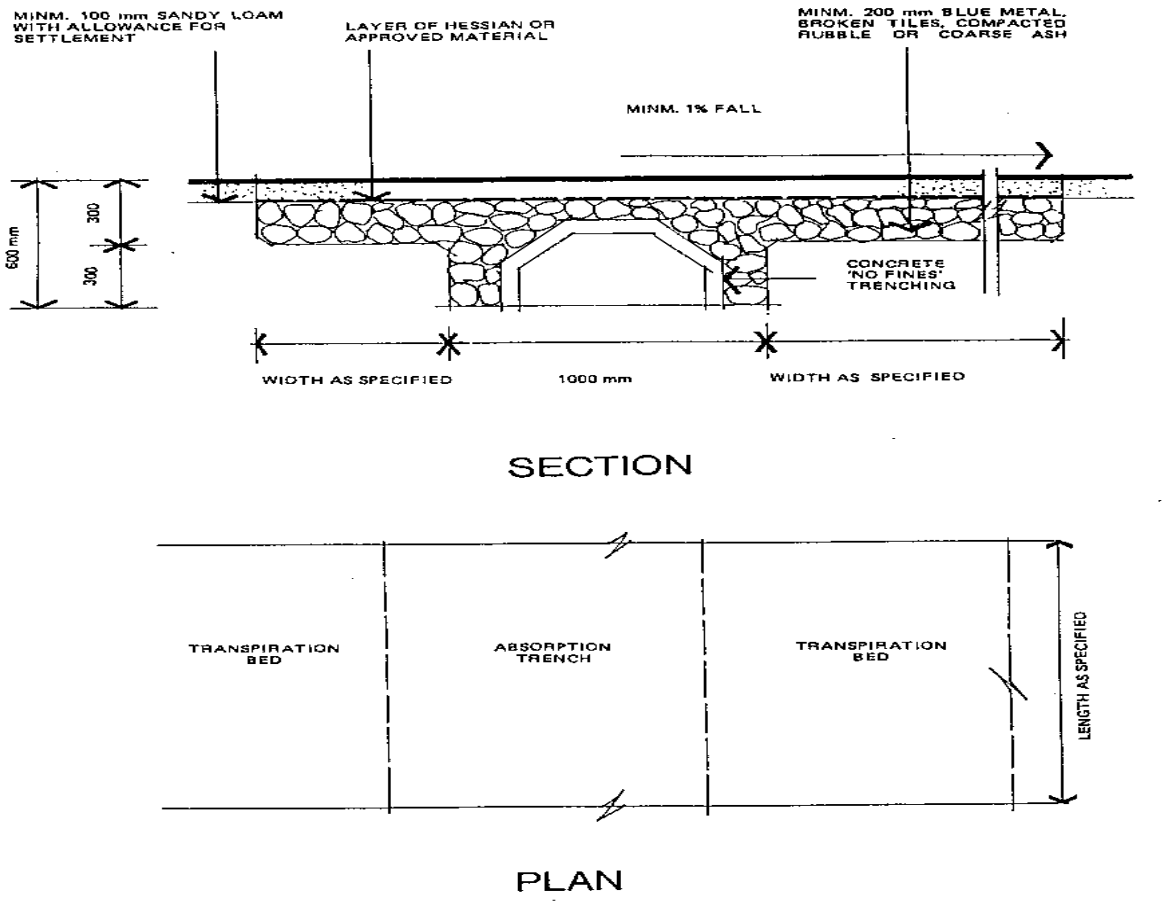

Figure 3 Evapo-transpiration area

Note:

Drainage disposal areas (absorption trenches and transpiration beds) are to be constructed to the sizes and in positions specified on Drainage Layouts.

The absorption trench is to be located in the transpiration bed in the position indicated on the layouts and the bottom of the transpiration beds to be level throughout.

Drainage disposal areas are to be finished with sufficient sandy loam to allow for settlement, and after settlement are to have minimum fall necessary to shed surface water. The natural ground forming the lower side of the bed is to be graded level. Impervious retaining walls may be required to achieve this objective.

Any concentrated flow of surface water is to be diverted clear of drainage disposal area to Council satisfaction. Disposal areas should be turfed as soon as possible following construction. Turfing of disposal areas is to be carried out at the time of construction of disposal areas when directed.

3.3 Aerated Wastewater Treatment Systems (AWTS)

3.3.1 How does an Aerated Wastewater Treatment System Work?

The aerated wastewater treatment system (AWTS) is an alternative to the conventional septic system. This effluent is treated to a level known as tertiary treatment with the effluent undergoing disinfection by chlorination or ultra violet light in various chambers of a tank to remove bacteria and other micro-organisms.

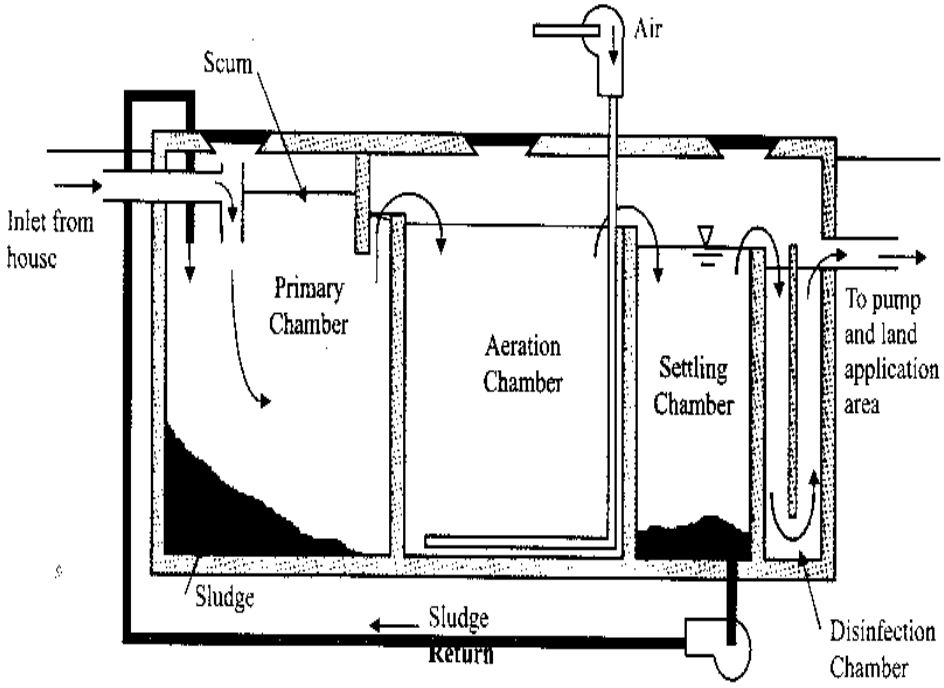

Figure 4 Aerated wastewater treatment system

This level of treatment allows the effluent to be spray irrigated above ground or discharged in a shallow sub surface bed, in most situations without any major health risk. Table 2 outlines an overview of expected effluent quality from an AWTS.

Parameter	Concentration
Biochemical Oxygen Demand (BOD)	20 mg/l
Suspended Solids (SS)	30mg/l
Total Nitrogen (N)	15-35mg/l
Total Phosphorous (P)	10-15 mg/l
Faecal Coliforms	Up to30 cfu/100ml

Table 3 AWTS expected effluent quality (EHPG, 1998)

Because the effluent is treated to a higher standard than the conventional septic tank, it contains fewer potential harmful pathogens and as such its impact on the health and amenity of the locality is not as great.

The exception is when an AWTS is not regularly maintained. Without regular maintenance by a suitably qualified person, significant public health and pollution problems can eventuate.

3.3.2 What Size does my Aerated Wastewater Treatment System have to be?

All AWTS are required to have NSW Health accreditation. All AWTS accredited in NSW have a 10 person capacity (expressed as a 10 EP system). An AWTS of this size will cater for most residences. Should your situation require a system greater than 10 EP a special design would be required. This is covered later in this chapter under alternative systems.

3.3.3 Does my Aerated Wastewater Treatment System need a Filter?

As with septic tank absorption systems a filter is required to be installed to all AWTS to restrict solids and sludge from finding its way to the disposal nozzles whether they be sprayers, drippers, or the like. Should solids find their way to these nozzles they may block causing localised inundation of the disposal area and the irrigation pump to burn out. It is also essential to ensure that the filter does not block, as blockage will also result in the same problems.

3.4 Disposal Options for Aerated Wastewater Treatment Systems

3.4.1 What is Surface Irrigation?

Surface irrigation utilises a specific area of your land. The site feasibility assessment will identify the most appropriate area to dispose of effluent over the irrigation field (LAA). Within this area the distribution line that comes from the outlet of the AWTS is laid. Along this line is a series of sprayers, drippers or soaker attachments that discharge the treated effluent.

The most common method of application for surface irrigation is by sprayers or sprinklers. Sprayers or sprinklers are usually low pressure devices. To ensure effluent does not detrimentally effect the environment and public health the spray head plume radius of the device should not exceed 2 metres and with a plume height not greater than 400 mm. This standard ensures that the prescribed buffer distances outlined in Appendix D protect the environment and public health.

In addition to the standard sprinkler used for surface irrigation, alternative designs will be considered. Appendix B outlines the requirements for a specific type of pulsating pop up sprinkler.

The effluent is absorbed by the soil, taken up by vegetation or evaporated. Suitable vegetation for land application areas can be found in Appendix C.

Surface irrigation of effluent has drawbacks particularly when the LAA is inadequate to deal with the effluent or where the prevailing conditions are not favourable. Poor soil, land slope, overland water flow and inclement weather may cause effluent to leave both the LAA and the site. The wayward effluent is discharged into the receiving environment causing adverse cumulative effects. The installation of shallow bed subsurface irrigation may overcome this constraint where local conditions permit.

3.4.2 What Size does my Surface Irrigation Area have to be?

Over recent years there has been conjecture as to the correct method in sizing the LAA whereby the disposal method is surface irrigation. These methods include determining the hydraulic and nutrient outputs of an AWTS and applying these characteristics to an equation.

In most cases a determination based on the total nitrogen concentration will be the limiting factor. Accordingly, the following method can be used to determine the appropriate size of the irrigation area in square metres:

$$SIA = \frac{TN \times N \times HLR}{CLR}$$

Where:

SIA = Surface Irrigation Area (square metres)
TN = Total Nitrogen Output of AWTS (mg/l)
HLR = Hydraulic Loading Rate (L/person/day)
N = Number of persons (max) in dwelling
CLR = Critical Loading Rate = 25 mg/Sqr m/d (EHPG pp152-153)

Note:

The total nitrogen output of an AWTS is taken to be the figure stated in the NSW Health accreditation document for the system in question. The critical loading rate is a nominal value. Should a revised rate be used in this calculation then supporting evidence will need to be submitted to justify the case.

Furthermore the preferred method may be substituted by alternative solutions; however, a report must accompany the proposal outlining the aims, methods and results of the procedure as well as how this complies with the objectives of this plan so that Council can undertake an assessment of the procedure.

3.4.3 What is Sub Surface Disposal?

As its name describes sub surface disposal is the method of discharging effluent below the ground to deal with sewage on site.

The system entails an arrangement of plastic irrigation pipes designed to discharge effluent evenly along their length (pressure compensating line). The pressure compensating line is similar to that used in agricultural applications for irrigation. The difference however is the inclusion of chemicals to inhibit root intrusion into the pipe work and bacterial growth inside the line. Pressure compensating line used for effluent disposal can be identified by a pink stripe along its length whilst agricultural irrigation line is identified by a purple stripe.

The principle of AWTS sub surface disposal (SSD) is similar to that of an ETA in that the effluent is evaporated from the ground and transpirated by the vegetation on the surface area. It is essential that the pressure compensating line is situated at the right depth being 150 mm below the surface. As an ETA is a closed disposal system there is no loss of effluent outside the LAA however SSD does allow the export of effluent from the LAA through percolation.

In New South Wales the technology of discharging effluent from an AWTS below the ground is a recent occurrence. Prior to this all AWTS effluent was spray irrigated in a designated disposal area. For some sites this produced problems in being able to dispose of effluent in an environmentally responsible manner due to the likelihood of effluent leaving the site or effecting sensitive areas. Subsurface irrigation overcomes some of these constraints and enables more difficult sites to be able to deal with effluent on site.

3.4.4 What Size does my Sub Surface Disposal Area have to be?

The following equation shall be used to determine the size of the LAA for sub surface irrigation in square metres.

$$A = HLR \div DDR$$

Where:

A = Area (Square metres)
HLR = Hydraulic Loading Rate (L/Person/Day)
DDR = Design Disposal Rate (L/Square Metre/Day)

Note: An additional 93 square metres shall be added to the calculated size of the LAA if an automatic washing machine is installed in the dwelling. In addition concession may be granted should water saving technologies be installed in the dwelling.

Based on:

The HLR is calculated using Appendix A (AS/NZS 1547:2012) of this document. It should be noted that the standard DDR figure given is conservative. If it is considered by the designer that the local conditions in conjunction with the vegetation chosen for the LAA will provide a better DDR then a water balance analysis over a twelve month cycle must be undertaken.

3.5 Recirculating Sand and Textile Filters

3.5.1 What is a Recirculating Sand Filter?

A recirculating sand filter (RSF) is an enhanced effluent treatment device that is situated between a septic tank or an AWTS and the land application area. They are usually constructed utilising a container such as a large concrete or reinforced plastic tub. The tub is filled with a specified grade of sand to the level of the outlet manifold. The manifold has outlet or orifice shields placed over the openings from which the effluent is pumped. The manifold is covered with either a coarser sand grade or pea gravel to enhance and protect the system (Figure 5). An RSF is required to have NSW Health accreditation.

3.5.2 How Does a Sand Filter Work?

Effluent from the treatment tank is pressure dosed by a pump over the surface area of the sand filter. The effluent then percolates through the sand. A percentage of this effluent is returned to the pump chamber and then reapplied to the sand filter. This gives the device its name. The remaining effluent is conveyed to the land application area for disposal.

Sand filters are a system to enhance the quality of effluent that is produced. Sand filters under normal conditions will decrease nitrogen by converting nitrates into nitrogen gas. In some situations nitrogen levels could be decreased to below 5mg/l.

De-nutrification from this process has also lead to phosphorous levels of less than 10 mg/l. In addition sand filters promote the growth of aerobic bacteria due to the filter's environment. A food source (nutrient rich effluent) for the bacteria is supplied to the bacteria on a regular basis throughout the day. Aerobic bacteria are essential in dealing with the treatment of *e-coli* and *faecal coli forms* present in the effluent.

Like most effluent treatment systems sand filters require regular maintenance. The method and considerations for servicing a sand filter is outlined in section 5.4 of this document.

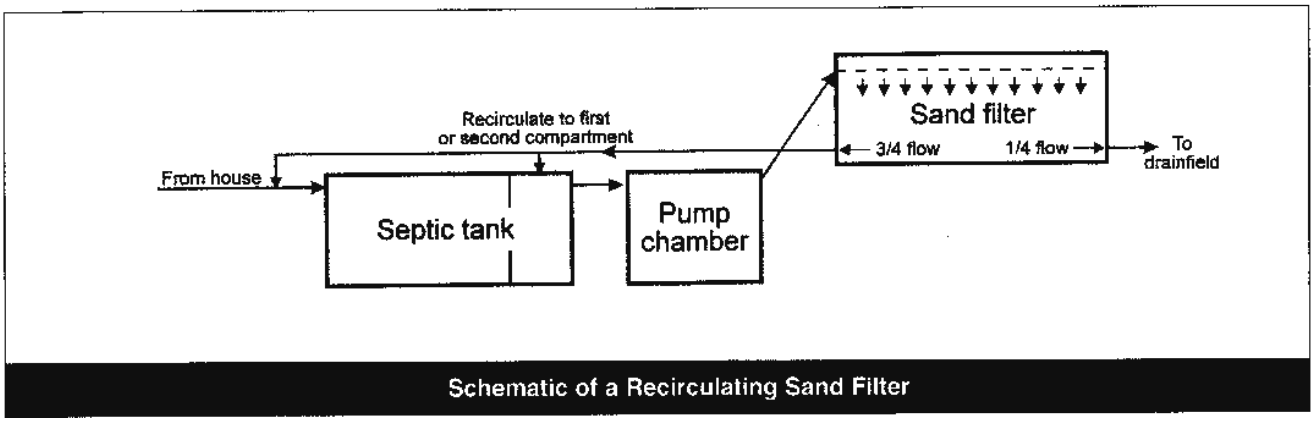

Figure 5 Sand recirculating filter

3.5.3 What is a Recirculating Textile Filter?

A recirculating textile filter (RTF) is an enhanced effluent treatment device that is situated between a septic tank or an AWTS and the land application area. They are usually constructed utilising a container such as a large concrete or reinforced plastic tub. The tub contains separate chamber and a rack of textile filters. Effluent percolates down through the textile media and is collected in the bottom of the chamber. The treated effluent flows out of the chamber to the disposal field.

3.5.4 How does a Recirculating Textile Filter Work?

An RTF, polishes effluent and is pre-treated by applying it in small, frequent doses onto a uniform, homogeneous textile, where it comes in contact with bacteria that colonize the media surface. The media presents an unsaturated aerobic environment that promotes efficient removal of BOD, TSS, and nitrogen by these microorganisms. The bacteria feed on the organic material and form a biological film on the media. Under these conditions, with oxygen readily available, the biological film typically reaches an equilibrium state ("endogenous respiration") in which the bacterial biomass is maintained at a manageable level, dependent on the amount of available "food" (organic carbon). Essentially, the RTF allows the growth and activity of treatment bacteria to be managed in a compact, self-contained treatment unit. The treatment unit offers a readily controlled well-oxygenated environment, promoting efficient breakdown of organic material. When properly designed and installed, and with regular maintenance at prescribed intervals, packed bed media filters operate consistently and reliably with a minimum of effort by a trained service provider. Additionally, packed bed media filters are passively aerated. They are more sustainable than a suspended growth aerobic treatment unit, as packed bed media filters do not depend on air blower motors that are prone to mechanical breakdown nor do they demand the large amounts of electricity to operate that suspended growth treatment units require.

3.6 Composting Toilets

There are two types of composting toilets currently available in NSW, dry composting and wet composting. They function with a no flush toilet pedestal or alternatively with moisture from cistern flushing.

In these systems, toilet wastes pass from the pan down a chute and into a chamber similar in size to a conventional septic tank. All faecal matter and other compostable matter produced in the dwelling, such as toilet paper, may be disposed of to this system where it is broken down into compost by natural decomposing organisms. When fully broken down, the compost may be used in gardens but must be buried and covered.

A fan connected to a vent pipe produces negative air pressure within the composting chamber. The fan aims to draw odours away from the toilet pan and evaporate excess liquid from the composting chamber in dry composting toilets.

A cross section of a composting toilet is depicted in Figure 6.

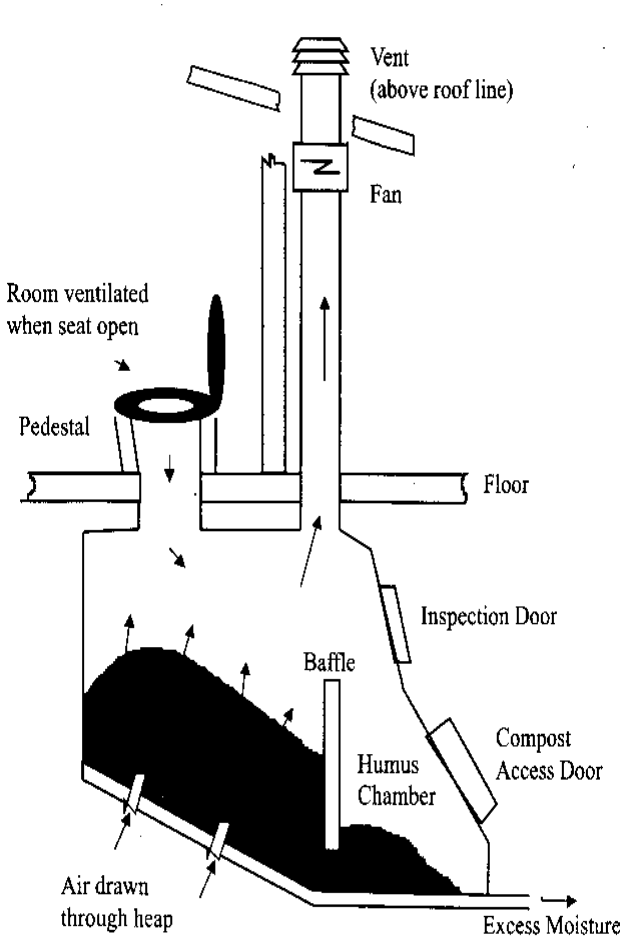

Figure 6 Composting toilet

These systems treat only toilet wastes, and all other liquid wastes from the shower, kitchen and laundry (sullage wastes or grey water) must be disposed of via a separate grey water system. These systems discharge to subsurface disposal areas such as absorption trenches or evapo-transpiration areas. The dry composting toilet itself produces only a small amount of liquid wastes where operated in accordance with the manufactures specifications.

3.7 Other Alternative Systems

Increasing awareness of environmental issues has seen significant changes to domestic effluent disposal in the last decade. This trend is likely to continue with new products coming onto the market. As such, certain installations are not described in the above information. This does not mean that Council will not assess an application for an alternative system; however, it does mean that Council must assess the proposal on its merits.

In such cases the applicant must provide designs and reports by suitably qualified professionals in the field of effluent disposal, demonstrating how the system will meet all relevant standards and legislation and the objectives of this Chapter.

3.8 Accreditation of Waste Treatment Devices

Clause 41 of the LG Regulation provides that Council cannot approve an application to install an "off the shelf" waste treatment device unless the Council is satisfied that the device has been accredited by the Director General of the NSW Department of Health.

The LG Regulation is intended for both domestic and commercial systems and prescribes the details required for assessment by Council. These details are outlined in Clause 26 of the LG Regulation.

With regard to non accredited systems it is up to the applicant to prove that the system is capable of operating to a level acceptable to Council and that the system meets the requirements of the regulation. The standard of effluent quality required to be met is generally of a secondary level. NSW Health stipulates a range that secondary treated effluent must meet.

To prove to Council that a system has an end effluent quality of this standard a report from an engineer or decentralised effluent treatment expert is required.

In summary:

- Council has the ability to approve any decentralised sewerage management system
- The LG Act provides the legislative requirements to achieve a sustainable outcome
- The approval process is simplified for domestic systems by having system accreditation and guidelines in place for ease of assessment
- Systems that do not require accreditation or are outside the guidelines must submit more detailed information to allow Council to determine compliance with the requirements of the regulation.

4.0 SITE AND SOIL INVESTIGATION

The LG Act empowers Council to approve all types of OSSMS such as domestic and commercial installations that meet the requirements of the LG Act and the LG Regulation.

The LG Regulation has performance criteria that all systems must meet which are outlined in Clause 29.

The majority of systems that Council approves are domestic in nature. To make it expedient to assess domestic systems the NSW Government has adopted a guideline known as "The Environmental Health Protection Guidelines - On Site Sewage Management for single Households". In addition Australian Standard 1547: 2012 references requirements for "On Site domestic Wastewater Management".

Both of these guidelines prescribe specific requirements for installation of a domestic system, which simplifies the process for the majority of applications submitted.

4.1 Site and Soil Investigation

Clause 26 of the Regulation outlines the information that must be submitted to Council when applying to have an OSSMS installed. The clause requires details of the actual system in addition to the physical site and soil conditions.

The manufacturer of the system is able to provide system details. The site and soil report is site specific and must address the ability of that site to adequately dispose of effluent. As such the report must be undertaken by a suitably qualified practising technician such as a geotechnical engineer or environmental health officer.

A generic site report outlining the required information is annexed in Appendix F.

4.2 High Risk Sites

If, because of local site conditions, the allotment poses a high risk to environmental amenity such as, but not limited to, flood, being located in the drinking water catchment, has extreme topographic limitations and the like the application is to:

a demonstrate the measures incorporated in the system design to deal with the hydraulic load as the result of site constraints identified in the risk assessment such as limited allotment size;

b demonstrate the measures incorporated in the system design to decrease nutrient output, namely total nitrogen and phosphorous of not more than 5mg/l as the result of site constraints identified in the risk assessment;

c provide site-specific information by way of report on how the system can operate to a level that provides adequate health and amenity as well as having minimal effect on the environment given the site constraints;

d detail of mitigative measures regarding protection of the system in the event of flood if the land is susceptible;

e provide an additional assessment if the system is within the Wyong district water catchment. Appendix E outlines the additional matters for consideration.

4.3 Assessment of Commercial, Tourist and Agricultural Development and Residential Developments with Occupancies Greater Than 10 Persons

a OSSMs proposed for commercial, tourist and agricultural development as well as residential developments with occupancies greater than 10 persons must produce effluent quality of at least a secondary standard.

b A development application for development within these categories will require a report addressing the following heads of consideration:

i outline the type and configuration of the system proposed for the development including tank capacities, the method of construction of tanks and the like;

ii provide information including calculations as to how the system will cater for the proposed loading. The information must reference hydraulic and solid capacities in the system design;

iii provide a water balance analysis for the site;

iv advise of the expected influent quality;

v advise of the proposed outputs of the treated effluent prior to disposal in the LAA;

vi advise of any adverse chemical or biological inputs into the system and how the treatment device will process these inputs and achieve the accepted effluent quality;

vii demonstrate that the OSSMS meets the objectives of this Chapter and related legislation;

viii provide a design including sizing calculations and construction methods regarding the LAA;

ix detail the mitigative measures proposed regarding protection of the system in the event of flood if the land is susceptible;

x additional assessment is required if the system is within the Wyong district water catchment. Appendix E outlines the additional matters for consideration;

xi submit a report to indicate the feasibility of the site and soil to accept and dispose of effluent in the form outlined in Appendix F.

5.0 INSTALLATION, OPERATION AND MAINTENANCE

The requirements within this Chapter do not replace the manufacturer's guidelines for installation, operation and maintenance of systems.

5.1 Installation

Once you have received the consent of Council you should make yourself aware of all requirements of the approval by looking over the stamped plans, details and specifications and by reading the conditions in the determination.

This letter prescribes the conditions that must be followed when installing and operating your OSSMS. In most cases the conditions imposed are standard pertaining to the particular system you have chosen, however, in some circumstances site and system specific conditions may be imposed.

To determine compliance with these conditions Council's Environmental Health Officers must carry out various inspections during system installation and on completion of all works.

Prior to the system being used Council must issue an approval to operate the system. Council's On Site Sewage Management Strategy (1999) provides detail of this process.

5.2 Operation

To ensure that your new system performs to the designed standard there are a few basic rules to follow. In short what you put into your system effects what comes out. Therefore:

Don't:

- Place stain removers, nappy soakers, etc down your sink
- Put any items such as condoms, nappies, sanitary napkins and the like into the system other than toilet paper
- Put large quantities of bleach, or other foreign material into the system
- Put oils and fats down the sink as they don't mix with water and will clog your system
- Install a garbage grinder in your house
- Use antiseptic such as medical and cleaning solutions as they will have the result their name suggests. They kill all the bacteria in your OSSMS

Do:

- Use only disinfectants that state they are septic friendly
- Avoid laundry detergents that contain high sodium content. Most laundry powder manufacturers use sodium as a bulking agent to give the appearance of value for money
- Try using a phosphorous free laundry detergent. Products that are phosphorous free indicate this fact on their packaging
- Use a sink strainer on your kitchen sink to stop food wastes from entering the system

5.3 Maintenance

On completion of the installation of your OSSMS Council will issue an "Approval to Operate". This approval outlines the requirements that must be complied with throughout the life of your system. Like your approval to install, the Approval to Operate does this by imposing conditions pertinent to the type of system that you have.

A large part of operating an OSSMS is the general maintenance that must be undertaken and this is reflected in the conditions of approval.

For instance, you will be aware from the description given earlier in this Chapter that an AWTS has a number of elements that allow it to operate. It is essential that regular checks be undertaken by suitably qualified personal to ensure that all parts of the system are operating to the optimum level. If you have an AWTS your approval to operate the system will require that this maintenance check be carried out every three months.

In addition to general servicing of OSSMS Council also carries out on the spot checks of selected systems according to the site's land category. As part of the audit program Council will take into consideration the location of the system and may require relocation at the time of upgrade. Council Officer's undertake 400 inspections per year as part of the audit program.

5.4 System Reporting

5.4.1 Conventional Septic Tank Systems

a Conventional septic tank systems are not maintenance free. Solids levels will build up in septic tanks over a number of years and accordingly, these systems require regular "desludging". The frequency of desludging is dependant upon the number of people using the system but generally systems will be required to be desludged every three to eight years. In addition, the in tank filter located in the outlet square of the system should be checked and cleared of any solid matter at periods of no longer than six months.

b Council from time to time will require a report from a suitably qualified expert to detail the operating standard of the system and make recommendations to correct any system faults. This report shall address the following criteria:

i tank size;

ii condition of internal baffle if installed;

iii condition of grease trap if installed;

iv height of tank above surrounding ground level;

v condition of tank lid;

vi whether the lid and inspection openings in the lid are appropriately sealed;

vii the state of repair of the tank;

viii the condition of the inlet and outlet squares;

ix the level of sludge in the tank;

x the level of scum in the tank;

xi whether there is evidence of effluent resurfacing on the site; and

xii whether there are odours present.

5.4.2 Aerated Wastewater Treatment Systems

a AWTS are by nature of their design complicated and have the propensity to break down should they not be checked regularly to ensure that all aspects of the system are operating to the required standard. Subsequently, Council's On Site Sewage Management Strategy and the system's approval to install, requires that a quarterly maintenance regime be implemented. The quarterly service is carried out by a Council approved service provider which includes the submission of a report.

b The quarterly service report from your service provider must address the following criteria:

i condition of internal baffle if installed

ii condition of grease trap if installed

iii height of tank above surrounding ground level

iv condition of tank lid(s)

v whether the lid and inspection openings in the lid are appropriately sealed

vi the state of repair of the tank

vii the condition of the inlet and outlet squares

viii the level of sludge in the tank

ix the level of scum in the tank

x operating standard of the pump

xi operating standard of the blower

xii operating standard of the electrical component

xiii operating standard of the alarms

xiv operating standard of the air lines

xv operating standard of the clarifier

xvi whether the sludge return is operating

xvii operating standard of the chlorinator

xviii whether there are signs of effluent resurfacing on the site

xix whether there are odours present

xx pH levels

xxi number of irrigation sprinklers

xxii operating standard of the irrigation sprinklers, and

xxiii whether effluent is running off the site

5.4.3 Composting Toilets

a Composting toilets are systems that require due diligence by the operator in so far as the material introduced to the composting chamber and the frequency in which the composted solids are removed and disposed of. From time to time Council requires that a report from a suitably qualified expert be submitted to Council on the operating standard of the system.

b The report shall address the following criteria:

i fan operation and maintenance;

ii filters to air intakes;

iii any heating elements;

iv any rotation or turning of the compost;

v levels of composted material;

vi presence of flies or other disease transmitting insects within the composting chamber;

vii that wastes have been allowed to compost for the period recommended for the type of unit;

viii that the permanent construction notice is still affixed within the closet compartment;

ix any liquid discharge from the unit and accompanying disposal location; and

x the grey water disposal system including inspection of the disposal area.

5.4.4 Sand Filters

a Like a septic tank and an AWTS, sand filters are not maintenance free. Although they form a different step in the treatment of effluent they are still subject to conditions that may cause them to fail. Supply to the filter is imperative to ensure proper operation. Accordingly, it is essential that the pump and supply manifolds are free of foreign matter and are working correctly.

b Likewise, the sand bed must also be monitored to ensure that the applied effluent is evenly distributing over and through the sand.

c The life of your sand filter and frequency of proper and effective maintenance is also dependant on the state of repair and effectiveness of the initial treatment system.

d An assessment is to be undertaken on a 12 monthly basis and must include:

i The state of repair of the container housing the sand filter

ii Height of the sand filter above the surrounding ground level

iii Operating standard of the dosing pump

iv Operating standards of the electrical components

v Operating standards of the alarms

vi Whether the return line to the treatment tank is operating

vii Whether there are odours present

viii Is the filter free of vegetation whether alive or dead, and

ix Whether there are signs of effluent re-surfacing in the filter bed

5.5 Council Auditing

Council has in place an auditing program. The program requires that from time to time Council will inspect your OSSMS. This inspection along with reports from your contractor will enable council to determine compliance with the approvals to install and operate your OSSMS. If it is found that your system does not comply with these approvals and current legislation, Council's orders process would then be followed. This form of action by Council is dependant on the severity of your systems departure from its operating standard.

APPENDIX A TYPICAL DOMESTIC-WASTEWATER FLOW DESIGN ALLOWANCES

Source	Typical wastewater flow allowance in L/person/day (see Note 1)	
	On-site roof water tank supply	**Reticulated community or a bore-water supply**
Households with standard fixtures (including automatic washing machine)	140	180
Households with standard water reduction fixtures (see Note 2)	115	145
Households with full water-reduction facilities (see Note 3)	80	110
Households with extra wastewater producing facilities	170	220
Households (black water only)	50	60
Households (grey water only)	90	120
Motels/hotels		
▪ guests, resident staff	140	180
▪ non-resident staff	30	40
▪ reception rooms	20	30
▪ bar trade (per customer)	20	25
▪ restaurant (per diner)	20	30
Community halls		
▪ banqueting	20	30
▪ meetings	10	15
Restaurants (per diner)		
▪ dinner	20	30
▪ lunch	15	25
Tea rooms (per customer)		
▪ without restroom facilities	10	15
▪ with restroom facilities	15	25
School (pupils plus staff)	30	40
Rural factories, shopping centres	30	50
Camping grounds		
▪ fully serviced	100	130
▪ recreation areas	50	65

Notes:

1 These flows are minimum rates unless actual flows from past experience can be demonstrated.

2 Standard water-reduction fixtures include dual flush 11/5.5 litre water closets, shower-flow restrictors, aerator faucets (taps) and water-conserving automatic washing machines.

3 Full water-reduction fixtures include the combined use of reduced flush 6/3 litre water closets, shower-flow restrictors, aerator faucets, front-load washing machines and flow/pressure control valves on all water-use outlets.

4 The minimum number of people taken to reside in a dwelling is 5. Occupancy loading is calculated at the rate of 2 persons per bedroom.

(Source: AS 1547:2012)

APPENDIX B DATA SHEETS

B1 Data Sheet 1: Pulsating Pop Up Sprinklers

An impulse or pulsating popup sprinkler is a device that allows the dispersal of liquid, in this case effluent, over a predetermined area. They are different to the usual sprinkler type used to disperse effluent over the land application area in that they are buried with only the top most cover plate visible and their droplet size is greater. The major advantage of this sprinkler is that it is not susceptible to damage from maintenance of the LAA such as mowing grass and the like as the sprinkler body retracts into the housing located below ground when the supply pump is deactivated. The disadvantage is the increased buffer distances required to those environmentally sensitive features and buildings on or surrounding the LAA.

Sprinkler Type

The type of sprinkler must be an Elgo 2688 or similar with a 3.5mm nozzle. A minimum of 4 sprinklers shall be installed.

Sprinkler Throw

A maximum radius of 5 metres is to be set for all sprinklers.

Buffer Distances

a At least 20 metres shall be provided between the outer most point of the sprinkler radius and:

  i any Dwelling on the site;

  ii any dwelling on adjoining properties. As such if pop ups are to be used the site analysis shall include details of improvements on adjoining properties.

b At least 10 metres shall be provided between the outer most point of the sprinkler throw and any property boundary.

c All other buffer distances will be as per the Environment and Health Protection Guidelines.

Coverage of Sprinkler

75 % of the area of the sprinkler radius that has direct contact with the ground is taken to be the effective irrigation field. This being the case each sprinkler is taken to cover 78.5 metres square.

Duration of Sprinkler Discharge

A water-rating device shall be installed such that all sprinklers shall discharge at an even rate at alternative cycles throughout the duration of the pumping out of the pump chamber of the AWTS.

Installation of Sprinklers

As the sprinklers form part of the delivery system to dispose of effluent on site they will be required to be installed by a suitably qualified and licensed tradesman.

B2 Data Sheet 2: Wobbler Off Centre Rotary Action Sprinklers

A Wobbler off Centre Rotary Action sprinkler is a device that allows the dispersal of liquid, in this case effluent, over a predetermined area. They are different to the usual sprinkler type used to disperse effluent over the LAA and their droplet size is greater. The disadvantage is the increased buffer distances required to those environmentally sensitive features and buildings on or surrounding the LAA.

Sprinkler Type

The type of sprinkler must be a Wobbler off Centre Rotary Action Sprinkler with a 2.78mm nozzle. A minimum of 4 sprinklers shall be installed.

Sprinkler Throw

A maximum radius of 5 metres is to be set for all sprinklers.

Buffer Distances

a At least 20 metres shall be provided between the outer most point of the sprinkler radius and

   i any Dwelling on the site;

   ii any dwelling on adjoining properties. As such if pop ups are to be used the site analysis shall include details of improvements on adjoining properties.

b At least 10 metres shall be provided between the outer most point of the sprinkler throw and any property boundary.

c All other buffer distances will be as per the Environment and Health Protection Guidelines.

Coverage of Sprinkler

75 % of the area of the sprinkler radius that has direct contact with the ground is taken to be the effective irrigation field. This being the case each sprinkler is taken to cover 78.5 metres square.

Duration of Sprinkler Discharge

A water-rating device shall be installed such that all sprinklers shall discharge at an even rate at alternative cycles throughout the duration of the pumping out of the pump chamber of the AWTS.

Installation of Sprinklers

As the sprinklers form part of the delivery system to dispose of effluent on site they will be required to be installed by a suitably qualified and licensed tradesman.

APPENDIX C SUITABLE VEGETATION FOR LAND APPLICATION AREAS

Botanical Name	Approx Height	Common Name or Variety
Trees		
Acacia floribunda	2 - 4 m	Gossamer Wattle
Angophora floribunda	Large tree	Rough Bark Apple Gum
Callicoma serratifolia	< 4 m	
Casuarina glauca	6 - 12 m	Swamp oak
Elaeocarpus reticulates	Large tree	Blueberry ash
Eucalyptus amplifolia	Large tree	
Eucalyptus botryoides (coastal areas)	10 - 30	Bangalay
Eucalyptus deanei	Large tree	Blue Mountains blue gum
Eucalyptus longifolia	20 m	Woollybutt
Eucalyptus pilularis	30 - 40 m	Blackbutt
Eucalyptus punctata	< 35 m	Greygum
Eucalyptus robusta	20 – 30 m	Swamp mahogany
Eucalyptus saligna (coastal)	30 – 50 m	Sydney blue gum
Eucalyptus tereticornis	30 – 40 m	Forest red gum
Acmena smithii	10 – 20 m	Lilli pilli
Hymenosporum flavuum	3 – 6 m	Native frangipani
Melaleuca armillaris (coastal)	3 – 4 m	Bracelet honey myrtle
Melaleuca decora	4 – 7 m	
Melaleuca ericifolia	6 m	
Melaleuca linariifolia	4 – 8 m	Snow in summer
Melaleuca quinquenervia	5 – 7 m	Broad paperback
Melaleuca stypheloides	6 – 15 m	
Melia azedarach	15 – 20 m	
Syzgium paniculatum	8 – 10 m	Bush cherry
Viminaria juncea	2 – 3 m	Golden spray
Sloarea australis		Maidens Blush
Cryptocarya glaucesceus		
Cryptocarya micronevra		
Endiandra sieberi		
Toona ciliata		Red Cedar
Acacia maidenii		
Acacia longifolia,		
Ficus rubignosa		Port Jackson Fig
Ficus coronata		Sand-paper Fig
Ficus macrophylla		Moreton Bay Fig
Rapanea howittiana		
Rapanea variables		
Rhodmania rubesceus		
Syncarpia glomulifera		Turpentine
Tristoniopsis lavrina		Water Gum
Alphitonia excelsa		Red Ash
Brachychiton acerifolius		Flame tree
Livistona australis		Cabbage Tree Palm
Archontophoenix cunninghamiana		Bangalow Palm
Shrubs		
Baekea linifolia	1 – 2.5 m	
Baekea virgata	< 4 m	
Banksia robur	0.5 – 2 m	
Bauera ruboides	0.5 – 1.5 m	
Callistemon citrinus	50 – 80 cm	Austraflora Firebrand

Botanical Name	Approx Height	Common Name or Variety
Shrubs (cont'd)		
Callistemon linearis	1 – 3 m	
Callistemon pallidus	1.5 – 4 m	
Callistemon paludosus	3 – 7 m	
Callistemon pinifolius	1 – 3 m	
Callistemon rigidus	1.5 – 2.5 m	
Callistemon salignus	3 – 10 cm	
Callistemon shiresii	4 – 8 m	
Callistemon sieberi	1.5 – 2 m	
Callistemon subulatus	1 – 2 m	
Goodenia ovata	1 – 1.5 m	
Hibiscus diversifolius	1 – 2 m	Swamp hibiscus
Kunzea capitata	1 – 2 m	
Leptospermum flavescens	< 2 m	Tea-tree
Leptospermum juniperinum	1 m	Tea-tree
Leptospermum squarrosum	< 2 m	Tea-tree
Melaleuca squamea	1 – 2 m	
Melaleuca thymifolia		
Grasses		
Carex spp.		
Lomandra longifolia		
Microlaena stipoides		
Oplismenus imbecillis		
Poa lab		
Stipa spp.		
Ground Cover / Climbers		
Hibbertia scandens		Snake vine
Kennedia rubicunda	Climber	Dusky coral pea
Scaevola ramosissima		
Veronica plebeia		
Viola hederacea		Native violet
Sedges / Grasses / Small Plants		
Baumea articulata	Sedge	
Baumea juncea	Sedge	
Baumea rubiginosa	Sedge	
Baumea teretifolia	Sedge	
Blandfordia grandiflora	30-90 cm	Christmas Bell
Blandfordia nobilis	30-90 cm	Christmas Bell
Brachyscome diversifolia	Clump	Native Daisy
Carex appressa	Sedge	
Crinum pedunculatum	< 2 m	Swamp Lily
Dianella caerulea	Low plant	Blue Flax Lily
Gahnia spp.	Tall Grass	
Juncus spp.	0.5 m Rush	
Patersonia fragilis		Swamp Iris
Patersonia glabrata		Native Iris
Restio Australia	Reed	
Restio tetraphyllus	1 m	
Sowerbaea juncea	Sedge	Rush Lily
Xyris operculata	< 1 m	Tall Yellow Eye

APPENDIX D RISK ASSESSMENT FORM (SAMPLE ONLY)

Risk Assessment Categories (Circle Below, Note U = Unknown)

Criteria	Low	Medium	High	Comment
Is the property on which the OSSMS proposed within the Wyong Shire Water Supply Catchment	No	No	Yes	
What is the size of property on which the OSSMS is to be installed (hectares) (1 hectare = 2.47 acres)?	Greater than 1	Between 1 and 0.5	Less than 0.5	
Is the proposed location of the OSSMS within a flood zone	Flood free	1 in 100 year flood zone	1 in 20 year floodzone	Not permitted below 1:100 in water catchment
Is the proposed location of the OSSMS within the recommended buffer distances of Table 5 of the Environment and Health Protection Guidelines, 1998 (extract below)	Complies	Does not comply <10% variation	Does not comply > 10% variation	
How many persons is the dwelling to which the OSSMS is connected, calculated to occupy	<8	>8 <10	>10	
What is the depth of the water table at the property?	< 1.5m	< 1.5m	< 1.0m	
Is the development Dual Occupation (i.e., both residences to one tank)?	No	Yes	Yes	
Risk Assessment Summary	**LOW 5**	**MEDIUM 3**	**HIGH 1**	

Note: Each of the above questions has three possible answers, one in each of the low, medium and high column. Once you have completed the seven questions add up the number of answers circled in each of the High, Medium and Low column. If you have answered high for one or more questions the risk is considered high. If you have circled 3 or more medium (and no high) then the risk is medium. If you have circled five or more answers as low (and no high) then the risk is low. The number written next to the result at the bottom of the table is the minimum number of times an answer in that column has to be circled to be considered that level of risk.

Recommended Buffer Distances for On-Site Systems

(from Table 5 Environment and Health Protection Guidelines, 1998)

System	Recommended Buffer Distances
All land application areas	▪ 100m to permanent surface waters (e.g. river, streams, lakes etc) ▪ 250m to domestic groundwater well ▪ 40m to other waters (e.g. farm dams, intermittent waterways and drainage channels)
Surface spray irrigation	▪ 6m if area up-gradient and 3m if area, down gradient of driveways and property boundaries ▪ 15m to dwellings ▪ 3m to paths and walkways ▪ 6m to swimming pools
Surface drip and trickle irrigation	▪ 6m if area up-gradient and 3m if area down gradient of swimming pools, property boundaries, driveways and buildings
Subsurface irrigation	▪ 6m if area up-gradient and 3 m if area down gradient of swimming pools, property boundaries, driveways and buildings
Absorption System	▪ 12m if area up-gradient and 6m if down gradient of property boundary ▪ 6m if area up-gradient and 3m if area down gradient of swimming pools, driveways and buildings.

APPENDIX E WYONG SHIRE WATER SUPPLY CATCHMENT, ADDITIONAL MATTERS FOR CONSIDERATION

Prior to the determination of any application to install an OSSMS on land that is within the boundaries of the Wyong Shire Water Supply Catchment the applicant must address the following matters:

a The effect of the proposed OSSMS on the water quality of rivers, creeks and groundwater in the catchment including periods of inclement weather

b What features have been designed into the OSSMS to ensure treated effluent does not leave the proposed LAA and enter the catchment

c The effect of the proposed OSSMS on the water cycle including pollutant loading and impacts on receiving waters

d The arrangements made to ensure that the system operates at a standard that will not detrimentally affect the sustainability of the catchment

e Systems below the 1:100 year flood level are not permitted in the Wyong water supply catchment

APPENDIX F MODEL SITE REPORT

1 SITE EVALUATION		
Company:	**Names:**	
Address:		
Phone:	**Fax:**	
Date of Assessment:	**Signature of Evaluator:**	**Date:**

2 SITE INFORMATION	
Address / Locality of Site:	**Council Area:**
Owner / Developer:	**Phone:**
Address:	
Size / Shape / Layout: ▪ Site plans attached ▪ Photograph attached	 YES / NO YES / NO
Intended Water Supply (circle relevant type):	Rainwater Reticulated water supply Bore / Groundwater
Expected Wastewater Quantity (litres/day):	
Local Experience (information attached regarding on-site sewage management systems installed in the locality):	YES / NO
If any site or soil features have not been assessed, note why:	

3 SITE ASSESSMENT	
Climate:	
▪ Are low temperatures expected (particularly below 15ºC)?	YES / NO
Where appropriate:	
▪ Rainfall water balance attached	YES / NO
▪ Land application area calculation attached	YES / NO
▪ Wet weather storage area calculation attached	YES / NO
Flood potential:	
▪ Land application area above 1 in 20 year flood level	YES / NO
▪ Land application area above 1 in 100 year flood level	YES / NO
▪ Electrical components above 1 in 100 year flood level	YES / NO
▪ Residual Current Device (RCD) Installed	YES / NO
Exposure:	
Slope:	
Landform:	
Run-on and Seepage:	
Erosion Potential:	
Site Drainage:	
Fill:	
Groundwater:	
▪ Horizontal distance to groundwater well used for domestic water supply (m)	
▪ Relevant groundwater vulnerability map referred to?	YES / NO / NOT AVAILABLE
▪ Level of Protection (I-VI)	
▪ Bores in the area and their purpose	
Buffer distances from wastewater management system to:	
▪ Permanent waters (m)	
▪ Other waters (m)	
▪ Other sensitive environments (m)	
▪ Boundary of premises (m)	
▪ Swimming pools (m)	
▪ Buildings (m)	
Is there sufficient land area available for:	
▪ Application system (including buffer distances)	
▪ Reserve application system (including buffer distances)	
Surface Rocks:	

4 SOIL ASSESSMENT	
Depth to bedrock or hardpan (m):	
Depth to high soil watertable (m):	
Hydraulic loading rate (where applicable): ▪ Soil structure ▪ Soil texture ▪ Permeability category ▪ Other measures of soil permeability ▪ Hydraulic loading recommended for soil absorption system (mm/day) ▪ Reasons for the hydraulic loading recommended	
Coarse fragments (%):	
Bulk density (and texture) (g/cm^3):	
pH:	
Electrical conductivity (dS/m):	
Exchangeable sodium percentage:	
Cation exchange capacity (cmol+/kg):	
Phosphorus sorption index:	
Geology and soil landscape survey: ▪ Presence of discontinuities ▪ Presence of fractured subsoil	
Soil and Landscape map reference:	
Dispersiveness:	

5 SYSTEM SELECTION	
Consideration of connection to a centralised sewerage system: ▪ Approximate distance to nearest feasible connection point ▪ Potential for future connection to centralised sewerage ▪ Potential for future connection to reticulated water	 High / Med / Low High / Med / Low / Already Connected
Type of land application system considered best suited to site:	
Why? _____	
Type of treatment system considered best suited to site and application system: _____	
Why? _____	

6 GENERAL COMMENTS	
Are there any specific environmental constraints?	YES / NO
Is the system in a Wyong water catchment supply area?	YES / NO
Are there any specific health constrains?	YES / NO
Any other comments?	