Part E- General Controls – Design Controls

Chapter E8: On-site Sewage Management Systems

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1 INTRODUCTION

1. This chapter of the DCP provides the framework for the integrated management and regulation of on-site sewage (wastewater) management systems within the City of Wollongong Local Government Area.

2. This chapter of the DCP sets out the minimum requirements and assessment criteria used for the installation and operation of on-site sewage (wastewater) management systems and their related land application areas in unsewered parts of the LGA, in order to minimise any potential adverse public health and environmental impacts. This includes unsewered areas in the following suburbs: Helensburgh, Otford, Darkes Forest, Maddens Plains, Clifton, Scarborough, Wombarra, Coledale, Kembla Heights, Mt Kembla, Cordeaux Heights, Unanderra, Kembla Grange, Wongawilli, Horsley, Marshall Mount, Avondale and Yallah.

2 OBJECTIVES

The objectives of this part of the DCP are:

(a) To ensure the protection of the surrounding environment including groundwater, surface water, land and vegetation through the selection of a system suitable for the specific site.

(b) To prevent public health risks from on-site sewage disposal.

(c) To ensure maximum re-use of resources.

(d) To ensure ecologically sustainable development, especially inter-generational equity.

(e) To recognise the value of wastewater as a reuse resource.

(f) To aid public recognition of on-site sewage treatment systems.

(g) To ensure on-going maintenance and monitoring programs involving both the land owner/ resident and Council.

(h) To create a framework for improved management of on-site sewage / wastewater management systems.

3 DEFINITIONS

For the purpose of this part of the DCP, the following definitions apply:-

Absorption Trench means a trench or trenches excavated into the ground and filled with aggregate and piping or arch fabric, used for the absorption of effluent.

Aerated Wastewater Treatment System means a wastewater treatment system typically involving sedimentation, aerobic biological oxidation, aerobic sludge digestion and effluent disinfection with final discharge of effluent to a land application area.

Biochemical Oxygen Demand (BOD_5) means the amount of oxygen required for the biological decomposition of organic matter, measured over a period of 5 days.

Blackwater means human faeces and urine and wastewater heavily and directly contaminated with human faeces and urine generated from a toilet, urinal, bidette or bidet. Blackwater may also contain contaminated solid material, such as toilet paper. Although not strictly water-based, human faeces and urine entering a waterless composting toilet is considered as “blackwater”.

Collection Well means a tank used for the collection and temporary storage of effluent discharged from a septic tank.

Domestic Greywater Diversion means the installation and operation of a system for diverting greywater generated on sewered residential premises to a garden or lawn on those premises, but does not include the manual collection and re-use of greywater (for example, by means of a bucket or similar receptacle).

Domestic Greywater Treatment System (DGTS) means a system that collects, treats and disinfects greywater for re-use for toilet and urinal flushing, or for use in surface irrigation in dedicated non-trafficable areas or other land application systems.

ESD (Ecological Sustainable Development) area means the total area required to be designated to effluent re-use on-site to minimise the cumulative environmental impact from effluent disposal over the long term.

Effluent means the liquid discharged from an on-site sewage management system.

Effluent Application Field (EAF) area means the minimum required disposal field size (ie directly wetted area) that is to be constructed within the ESD (Ecological Sustainable Development) area and has been determined in accordance with AS/NZS 1547 (2000), based on the ability of the site's soils to receive effluent without creating health risks or hydraulic failure.

Evapotranspiration (ET) Bed means a system of effluent disposal that uses the loss of water from the soil by evaporation and from plants by transpiration from beds that are essentially shallow trenches.

Gate Valve means a stop cock used to prevent the flow of effluent at the collection side of the suction line.

Greywater (sullage) means domestic wastewater excluding toilet waste and may include wastewater arising from a hand basin, shower, bath, spa bath, clothes washing machine, laundry tub, dishwasher and kitchen sink.

Greywater Diversion Device (GDD) is a device that diverts (or diverts and collects), and directs untreated greywater to a sub-surface irrigation area.

Groundwater means the body of water that fills the pore spaces of the soil and subsoil and includes seepage from springs.

Land Application Area means the area of land intended for the disposal of effluent and includes the ecological sustainable development area.

Mound system means a raised effluent application system that is used where natural soils are extremely permeable and/or underlying groundwaters are seasonally close to the ground surface.

On-site Sewage Management system (OSSM) or On-site Wastewater Management (OSWM) System means an on-site system used for the purpose of holding or processing, or reusing or otherwise disposing of sewage or by-products of human waste.

Piezometer means a borehole constructed with 100mm PVC perforated piping to a depth below the subsoil horizon or to the top of unweathered rock formation or below the water table, used to monitor groundwater quality.

Septic Tank means a tank used for the storage or primary treatment of sewage comprising sedimentation of settleable solids, flotation of oils and fats, and anaerobic digestion of sludge.

Sewage means a combination of blackwater and greywater.

Shallow Sub-surface Drip/Trickle Irrigation means the use of effluent applied directly to plants by drip or trickle to the soil below a 50-100mm layer of bark, wood chip or mulch.

Sub-surface (Micro-trench) Irrigation means the disposal of effluent through microtrenches at a depth of between 100mm and 300mm below ground level.

Surface Irrigation means the use of effluent applied to the ground from above ground level.

Wastewater means blackwater, greywater or a combination of blackwater and greywater arising from activities such as the use of toilets, bathrooms (basins, baths and showers), kitchens and laundries.

Water Table means the surface of groundwater below the ground surface.

4 LEGISLATIVE FRAMEWORK

4.1 Local Government Act 1993

1. Under Part C of the Section 68 of the Local Government Act 1993, the installation or alteration of an on-site sewage management system or the operation of a sewage management system requires Council approval.

2. The Local Government Act 1993 also requires that any Section 68 application for the installation and operation of an on-site sewage management system take into account the principles of ecologically sustainable development, including intergenerational equity.

4.2 Local Government (General) Regulation 2005

1. The Local Government (General) Regulation 2005 sets out the requirements and matters for consideration in determining applications for installation, alteration and operation of sewage management system and includes the performance standards to be met for the installation and operation of sewage management systems.

2. Under Clauses 40 and 41 of the Local Government (General) Regulation 2005, a local council must not approve of the installation of certain sewage management facilities unless the facility has been accredited by the NSW Department of Health. This is the only statutory role of NSW Health has in the regulation of on-site single domestic wastewater management systems.

3. The types of on-site sewage management systems to which accreditation applies include septic tanks, collection wells, aerated wastewater treatment systems, greywater treatment systems, composting toilets and incinerating toilets which are available for purchase by retail. A full list is detailed in clause 40 of the above regulation and only includes sewage management facilities which treat sewage of a domestic nature from premises occupied by a maximum of 10 persons or where the average daily flow of sewage is less than 2000 litres.

4. The key NSW Department of Health Accreditation Guidelines for on-site sewage management systems include the following:

    - Septic Tank and Collection Well Accreditation Guideline December 2001 (includes septic tanks, collection wells, septic closets, greywater tanks, CED pretreatment tanks and sewage ejection pump stations);
    - Sewage Management Facility, Sewage Treatment Accreditation Guideline (incorporating AWTS and Sand Filters), May 2005;
    - Waterless Composting Toilet Accreditation Guideline, May 2005; Greywater Reuse in Single Domestic Premises April 2000; and
    - Domestic Greywater Treatment Systems Accreditation Guidelines Feb 2005.

5. Accreditation does not apply to the drains which are connected to the facility nor to any land application system. Similarly, accreditation does not apply to models under test or if the facility is specifically designed for a particular premises.

6. Clause 44(1) of the Local Government (General) Regulation 2005 specifically requires that the operation of any on-site sewage management system and related land application area must meet the following performance standards:

   (a) The prevention of spread of disease by micro-organisms;

   (b) The prevention of spread of foul odours;

   (c) The prevention of contamination of water;

   (d) The prevention of degradation of soil and vegetation;

   (e) The discouragement of insects and vermin;

   (f) Ensuring 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 minimisation of any adverse impacts on the amenity of the premises and surrounding lands; and

   (h) If appropriate, provision for the reuse of resources (including nutrients, organic matter and water).

7. The regulation prescribes domestic grey water diversion as an activity requiring prior Council approval. The regulation also provides for an exemption from the requirement for prior Council approval for domestic grey water diversion, if certain conditions are met.

4.3 Environmental Planning and Assessment Act 1979 and Environmental Planning and Assessment Regulation 2000

1. The Environmental Planning and Assessment Act 1979 and the Environmental Planning and Assessment Regulation 2000 identify criteria and procedures for the assessment of certain activities identified as “Designated Development”.

2. If an on-site sewage management system or sewerage system meets the threshold criteria detailed in Schedule 3 of the EP & A Regulation 2000, then a Development Application and supporting Environmental Impact Statement (EIS) must be lodged with the consent authority. The preparation of the EIS is required to be carried out in accordance with the requirements of the Director – General of the NSW Department of Planning.

3. The Development Application and the supporting EIS will be assessed in accordance with the provisions of the EP & A Act and Regulation.

4. The provisions of Section 79(c)(1) of the EP and A Act require that a consent authority take into account all relevant “matters for consideration”, including sub-section 79(C)(1)(b), namely:

   “..the likely impacts of the development including environmental impacts on both the natural and built environments and social and economic impacts in the locality”.

   Therefore, Council is required to consider the potential environmental impacts associated with the development of land in unsewered parts of the LGA. This requires the assessment of the

suitability of the site to cater for the specific development and as part of this assessment, consideration as to the most appropriate on-site sewage management system upon the land.

4.4 Protection of the Environment Operations Act 1997

1. The Protection of the Environment Operations Act 1997 (POEO Act) states that it is an offence to pollute waters or permit waters to be polluted except where that pollution occurs in compliance with an environment protection licence. Other offences relating to land, air (including odour) and noise pollution are covered in the POEO Act.

2. In addition, the POEO Act requires environment protection licences for certain activities listed in Schedule 1 of the Act ('scheduled activities'). The NSW Department of Environment and Climate Change (NSW DECC) issues these licences. Sewage treatment systems are a scheduled activity, defined under the Act as:

   "Sewage treatment systems (including the treatment works, pumping stations, sewage overflow structures and the reticulation system) that have an intended processing capacity of more than 2,500 persons equivalent capacity or 750 kilolitres per day and that involve the discharge or likely discharge of wastes or by-products to land or waters."

3. NSW DECC will not generally license non-scheduled wastewater recycling systems, as these systems can typically be designed and operated to avoid pollution e.g. by using all the recycled water or by discharging surplus recycled water or untreated wastewater to the sewer.

5 RELEVANT AUSTRALIAN STANDARDS / GUIDELINES FOR ON-SITE SEWAGE MANAGEMENT SYSTEMS

1. The current relevant Australian Standards and guideline documents for on-site sewage management systems are referenced at Appendix 1 to this chapter.

6 TYPES OF ON-SITE SEWAGE MANAGEMENT SYSTEMS

1. The main types of on-site sewage management (OSSM) systems include:

   (a) Conventional Septic tank system with pump out;

   (b) Septic tanks with absorption trenches or evapotranspiration beds /areas;
   (c) Aerated wastewater treatment systems (AWTS) and Land Application Areas (LAA's);
   (d) Composting toilets;
   (e) Greywater diversion devices and Greywater Treatment systems;

   (f) Mound systems;

   (g) Recirculating aerobic sand filter devices;

   (h) Amended Soil Systems; and

   (i) Organic separation and treatment systems.

(i) Conventional Septic Tank system with Pump Out

1. A septic tank is a waterproof tank usually located below ground level and provides treatment of sewage by allowing solids to settle to the bottom of the tank and oils and fats to float to the top to form a scum layer. Anaerobic (in the absence of air) bacterial digestion of the stored solids

produces a sludge which accumulates at the bottom of the tank. The partly treated effluent flows from the septic tank to a holding tank for regular pump out.

2. Pump out systems do not require a site and soil assessment to be performed. Consideration should be given to whether any structural or stability problems exist to installing tanks on the site, siting tanks outside tree drip zones and the amount of room available for the system. The septic tank and collection well must be sized according to the potential number of occupants in the building. A minimum of five (5) people is used for the purpose of calculation. The minimum capacity for a septic tank that is receiving all septic wastes is 2300 litres, while the minimum size for collection wells is 5250 litres. The maximum number of persons for calculations is ten (10) (see Appendix 2).

3. Council may consider the possibility of a split system, where a pumpout system is combined with a greywater diversion device (GDD) or a domestic greywater treatment system (DGTS) provided that when rain is anticipated, during wet weather or when the ground is sufficiently irrigated, the greywater is directed back to the septic tank. With a reduced amount of wastewater, care must be taken in the plumbing design to ensure that solids are carried to the septic tank, preventing drain blockages.

4. The provision of a septic tank with a pump out system will be required for the majority of unsewered lands in Austinmer, Coledale, Wombarra, Scarborough and Coalcliff, given inherent topographical and geological constraints in these suburbs. An alternative on-site sewage management system will only be considered where appropriate detailed evidence proves that the alternative system provides a higher or more appropriate wastewater treatment option, than a pump out system.

5. The use of a septic tank and pump out system will generally not be supported upon land within any rural or environmental protection zone where sufficient land is available on-site for alternative on-site sewage management systems.

(ii) Septic Tank with Soil Absorption System

1. There are two types of soil absorption system commonly used for the disposal of effluent from a septic tank, namely: absorption trenches and evapotranspiration areas.

(a) Absorption trenches

The absorption or sullage trench receives primary treated effluent from a septic tank. The role of the trench is to evenly discharge the effluent into the subsoil which then filters the effluent as it percolates through the soil strata.

The sizing and construction of an absorption trench shall be undertaken in accordance with the Rapid Evaluation Procedure for On-site Wastewater Management at Appendix 2 to this policy as well as *AS /NZ 1547:2000 On-site Domestic Wastewater Management* and / or the *Environment and Health Protection Guidelines – Onsite Sewage Management for Single Households 1998*.

(b) Evapotranspiration Bed (ET Bed)

The Evapotranspiration bed is an area made of sand and gravel which is not sealed at the base and sides. The hydraulic load of ET beds is taken up by evaporation and transpiration by vegetation as well as disposal of some of the effluent through the permeable base of the bed. The beds are required to be designed so that they are well vegetated and mounded to prevent the ETA filling with rainwater during rainwater events.

The sizing and construction of the ET bed shall be undertaken in accordance with the Rapid Evaluation Procedure for On-site Wastewater Management at Appendix 2 to this policy as well as *AS /NZ 1547:2000*

On-site Domestic Wastewater Management and / or the *Environment and Health Protection Guidelines – Onsite Sewage Management for Single Households 1998*.

(iii) Aerated Wastewater Treatment Systems (AWTS) and Land Application Area / Irrigation Systems

1. The aerated wastewater treatment system (AWTS) is an alternative to the conventional septic system which uses the processes of aeration, clarification and disinfection to treat the wastewater to a level which is suitable for above ground irrigation to Land Application Areas (LAA's) or sub-surface disposal (SSD).

2. Aerated wastewater treatment systems (AWTS) use aeration of wastewater as an integral part of the treatment process. A typical AWTS treats wastewater through the following process:

   - Settling of solids and flotation of scum in an anaerobic primary chamber (septic tank);
   - Oxidation and consumption of organic matter through aerobic biological processes;
   - Clarification - secondary settling of solids;
   - Disinfection using chlorine or other approved means if surface land application of treated wastewater is to occur; and
   - Regular removal of sludge to maintain the process.

3. All AWTS are required to have NSW Department of Health accreditation. The majority of AWTS have a 10 person capacity (ie expressed as a 10 EP system).

4. All AWTS must be regularly serviced every quarter by a qualified service technician to ensure the proper functioning of the AWTS and records of servicing must be forwarded to Council for its record keeping purposes.

Irrigation Systems associated with an AWTS

(a) Surface Irrigation – Land Application Areas

The irrigation of wastewater is applied to the designated Land Application Area (LAA) from the AWTS. The most common method of application for surface irrigation is by sprayers or sprinklers with low pressure devices. The spray head plume radius should be restricted to not more than 2 metres with a maximum plume height of not more than 400millimetres. Drip and trickle systems may also be used to allow water to drip to the soil, below at least a 100mm layer of bark, woodchip or mulch. The effluent which is applied to the area of irrigation is absorbed by the soil and is taken up by vegetation or evaporated.

However, surface irrigation systems will only be permitted upon sites with suitable geology / soil depth (ie with no waterlogging) and flat to gently sloping land. The minimum area for surface irrigation must be calculated in accordance with AS /NZ 1547:2000 or the Environment and Health Protection Guidelines – Onsite Sewage Management for Single Households 1998.

(b) Sub-Surface Disposal

Sub-surface disposal is the method of discharging treated effluent below the ground to deal with on-site wastewater. Sub-surface or drip irrigation is the only acceptable method of reclaimed effluent disposal from an AWTS located within a high risk classification area.

The principle of AWTS subsurface disposal is similar to an evapotranspiration area in that the effluent is evaporated from the ground and transpired by the vegetation on the surface area. The sub-surface

system involves the use of a series of drainage irrigation pipes to discharge effluent evenly along the length of the pipeline (ie pressure compensating line).

(iv) Composting Toilets

1. There are two msain types of composting toilets generally available in New South Wales, namely: dry composting toilets and wet composting toilets.

2. Composting toilets function with no flush toilet pedestal or with moisture from a cistern. Toilet waste passes from the pan down the chute and into a chamber similar in size to a conventional septic tank. All faecal matter and other compostable matter produced such as toilet paper 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.

3. Composting toilets have a fan connected to a vent pipe which 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.

4. However, these systems only treat toilet wastes and all other liquid wastes from the shower, kitchen and laundry must be disposed of via a separate grey water system. These systems discharge to subsurface absorption trenches or evapotranspiration areas.

(v) Greywater Diversion Devices (GDD) and Domestic Greywater Treatment Systems (DGTS)

1. The Local Government (General) Regulation 2005 defines “greywater” as waste water from washing machines, laundry tubs, showers, hand basins and baths, but does not include waste water from a kitchen, toilet, urinal or bidet.

2. A greywater diversion device (GDD) is designed to allow greywater from the shower, bath, basin or laundry to be diverted to an alternative disposal site rather than through the effluent management system. Gravity fed diversion devices incorporate a hand activated value, switch or tap and is fitted to the outlet of the waste pipe of the plumbing fixture directly to the disposal area. Pump diversion devices incorporate a surge tank to cope with sudden influxes of greywater for distribution to a disposal area. The surge tank does not operate as a storage tank.

3. Domestic greywater treatment systems (DGTS) treat greywater to a tertiary level which is satisfactory for above ground land application (excluding high risk areas). The greywater treatment system involves a cycle of aeration and inactivity to achieve biological breakdown of the water through oxidation. The inactive period in the cycle results in a reduction in nitrogen levels in the water. Filtration of the wastewater removes any suspended solids and the water is then disinfected by a UV disinfection unit.

4. Greywater collected, treated and disinfected (to a standard of 20 mg/L BOD_5, 20 mg/L suspended solids and 10 colony forming units/100mL thermotolerant coliforms) in a DGTS can be re-used for toilet and urinal flushing, cold water supply to washing machines or used in surface irrigation in dedicated non-trafficable areas or other land application systems.

5. Greywater diversion devices do not treat the greywater and hence, greywater must be disposed of by subsurface methods using the calculations for subsurface irrigation.

6. Greywater disposal shall be restricted to a portion of site which is not used for either the growing of fruit or vegetables or as a recreational area.

7. Further guidance about greywater reuse can be found in the Department of Energy, Utilities and Sustainability’s *NSW Guidelines for Greywater Reuse in Sewered, Single Household Residential*

Premises (2007) and *Interim Guidance for Greywater and Sewage Recycling in Multi-Unit Dwellings and Commercial Premises* (2004).

8. Land application areas associated with DGTSs or GDDs must be designed in accordance with AS/NZS 1547:2000 and in consideration of the REP and Section 3.4 of this policy.

(vi) Mound Systems

1. Mound systems are elevated absorption beds and utilise suitable sand fills to partially treat wastewater before it reaches natural soil. Mound systems are used to augment natural soil for complete treatment and disposal.

2. A mound system generally consists of a septic tank, a dosing tank, distribution pipes, and a mound, as shown in Figure 1. The septic tank allows the solids in wastewater to settle and degrade. The septic tank effluent is filtered by an effluent filter and discharged to a dosing tank. The dosing tank is equipped with a pump to deliver the septic tank effluent through the distribution system to the mound. The distribution system normally consists of small diameter pipes and allows for even wastewater application under low pressure on the mound.

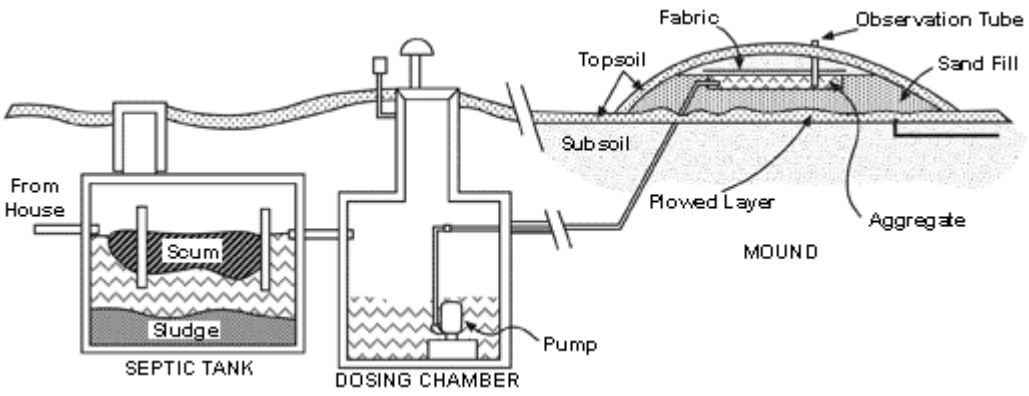

Figure 1: Schematic of a Mound System

(Source: Ohio State University. 2004. Mound Systems for On-site Wastewater Treatment)

(vii) Recirculating Aerobic Sand Filter Devices

1. A recirculating aerobic sand filter device further treats the effluent from a septic tank. The treatment process involves the collection of effluent from a holding well or sump which is then pumped intermittently for distribution through a bed of coarse sand. The treated effluent is then redirected back to the sump for further recirculation. The effluent is then directed to a land application system. The effluent may also be disinfected for above ground spray irrigation.

(viii) Amended Soil Systems

1. Amended soil systems are designed to provide further treatment to effluent which has previously undergone primary or secondary treatment such as a septic tank or AWTS, prior to land application.

2. The amended soil systems involve an impermeable membrane with the effluent from the septic tank flowing through the amended soil medium. Such systems may promote evapotranspiration from the amended soil with any remaining water directed to a separate land application system.

3. Amended soil systems can achieve high removal efficiencies for biochemical oxygen demand (BOD), suspended solids (SS), nutrients and pathogens.

(ix) Organic Separation and Treatment System

1. This system involves the treatment of both household wastewater and food waste using a passive aerobic process. The technology is based on a layered, flexible modular filter element which is contained within a tank or may be retrofitted to an existing septic tank. The system treats sewage, wastewater, food wastes and scrap paper and cardboard. The filter is an organic soil ecosystem which is not only fed by the organic wastes that are filtered out of the wastewater but is actually structured from the fine humus produced, cleverly turning the problem into the solution. The system includes millions of worms and beetles & microscopic organisms which continually renew the organic material so that its drainage and air porosity are continually renewed and maintained indefinitely.

2. The system normally includes a single pass filter where wastewater enters at the top of the bed and clear organically filtered water, is pumped out from the bottom. The treated wastewater can then be directed to a land application system.

7 RAPID EVALUATION PROCESS –SELECTION OF AN APPROPRIATE ON-SITE SEWAGE MANAGEMENT SYSTEM

7.1 General

1. The On-site Wastewater Management Approvals Criteria: Support Document dated October 2002 (ie prepared by Martens & Associates Pty Ltd on behalf of Council) introduced the Rapid Evaluation Procedure (REF) for the selection of appropriate on-site sewage management systems in the City of Wollongong LGA.

2. The Rapid Evaluation Procedure (REP) for On-site Wastewater Management has been developed, taking into account the principles of Ecologically Sustainable Development.

   The Rapid Evaluation Procedure for On-site Wastewater Management is illustrated at Appendix 2 to this chapter.

3. The Rapid Evaluation Procedure (REP) consists of four stages that help determine the relevant constraints or limitations to achieving ecologically sustainable on-site wastewater management. The four stages are:

   - Stage 1 - Treatment and disposal type selection;
   - Stage 2 - Effluent Disposal Field sizing;
   - Stage 3 - Site Buffers and Assessment Requirements; and
   - Stage 4 - Effluent Re-use Field Design.

7.2 Stage 1 – Treatment and Disposal Type Selection

Stage 1 provides the applicant with a procedure for assessing the viable options available for selecting an on-site sewage management system suitable for their site.

Stage 1 has been developed in consideration of the evaluation procedure outlined in DLG Guidelines (1998).

Stage 1 consists of three (3) steps:

Step 1. Evaluation of minimum acceptable sewage treatment standard based on acceptable and achievable buffer setbacks from waterways – Use Table 1 below to identify suitable treatment technologies where minimum buffer requirements from waterways are achievable.

Table 1: Minimum Separation Distance Requirements for On-site Sewage Management Systems

Type of On-site Sewage Treatment System	Minimum Separation Distance from Permanent surface waters (eg rivers, streams & lakes)	Minimum Separation Distance from Intermittent Watercourses, Drainage Channels and Farm Dams	Minimum Separation Distance from Groundwater bores
Septic tank	100m	40 (50[1])m	250m
AWTS	100m	40 (50[1])m	250m
Sand filter (including septic)	100m	40 (50[1])m	250m
Tertiary treatment	50m	20 (50[1])m	100m
Composting toilet	50m	20 (50[1])m	100m

Note[1]: Special buffer distance requirement for Category 1 watercourses - On-site sewage management systems and their associated land application areas must not be located less than 50 metres from an intermittent watercourse that has been has been classified as a Category 1 watercourse under the Riparian Corridor Management Study March 2004 (ie prepared for Wollongong City Council by the Department of Natural Resources (formerly the Department of Infrastructure, Planning and Natural Resources)).

Note[2]: The values given are the minimum based on ideal site and soil conditions. If these conditions are less than ideal, then the minimum separation distances should be increased

Step 2. Select the appropriate disposal system based on physical site constraints, including site slope, high groundwater and site instability – Use Table 1.2 in the REP for On-site Wastewater Management at Appendix 2 to evaluate suitable effluent re-use options based on physical site constraints.

Step 3. Determine the range of acceptable on-site sewage management systems using the results achieved in steps 1 and 2 – Use Table 1.3 in the REP for On-site Wastewater Management at Appendix 2 to compare suitable treatment standards with disposal options to produce a range of acceptable system alternatives.

Stage 2 – Effluent Disposal Field Sizing

Stage 2 is a three-step process used to evaluate the minimum field size requirements for on-site effluent disposal, namely:

Step 1. Evaluation of minimum disposal field area requirements - Two field sizing requirements area achieved from this step.

(i) The first area requirement is the ESD area requirement, which has been developed through detailed daily soil moisture balance modelling. The ESD area forms the total area to be dedicated to effluent application and includes a nutrient assimilation zone.

(ii) The second area requirement is the Effluent Application Field (EAF) area requirement and has been determined based the design requirements of AS1547 (2000). The EAF forms the actual disposal area over which the effluent is applied and is to be located within the upper sections of the ESD area. EAF area requirements are provided for both primary (septic tank) and secondary treated effluent (AWTS).

Use Table 2.1 in the REP for On-site Wastewater Management at Appendix 2 to select the minimum ESD area requirement and then the minimum EAF requirement. Use EAF_{min}(Septic) if selecting septic tank effluent option and use EAF_{min}(AWTS), if selecting the AWTS effluent option.

Step 2. Adjustment of ESD and EAF areas based on house size (bedroom number).

The minimum disposal areas as per Table 2.1 in the REP for On-site Wastewater Management require adjustment if the proposed dwelling has more than 3 bedrooms and / or equivalent persons (EP) are greater than five (5).

Step 2.1 - Use Table 2.2 in the REP for On-site Wastewater Management at Appendix 2 to select the equivalent household population (EPreq) based on proposed bedroom number.

Step 2.2 Adjust both the ESD $area_{min}$ and the EAF $area_{min}$ (derived from Step 2.1) by utilising the following equations:

ESD area = (ESD $area_{min}$/5) x EP_{req}

EAF area = (EAF $area_{min}$/5) x EP_{req}

Step 2.3 Where reticulated water supplies are not available to the site, the required ESD and EAF areas may be reduced by multiplying each area by the following multiplication factor:

Tank Water Supply Multiplication Factor = 0.8

Step 3. Adjustment of ESD and EAF areas based on water supply situation (tank water supply or town water supply).

Stage 3 – Site Buffer and Assessment Requirements

Stage 3 details site buffer requirements and further site assessment requirements based on site limitations and development type.

The minimum buffer setback requirements have been sourced from the NSW Department of Local Government's *Environment & Health Protection Guidelines: On-site Sewage Management for Single Households January 1998.*

Two (2) additional levels of site assessment are required, based on the occurrence of certain site attributes, namely:

(i) A minimum site assessment requirement involves the preparation of a 'single lot' wastewater management study for the site in accordance with AS1547 and the principles of the NSW Department of Local Government's *Environment & Health Protection Guidelines: On-site Sewage Management for Single Households January 1998* by a suitably qualified environmental engineer/scientist.

(ii) A full site assessment requirement involves the preparation of a wastewater management study as required for 'subdivision sites' in accordance with AS1547 and the principles of DLG guidelines (1998) by a suitably qualified environmental engineer/scientist. An increased level of test pitting and soil analysis is required for such assessments.

The minimum buffer distance requirements for land application systems shall be in accordance with Table 3.1 below (and as per Table 3.1 in the REP for Wastewater Management):

Table 2: Minimum Buffer Distances Requirements for Land Application Systems

System	Minimum Buffer Distances
Surface spray irrigation	• 6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, driveways and property boundaries • 15 metres to dwellings • 3 metres to paths and walkways • 6 metres to swimming pools
Surface drip/ trickle irrigation and sub-surface irrigation	• 6 metres if area up-gradient of swimming pools, property boundaries, driveways and buildings or • 3 metres if area down-gradient of swimming pools, property boundaries, driveways and buildings
Absorption system	• 12 metres if area up-gradient and 6 metres if area down-gradient of property boundary • 6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, driveways and buildings

(Source: NSW Department of Local Government 1998. *Environment & Health Protection Guidelines - On-site Sewage Management for Single Households*)

Stage 4 – Effluent Re-use Field Design

Stage 4 outlines the common types of effluent re-use systems available, applications where they are most suited and an overall analysis of their advantages and disadvantages. Design requirements are provided for each of the systems.

8 DETAILED ASSESSMENT OF ON-SITE SEWAGE MANAGEMENT SYSTEMS FOR SITES WITH INHERENT SITE CONSTRAINTS

1. If the site has any one or more of the following limiting site attributes, a detailed assessment of the proposed on-site sewage management system is required:

   - Insufficient land area for the ESD (Ecologically Sustainable Development) area and buffer requirements;
   - Average land slope greater than 20%;
   - Land within the 1 in 100 year flood level;
   - Poorly drained or waterlogged sites;
   - 20 % of EAF (Effluent Application Field) area covered in rocks/outcrops larger than 0.2 metres;
   - Soil depth to bedrock or hardpan less than 0.5 metres;
   - Depth of soil to watertable less than 0.5 metres;

- Site within an area subject to slope instability;
- Site within an area containing acid sulphate soils;
- Subdivision or multi-lot developments;
- Commercial or industrial sites; and
- Environmentally sensitive areas. [1]

Note: [1] Environmentally sensitive areas include lands within the catchments of the Hacking River, Sydney Water's dam catchments, Mullet Creek, Duck Creek or Macquarie Rivulet or any land zoned RU1 Primary Production, RU2 Rural Landscape, E1 National Parks and Nature Reserves, E2 Environmental Conservation, E3 Environmental Management, E4 Environmental Living and SP 2 Infrastructure, under Wollongong Local Environmental Plan (WLEP) 2009).

2. The detailed assessment of the proposed on-site sewage management system must be undertaken by a suitably qualified and experienced environmental engineer or environmental consultant.

3. The detailed assessment of the proposed on-site sewage management system must take into account *AS / NZ 1547:2000: On-site domestic wastewater management* and NSW Department of Local Government *Environment & Health Protection Guidelines - On-site Sewage Management for Single Households 1998*.

4. Any on-site sewage management system with related land application area intended to cater for more than the number of people expected in a single household [up to an equivalent population of ten (10)] and located in environmentally sensitive areas will need to treat wastewater to a tertiary standard, being:

   (a) Maximum of 10 mg/L BOD_5;

   (b) 10 mg/L suspended solids;

   (c) 5 mg/L total nitrogen;

   (d) 3mg/L total phosphorus; and

   (e) 10 colony forming units/100mL faecal coliforms.

5. For all land application systems with one or more of the limiting attributes listed above, a full site and soil assessment and calculations of the size of both ESD and EAF areas must be submitted with the application to install the particular system.

6. Copies of all laboratory reports from a registered NATA laboratory and calculations are required to be included in the detailed assessment report.

7. For rural residential type subdivision applications, the calculations of the sizes of the ESD and EAF areas for each proposed lot should be based on a dwelling containing at least four (4)a bedrooms or an equivalent population (EP) of at least six (6) persons. A flow allowance of 180 litres/ person/ day should be assumed if the lots are to be supplied with town water.

8. For sites with any of the limiting attributes mentioned above, a piezometer located down gradient of the land application area will also need to be provided, during installation of the sewage management system to allow on-going monitoring of groundwater quality. The results of the

groundwater quality monitoring will be required at the time of lodgement of the Section 68 application for the operation of the system and for every subsequent renewal application.

Soil Assessment for Land Application Areas

1. Soil assessment must be completed for any proposed land application area. A soil profile must be established to a depth of 1 metre or to bedrock (whichever occurs first) for the proposed application area(s).

2. The profile should then be analysed for the parameters outlined in Table 6 of the NSW Department of Local Government's publication *Environment & Health Protection Guidelines - On-site Sewage Management for Single Households 1998*.

3. Any profile with more than a "moderate" limitation as set out in the Department's guidelines is generally not suitable. In some cases, the problems posed by a limiting feature or features can be overcome by specialised design to the proposed on-site sewage management system or minor modifications to the site.

Calculation of Size of ESD and EAF Areas Assuming No Wet Weather Storage

1. All land application systems require climate analysis to determine the sizes for the ESD and EAF areas.

2. The following climate information is provided to enable consultants to calculate the sizes of the ESD and EAF areas specifically for local conditions and are applicable across the Wollongong LGA.

Climate Set	Source Record (Bureau of Meteorology)	
	Rainfall	**Evaporation**
Dapto	Dapto	Nowra
Wombarra	Wombarra	Sydney Airport
Helensburgh	Helensburgh	Sydney Airport
Darkes Forest	Darkes Forest	Sydney Airport

For each of the geographic locations listed in the table below, use the corresponding climate set.

Geographic Zone	Climate set
Areas surrounding West Dapto, below the Illawarra Escarpment. Communities include West Dapto, Yallah, Unanderra, Cordeaux Heights and Mt Kembla	Dapto
Escarpment footslope areas: Thirroul to Wombarra	Wombarra
Escarpment footslope areas: Scarborough to Stanwell Park	Wombarra
Areas on top of the escarpment: Otford, Stanwell Tops	Helensburgh
Darkes Forest area	Darkes Forest

The following sustainability cut-off values for performance parameters are to be used in calculations.

Performance Parameter	Maximum Value
Effluent Runoff	0 mm/year
Effluent Drainage (increase above background)	260 mm/year
Nitrogen Export	1 kg/year
Phosphorus Export	1 kg/year
P-Sorption Capacity (minimum years)	50 years

All other assumptions used in the calculations should be stated, such as effluent quantity and effluent quality parameters.

9 PRELODGEMENT DISCUSSIONS WITH COUNCIL STAFF

1. Applicants are encouraged to consult with Council staff at an early stage, before finalising their proposal and lodging any application for the installation of a proposed on-site sewage management system.

2. In particular, applicants are encouraged to consult with Council staff in following cases:

   (a) If the proposed on-site sewage management system is located in an environmentally sensitive area; or

   (b) The proposed system is for a rural residential subdivision in rural or environmental protection zones, business, retail or industrial development; or

   (c) The proposed system involves recent technology which has yet to be widely installed in NSW, especially in areas near the coast or rural escarpment / hinterland.

10 APPLICATION LODGEMENT REQUIREMENTS

1. The following options are available for the lodgement of a Development Application for a proposed development / subdivision and a Section 68 application for the proposed installation of an on-site sewage management system:

   (a) The lodgement of a Development Application under Section 78A of the Environmental Planning and Assessment Act 1979 – This application will enable both development consent for the proposed development and approval for the installation of an on-site sewage management system, under Section 68 of the Local Government Act 1993 to be sought upfront and simultaneously.

   (b) The concurrent lodgement of a Development Application for the proposed development upon the site and a separate Section 68 Application for the proposed installation of an on-site sewage management system – In this case, the Section 68 Approval to Install an On-Site Sewage Management System will be issued immediately after the date of development consent (if applicable), subject to the proposed on-site sewage management system being satisfactory, in the opinion of Council, given the characteristics and location of the site and the nature of the development.

(c) The lodgement of a Development Application for a proposed development prior to the separate lodgement of a Section 68 application – This option will require the lodgement of sufficient information with the Development Application to determine the site's suitability for a future Section 68 application for the installation and on-going operation of an on-site sewage management system.

2. In this case, if the Development Application is ultimately approved, then a condition will be placed on the Development Consent requiring the lodgement of a Section 68 application for the proposed installation of an On-Site Sewage Management System for the approval by Council prior to issue of the Construction Certificate and the Section 68 application approval to Operate an On-Site Sewage Management System being issued, prior to issue of the Occupation Certificate.

(a) For combined Development/Construction Certificate Applications, the Section 68 Application to Install and Operate an On-Site Sewage Management System will need to accompany the Development/Construction Certificate Application submitted to Council.

(b) In cases where development consent has already been issued for a development / subdivision, a Section 68 application for the installation and operation of an on-site sewage management system is only required.

11 MINIMUM INFORMATION REQUIRED FOR A DEVELOPMENT APPLICATION / SECTION 68 APPLICATION FOR THE INSTALLATION AND OPERATION OF AN ON-SITE SEWAGE MANAGEMENT SYSTEM

11.1 Application to install an On-Site Sewage Management System

1. The following information must be submitted with any Development Application / Section 68 Application for the proposed installation of an on-site sewage management system:

(a) Site plan (at a 1:200 scale) showing the proposed location of all main components of the proposed on-site sewage management system including any land application area and distances to all property boundaries, watercourses and / or any other environmentally sensitive area etc;

(b) Completed Development Application / Section 68 Application to Install and Operate an On-Site Sewage Management System form(s);

(c) Full specifications for the proposed sewage management system;

(d) A description of the depth and type of soil profile;

(e) Results from stages 1 and 2 of the Rapid Evaluation Procedure for On-Site Wastewater Management (see Appendix 1);

(f) Detailed Site and Soil Assessment, ESD and EAF area calculations and AS/NZS 1547:2000 design (if required); and

(g) Details of the maintenance, monitoring and reporting that will be carried out after the system and any associated land application area has been installed.

2. If the proposed on-site sewage management system is new to the Wollongong LGA, the following additional details should be submitted:

(a) Examples of systems installed in situations that would be similar to the proposal;

(b) Testimonials from owners/operators of systems in situations similar to the proposal that indicate the successful performance of the system over the longer term;

(c) Numbers of systems installed in Australia and the length of time since the first one was installed;

(d) Any examples of system failure, the reasons for the failure and the rectification action taken to address the issue.

11.2 Application to operate an On-Site Sewage Management System or renewal of an existing system

1. Any Section 68 application for the operation of an on-site sewage management system must be supported by the following documentation:

(a) Completed Application to Operate an On-Site Sewage Management System form;

(b) Full specifications of the existing sewage management system;

(c) Site plan showing the location of the existing sewage management system; any related effluent application area and the location of waste fittings, drainage lines and disposal areas;

(d) For renewals of Approvals to Operate an On-Site Sewage Management System for pumpout systems, copies of receipts demonstrating the pumpout frequency and volume of effluent removed at each pumpout over the period of the Approval to Operate an On-Site Sewage Management System in force; and

(e) For renewals of Approvals to Operate an On-Site Sewage Management System for land application systems where a piezometer was required to be installed, copies of the monitoring results.

12 OPERATIONAL REQUIREMENTS – APPROVAL TO OPERATE AN ON-SITE SEWAGE MANAGEMENT SYSTEM

1. All existing on-site sewage management systems (including septic tank and pumpout systems) in the LGA require a current Section 68 Approval to Operate an On-Site Sewage Management System, except for exempt domestic greywater diversion devices (GDD).

2. For any new technology, the initial Approval to Operate an On-Site Sewage Management System will be restricted to 12 months only, in which case Council will review the performance of the system to determine whether the system requires alteration or another system is required to be installed.

3. Most newly installed on-site sewage management systems are likely to be a “low risk” and hence, Council may issue an Approval to Operate an On-Site Sewage Management System for up to three (3) years.

4. Applications for renewal to operate an on-site sewage management system should be submitted to Council at least one (1) month before the expiry date of the current approval.

5. All on-site sewage management systems will be inspected by Council before any Approval to Operate an On-Site Sewage Management System is issued.

6. Prior to the issue of an Approval to Operate an On-Site Sewage Management System, Council will consider whether possible strategies to comply with the objectives of this policy. A risk classification will be given to each property, which will depend on the system type, ease of maintenance, location and effluent treatment level.

7. The on-site sewage management system should not be used until such time as the applicant receives an Approval to Operate an On-Site Sewage Management System in writing. This approval indicates that Council is satisfied the installation of the system is substantially in accordance with the initial Approval to Install an On-Site Sewage Management System and / or any previous Approval to Operate an On-Site Sewage Management System conditions imposed on the system.

8. The results of any groundwater monitoring from the piezometers installed within the land application area may also be reviewed as part of the assessment of the Section 68 Application for Approval to Operate an On-Site Sewage Management System. Upgrading of an existing system may be necessary where a pollution problem is evident before any Approval to Operate an On-Site Sewage Management System is reissued.

9. An Approval to Operate an On-Site Sewage Management System may also impose requirements to renew or repair defective systems or components of systems, upgrade system types and better maintenance and monitoring requirements. For example, a septic tank and absorption trench system may be required to be converted into a septic tank with pumpout system.

10. In certain cases, Council may issue an Order under Section 124 of the Local Government Act 1993 to the property owner or occupier of premises to seek connection to Sydney Water's sewerage system by a specified date, if the site is located within 75 metres of a sewer.

Appendix: 1

RELEVANT AUSTRALIAN STANDARDS AND GUIDELINES FOR ON-SITE WASTEWATER MANAGEMENT SYSTEMS

The following Australian Standards and guideline documents are recommended to be reviewed and considered for the selection of an appropriate on-site sewage management system for a specific site:

AS/NZS 1547:2000: On-site domestic wastewater management - This Standard specifies requirements for on-site domestic wastewater systems including both primary and secondary wastewater treatment units and associated land application systems.

AS/NZS 3500.5:2000 : National plumbing and drainage - Domestic installations - This Standard sets out the requirements for the installation of sanitary plumbing and drainage within buildings.

AS 2698.2-2000: Plastics pipes and fittings for irrigation and rural applications - Polyethylene rural pipe - This Standard specifies the requirements for black polyethylene pipe for use in rural applications below and above ground.

AS 2698.3-1990: Plastics pipes and fittings for irrigation and rural applications - Mechanical joint fittings for use with polyethylene micro-irrigation pipes - This Standard specifies the requirements for mechanical jointing fittings suitable for use as fixed joints with polyethylene pipes.

Australian Standard AS/NZS 3500:2003, Plumbing and Drainage - The Australian Standard AS/NZS 3500:2003, Plumbing and Drainage (the Standard) specifies uniform requirements for the installation of water services and takes account of regulations stipulated by the authorities responsible for the administration of water supply legislation in each State and Territory of Australia. The requirements of the Standard apply to the cold water service from the point of connection to the water main up to the outlet points within the property. This Standard applies to new installations as well as alterations, additions and repairs to existing installations.

The standards are enforceable when called up by the Building Code of Australia or the NSW Code of Practice.

Environment & Health Protection Guidelines - On-site Sewage Management for Single Households January 1998 prepared by the NSW Department of Local Government, NSW Environment Protection Authority, NSW Department of Health, NSW Department of Land and Water Conservation and NSW Department of Urban Affairs and Planning - This document provides information and guidelines on the selection, design, installation, operation and maintenance of single household on-site sewage management systems.

NSW Guidelines for Greywater Reuse in Sewered, Single Household Residential Premises (2007) prepared by the NSW Department of Energy, Utilities and Sustainability - This guideline provides direction on the use of grey water diversion devices in single households and additional advisory information to the owners and/or occupiers of sewered residential premises on grey water treatment systems and manual bucketing of grey water.

Greywater and Sewage Recycling in Multi-Unit Dwellings and Commercial Premises - Interim Guidance (2004) prepared by the NSW Department of Health - This document provides interim guidance on grey water and sewage recycling in multi-unit and commercial buildings. The guidance is intended for use by the building industry, system designers, operators, local councils and other regulators and aims to ensure that grey water and sewage recycling systems are operated to consistently produce water of the required quality and that there is adequate management to avoid cross-connections or inappropriate use of water.

NSW Code of Practice, Plumbing and Drainage (3rd Edition) 2006 - The NSW Code of Practice, Plumbing and Drainage (3rd Edition) 2006 (the Code) provides cost-effective, efficient and safe plumbing and drainage solutions that protect public health and the environment. The Code details the administrative requirements for plumbing and drainage works in NSW, and adopts and varies the Australian Standard AS/NZS 3500:2003 to meet the requirements of the major urban and regional water supply authorities.

Schedule 1 of the Local Government (General) Regulation 2005 states that water supply work, sewerage work and stormwater drainage work must comply with the Plumbing and Drainage Code of Practice.

The Code provides requirements for recycled water reuse, including greywater reuse. It also provides the technical plumbing and drainage support to the compliance options for meeting the water efficiency requirements of BASIX4.

Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) 2006 - The Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) 2006 (subsequently referred to as "The Australian Guidelines for Water Recycling") has been produced by the Environment Protection and Heritage Council, Natural Resources Management Ministerial Council and the Australian Health Ministers Conference to provide guidance on best practices for water recycling.

The guidelines provide a risk assessment framework that is applicable to the recycling of water from stormwater, greywater and treated sewage sources. The guidelines are not mandatory but are designed to provide an authoritative reference that can be used to support beneficial and sustainable recycling. The guidelines are intended to be used by anyone involved in the supply, use and regulation of recycled water schemes.

The guidelines are available to download from the Environment Protection and Heritage Council website.

ANZECC Guidelines for Fresh and Marine Water Quality (2000) - The Australian and New Zealand Guidelines for Fresh and Marine Water Quality do not apply directly to recycled water; however, they provide an outline for setting water quality criteria. Specifically they provide guidance on designing and implementing water quality monitoring and assessment programs for irrigation that may be useful in the development of recycled water schemes.

The ANZECC guidelines are available to download from the federal Department of the Environment and Water Resources website at:

NSW DECC Environmental Guidelines: Use of Effluent by Irrigation (2004) - The Environmental Guidelines: Use of Effluent by Irrigation (2004) produced by the former NSW Department of Environment and Conservation (now the NSW Department of Environment and Climate Change (DECC)) has been adopted in NSW for the use of effluent for irrigation in non-domestic applications.

The document covers the broad framework, principles, objectives and best management practices that should be considered when establishing an irrigation system that uses effluent. This information can be used in the design and operation of effluent irrigation systems and can also be relevant and useful for meeting environmental requirements under the POEO Act and in negotiations for premises-specific environment protection licences.

The NSW DECC guidelines are available to download from the Department of Environment and Climate Change website at: www.environment.nsw.gov.au .

Appendix: 2

Rapid Evaluation Procedure for On-Site Wastewater Management Fact Sheet

[Source On-Site Wastewater Management Approvals Criteria: Support Document (2002) Martens & Associates]

Rapid Evaluation Procedure for On-Site Wastewater Management

Wollongong City Council

OVERVIEW & BACKGROUND

The rapid evaluation procedure includes 4 stages to guide applicants through assessing site requirements for the treatment and re-use of domestic wastewater at an early stage of the development process.

The procedure helps determine relevant constraints/limitations to achieving ecologically sustainable on-site wastewater management (OSWM) through evaluation of site limitations and minimum assessment and design criteria.

STAGE 1 Select Treatment and Disposal Type

Step 1.1: Determine Treatment Options Based on Distance to Waterways

Locate site with respect to local waterways. Use Table 1.1 to identify suitable treatment technologies where minimum buffer requirements from waterways are achievable. Treatment systems are to have Department of Health accreditation.

*Table 1.1:*Evaluation of suitable treatment options based on minimum waterway buffer requirements (metres).

Type	Permanent surface waters (rivers, streams & lakes)	Other Waters (Intermittent waterways & farm dams)	Groundwater Bores
Septic tank	100	40	250
AWTS	100	40	250
Sand filter (inc. septic)	100	40	250
Tertiary treatment*	50	20	100
Compost. Toilet	50	20	100

* Tertiary treatment systems require Council approval.

Step 1.2: Determine Re-use Options Based on Physical Site Constraints

Use Table 1.2 to evaluate suitable effluent re-use options based on physical site constraints.

Step 1.3: Summarise Range of Solutions

Use Table 1.3 to compare suitable treatment standards with disposal options to produce the range of acceptable system alternatives.

Table 1.2: *Evaluation of disposal options based on physical site constraints.*

Disposal Method	Low Slope (< 6 %)	Mod. Slope (6–20 %)	High Slope (> 20 %)	Unstable Areas	High G'water[1]
Surface Irrigation[2]	✓	✓ (6-12 %)	× (> 12 %)	✓[3]	✓
Sub-surface Irrigation	✓	✓	✓	✓[3]	×
ET Bed	✓	✓	×	×	×
Absorption Trench	✓	✓	×	×	×
Mound Systems	✓	✓	×	×	✓

[1] High G'water = Groundwater < 0.5 m below ground level.

[2] Use alternative slope categories for surface irrigation systems.

[3] Subject to satisfactory geotechnical report

Table 1.3: *Determination of system alternatives.*

Type	Surface Irrigation	Sub-surface Irrigation	ET Bed	Absorption Trench	Wisconsin Mound
Septic tank	×	×	✓	✓	✓
AWTS	✓	✓	✓	✓	✓
Sand filter (with septic)	×	✓	✓	✓	✓
Tertiary treatment*	✓	✓	✓	✓	✓
Composting toilet	×	×	✓	✓	✓

* Tertiary treatment systems require Council approval.

STAGE 2 Determine Effluent Re-use Field Size

Effluent disposal field size requirements vary according to geographic zones and a site's topographic placement within that zone. Effluent disposal field requirements are described in terms of two area requirements: 1) ESD area; and 2) EAF area.

The **ESD (Ecological Sustainable Development) area** is the total required area to be designated to effluent re-use on-site and refers to the amount of land required to minimise cumulative environmental impact from effluent disposal.

The **EAF (Effluent Application Field) area** is the minimum required disposal field size (i.e. directly wetted area) that is to be constructed in the upper slope sections of the **ESD area** and has been derived in accordance with AS/NZS 1547 (2000), based on the ability of the site's soils to receive effluent without creating health risks or hydraulic failure.

Employing both areas will result in a minimum of required re-use field infrastructure whilst maintaining an area down slope of the irrigation field to assimilate nutrients and hence ensure ecological sustainable development

Step 2.1: Minimum Disposal Area

(i) Use Table 2.1 to select minimum **ESD area$_{min}$**

(ii) Use Table 2.1 to select **EAF area$_{min}$** requirement -

EAF$_{min}$ (Septic): if applying septic tank effluent

EAF$_{min}$ (AWTS): if applying AWTS effluent

Areas are selected based on location zone and the topography / landform upon which the site is located.

Step 2.2: Adjusting Area for House Size

Minimum disposal areas shown in Table 2.1 require adjustment if the proposed dwelling has **more than 3-bedrooms** and/or equivalent persons (EP) > 5.

i) Using Table 2.2 select the equivalent household population (EP_{req}) based on proposed bedroom number.

ii) Adjust **both** the **ESD area$_{min}$** and the **EAF area$_{min}$** (derived from Step 2.1) by utilising the following equations:

ESD area = (ESD area$_{min}$/5) x EP$_{req}$

EAF area = (EAF area$_{min}$/5) x EP$_{req}$

Table 2.2: Bedroom V's Equivalent Persons (EP).

Proposed Bedroom Number	Equivalent Population
3	5
4	6
5	7
6	8

Table 2.1:Minimum disposal area selection (ESD_{min} & EAF_{min}).

Geographic Zone	Topography	ESD_{min} (m^2)	EAF_{min} (Septic) (m^2)
Areas surrounding West Dapto, below the Illawarra Escarpment. Communities include: West Dapto, Yallah, Unanderra, Cordeaux Heights, Mt Kembla.	Upper floodplains & terraces	800	45
	Valley Flats	700	180
Escarpment footslope areas: Thirroul to Wombarra.	Ridges, upper slopes & midslopes	600	NA
	Lower slopes	700	NA
Escarpment footslope areas: Scarborough to Stanwell Park.	Crests	800	NA
	Slopes & drainage lines	700	120
Areas on top of escarpment: Otford, Stanwell Tops.	Crests	800	NA
	Slopes & drainage lines	700	120
Darkes Forest area.	Crests & plateaux	700	120
	Wet areas (i.e. poorly drained)	900	120
	Valley flats & slopes on sandy sites	900	120

Minimum disposal areas have been determined based on a household population of 5 equivalent persons (EP)(equivalent to 3-bedrooms)

Step 2.3: Adjusting Area for Water Supply

The areas that have been derived to this stage are acceptable for houses with reticulated town supply. If no town water is available to the site then the required areas can be reduced by multiplying each area by the following multiplication factor.

Tank Water Supply Multiplication Factor = 0.8

STAGE 3 OSWM Application Requirements

Step 3.1: Application Area Placement

The EAF should be placed within the upper slope section of the ESD area. Buffer distances between the ESD area and other site features should also be provided. Buffer distances are outlined below in Table 3.1.

Table 3.1: Recommended buffer distances for on-site systems.

System	Recommended Buffer Distances
All application systems	▪ In accordance with waterway buffer requirements (Table 1.1)
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/trickle and Sub-surface irrigation	▪ 6m if area up-gradient and 3m if area down-gradient of swimming pools, driveways, buildings and property boundaries
Absorption system	▪ 12m if area up-gradient and 6m if area down-gradient of property boundaries ▪ 6m if area up-gradient and 3m if area down-gradient of swimming pools, driveways and buildings

Table sourced from DLG *et al.* (1998) Table 5.

Step 3.2: Application Requirements

All OSWM applications are to include

- ❑ A site plan in accordance with the requirements detailed in Section 3.2 i);
- ❑ An OSWM report in accordance with the requirements detailed in Section 3.2 ii).

Plan and report can be completed by either the applicant or a suitable qualified industry professional.

In addition, applicants need to prepare **three soil test pits** within the proposed EAF area. Test pits will be inspected by a Council officer prior to approval of the OWSM application to ensure compliance with the reported site conditions and site plan. Test pit locations should be evenly spaced in the EAF area to provide a representative indication of soil conditions throughout the entire area. Test pits should be dug with a shovel or suitable machinery, and be a minimum of 400 mm in diameter and 1000 mm deep or to bedrock (whatever occurs first).

i) **Site Plan Requirements**

The applicant is to provide a 1:200 scale plan to Council that should include the following details:

- ❑ Property boundaries, buildings and other infrastructure (paths, decking, retaining walls, pools etc.);
- ❑ Location of existing and proposed effluent management infrastructure including existing tanks and disposal areas, proposed tank sites, EAF and ESD areas (dimensions and locations).
- ❑ Site physical attributes including rock outcrops, vegetation, watercourses (incl. drainage lines and dams), and slope (magnitude and direction).
- ❑ Disposal field layout within the EAF area showing buffer distances to pertinent site features (Table 3.1).
- ❑ Location of test pits within the EAF area.

ii) **OSWM Report Requirements**

- ❑ Completed *Application to Install & Operate* form.
- ❑ Copy of manufacturers specifications for the sewage treatment system.
- ❑ A description of the depth and type of soil profile (noting soil texture such as sands and clays and presence of rock floaters) and other constraints to OSWM (as referred to in table 3.2).
- ❑ Results from stages 1 & 2 of the Rapid Evaluation Procedure including selections for treatment and re-use systems, selection of minimum ESD and EAF areas and relevant adjustments according to house size and water supply.

In some instances, a more detailed assessment is required to support an application. If one or more limiting attributes as listed in Table 3.2 apply to the site, a detailed assessment is required. A detailed assessment (including AS/NZS 1547 (2000) design) is to be conducted by a suitable qualified industry professional in accordance with the Environmental & Health Protection Guidelines *"On-site Sewage Management for Single Households"* (Department of Local Government *et al*, 1998). Report is to be submitted with the on-site sewage treatment application form and plans.

STAGE 4 Disposal Field Design Requirements

Overview

Generally, primary treated effluent (i.e. septic tank discharge) is conveyed to sub-surface application systems such as trenches, beds or mounds. The main mechanism for effluent disposal using these systems is through deep infiltration and lateral seepage. A smaller EAF area is required in comparison to irrigation systems but the risk of failure (i.e. effluent resurfacing) is far greater and the level of additional treatment received in the disposal process is less. Achievement of ESD is unlikely with a primary quality based system.

Secondary treated effluent (e.g. AWTS effluent) can be applied to land by irrigation where evapo-transpiration and percolation are the main mechanisms for re-use. Irrigation allows for a superior, more uniform method of distributing the effluent over the EAF area. Failure of irrigation systems is less likely and in many cases the irrigation process provides a valuable water re-use opportunity.

Table 3.2: Requirement for detailed site assessment.

Limiting Site Attribute	Detailed Assessment Required
Insufficient land area for ESD and buffer requirements	✓
Average land slope > 20 %	✓
Land within 1 in 100 year flooding level	✓
Poorly drained sites	✓
> 20 % of EAF covered in rocks / outcrops larger than 0.2 m.	✓
Soil depth to bedrock or hardpan < 0.5 m	✓
Depth of soil to watertable < 0.5 m	✓
Site within a recognised land slip area	✓
Site within a recognised acid sulphate soil area	✓
Subdivision or multi-lot developments	✓
Commercial or Industrial sites	✓
Environmentally sensitive areas[1]	✓

[1] as determined by Council

Irrigation Systems (Secondary Treated Effluent)

Irrigation disposal systems are only suitable for disposing of secondary treated and disinfected effluent (ie. effluent from an AWTS or similar system). They provide an efficient, uniform method of re-using the effluent with minimal health risk.

All systems should be constructed / installed by a suitably qualified individual in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- Minimum application field area as determined for the site in Table 2.1 and positioned in accordance with buffers as indicated in Table 3.1.
- It is recommended that a cartridge filtration system be included following the treatment system in any effluent irrigation system.
- Effluent to be pumped from the treatment tanks to the top of the disposal field through a 25 mm [minimum diameter] poly main line. A larger main may be required if the there is a large height difference (> 10 m) between the tanks and the field or if the field is further than 20 m from the tanks.
- A 25 mm [minimum] manifold is to be installed along the side of each irrigation field with distribution lateral line(s) running from it into the relevant disposal structure.
- The effluent distribution main and distribution manifolds are to be fixed in place through burial to a depth of no less than 100 mm.
- Only products designed specifically for sub-surface effluent application to be used within sub-surface irrigation systems.
- The use of drilled poly pipe for effluent distribution is considered inappropriate. Such a system may result in uneven effluent distribution and possible root intrusion and subsequent clogging.
- Edible vegetables (eg. lettuce) should not be grown in areas where effluent disposal is undertaken.

Sub-surface (Micro-trench) Irrigation Field Requirements

This approach provides for an efficient means of further treating and re-using secondary treated effluent. Health risks (human contact) are minimised and the disposal field area can be utilised for other activities. Minimal maintenance is required for such systems and the chance of hydraulic failure of the field is very low compared to absorption systems.

The sub-surface (micro-trench) system should be constructed in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- A series of micro-trenches spaced at 1.0 m intervals (maximum) are to be constructed across the field parallel to site contours.
- Micro trenches are to be filled with course durable aggregate [10 - 20 mm], 200 mm wide and 300 mm deep. Of this, the lower 200 mm is to be aggregate and the remaining 100 mm topsoil [see Attachment C]. These layers are to be separated with a layer of geotextile fabric.
- Topsoil (sandy loam) should be used for backfilling the top 100 mm of microtrenches.
- Sub-surface effluent irrigation line such as “Wasteflow 16 mm” or “Netafim 13 mm” should be used for effluent distribution within the micro-trenches and should be placed towards the top of the aggregate zone.

Shallow Sub-surface Drip/Trickle Irrigation Field Requirements

This approach is suitable for use in substitution of or in addition to standard sub-surface (micro-trench) irrigation when: minimal disturbance to existing site vegetation is required or sufficient landscaped garden areas are available. No casual access to the application area by humans and animals should be permitted.

The shallow sub-surface drip/trickle system should be constructed in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- Shallow sub-surface drip irrigation laterals should be laid at a depth of 50 mm within sandy loam topsoil (clayey soils not suitable) and covered with 50 - 100 mm of mulch.
- Sub-surface irrigation laterals be installed parallel to site contours. Maximum distance between laterals should be 1 m.
- Sub-surface effluent distribution line (eg. 16 mm Wasteflow, 13 mm NetaFim) should be used to disperse treated effluent.

Surface Irrigation Field Requirements

This method provides an efficient method of re-using secondary treated effluent. Stricter management practices are required as the risk of human contact with effluent is higher than sub-surface irrigation.

The surface irrigation system should be constructed in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- Spray irrigation systems to be designed to limit pooling or run-off of effluent within or from the surface of EAF area (i.e. site to be evenly graded).
- Casual access to the field by humans or animals is to be restricted by vegetation (500 mm hedges) or fencing. Ensure that effluent does not come into contact with people, domestic or farm animals or crops intended for human consumption.
- Only sprinkler systems (spray heads) suitable for use with effluent should be used.
- Spray heads to emit course droplets, with throw and plume controlled so that the risk of aerosol dispersion and wind drift of effluent beyond the designated area is negligible.
- Field to have warning signs, complying with AS 1319, at the boundaries of the designated area in at least two places, clearly visible to property users, with wording such as, “Recycled Water - Avoid Contact - DO NOT DRINK”.
- Pipe laterals connecting the spray heads are to be buried to a depth of at least 150 mm.
- Irrigation system to be permanently installed and cover the entire designated EAF area.

Infiltration Systems (Primary Treated Effluent)

The following general disposal field requirements apply to all of the infiltration disposal system types discussed below. All systems should be constructed / installed by a suitably qualified individual in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- Minimum trench base area as determined from Table 2.1, positioned in accordance with buffer requirements (Table 3.1).
- Total required trench or bed length calculated by dividing the total base area requirement by the trench or bed width (see relevant section below for details).
- Surface water interceptor trenches / banks to be installed above all trench and bed areas to divert upslope runoff.
- Effluent is usually supplied to each trench or bed by gravity from the septic tank.
- Where pump application is used, designer to determine trench or bed lengths and pipe details appropriate to the system layout and pump duties. Alternatively, effluent is pumped from septic tank to a $1m^3$ brick or concrete chamber and allowed to gravity feed to beds or trenches.
- For gravity loading systems, individual trench or bed lengths should be limited to around 20 m.
- Trenches/beds to be installed on low slope areas (< 6 %).

Absorption Trench Requirements

Absorption trench systems to be constructed in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- Total required trench length calculated by dividing the total base area required by the standard trench width of 0.6 m (e.g. a base area of 45 m divided by 0.6 = total required trench length of 75 m).
- A series of trenches (to satisfy total trench length) requirement) 0.6 m wide and spaced a minimum of 1.0 m apart are to be constructed on low slope ground (< 6 % slope).
- Self-supporting arch (typically 230 mm minimum height for domestic sites) placed at bottom of trench.
- Trench depth to be 400 – 600 mm with lower 250 mm (surrounding arch) filled with course durable aggregate [10 - 20 mm], and the remaining 150 mm topsoil. Layers to be separated with a layer of geotextile fabric.
- Topsoil (loamy sand) backfilled over aggregate and geotextile to fill trench with an allowance made for settling.

Evapotranspiration (ET) Bed Requirements

ET bed systems to be constructed in accordance with AS/NZS 1547 (2000) to meet the following minimum specifications:

- Total required bed length calculated by dividing the total base area required by the selected bed width (typically 1 to 4 m) (e.g. a base area of 45 m divided by a bed width of 3 m = total required bed length = 15 m)
- A series of beds to satisfy the total required area and spaced a minimum of 1.0 m apart are to be constructed on low slope ground (< 6 % recommended, < 12 % max. allowable).
- Acceptable bed depth ranges from 500 - 700 mm, with upper 100 - 150 mm filled with topsoil and lower section (400 – 600 mm) filled with course durable aggregate [10 - 20 mm stone size]. Layers to be separated with geotextile fabric.
- Topsoil (loamy sand) backfilled over aggregate and geotextile to fill trench with an allowance made for settling.

Mound Systems

Mound systems are a possible solution for use in areas with poor soil depth and characteristics and areas of shallow groundwater. Further site evaluation including appropriate system selection is required for such sites. In addition, the design and construction of mound systems is not a straightforward exercise and should be conducted or supervisedby appropriately qualified industry professional in accordance with AS/NZS 1547 (2000). For these reasons, detailed design requirements are not included here.

Management of ESD Field

Vegetation within ESD fields is to be maintained and adequately managed to encourage continued vigorous plant growth. Grass clippings and tree prunings from the ESD area contain rich nutrient organic matter beneficial for use as garden mulch and should be used in other areas of the site but excluded from runoff areas such as localised drainage depressions. Planting of water loving trees down-slope of effluent application areas is encouraged.

Notes

1. In Step 1.1 use a buffer distance of 50 metres for intermittent Category 1 watercourses (refer to the Department of Infrastructure, Planning and Natural Resources' Riparian Corridor Management Study prepared for Wollongong City Council March 2004).

2. For the suburbs of Yallah, Unanderra, Cordeaux Heights and Mt Kembla use the Geographic Zone "Areas Surrounding West Dapto" (Table 2.1).

13 REFERENCES

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