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.

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

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 1.3: 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 2.1: Minimum disposal area selection (ESD$_{min}$ & EAF$_{min}$).

Geographic Zone	Topography	Typical Soil Type	ESD$_{min}$ (m^2)	EAF$_{min}$ (Septic) (m^2)	EAF$_{min}$ (AWTS) (m^2)
Areas surrounding West Dapto, below the Illawarra Escarpment. Communities include: West Dapto.	Upper floodplains & terraces	Up to 1.0 m apedal sandy loam over bedrock	800	45	180
	Valley Flats	Up to 1.0 m apedal sandy clay loam over heavy clay	700	180	250
Escarpment footslope areas: Thirroul to Wombarra.	Ridges, upper slopes & midslopes	Up to 0.5 m moderately structured loam over up to 01.0 m light clay	600	NA	230
	Lower slopes	Up to 0.3 m moderately structured loam over up to 0.4 m light clay	700	NA	250
Escarpment footslope areas: Scarborough to Stanwell Park.	Crests	Up to 0.15 m apedal sandy clay loam over 0.5 to 1.0 m medium clay	800	NA	290
	Slopes & drainage lines	Up to 0.5 m apedal sandy clay loam over up to 1.0 m medium clay	700	120	250
Areas on top of escarpment: Otford, Stanwell Tops.	Crests	Up to 0.15 m apedal sandy clay loam over up to 1.0 m medium clay	800	NA	290
	Slopes & drainage lines	Up to 0.5 m apedal sandy clay loam over up to 1.0 m medium clay	700	120	250
Darkes Forest area.	Crests & plateaux	Up to 1.5 m apedal sandy clay loam over bedrock	700	120	250
	Wet areas (i.e. poorly drained)	Up to 0.4 m clayey sand over up to 0.5 m sandy clay loam	900	120	250
	Valley flats & slopes on sandy sites	0.3 m to 1.0 m coarse quartz sand over up to 0.5 m clayey sand	900	120	180

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

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

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

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.

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

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.

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 supervised by 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.