Local Approvals Policy Onsite Wastewater Management

Applies to:	Owners of on-site sewage management systems , plumbing industry , conveyancers, developers and environmental consultants
Responsible Stream:	Organisation Services
Responsible Officer:	Environmental Health Officer
Adoption Date/History:	*Version II – May 2013* *Version III August 2018* *Version IV April 2019*
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Objectives

The primary objectives of this Local Approvals Policy are:

- To facilitate the safe and sustainable management of on-site wastewater systems; and
- To observe Council's obligations under current State legislation and specifically the *NSW Environment Protection and Health Guidelines for On-Site Sewage Management for Single House Households* (Feb 1998). These remain the current NSW Guidelines of the Director-General of the NSW Division of Local Government, for the purposes of mandatory consideration by Councils pursuant to cl.29(3) of the Local Government (General) Regulation 2005.

Secondary objectives are to:

- To communicate the requirements necessary for existing and potential owners to gain approval for effective installation and operation of on-site wastewater systems.
- To educate property owners, managers and plumbers of the best practices in construction and maintenance of these systems.
- To make best use of the relevant Australian and New Zealand Standards applicable to on-site wastewater with applied scientific knowledge.

Preamble

On-site wastewater is produced when dwellings that are not connected to a Council (piped) sewer produce blackwater (toilet and kitchen) and greywater (bathroom and laundry). There may be other wastewaters that would also qualify.

An on-site wastewater system is a physical collection of pipes, chamber(s), and dedicated areas of land that treat any domestic wastewater. Such systems may vary considerably in their components, often with successive modules of treatment systems, *e.g.* wetland systems or ultraviolet disinfection systems.

This Local Approval Policy (LAP) has been prepared to facilitate the management of on-site wastewater systems within the Armidale Regional Council area. The LAP observes Council's obligations within current State legislation*. This LAP represents a substantial revision of Council's previous On-site Wastewater Management Policy adopted in 2013 to cater for the newly amalgamated Armidale Regional Council Local Government Area.

**NOTE: The current AS/NZS 1547 "On-site Domestic Wastewater Management" has not been adopted by the NSW Government at the time this document was prepared. All on-site wastewater plans must conform to the NSW legislation and this LAP. The NSW "Environment and Health Protection Guidelines (1998)" take precedence to the Standard when developing on-site wastewater management plans. The Local Government (General) Regulation 2005 requires that those Guidelines, prepared by the Director-General of the Office of Local Government, must be considered in relation to matters under cl.29(2), being the principles for environment and health protection.*

This LAP applies to all on-site wastewater systems (including those for greywater) servicing dwellings and other buildings, including schools, commercial or industrial premises, where the wastewater is treated on site and the effluent is disposed of by land application. Special conditions apply to components used for dwellings where the normal occupancy is up to 10 persons. The separation of greywater, where an on-site wastewater system is installed, requires the approval of Council.

This LAP does not regulate infrastructure connected to Council's piped sewer system. However, for premises connected to sewer, the discharge of greywater onto the allotment (rather than the sewer) is covered by this Policy. Refer to Part 2.7 for specific requirements.

NSW Health sets out various policies that also apply to on-site systems, particularly the certification of manufactured products such as aerated wastewater treatment systems and septic tanks, and other commercially available products. Certification of greywater diversion devices is covered by WaterMark certification, but the installation must meet the requirements of this LAP.

The Structure of this Local Approvals Policy

This document is an essential reference for stakeholders involved in the disposal of wastewater, generally from dwellings, on land that does not have access to a common sewer system. These persons include, but are not limited to:

- Owners of dwellings;
- Tenants;
- Investors and property developers;
- Conveyancing agents;
- Plumbers;
- Wastewater consultants;
- Wastewater system designers and manufacturers; and
- Regulators, including Council Officers.

This document is divided into three parts, as required by s.158 of the Local Government Act 1993, followed by several Appendices:

Part 1 - Any exemptions from the need for approval under State legislation.

Part 2 - Specifies the criteria that Council must take into consideration in determining whether to give or refuse an approval. This part contains the principles against which the on-site system performance will be assessed, as well as the information provided by the applicant to support the application.

Part 3 - Additional information relating to relevant approvals, in particular the implications for various stakeholders.

The **Appendices** provide technical and advisory information as follows:

- Appendix A: Council application form
- Appendix B: Design Guidelines for on-site wastewater systems
- Appendix C: Appropriate landscape plants
- Appendix D: Examples of wastewater systems

Notes to assist readers are provided in italics throughout the document.

Variations to Council Policy

Any requests for variations from the local standards in this LAP will be considered on merit.

Further amendments to the Policy itself may arise from future changes in the Act or Regulation, relevant Guidelines or the appropriate parts of Australian Standards.

Definitions (see also technical definitions in Appendix E)

Act refers to the Local Government Act 1993.

Environmentally sensitive area includes any land or area:

(i) within 100 metres of a natural waterbody, wetland or coastal dune field; or
(ii) with a high watertable; or
(iii) with highly permeable soils or acid sulphate, sodic or saline soils; or
(iv) within a drinking water catchment; or
(iv) within the water catchment area of an estuary where the entrance to the sea is intermittently open; or
(v) within a National Park or reserve for flora, fauna, wilderness or the like (See Part 4, Section 3 of the Environmental Planning and Assessment Regulation 2000); or

(vi) Any other area where Council determines on a case by case basis that due to the sensitivity of a natural resource or environment, the term environmentally sensitive area applies.

Guidelines refers to the "Environment and Health Protection Guidelines for: On-site Sewage Management for Single Households" (1998)

http://www.dlg.nsw.gov.au/dlg/dlghome/dlg_septiconsite.asp

Human Waste means human faeces and urine.

Human Waste Storage Facility means a device for holding or disposing of human waste, including a cesspit, septic tank, septic closet, water closet, chemical closet, humus closet and combustion closet.

On-site Wastewater System includes any systems treating domestic black water, domestic greywater and solid wastes generated by the human body; and includes the land application area.

Operate a System of Sewage Management is defined in s.68A of the Act and refers to the activity of holding or processing, reusing or discharging, sewage or by-products of sewage.

Regulation refers to the Local Government (General) Regulation 2005

Sewerage Work means the construction, alteration, extension, disconnection, removal, ventilation, flushing, cleansing, maintenance, repair, renewal or clearing of any sewerage service pipes or fittings or fixtures communicating or intended to communicate, directly or indirectly with:

a) septic tank, and effluent or a sullage disposal system or;
b) any sewer of a council; and
c) includes work of sanitary plumbing and work of house drainage.

Standard refers to current AS/NZS 1547 On-site Domestic Wastewater Management.

WaterMark is a certification from testing by Standards Australia.

Measurements

All measurements are to be in metric (S.I.) acceptable units

Abbreviations

The following abbreviations used in and relevant to this Policy are:

- AS/NZS – Joint Australian and New Zealand Standard
- AWTS – Aerated Wastewater Treatment System
- BCA – Building Code of Australia
- CEC – Cation Exchange Capacity
- DCP – Development Control Plan
- DLG – NSW Division of Local Government
- DP&I – Department of Planning and Infrastructure. Website: www.planning.nsw.gov.au
- EPAA – Environmental Planning & Assessment Act 1979
- GDD – Greywater diversion device
- GTS – Greywater treatment system
- LAP – Local Approvals Policy
- OEH – Office of Environment and Heritage, which incorporates the Environment Protection Authority (EPA) Website: http://www.environment.nsw.gov.au

PART 1

Exemptions

1.1 Exemptions

This Local Approvals Policy provides no local exemptions to the need for approval to install, construct or alter a human waste storage facility or to operate a system of sewage management.

However, cls. 48 and 75A of the Regulation provide various relevant exemptions from the need for approval throughout NSW, including:

- Discharge of domestic sewage into a sewer of Council where in accordance with arrangements made with Council; and
- Domestic greywater diversion in a sewered area where the requirements of cl.75A of the Regulation are met (refer to Part 2.7 of this LAP).

Readers should consult the Regulation for further information.

https://www.austlii.edu.au/cgi-bin/viewdb/au/legis/nsw/consol_reg/lgr2005328/

Routine maintenance of a septic tank does not require approval.

PART 2

Criteria against which Council will assess an Application for Approval

2.1 Guiding Principles of the Legislation

Under NSW legislation, persons are required to seek Council approval for an on-site wastewater system installation or modification, and for these systems' ongoing operation. Thus two approvals are required: one to install and one to operate. Details of the relevant legislation can be found in Chapter 7 of the Act and Divisions 4 and 5 of Part 2 of the Regulation.

Armidale Regional Council has a responsibility to ensure that on-site wastewater systems within its local government area are installed and operated effectively, to protect the environment and human health.

The broad objectives of the Regulation (cls. 29, 44, 75A) are that on-site wastewater systems are designed and operated to meet the following performance standards:

- the prevention of the spread of disease by micro-organisms;
- the prevention of the spread of foul odours;
- the prevention of contamination of water;
- the prevention of degradation of soil and vegetation;
- the discouragement of insects and vermin;
- 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;
- the minimisation of any adverse impacts on the amenity of the premises/land and surrounding lands; and
- if appropriate, provision for the re-use of resources (including nutrients, organic matter and water).

Council will refer to these matters when assessing applications, responding to complaints and conducting inspections. They provide Council with a basis to measure the performance of on-site systems. This is especially so with older systems that may fall well short of current standards but appear to be meeting these performance standards.

Recent changes to the Legislation (cl.75A of the Regulation) now regulate 'greywater' systems in both sewered and non-sewered areas. Some activities can be carried out without Council approval provided they meet specified requirements. The specific requirements for greywater disposal are addressed in Part 2.7 of this LAP.

2.2 Council's Responsibilities and Powers

Council's responsibility to administer On-site Wastewater Management includes the preparation and implementation of this LAP, in order to guide local assessment of Applications for Approval.

The NSW Local Government (General) Regulation 2005 provides both a regulatory framework and performance criteria for the installation, operation and maintenance of all on-site wastewater systems. Where a system services up to 10 persons and flows of less than 2000 litres per day, special certification rules apply to components that may be installed. Systems larger than 2000 litres/day may not require component certification but must meet the same performance outcomes.

Council wishes to ensure all dwellings are satisfactorily serviced by approved sewage disposal facilities. For existing and prospective dwelling owners, where on-site sewage facilities require installation or upgrading, the owners may first need to justify the need not to connect to a sewer. In some circumstances, Council has powers to require premises to be connected to sewer.

This LAP provides the details of Council's requirements and mechanisms to manage on-site wastewater systems specific to the Armidale Regional Local government area. The LAP incorporates and confirms the following requirements regarding these systems:

- That landowners obtain approval to install, remove or modify an on-site system or "human waste storage facility", as defined by the Act, prior to that activity;
- That landowners obtain approval, by way of an Approval to Operate an on-site wastewater system or "human waste storage facility", as defined by the Act, prior to that activity occurring;
- That Council categorises existing systems using a risk-based approach;
- That Council inspects systems on a risk-based assessment period;
- That Council charges for renewal and inspection;
- That Council maintains a register of all on-site systems in its area; and
- That Council orders a person repair an ineffective on-site wastewater system.

Applications for the Installation, Modification or Removal of an On-site System require proponents to submit specific information for Council to assess and make a determination to approve or reject an application. The specific information required by Council is outlined below. Failure to supply this information may result in applications being significantly delayed or rejected. Applications attract fees for service, which recover the costs for application assessment and determination, database management, consultation with wastewater trades/professionals and site inspection(s).

Applications for the Operation of an On-site System may be made for existing systems that currently have no such approval, or may be made when applying for the installation of a new system.

The **Approval to Operate** is issued on commencement and subsequently by way of a recurrent process ('licensing' system). This process enables Council to provide regulatory and educational services for the management of on-site systems, and recover the costs for these services via fees. The regulatory and educational services include the assessment of the risk the system poses to the environment, periodic on-site inspections by specially trained Council Officers or nominated agents, the management of the licensing database and educational services offered to the owners/users of on-site systems.

Owners of most systems operating in Council's local government area should have existing Approvals to Operate. Council issued these approvals following a postal audit to owners of existing systems in 2000.

All applications to install a system post 2000 included an automatic initial Application to Operate.

The Approval to Operate is made active once the system is commissioned, typically when the dwelling occupation certificate is given to the owner. Renewals will then be followed up as outlined above.

For the owners of systems that are being actively used and that have no Approval to Operate, Council requires the owner to immediately make an Application to Operate. Failure to do so can result in penalty or prosecution under The Local Government Act 1993.

2.3 Risk Classification of On-Site Wastewater Systems

Council maintains a database of the approved on-site wastewater systems in the local government area. Each Approval will contain certain information on the system type, its history of inspections and its risk category, and other information that may be relevant for specific systems.

Systems are classified High, Medium and Low Risk according to the potential environmental or health risk they pose. The main considerations in determining the risk category include:

- Location and size of block of land (e.g. village allotments and farms);
- System design, condition and observed performance;
- Hydraulic load generated by activities;
- Soil type;
- Vegetation coverage;
- Slope of land in application area;
- Distance to watercourses, drains and property boundaries; and
- Surface or subsurface discharge of effluent.

High Risk systems attract more frequent inspections by Council Officers or nominated agents, whilst Low Risk systems command the least frequent inspections. The frequency of inspections may be varied from time to time depending on Policy review. Expected inspection frequencies are listed in Table 2.1, below.

Table 2.1 – Frequency of on-site system inspections by Risk Category

Risk Category of System	Expected Frequency of on-site inspection
High Risk	Every 3 years
Medium Risk	Every 6 years
Low Risk	Every 12 years

High risk systems: Those systems that have the potential to cause impacts from poorly treated sewage leaving the approved on-site wastewater system on neighbours, local water bodies or environmentally sensitive areas. Such systems may be located on small allotments, in villages, close to surface water or groundwater drinking wells or bores. These systems have high probability of failure and likely high consequences should they fail.

Medium risk systems: Those systems that have a high probability of failure but a low negative impact on health and/or environmental issues; but either individually or cumulatively pose a reasonable risk; or have a low probability of failure but the consequences may be serious with respect to health and environmental issues.

Low risk systems: Those systems that should they fail the consequences of health and/or environmental risks are low. Such systems may be on larger holdings or remote from neighbours, rivers and water bodies. Such systems may have large land application areas and/or low wastewater generation rates.

When designing for new or upgraded on-site wastewater systems, consideration of the potential risk category may determine the level of treatment afforded the wastewater. Systems in high risk areas may need secondary treatment, while those in low risk areas may be well suited to primary treatment only. Council, however, will assign a risk category to all existing and proposed new or upgraded systems.

2.4 A Process for Installing an On-Site Wastewater System

The application process for an on-site system is developed around the particular requirements of the house fixtures, the site and soil assessment and the constraints on the land application system. In the sections above, the Council requires that sufficient information is presented with the application that Council staff may make an assessment of the potential for the system to perform in accordance with the policy. Figure 2.1 indicates the process by which applications pass from design through to completion.

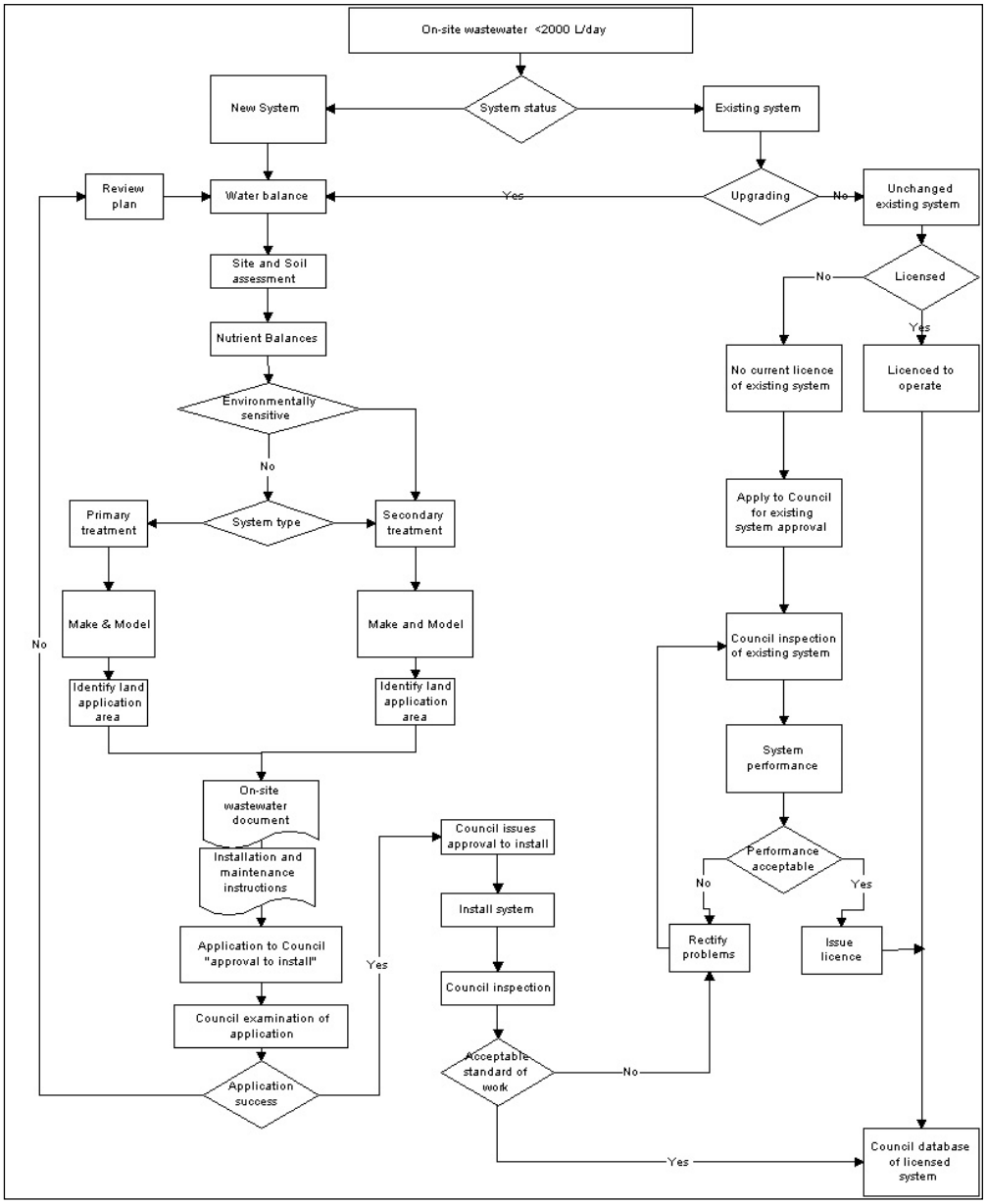


Figure 2.1 - Process for application and installation of an on-site system

2.5 Application for Approval to Install or Modify an On-Site Wastewater System

Council's Assessment Officer will consider applications for installation or modification of on-site systems only if sufficient information has been provided as part of the application. Acceptable applications consist of three elements:

1. Council's Application to Install, Modify, Remove and Operate an On-Site Wastewater System form, completed (**see Appendix A**);
2. Essential accompanying information as detailed in 2.6 below (Clause 26 of the Local Government (General) Regulation 2005 also specifies minimum information required under the legislation); and
3. An application fee as per Council's current Fees and Charges Schedule.

For the system designer, the emphasis is on the assessment of the site and soil detail to derive an appropriate wastewater system. Three options of how to go about approaching and presenting an application are given in this document and are dependent on the applicant's, trades person's or professional's knowledge and expertise. Applicants may request variation of an application at any time prior to its approval by Council. Proposals that are approved need to be installed and operated in accordance with the approval. Variations after the approval and at installation must be authorised, at the discretion of a Council Officer, delegated with the appropriate authority.

In selecting retail products such as septic tanks, septic closets, aerated wastewater treatment systems, compost toilets (wet and waterless), holding tanks and collection wells, sand filters and greywater treatment systems must be certified by NSW Health. Council is not permitted to approve non-certified products, except under Cl. 41(2) of the Regulation which provides for a sewage management facility:

(a) that is to be installed or constructed as a model for the purposes of testing, or
(b) that is designed, and is to be constructed, by the owner or occupier of the premises on which it is to be installed, or
(c) that is designed, by a person other than the owner or occupier of the premises on which it is to be installed, specifically and uniquely for those premises.

Check to ensure that the product to be fitted is certified. All dwellings normally occupied by up to 10 persons must meet this certification requirement.

Further information is provided in Part 3 of this LAP.

2.6 Information to Accompany the Application to Install or Modify an On-Site Wastewater System and Options for Applicant Submissions

NOTE: The word "system" in this section refers to the proposed treatment system AND the effluent application area(s).

Council's "Application to Install, Modify or Remove an On-Site Wastewater System" (**Appendix A**) must be accompanied by the following information (2.6.1 – 2.6.6 below) when installing a new system. System modifications may require all or some of the information below; Council Officers will advise applicants. Applicants need to justify any omission of required information in writing as part of the application. Council will check property files and aerial photographs to ascertain the completeness of the application.

The information required under headings 2.6.1 - 2.6.6 below, is used to design an appropriate system to meet the performance standards of the Act, as set out in Part 2.1 above.

This LAP offers the person responsible for system design three suggested options in approaching overall system design requirements.

Option 1

In this option, the system designer may use the values set out in **Appendix C** as appropriate to the locality, the water use, the occupancy rate, the soil field texture and soil structural assessment and the nutrient limitations, to determine the area required for the hydraulic and nutrient loads. Some verification of the soil texture and horizon depths in the land application area will be required as part of the report. Colour photographs of the exposed soil profile and a description of each horizon would be the minimum required.

Option 1 is likely to be completed by a plumber, or the applicant, using soil data assessed by an experienced person. The application must address all the components set out below (2.6.1 – 2.6.6) in sufficient detail that Council can make an assessment without seeking additional information. Council Officers may make a site inspection for assessment purposes. Fees for service are applicable.

Option 2

The system designer may select the design criteria as set out in The Guidelines and/or The Standard to develop a unique assessment of the hydraulic and nutrient load. The report must address the information requirements set out above. A proposal under Option 2 will need to cite references for assumptions and design loadings. A water balance using rainfall and evaporation data appropriate to the locality will be appended to the document showing the assumptions made within that model.

The Guidelines (see **Appendix C**) provide an example of a water balance model based on monthly data. Other models may be used, provided that, at a minimum, monthly average data are used for rainfall and evaporation. Median rainfall data are not acceptable.

The nutrient balances will include nitrogen and phosphorus using realistic estimates of annual loads. Phosphorus sorption test results for soil samples from the proposed land application area may be used to develop an application area based upon phosphorus retention by the soil as well as plant uptake.

Option 2 is likely to be undertaken by an experienced system designer with relevant capacity to assess site and soil conditions and undertake the relevant hydraulic and nutrient balances to suit the site. The minimum information required is set out below (2.6.1-2.6.6).

Option 3

To account for unusual designs, an experienced system designer may prepare an application, supported by published research, to propose a system of treatment and land application that meets the performance objectives of the Act. The minimum information required is set out below (2.6.1-2.6.6). It will be incumbent upon the designer to justify assumptions. In the use of proprietary products, the rules of certification apply.

Where the designer wishes to vary an interpretation from the generally accepted view of wastewater treatment and land application techniques, sufficient assessment will be required of the site and soil conditions to justify the performance of the system, and convince Council of its reliability.

An unusual design may fall within the meaning of Cl. 41(2) of the Regulation for which Council can approve a device for which a current certification of accreditation is not available.

TIP: *Applicants and system designers are advised to provide the information required below using the examples, reference tables, and proforma checklists found in* ***Appendix C*** *to assist in completing the design assessment criteria; e.g. plans, soil assessments and calculations.*

At a minimum, the application submitted to Council should include sufficient information that an installer can complete the installation and site testing of the system without requesting additional information from the designer. The designer may allow some flexibility into the practical siting of the land application area based upon final survey in relation to floor levels and tank levels.

Key elements for applications are as follows:

2.6.1 A Plan (map) Showing the Location with Distances to 'The System'

a) Any existing system, including drainage lines and disposal areas;
b) The system and extent of the effluent application area(s);
c) Buildings & structures, within 100 metres of the system;
d) Any cut or fill at the system site or within 20 metres;
e) Groundwater bores within 250 metres of effluent application area;
f) Dams and ponds within 100 metres of the effluent application area;
g) Natural or constructed drainage lines - (these can be wet or dry at the time);
h) Property boundaries;
i) Trees in the vicinity of the system;
j) Tracks, driveways, access gates;
k) Fencing in the near vicinity of the system;
l) Grazing areas in the vicinity of the system;
m) Slope at the system location, given as a ratio e.g. 1:20; and
n) "North" point.

The Plan must be titled with the owners' names, the physical address and the legal description (Lot/DP) and be drawn to a metric scale.

2.6.2 Site Assessment

The detail required in the site assessment is limited to the specific details that relate to the siting of the on-site wastewater system and the land application area. Select from the list below, the heading that may require sufficient detail to determine the site capability. Guidance to the terms is given in The Guidelines (Section 4.3) and The Standard.

a) Landscape position (i.e. upper slope, mid slope, lower slope, drainage line). A simple diagram may suffice;
b) Landform (i.e. hills, valley);
c) Slope (%);
d) Flood potential (above or below estimated 1 in 100 year flood level);
e) Erosion potential;
f) Exposure to wind for evapotranspiration;
g) Site drainage (ideal conditions are well drained on the surface);
h) Exposure to sun and wind (ideal conditions have high sun and wind exposure);
i) Land area available;
j) Setbacks from boundaries and environmentally sensitive areas – see Table 4, **Appendix C**;
k) Geology;
l) Rocks and rock outcrops;
m) Description of the vegetation on the site;
n) Identification of any "environmentally sensitive areas";
o) Proximity to surface waters (farm dams, streams, creeks, rivers);
p) Depth to groundwater;
q) Distance to groundwater bore and use of groundwater, if available; and
r) Distance between land application area and neighbouring homes.

2.6.3 Soil Assessment

A soil assessment requires an observation of the soil profile, to a depth at least 600 mm below the bottom of the proposed effluent disposal method. In the case of trenches, that depth is about 1100 mm, whereas for a surface irrigation system it is 600 mm. Where the soil profile suggests that a lower horizon may continue to the depth suggested above, a shallower depth may suffice, or to heavy clay or refusal.

The soil profile description will include sufficient detail to accurately assess:

a) The various horizons and the depths of each (typically three);
b) The field texture for each horizon;
c) The structure of each horizon (or an estimate);
d) A description of soil colour for each horizon, including description of mottles;
e) The identification of a limiting horizon on which a water balance will be based;
f) The permeability of the soil, based on the limiting horizon, by a method set out in either The Guidelines or The Standard or as otherwise referenced (Note: the soil percolation test is not acceptable);
g) The soil chemical properties pH, electrical conductivity, salinity for each horizon;
h) The results of the Emerson Aggregate Test (refer to The Guidelines);
i) An indication of the soil sodicity;
j) Depth to seasonal water table (observation or soil colour indicators); and
k) Depth to end-of-hole, or refusal.

For the purpose of soil examination, a back-hoe pit, a soil auger hole or hand-dug hole in the area where the effluent will be discharged, is sufficient. The number of holes required will depend upon

the changing soil type across the proposed land application area. Where the soil is variable, one hole at either extremity of the land application area and one in the middle may suffice. Where the soil profile is similar for each, only one profile will require testing and reporting.

Additional soil description and physical and chemical tests may be appropriate where the designer wishes to propose design criteria other than those general values set out in **Appendix C**. Options 2 and 3 will require support of an appropriate soil examination and soil analysis.

2.6.4 Operation and Maintenance (see also Part 3 of this LAP)

The application must include details of:

a) The operation and maintenance requirements of the proposed system (system specification);
b) The proposed operation, maintenance and servicing arrangements intended to meet those requirements;
c) The actions to be taken in the event of breakdown or interference with its operation; and
d) Where applicable, the service contractor's contact details.

2.6.5 Water Balance

A monthly water balance using at a minimum the average long term monthly rainfall and evaporation for the official recording station nearest the site will be used. Assumptions of runoff coefficients, crop factors and long term absorption rates must be stated. Median rainfall data are not acceptable.

Calculations set out in **Appendix C** have been adjusted for the rainfall and evaporation in four zones within the Council area. These values may be used in Option 1, in which case a separate water balance is not required.

Additional rainfall values may be obtained from the Bureau of Meteorology's website (www.bom.gov.au).

2.6.6 Nutrient Balance

At a minimum, nutrient balances will be required for total nitrogen and total phosphorus using values for plant uptake and other soil processes. Nitrogen uptake by plants may be up to 250 kg/ha, while plant uptake of phosphorus of 30 kg/ha may be used. Some allowance may be used for degradation of total nitrogen in the soil. Values higher than the above will require justification.

Nutrient balance calculations should be performed using load values (kg/person.year) rather than concentrations (mg/L) and daily wastewater generation (L/day) as it is well known that higher water use does not necessarily equate to higher nutrient load.

Soil phosphorus absorption capacity may be measured and used to account for phosphorus removal. Such calculations must be supported by laboratory analysis of the phosphorus adsorption capacity of the B horizon. It is expected that Option 2 will incorporate a phosphorus isotherm adjustment to land application area.

2.7 Greywater Treatment and Diversion Systems

A **greywater treatment system** (GTS) collects, stores, treats, and may disinfect, greywater to the standards specified in the *Domestic Greywater Treatment Systems Accreditation Guidelines (NSW Health, February 2005*). They can be installed in residential premises to provide treated greywater for reuse for irrigation (including surface irrigation), toilet flushing and washing machine use.

An application for approval to install is similar to that which is required to install an on-site wastewater treatment system because, under the Act, it is a "sewage management facility" and the requirements of Section 68 of the Act apply. These systems must be accredited by NSW Health. There are no exemptions from this requirement.

In **sewered** areas, the installation of **greywater diversion devices** (GDD) does not require Council approval provided the requirements of cl.75A of the Regulation are met, including:

- installation in accordance with the Plumbing and Drainage Code of Practice;
- certification with WaterMark (Standards Australia);
- installation where there is no existing sewage management facility servicing the premises; and
- the installation meeting the Regulation's relevant performance standards being:
  - (i) the prevention of the spread of disease by micro-organisms,
  - (ii) the prevention of the spread of foul odours,
  - (iii) the prevention of contamination of water,
  - (iv) the prevention of degradation of soil and vegetation,
  - (v) the discouragement of insects and vermin,
  - (vi) 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,
  - (vii) the minimisation of any adverse impacts on the amenity of the premises concerned and surrounding lands.

Relevant definitions for the purposes of cl.75A include:

- "**greywater treatment**" means the specific treatment of greywater similar to that of raw sewage via primary and secondary treatment processes. Treatment systems are similar to those for blackwater and must be approved by NSW Health.
- "**domestic greywater diversion**" means the installation and operation of a system for diverting greywater generated on 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).
- "**greywate**r" means wastewater from washing machines, laundry tubs, showers, hand basins and baths, but does not include wastewater from a kitchen, toilet, urinal or bidet.
- "**residential premises**" does not include premises comprising more than one dwelling.

In **unsewered** areas, greywater diversion devices always require Council approval. Greywater from a diversion device is untreated and must only be used for sub-surface irrigation (DWE, 2008).

The "NSW Guidelines for Greywater Reuse in Sewered Single Household, Residential Premises" *(NSW Department of Water and Energy, 2008)* provide further detail on the effective management of greywater.

http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/557324/recycling_grey_nsw_guidelines_for_greywater_reuse_in_sewered_single_household_residential_premises.pdf

Other relevant information can be located as follows:

Accredited Greywater Treatment Systems -

https://www.health.nsw.gov.au/environment/domesticwastewater/Pages/gts.aspx

NSW Code of Practice for Plumbing and Drainage –

https://www.abcb.gov.au/Resources/Publications/Education-Training/NCC-Volume-Three-Plumbing-Code-of-Australia-Resource-Kit

2.8 System Removal

In the event of applications for removal of existing systems, Council will have regard to current advice from NSW Health. At the time of preparing this document the current advice was reproduced in that Department's *"Advisory Note 3 – May 2006 - Destruction, Removal or Reuse Of Septic Tanks, Collection Wells, Aerated Wastewater Treatment Systems and other Sewage Management Facility Vessels".*

This can be found at:

https://www.health.nsw.gov.au/environment/domesticwastewater/Documents/adnote3.pdf

Persons wishing to remove or otherwise alter systems should discuss these proposals with Council in all cases.

PART 3

Other Matters

3.1 Matters to Consider After Council's Approval of Applications

On-site wastewater systems must be installed ONLY as per the applicable Council approval.

If during construction of the on-site wastewater system, departure from the approval is required for some unforeseen obstacle; prior permission to vary from the approved plan must be obtained.

Effluent disposal systems may not to be used until the effluent disposal area/irrigation area has been inspected and approved by Council. An irrigation system includes the grassed area.

Premises without Approval to Operate an on-site wastewater system cannot be occupied until such time as the approval is granted.

Installers

All installers should ensure they have sighted the approval and associated conditions before undertaking work. Council may order work to be redone where installation work has been carried out contrary to, or without, an approval. Penalties may apply for operating an on-site waste system without approval are referenced in Schedule 12 of the Regulation.

Reporting Schedules

All systems are open to inspection by Council Officers as part of Council's obligations under the Act and these inspections are discussed further below. Inspections may be more frequent for on-site wastewater systems in areas of high environmental and health risk, such as close to rivers, in small village lots and close to environmentally sensitive areas. The risk categories are addressed in Part 2.3 above.

Reports by owners and operators of on-site wastewater systems are required in specific circumstances such as those listed below:

- **Septic Tanks and Traditional Drainfields** - no routine reporting requirement, but a requirement to provide details on the operation and evidence of compliance when requested by Council. Council may inspect these systems.
- **Aerated Wastewater Treatment Systems** – three monthly maintenance and reporting requirement of approval from a qualified service agent; report to be submitted to Council.
- **Compost Toilets** - no routine reporting requirement, but for health reasons will require routine additions of a carbon source, and removal of accumulated humus for burial.
- **Wetlands and Reed Beds** – no routine reporting requirements but may require some maintenance to ensure adequate vegetative condition, and appropriate disposal of excess water.

3.2 Inspection Services of Council

The inspection services by Council are an important element in ensuring minimum performance levels are met, with respect to the treatment and disposal of human solid and liquid wastes, in line with the objectives set out in the Regulation. Inspections may result in three outcomes:

1. System pass – the system has been found to meet the objectives of the Regulation.
2. System minor failure – the system requires minor work.
3. System major failure – the system requires major work.

NOTE: Systems that were installed under previous approvals only have to satisfy the objectives of the Regulation. There is no intent in the Regulation that systems have to be ungraded with technological advancements if the current system performs to the objectives. The Regulation is "performance" based. Does the system function to meet the objectives? Yes or No?

Additions to existing systems, however, must meet any approvals for those components at the time of repair or replacement, unless otherwise exempt.

Council is to:

a. Maintain an appropriate register of all on-site wastewater system within its local Government area; and
b. Regularly inspect all on-site wastewater systems, based on the risk classification in Part 2.3 of this Policy, and use the inspection process as a basis for:
    i. reviewing current Approvals to Operate; or
    ii. issuing an Order to repair by a due date; or
    iii. issuing a Penalty Infringement Notice for failure to comply.

Summary of Council Powers

Council officers must seek the permission of owners to enter the property (Part 2, Chapter 8 of the Act). However, if Council Officers suspect there could be a serious health risk authorised Council Officers may gain immediate entry to property without permission from the owner. Council Officers may also issue a Notice of Entry to property owners for the purposes of entering premises to conduct an inspection.

Council has the power to approve, inspect and where necessary impose orders for a person to do, or to refrain from doing a thing that is specified by the legislation.

Council is empowered to charge for application processing and inspections. Chapter 16 of the Act also enables Council to issue Penalty Notices for offences such as the failure to obtain or comply with an approval under Chapter 7.

Council Officers may inspect an On-Site Wastewater System for the Following Reasons:

1. For all new or modified installations, usually just before the backfilling of soil over pipework, tanks and disposal areas;
2. For existing installations as part of routine assessments of system performance;
3. For existing installations subject to a request made by the owner or the owner's agent, often during conveyancing; and
4. For existing installations where a Council Officer or member of the public has reason to suspect the system is failing and is posing a risk to the environment or human health (see Management of Complaints, see 3.7 below).

When special site inspections are required, Council recovers the cost for the inspection by way of a fee.

Fees for inspections of new system installations are included in the fees for Applications to Install; all other fees including the annual Approval to Operate renewal fees are applied as per Council's annual Schedule of Fees and Charges in its annual Operational Plan (available on www.armidale.nsw.gov.au).

The plan submitted as part of the application, then approved by Council, will be used for the final inspection. Where the "works as executed" are different from the approved plan, and the modification approved, the alterations will be recorded.

Routine inspections are carried out as part of Council's responsibility to manage the cumulative impact of sewage pollution in the local government area and to supervise the performance of systems over time. Council has taken a risk-based approach to routine system inspections as per the risk categories in Part 2.3 of this Policy.

Council will advise each system owner of the frequency of inspection and this will be recorded on the Approvals to Operate. Frequencies of inspection may vary according to Council's risk assessment and determination. Owners may apply for a reassessment at any time.

3.3 Inspection Criteria

Council inspections examine indicators that the on-site wastewater system and its components are performing to protect human and environmental health. Refer to the broad objectives of the Regulation in 2.1 "Guiding Principles of the Legislation".

Council inspectors will examine the following aspects of each of the components of an on-site wastewater system:

1. Connection of the building to the treatment system

- All services are connected correctly to the treatment system;
- Stormwater is excluded from the system;
- Vermin cannot access or interfere with the system;

- Overflows from the system do no occur.

2. The treatment system

Wet systems

- The system is installed in accordance with relevant Approvals;
- The system is watertight and vermin proof;
- Stormwater does not enter the system;
- The treatment system does not overflow;
- The primary Treatment system functions as required;
- The effluent quality appears acceptable limits;
- The system does not indicate unacceptable sludge or scum accumulation.

Aerated Wastewater Treatment Systems

- Current contract with servicing agent;
- Servicing is up-to-date;
- Servicing reports received by Council, as required*.

**Aerated Wastewater Treatment Systems are required to be serviced by an appropriately qualified person on a three-monthly schedule. A report on the system is to be forwarded to Council.*

Dry systems (compost toilets and pit latrines)

- No odour or disease/infection issues;
- The facility is operating as designed;
- The waste accumulation appears within acceptable limits;
- The compost is buried appropriately.

3. The land application area
   - No obvious saturated soil or wet spots due to effluent rising;
   - Land application area is well maintained;
   - Irrigation system, where installed, meets conditions of relevant approval;
   - Land application area is adequately fenced and has not been adversely impacted e.g. vehicle traffic impacts;
   - Buffer distances are adequate and observed as per relevant approvals.

4. Greywater diversion devices
   - Approved type, i.e. WaterMark;
   - Operating as designed;
   - Irrigation area complies with requirements (subsurface).

5. Greywater Treatment System
   - Approved type, i.e. NSW Health certified;
   - Operating as designed;

- Irrigation area complies with requirements.

3.4 Obligations of and Advice for Parties

3.4.1 Obligations for Property Owners

For the purposes of this Policy, an on-site wastewater system is one that collects and treats premises' wastewater, or separates the black water and the greywater for separate treatment. The system includes the drains and the land application area.

The Act requires persons to gain approval from Council to install, modify or remove an on-site wastewater system or any part of such a system. This applies to homeowners, landholders or anyone wishing to dispose of wastewater where there is no piped connection to a Council sewer. Those seeking approval need to complete and lodge the Application to Install, Modify Remove or Operate an On-Site Wastewater System. The application must contain detailed information as set out in Part 2.6 of this Policy.

Retrofitting part of the system, such as installing a greywater diversion device, or repairing an existing system requires Council approval. General maintenance, such as pump-out of accumulated sludge, or repairs to pumps or aerators does not require Council approval but it is recommended homeowners keep records of these events for future Council inspections.

The Act also requires persons to obtain and maintain an approval to operate for an on-site wastewater system before it can be used*. In effect this is similar to registering a motor vehicle by the owner of that vehicle so as it can be used safely and legally on the road. Those seeking approval need to complete and lodge the Application to Install, Modify Remove or Operate an On-Site Wastewater System (see **Appendix A**).

Existing systems require the owner to maintain a current Approval to Operate for the on-site wastewater system, irrespective of age or type of system. It is the property owners responsibility to ensure that they have a current Operational Approval under the Local Government Act 1993 to operate their On-site Sewage Management System, Council will not automatically reissue an Operational Approval unless a request for inspection is received or Council conducts a routine inspection.

NOTE: There are exceptions to the requirement of a new owner of a system to immediately obtain an approval to operate that system (cl.47 of the Regulation). Owners who have recently acquired land on which an on-site wastewater system exists, can lawfully operate that system for a period of **three months after transfer of title into their name(s), after which they must have an Approval in their name(s). Further, if the new owner of the land submits an Application to Operate on On-Site Wastewater System to Council within two months of acquiring title of that land, the owner may lawfully operate the system without an Approval until this is issued.*

In cases where no Approval to Operate for the system on the land exists, the purchaser should immediately apply to Council for an Approval to Operate an On-Site Wastewater System. This will trigger an inspection of the system by Council's Environmental Health Officer(s).

Care of On-site Wastewater Systems

Property owners need to manage and care for their on-site system. The treatment of wastewater is a biological process and involves growing and nurturing micro-organisms (bugs) in the best conditions possible. The most effective systems operate on the following principles:

1. Conservation of water to minimise the wastewater generated;
2. Minimisation of chemicals used for personal cleaning, household cleaning and laundry (see **Appendix E** for guidance);
3. Observation and vigilance of the treatment system, particularly aerated systems;
4. Observation of the land application area and the avoidance of wet spots or surfacing effluent, from irrigation or drainage activities;
5. Timely repair and maintenance of systems; and
6. Compliance maintenance and reporting for aerated wastewater treatment systems.

3.4.2 Obligations for Those Proposing New Buildings

Installing an On-Site Wastewater System

New dwellings and certain other new buildings require the approval of Council before works commence. In turn, the approval to build requires a concurrent approval to install an on-site wastewater system in areas where connection to a Council sewer has been considered and is not an option (DCP 2007 Chapter C1 - Urban Residential and Subdivision Code Appendix 6). An Application to Install, Modify, Remove or Operate an On-Site Wastewater System needs to accompany the Development Application at the lodgement stage.

NOTE: Council will consider Development Applications with due consideration and observation of the requirement to provide an Application to Install, Modify, Remove or Operate an On-Site Wastewater System at the lodgement stage. All applications must be completed to the satisfaction of relevant Council Officers.

Commissioning an On-Site Wastewater System

As indicated above, the approval of Council is required by the owner of an on-site wastewater system to operate such a system. Effectively, this means the system cannot be used (or the home occupied) until this approval is given. Council's Environmental Health Officers or Building Surveyors normally issue the initial Approval to Operate following the final inspection of a newly installed system. These Approvals to Operate remain 'pending' until Occupation Certificates for the building are issued. They then become 'active' when occupants are expected to generate domestic waste. Approvals to Operate will need to be maintained through an annual "licensing" process, with ongoing Council inspections to review performance in accordance with the risk classification of the system determined by Council (see Part 2.3 of this LAP).

The Application to Install, Modify Remove or Operate that is to accompany a Development Application is of the same form as set out in **Appendix A** and contains a wastewater plan that addresses the relevant sections of Part 2 of this Policy.

Without a current Approval to Operate an on-site wastewater system, the host/related premises cannot be occupied.

3.4.3 Obligations for Developers of a Subdivision

Applicants wishing to subdivide land outside currently sewered areas will be required to produce a Wastewater Management Feasibility Plan. This LAP requires, for each land use planning zone, that wastewater can be disposed of effectively on each allotment either via:

a. connection to a Council sewer or;
b. appropriate treatment and disposal by an on-site wastewater system discharging within the allotment boundaries.

Prior to the application to subdivide land, the developer will be required to assess the potential for individual lots to meet this requirement.

In many cases, a detailed on-site wastewater plan prepared for the subdivision will permit purchasers of individual lots to proceed with development applications to build without preparing additional plans for each on-site wastewater system. In these cases the intention will be for the systems to be adopted that are identified, and approved, in the original plan. Where purchasers, for whatever reason, wish to install a different system, a separate application to install will be required with the relevant development application.

**NOTE: Council will only accept plans for a subdivision where sufficient information is provided detailing the suitability of land for effluent disposal within each lot In effect, the same outline plan as required for a single lot is applied to all lots in the subdivision. See Part 2 of this LAP.*

3.4.4 Obligations of Designers and Installers

Designer

The designer needs to be competent at selecting a system of treatment for the wastewater and suitably sizing the land application area to meet the long-term needs of the unique household conditions and the site and soil conditions in the land application area.

The number of occupants and the daily wastewater generation rates are critical to adequately sizing the treatment system and the land application area. Examples for this purpose are given in **Appendix C** of this Policy, and may be used where the designer has local knowledge or has sought to have site and soil conditions assessed by a competent person.

It is imperative that for households of up to 10 persons, only approved components are used in the on-site wastewater system unless cl.41(2) of the Regulation applies to a specific design. If a specific design requires a component that is generally available for retail purchase, such as a septic tank, then that device must meet the appropriate accreditation by NSW Health. A list of these approved devices is set out in Cl.40 of the Regulation and this is reproduced below:

(40) This Subdivision applies to such models of the following sewage management facilities as are generally available for purchase by retail:

(a) wet composting closets;
(b) waterless composting closets;
(c) septic closet;
(d) septic tanks;
(e) holding tanks and collection wells used for the receipt and storage of effluent (other than those intended to be emptied after each use, such as chamber pots);
(f) waste treatment devices designed to comminute or macerate and discharge sewage to a sewerage system;
(g) waste treatment devices that receive and treat sewage before discharging effluent to a common effluent drainage scheme;
(h) waste treatment devices that treat sewage using a specific process to produce biosolids and disinfected effluent to a standard suitable, either separately or in combination, for recycling by surface or sub-surface irrigation or by internal or external household use; and
(i) any other kind of sewage management facility specified in a notice published in the Gazette by the Director-General [of the DLG] *for the purposes of this clause.*

The design presented in the application to Council for "approval to install" will need to be set out in a form that complies with Part 2 of this Policy.

For larger systems serving premises normally occupied by more than 10 persons, or for non-residential buildings, the components selected must be of high quality and fir for purpose. These systems must meet the regulated performance objectives (refer Guiding Principles, Part 2.1).

Installer

It is imperative that the system installation is consistent with the plan approved by Council. In some cases, experienced installers may wish to modify the approved design for reasons of costing, ease of construction or specific site constraints. The installer should seek Council approval for the modification prior to continuing the work. A phone call may suffice and Council may approve a minor amendment verbally, and record as required.

The accreditation of devices nominated in cl.40 of the Regulation, as set out above, is binding for retail products.

Insurance

Both the Designer and the Installer should carry the appropriate insurances for their work.

3.4.5 Obligations of Tenants, Landlords and Their Agents

The approval to install and operate an on-site wastewater system rests with the owner of the land. However, any other owner (e.g. owning partner or occupier) of the land on which the system is installed will also be deemed to have an Approval to Operate for the system (cl.46 of the Regulation). These persons must be aware of and comply with Council's Approval to Operate conditions.

The tenants of a leased dwelling are responsible for the daily operation of the system and for reporting to the owner, or owner's agent, any indications that the system may not be functioning properly.

The maintenance and repair of the system will, in most cases, be the responsibility of the owner or delegated by the owner.

Council recommends the following aspects of on-site wastewater system management are communicated to tenants by landlords, and/or their agents:

- Conditions of the Council's (annual) Approval to Operate;
- general limitations of the system;
- the need for water conservation;
- appropriate use of chemicals within the home;
- restrictions on wastes discharged to the system; and
- common signs of failure of the system.

Real estate agents need to be aware that the tenant has a responsibility with respect to the effective operation of the on-site wastewater system by the general conduct of wastewater generation within the home.

Inspection of the on-site wastewater management system by the managing agent is in the interests of the landlord.

3.4.6 Advice for Conveyancers and Agents

On-site wastewater systems have variable longevity and generally experience decreased effectiveness over time. Systems are expensive to repair or replace, especially with increased performance standards being applied over time. Systems may represent a significant liability for purchasers and Council recommends conveyancing agents make their clients aware of the condition and performance of the system.

Each property that operates an on-site wastewater system, whether a simple septic tank and drain field (trenches), an aerated wastewater treatment system, or some other facility, must have two Council approvals as follows:

- **Approval to Install** an on-site wastewater treatment system
- **Approval to Operate** an on-site wastewater treatment system

The Approval to Install is attached to the land and provides evidence to landowners that the system has been designed and installed in accordance with the standards of the day providing some assurance that it will function safely and effectively. Retrospective approvals cannot be given by Council. This means, if the system was installed without an application to do so, and the owner now wanted to have this approved, Council would be unable to issue an approval for the system on that land. The system would remain an unapproved system and carry possible additional liabilities. However, Council is able to issue an Approval to Operate at any time.

The Approval to Operate is also attached to the land but also references the current owner(s). Where an Approval to Operate is given by Council, any other owners or any occupier of the land may lawfully operate the system (cl.46 of the Regulation).

Any operators of the system need to understand the specific conditions accompanying this approval. Approvals to Operate need to be maintained through an annual "licensing" process, with ongoing Council inspections to review performance in accordance with the risk classification of the system determined by Council (see Part 2.3 of this LAP).

NOTE: There are exceptions to the requirement of a new owner of a system to immediately obtain an approval to operate that system in their name (cl.47 of the Regulation). Owners who have recently acquired land on which an on-site wastewater system exists, can lawfully operate that system for a period of **three months after transfer of title into their name(s), after which they must have an Approval in their name(s). Further, if the new owner of the land submits an Application to Operate on On-Site Wastewater System to Council within two months of acquiring title of that land, the owner may lawfully operate the system without an Approval until this is issued.*

In cases where no Approval to Operate for the system on the land exists, the purchaser should immediately apply to Council for an Approval to Operate an On-Site Wastewater System. This will trigger an inspection of the system by Council's Environmental Health Officer(s).

Accordingly, conveyancers acting for the purchasers are advised to seek the status of the Approval to Install and Approval to Operate in advance of settlement between the vendor and purchaser.

During the conveyancing process, relevant agents and solicitors are invited to request a copy of the Approval to Operate from Council. Agents or solicitors acting for purchasers or vendors may also request an inspection of the system by a Council Officer.

Where a new subdivision is placed on the market, the selling agents need to make potential purchasers aware of the requirements for an Approval to Install and an Approval to Operate an on-site wastewater system. In some cases, Council may have approved certain systems on some or all lots in the new subdivision, in which case the owner may choose to install such a system without further approvals. Purchasers need to be aware of the costs of meeting the requirements for on-site wastewater treatment and land application, and the possible impost the land application area may be on part of the lot.

3.5 System Design

3.5.1 What Sort of System?

Clause 41 of the Regulation states that:

1) *The council must not approve the installation or construction of a sewage management facility to which this Subdivision applies unless the council is satisfied that the facility is to be installed or constructed to a design or plan that is the subject of a certificate of accreditation from the Director-General of the Department of Health, being a certificate that is in force.*

NSW Health identifies the systems that are certified on the website

https://www.health.nsw.gov.au/environment/domesticwastewater/Pages/default.aspx

The NSW Health website lists the manufacturers of the accredited systems, however, there is no accreditation for the land application area, as each system needs to be designed for the site conditions.

Three exemptions in Clause 41(2) state:

2) *Subclause (1) does not apply to or in respect of a sewage management facility:*

a) *that is to be installed or constructed as a model for the purposes of testing, or*
b) *that is designed, and is to be constructed, by the owner or occupier of the premises on which it is to be installed, or*
c) *that is designed, by a person other than the owner or occupier of the premises on which it is to be installed, specifically and uniquely for those premises.*

Passive Systems are those that operate by gravity and require minimal, if any, source of electrical energy. Most passive systems can operate for long periods with minimum maintenance.

Active Systems require an energy source to either aerate the effluent or pump to a land application area, or both. Many active systems require routine maintenance, by a competent person, at periods from three to six monthly and the operation of the system must be reported to Council as a condition of the ongoing Approval to Operate. These additional costs need to be considered when planning a system.

Split Systems may incorporate compost toilets with separate greywater treatment, or systems that separately treat wastewater from the toilet (blackwater) and kitchen, and greywater from the other facilities.

Greywater Treatment and Diversion Systems – deal with wastewater from washing machines, laundry tubs, showers, hand basins and baths, but does not include wastewater from a kitchen, toilet, urinal or bidet. See Part 2.7.

Appendix C of this document sets out some examples of the different systems available.

3.5.2 System Design and Selection

Of the various systems available, the ideal system is the one that best meets the objectives for the specific conditions of the home and the land application area. A risk assessment of the potential impact of the system on the surrounding neighbours and environment may assist in choosing an appropriate treatment system and method of land application. The higher the risk, the higher the level of treatment before land application.

The complexity of the treatment system will depend upon the specific site and soil assessment, proximity to water courses, environmentally sensitive areas and neighbouring properties.

Where the impacts of a primary system can be contained by the site and soil conditions, so as to satisfy the performance standards cited in Part 2.1, then a primary system has the least environmental footprint.

Where environmental impacts need to be limited by a higher level of treatment, then the secondary system is required. Where water re-use for gardening activities is sought, secondary treatment is required.

Figure 3.5-1 shows typical layouts from some common on-site wastewater systems. As the level of environmental and health protection increases (down the page), so the level of treatment increases.

Any system should be no more complex than the site and soil conditions demand. Over-design of an on-site system wastes financial and physical resources and may increase the annual expenditure to operate and maintain.

The term ‘treat for purpose’ is most applicable to on-site wastewater treatment and disposal. This means that the wastewater needs to meet the appropriate water quality depending upon the constraints of either the land or the use of the effluent.

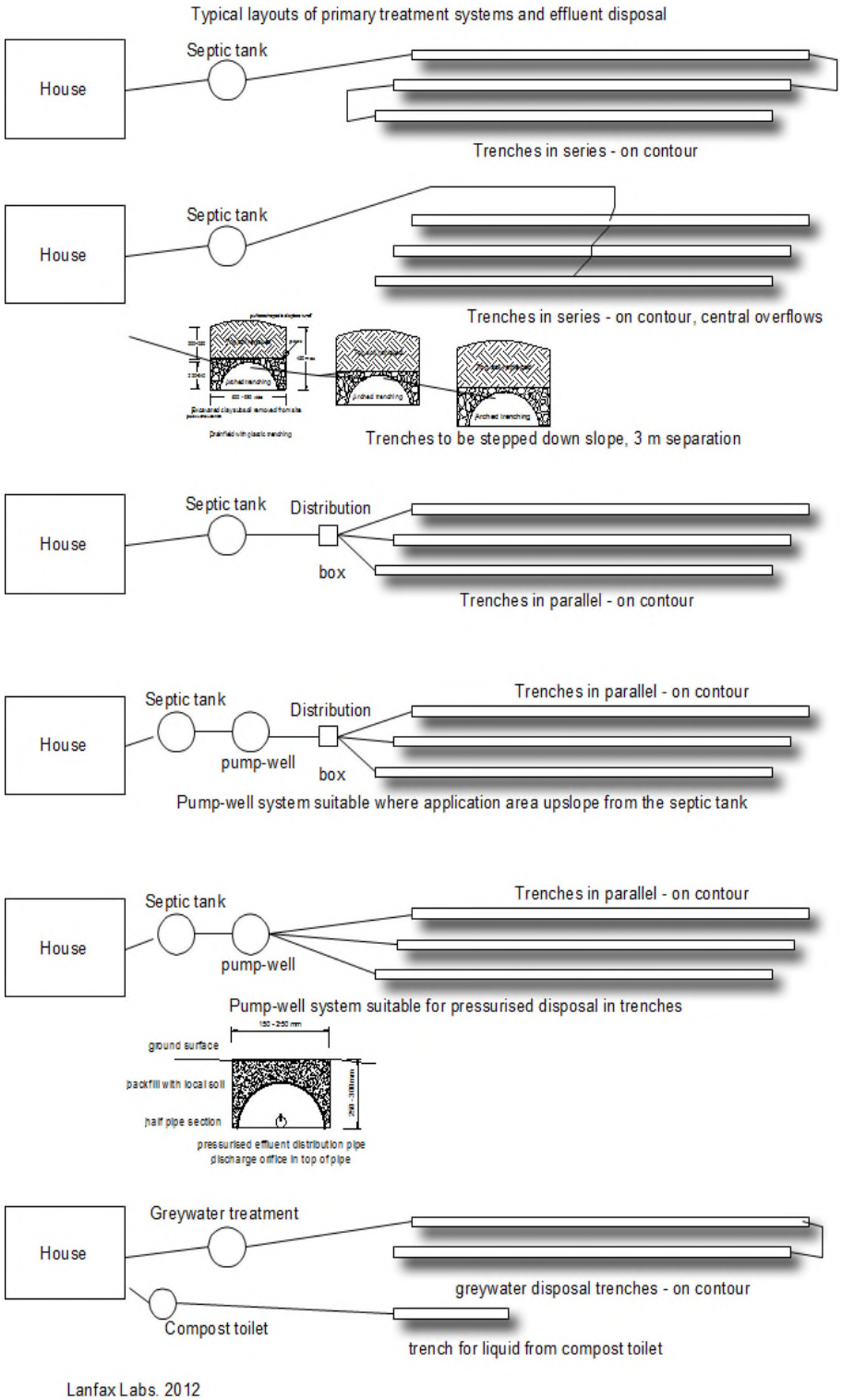


Figure 3.5-1: Typical on-site wastewater systems with increasing environmental requirements

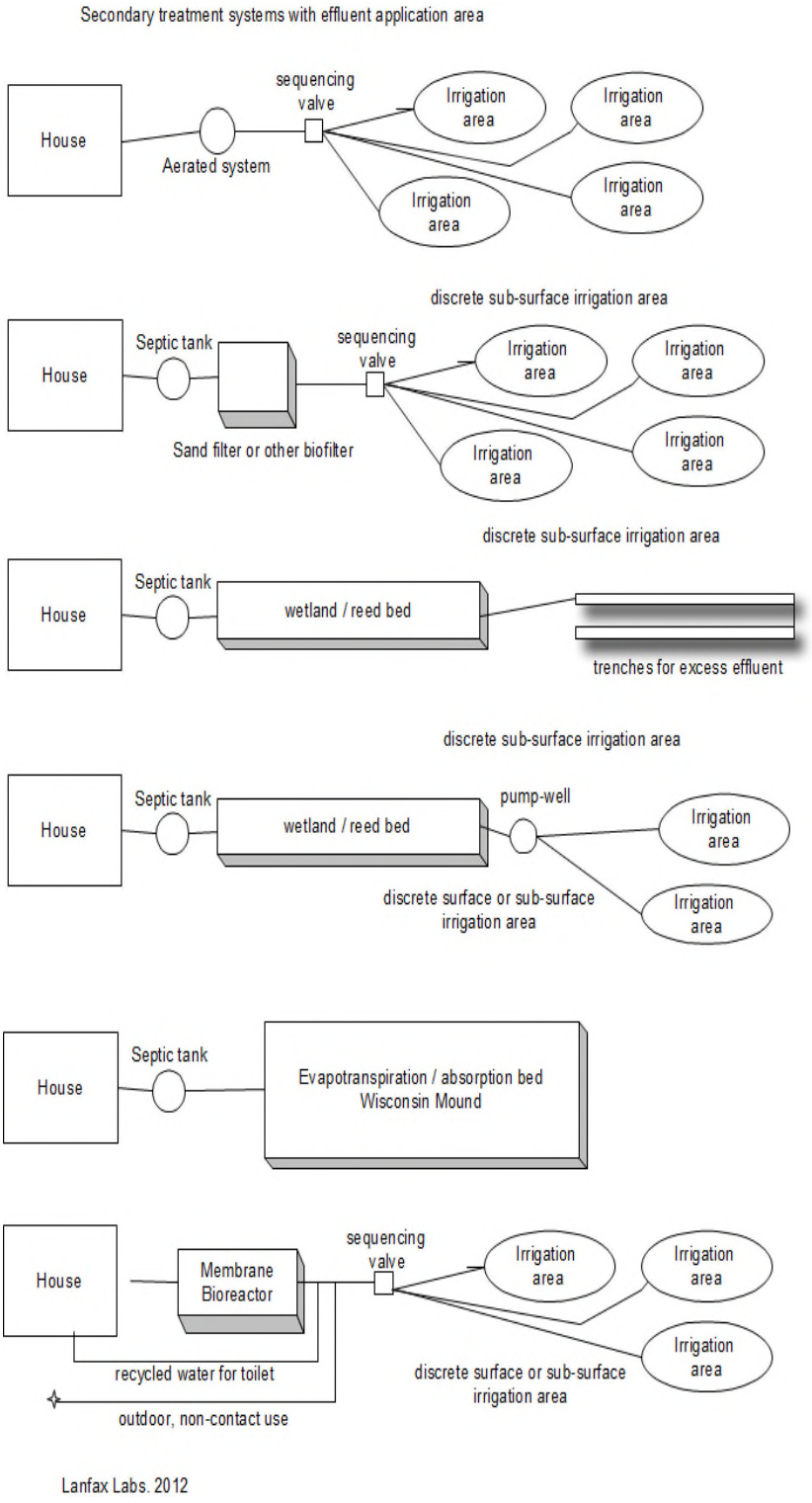


Figure 3.5-2: Typical on-site wastewater systems with increasing environmental requirements

3.6 Operation and Maintenance Information

3.6.1 Basic Operational Issues

At any time, Council may request details of the operation and evidence of the performance of a system.

The householder must have sufficient knowledge of the operation of the on-site wastewater system to prevent disruption to the effective treatment of the wastewater and/or failure of the land application area. The detail will vary from site to site. A contingency plan and emergency contact details form part of this knowledge base.

All systems must be serviced and maintained in accordance with the conditions of approval to install and operate the system. Good operation and maintenance of the system is important for protecting the overall condition of the system.

All domestic wastewater treatment systems rely on natural decomposer micro-organisms to break down the effluent. These organisms can be adversely affected by certain chemicals, such as bleaches, in some cleaning agents. Householders should avoid these products rather than having to seek remedies.

The washing powders and detergents used can also influence how an effluent disposal system works and the potential pollution which is generated. In this regard, Council encourages the use of readily biodegradable products, of low sodium content and low phosphorus.

In relation to water conservation measures, Council supports and recommends the installation of the following devices and maintenance procedure. Toilets are to be fitted with a 6/3 litre dual flush system and water pressure to the premises, where possible, should be restricted to around 150 kPa. Devices to Australian Water Conservation Rating AA or better, including shower flow restrictors, tap aerators, and water conserving washing machines.

3.6.2 Maintenance of On-Site Wastewater Systems

On-site wastewater systems require some simple maintenance checks by owners or their agents. Below are essential checks by owners. Refer to **Appendix E** for detailed diagrams.

Quarterly Checks

Septic Tank

1. Check the tank seals against stormwater ingress, especially when tank lids are flush with the ground surface (prefer tank lids above ground level);
2. Check the tank lid is intact, including inspection covers, that must seal against insect entry;
3. Effluent at the tank outlet must appear relatively clear and low in suspended solids;
4. No evidence of overflows either at tank lid or via tank “T” inlet or outlet points (see **Appendix E**, Figure 1);

5. Solids accumulation in the tank within acceptable levels;
6. Outlet filter, if fitted, is regularly cleaned.

Aerated Wastewater Treatment Systems (professional/agency servicing)

1. Solids accumulation in primary chamber within acceptable levels;
2. Aerator working and dissolved oxygen at acceptable level;
3. Warning light connected and capable of operating;
4. Disinfecting tablets in place;
5. Irrigation chamber water of acceptable clarity;
6. Irrigation pump operational;
7. No overflows or short-circuiting;
8. Irrigation system back flushed and no obvious wet spots.

Other Systems

Maintenance according to a documented schedule.

Annual Checks

Any maintenance of the primary treatment compartment needs to measure the depth of crust and scum at least annually. Over time, as the sludge and scum accumulate, the tank will require pumping out and the contents taken to Council's Waste Treatment Facility. Only approved waste contractors may remove and cart this sludge to an approved facility, and provide such records of pump-out to Council.

Land Application Area (All Systems)

1. Adequately fenced from livestock and vehicle traffic;
2. No obvious wet spots or surface discharges;
3. No depressions in surface to accumulate rain;
4. Effective rainfall run-off diversion away from, or around irrigation area;
5. Control of vegetation growth over disposal area.

Conventional Septic Tanks and Absorption Trenches

Conventional septic tanks and absorption trenches are low maintenance. Residents need to reduce the quantity of solids entering the system. **Appendix C** outlines some considerations to extend the life of a septic tank.

Over time, sludge and scum will accumulate in the primary treatment chamber and removal will be required. The frequency of de-sludging is dependent upon the number of persons using the system but generally systems will be required to be de-sludged every three to eight years.

Split systems separate black and greywater for treatment and disposal. Toilet and kitchen waste should be treated together as blackwater in an appropriate treatment system. Wastewater from the laundry and bathroom may be combined as greywater.

Where an outlet filter has been installed in the septic tank, the homeowners should be competent at regular cleaning by removing the filter and hosing it down into the inlet port of the septic tank. This exercise should be at periods of not more than six months.

The land application area will need to be fenced to exclude stock. Access for mowing will be required to reduce fire risk, vermin harbour and weeds. In the event that the land application areas become soggy, seek advice from a reputable plumber.

At the least, the homeowner should have a contingency plan to address any discharge from the septic tank or excess water in the land application area. The emergency phone number for a plumber should be at hand. For systems that include a pump, specifications of the pump should be available so that a replacement can be procured as a matter of urgency, if required.

Aerated Wastewater Treatment Systems

Council will require the submission of a maintenance report prepared by a suitable qualified service contractor. The period for such reports will be contained in the consent(s) to operate a wastewater treatment device for individual properties. The service must include a check and report on:

1. Sludge levels and scum levels in primary chamber;
2. pH and dissolved oxygen in irrigation chamber;
3. The sludge volume index of aeration chamber;
4. The measured chlorine value in irrigation chamber;
5. The irrigation area and back flush; and
6. The integrity of the alarm system.

Specific requirements apply to the maintenance of aerated wastewater treatment systems (AWTS) and composting toilets, essential to their satisfactory performance.

The servicing agent must be engaged to carry out necessary repair work to the installation as well as the routine cleaning and maintenance activities at the householder's expense. Any installation faults revealed in the three-monthly inspection must be repaired promptly.

An annual service must also include a check on sludge accumulation in the septic tank (primary treatment tank) and the clarifier where appropriate to determine the need for de-sludging.

Each quarterly service on an AWTS must involve checks and maintenance on the irrigation system and area. The report of each quarterly check must be forwarded to the client and the Council within 14 days of the service. Any repairs must be effected and reported separately.

The report required by Council is provided as part of the form in **Appendix A**. Failure to comply may result in approval to operate being withdrawn until necessary repairs are effected.

Septic Tank Outlet Filters

Outlet filters are fitted to the outlet of a primary treatment tank to prevent larger solids carrying-over into the subsoil drain field or into the secondary treatment chamber. Various styles of outlet filters are available from several suppliers. The important consideration is that over time, the filtering capacity becomes clogged and the filter must be hosed down. The filter is usually hosed down into the inlet of the primary treatment chamber. The filter does not need to be spotlessly clean as some remnant slimes assist the filtering process.

Other Systems

It is expected that each on-site wastewater system will have its own maintenance schedule, provided with the original application for approval to install, or supplied subsequently by the designer or installer.

Each maintenance manual should include details of the construction and operation of the system together with advice for operating and routine maintenance. A contingency plan for unavoidable failures needs to be considered.

3.7 Appeals, Complaints and Disputes

Appeals

Applicants may request a reassessment of an Application to Install, Modify, Remove or Operate an On-Site Wastewater System where it has been rejected or where modification of the approval, in particular the conditions within, is sought. A formal appeal process is defined in the Act and in Council's correspondence to allow applicants timely action if necessary.

Complaints

Council receives requests from members of the public and residents to investigate issues involving on-site wastewater systems, typically reporting odours or surface effluent discharges. These are recorded on Council's Service Request system and are allocated to an Officer. Council officers will respond in the most appropriate way to the situation and will make every effort to contact the owner or their agents as soon as possible prior to an inspection of the area where the issue has been reported.

3.8 Additional requirements and restrictions

Certain site specific circumstances may require Council to condition in any Onsite Sewage Management System Approval, additional requirements to ensure the safe and effective operation and longevity of a onsite sewage management system. A summary of the following requirements and restrictions that Council may impose **on a case by case basis** are below.

- Irrigation lines from Aerated Wastewater Treatment Systems are required to be buried from the irrigation chamber to a connection capable of accepting a separate connection line. These connections can be sometimes referred to as spear head connections. This will restrict any effluent disposal to the approval irrigation area.
- Irrigation areas from Aerated Wastewater Treatment systems must be subsurface irrigation only.

APPENDIX A

Council's Application to Install, Modify, Operate or Remove an On-site Wastewater System

(Copy available from Customer Service Desk)

135 Rusden Street
PO Box 75A Armidale NSW 2350
P: 02. 6770 3600 • F: 02. 6772 9275
council@armidale.nsw.gov.au
ABN 39 642 954 203

ARMIDALE Regional Council
www.armidaleregional.nsw.gov.au

APPLICATION TO INSTALL, MODIFY OR OPERATE AN ON-SITE WASTEWATER MANAGEMENT SYSTEM

1. Information

Under Section 68 of the *Local Government Act 1993* prior approval of Council is required to install, modify and operate a sewage management system. Failure to seek approval is an offence and penalties apply. Approvals cannot be given retrospectively

Council has a specific policy for On-Site Wastewater Management (POL225).This is available upon request or on Council's web site. Your plumber should also have a copy.

2. Applicant's Information

Name	Company/Organisation (if applicable)	
Street Address/Postal Address		
Town	**State**	**Postcode**
Email Address	**Telephone**	**Mobile**

3. Property Identification

Property Street Address	Lot and DP Number (if available)	
Town	**State**	**Postcode**

4. Signature of Property Owner

All owners must sign this consent. If property ownership has recently been transferred, please also provide evidence of the transfer.

As the owner/s of the above property, I/we consent to the lodgement of this Application.

I/we permit officers of Council to enter the land to carry out inspections as required for the assessment of this application and will provide access where required.

Owner's Name	Signature	Date
Owner's Name	**Signature**	**Date**

Applications will not be accepted unless signed by the owner(s) of the property.

COUNCIL USE ONLY

Records Stamp

Application Number	Amount Paid
s68 /	$
Receipt Number	**Received by**
Signature	**Date**
Record Scanned into TRIM	**Application Fee + Inspection Fee**
Yes ☐	$425

ON SITE WASTEWATER MANAGEMENT SYSTEM DETAILS

5. Application Type

Install a new system	❒
Alter an existing system	❒
Renew license/or apply for a license to operate an existing system	❒

6. Type of Waste Treatment System

Septic Tank for all waste	❒
Septic Tank and collection well	❒
Septic tank with Reed Bed system	❒
Aerated wastewater treatment system (AWTS)	❒
Sand or Biological filter system	❒
Composting system	❒
Other system (please specify)	❒

7. Type of Waste Disposal Area

Absorption trenches	❒
Transpiration Beds (please indicate: lined or unlined)	❒
Surface irrigation (disinfected effluent only)	❒
Sub-surface drip irrigation	❒
Other (please specify)	❒

8. Connection Details

Number of persons in household/building	
Number of bedrooms in building	
Town Water supply	❒
On-site water supply (rainwater, bore, dam, other specified)	❒
Special wastewater requirements for the system (e.g. processing, cleaning) + please detail:	❒

9. Manufacturer's Information (of primary system)

Manufacturer/Brand Name

Type

Tank Capacity

Dept. of Health Accreditation Number

See 11 (c) overleaf for Accreditation Number

10. Installer's Information

Name

Company/Organisation

Address

Email Address

Telephone

Mobile

License Number or Accreditation Number

11. Checklist

As part of the application process to Council, you are requested to complete the following checklist. On-site inspections may be carried out as part of the assessment process and may result in the request for further information. A council officer will contact you after their initial inspection if this is the case.

a) You have submitted plans This application must be accompanied by a clear copy of a site plan, showing the location of:	
• the wastewater **treatment system** proposed to be installed or modified on the site;	☐
• the wastewater **disposal area** proposed to be installed or modified on the site;	☐
• any buildings or facilities existing on, and any environmentally sensitive areas of, any land located within 100m of the treatment system or disposal area;	☐
• topography/slope, existing vegetation, existing wet/dry drainage channels, tracks/roads.	☐
b) You have provided a scientific soils report for the purposes of waste water disposal Reports may be provided by qualified plumbers, environmental consultants and soil laboratory services. Please ask Council for advice.	☐
c) You have checked Wastewater Treatment System Accreditation by NSW Health The wastewater treatment system must have a current Certificate of Accreditation by NSW Health. We do not ask for a copy of this Certificate but will check for its currency before approval is given. Go to: http://www.health.nsw.gov.au/publichealth/environment/water/waste_water.asp	☐
d) Operation and Maintenance The application must be accompanied by details of the operation and maintenance requirements for the proposed sewage management facilities including details of any action to be taken in the breakdown or some other interference in the facilities operation.	☐

12. Processing

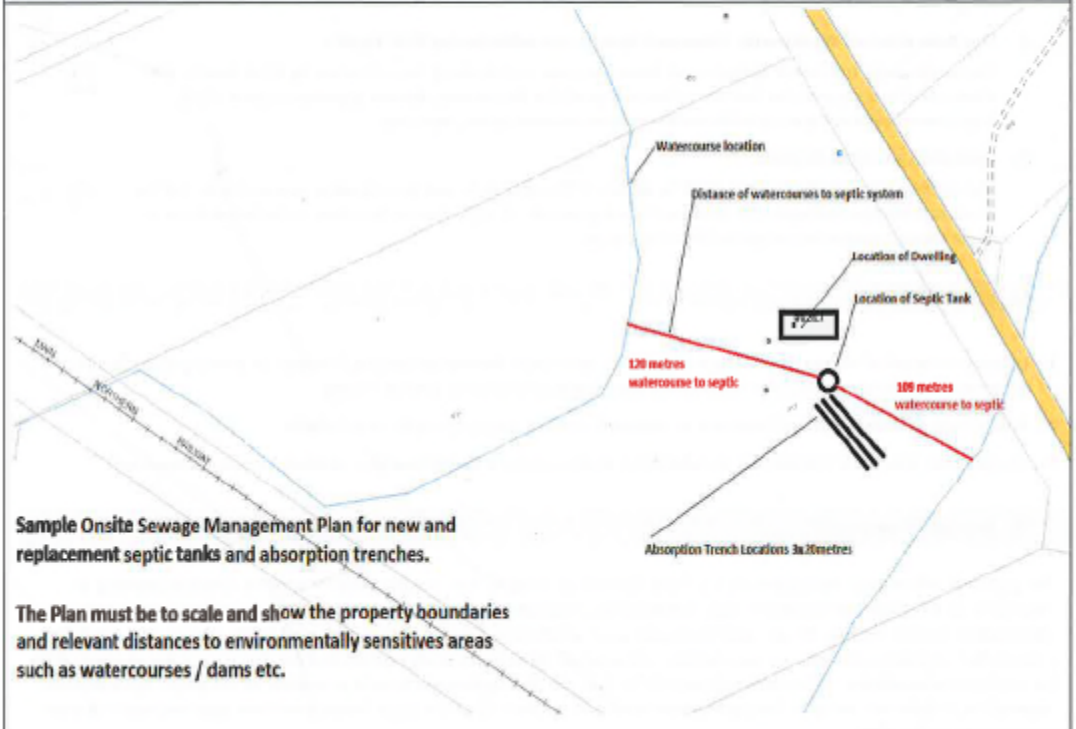
1. Lodge your application and pay the application fees to Council. Normal processing is within 14 working days. Failure to provide information may result in rejection of your application with no refund of fees.
2. Council will issue the approval/rejection by mail and email to owner/occupier and installer.
3. Please notify Council at completion of installation to arrange for a final inspection. At least 24 hours is required..

13. Privacy Statement

The personal information requested on this form will only be used to fulfil the purpose for which it is being collected as described on this form. The supply of information by you is voluntary, but if you cannot, or do not wish to, provide the information sought, we may not be able to process your application. Council is to be regarded as the agency that holds the information and will endeavour ensure that this information remains accurate and up-to-date. You may make an application for access or amendment to this information held by Council. This application form is accessible to the public upon written application, subject to Council's Privacy Management Plan, Section 12 of the Local Government Act 1993 and the Freedom of Information Act 1989.

14 Site Plan

15 Sample



Sample Onsite Sewage Management Plan for new and replacement septic tanks and absorption trenches.

The Plan must be to scale and show the property boundaries and relevant distances to environmentally sensitives areas such as watercourses / dams etc.

APPENDIX B

Guidelines for the Design of On-Site Wastewater Systems within the Armidale Regional Council Area

1 Site Design Plan

The location of the components of an on-site system will be dictated by the living area, buildings and boundaries, as well as the landscape and soil conditions. The figure below indicates the likely limitations to layout, taking account of buffer distances.

All applications to install or modify an on-site wastewater system require design plans. The following may be used for the design of on-site wastewater systems. Please remember that all systems have a primary, secondary and tertiary treatment stages, e.g. primary = septic tank; secondary = absorption trenches and; tertiary = soil surrounding absorption trenches.

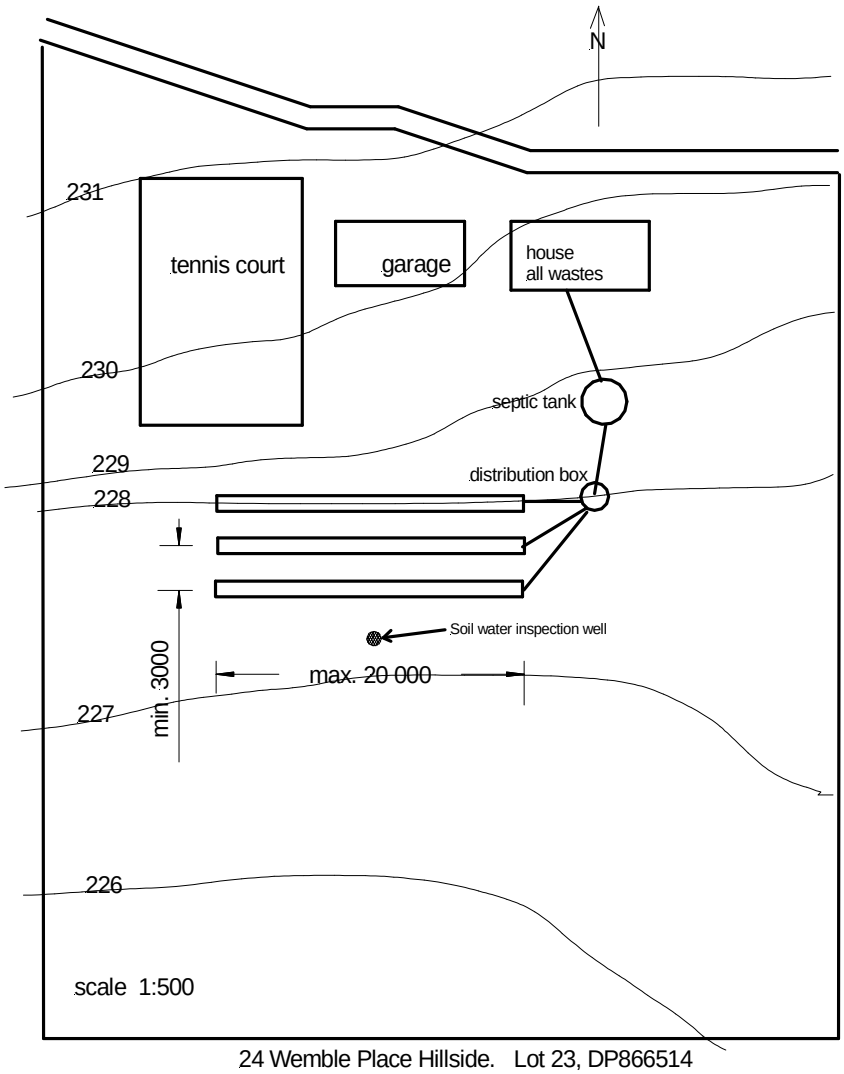


Figure B1: Example layout of a on-site system

2 Hydraulic Loading

Hydraulic loading refers to the quantity of wastewater generated by the dwelling and is expressed as: litres of wastewater produced per day (L/day). It is important that the hydraulic load reflects the likely discharge of wastewater into the treatment system and then the land application area for the system to effectively function in the longer term.

Hydraulic loadings are calculated by answering the following questions:

1. How many persons can potentially reside at the dwelling? (Table B1)
2. How much wastewater is produced per person? (Table B2)
3. Are there any other wastewater generating activities and how much effluent is produced?
4. What then is the total wastewater load generated for the on-site system to treat?

Table B1 – Probable Occupancy Rates for Dwellings

Number of bedrooms	Probable number of persons residing
2 bedrooms (minimum)	3 persons
3 bedrooms	4 persons
4 bedrooms	5 persons
5 bedrooms	6 persons

Other calculations may be made on the basis of two persons for the main bedroom and one person in each of the other bedrooms. Council reserves the right to count additional rooms such as offices / rumpus rooms as an additional bedroom.

NOTE: Please account for other activities, such as the use of spas, animal grooming, excess laundry or home industry by estimating the daily additional wastewater generation and adding to domestic loadings.

Table B2 - Wastewater Generation Rates

	Typical wastewater flow allowance in litres/person/day	
Source of Water	Rainwater collection	Municipal Water and/or bore water
Older style homes with old dual flush toilets, few other water conservation fixtures	150	200
Modern homes compliant with BASIX	120	150
Ultra water conservative homes, pressure reduced, low flow systems, current 4-star water rated appliances	100	120

NOTE: Council encourages domestic water saving devices, which in turn may reduce the size and cost of the on-site system.

3 Site Characteristics

Council suggests using the following table to indicate the site suitability for an on-site wastewater system. This indicates the ease of installation of an on-site system at the application stage providing the owner with some security that the system will meet final approval after design and plumber installation. It also provides Council with information to assess the risk the system may pose to the environment.

Table B3 is a checklist. Most information can be given on your Site Design Plan, but some criteria ask you to indicate other information as a description.

Table B3 – Site Characteristics

	Site characteristic	**Description and comment**
1	Landscape position	*Please provide a sketch in relation to surrounding land – other residences, farmland, nature reserves or parkland etc.*
2	Landform type	*E.g. Hilltop, ridge, hillslope, footslope, terrace, floodplain*
3	Slope at land application area	*Indicate on site design plan*
4	Erosion potential	*Severe, moderate, low, none*
5	Site drainage	*Indicate on site design plan, especially intermittent drainage channels*
6	Exposure to sun (aspect)	*Exposed to the sun most of the day or* *Shaded most of the day*
7	Exposure to wind	*Exposed or not exposed*
8	Land area available (m^2)	*Take into account buffer distances (table C4)*
9	Setback distances from each boundary (m)	*Indicate on site design plan*
10	Geology	*Sediments, basalts, granites.*
11	Rock outcrops or large trees present	*Indicate on site design plan*
12	Description of vegetation on site	*Grassland or open woodland, or forested*
13	Identification of any environmentally sensitive area	*Indicate on site design plan*
14	Proximity to dams / waterbodies	*Indicate distances on site design plan*
15	Depth to groundwater bore (m)	*If known*
16	Distance to groundwater bore (m)	*Indicate distance on site design plan*
17	Distance between land application area and neighbouring homes	*Indicate on site design plan*

4 Buffer Distances

The buffer distances are required to provide protection of neighbours, other living areas and environmentally sensitive areas from the possibility of contamination from an on-site system.

Table B4 – Recommended Buffer Distances for Land Application Areas

Feature or environmental attribute	**Minimum buffer distances**
Permanent surface water	50 m trench/spray 20 m sub-surface drip irrigation
Domestic groundwater bore (all systems)	20 m plus, in clay soil profile 50 m in duplex soil profile 80 m in sand
Other water (dams, drainage channels, intermittent waterways)	30 m trench/spray 20 m sub-surface drip irrigation
Water that forms part of stormwater treatment system	20 m trench/spray 10 m sub-surface drip irrigation
Swimming pool	5 m trench/spray all sides 1.0 m sub-surface drip irrigation
Driveways	5 m trench/spray all sides 1.0 m sub-surface drip irrigation
Property boundaries – upslope from application area	3 m/ 2 m trench/spray 1.0 m sub-surface drip irrigation
Property boundaries – down slope from application area	6 m/ 4 m trench/spray 2.0 m sub-surface drip irrigation
Buildings	5 m / 2 m trench/spray 1.0 m sub-surface drip irrigation
Environmentally sensitive areas	100 m
Disturbed land, e.g. cut/fill	5 m / 2 m trench/spray 1.0 m sub-surface drip irrigation

Notes: 1. Environment and Health Protection Guidelines (DLG, 1998) Table 5, page 66
2. AS/NZS 1547:2000 Setback distance requirements vary from one regulatory authority to another. There is no agreed setback or series of setback distances.(page 62, 4.3.3.3.(b)

#SSDI – subsurface drip irrigation (pressurised)

5 Soil Evaluation and description

Soil evaluation is a critical part of the on-site assessment for Council's approval. The soil profile into which the treated effluent is applied determines the type and size of the on-site wastewater system, and therefore cost. Most systems fail because their design has not considered soil type carefully enough. This failure results in environmental harm, increased human health risk and ultimately unexpected additional expense for the system owner.

An assessment of the soil profile is required for each application to install a new system, or for an application to alter the land application area. The criteria, which need to be addressed are listed in Table 5. There are some criteria that can be addressed in the field, and some that must be done by a suitable laboratory analysis.

A soil profile is a description of the various horizons of the soil, from the surface to at least 600 mm below the bottom of the effluent application zone. For subsurface drip irrigation that would be 700-750 mm, and for a typical 450 mm deep trench the investigation depth would be 1050 mm. An exception to this investigation depth is where the profile suggests that the subsoil will continue to be the same if you dig deeper, or if you hit rock.

A soil profile is a description of the various horizons of the soil, from the surface to about 1.2 m deep, that show the characteristics in Table 5.

Table 5 – Soil Description and Properties Required

	Property	**Horizon 1**	**Horizon 2**	**Horizon 3**
1	Land application area	Ensure location shown on plan		
2	Depth (mm) of the horizon (e.g. 0-200, 200-500) [Field test and photographs]			
3	Soil colour [Field test and description]			
4	Soil field texture (Table 9) [Field test and description]			
5	Soil structure (Table 10) [Field test and description]			
6	Soil category (column 1 Table 10) [Field test and description]			
7	Behaviour of air-dry ped e.g. water stable, slaked, dispersed in distilled water [Field test and description] (see Figure 5)			
	Desirable			
8	Soil pH (1:5 in water)			
9	Soil electrical conductivity (1:5 in water (EC) in dS/m			
10	Exchangeable sodium percentage (%) [Laboratory]			
11	Soil cation exchange capacity			
12	Soil phosphorus sorption capacity [Laboratory]			

NOTE: *Item 7 is Emerson Aggregate Test (initial part of test procedure only)*

Items 1-7 are mandatory; and Items 8-12 are mandatory for Options 2 & 3

Description of the Soil in the Land Application Area

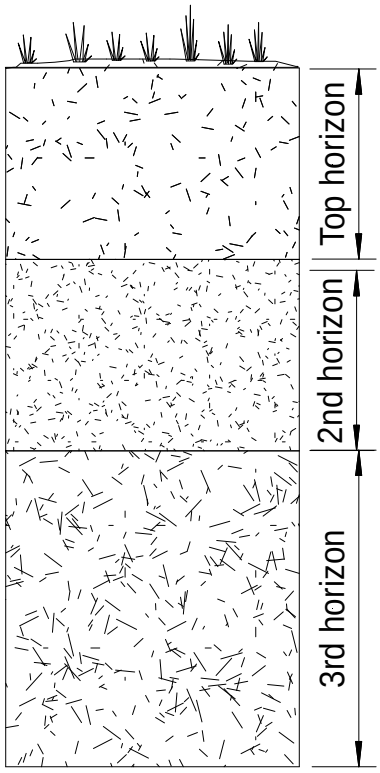


Figure 2: Soil profile

	The top horizon is dark from organic material and decomposing vegetation. Often this horizon will be bound together by plant roots. Describe depths, colour, distinguishing features such as rocks, soil texture.
	The second horizon will mostly be paler than surface, but may also be very pale compared with either the top or third horizon. Describe depths, colour, and distinguishing features such as rocks, gravel, and soil texture.
	The third horizon is often the most clayey, and its colour may vary from red, to yellow to grey in soils developed on sediments or granites. Describe depths, colour, distinguishing features such as rocks, soil texture, mottles or fragments when >20% of the horizon.

Figure B3: Photograph of soil profile

Lay out the soil, in the order that it was extracted, as shown in Figure B3, and include a colour photograph of the soil with your report.

This photograph will assist the Council officer in verifying the soil description and likely suitability for the design.

Ensure that the soil core has some scale. In the figure opposite the auger shaft has a marking every 100 mm (total length 1100 mm).

6. - Water Balance (Land Application Area)

The purpose of a water balance is to find the land area required to accept the effluent without saturating the soil or overflowing the trench. This calculation ensures that the land application area (trench or soil) has the physical capacity to accept the daily wastewater (L/day) in addition to rainfall (mm/day) for that location. This area is expressed as square metres of application area required to accept the effluent. Water balances go towards safeguarding effluent overflows and surface discharging.

Tables B6A, B6B, B6C or B6D may be used to select the required effluent application area depending on soil type and location: Armidale; Jeolga; Lower Creek (Kempsey); or West of Guyra areas.

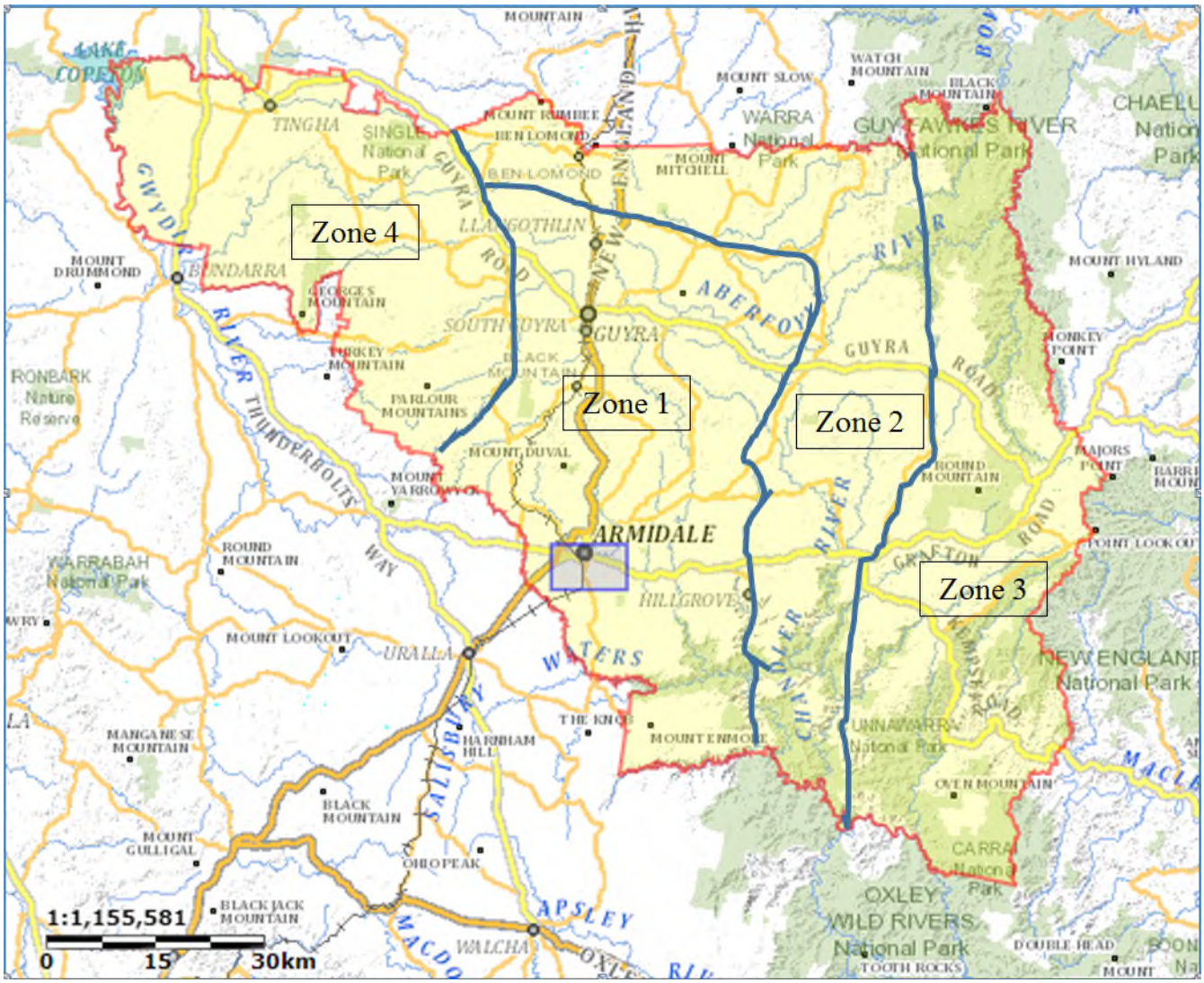


Figure B4. Zones with Armidale Regional Local Government Area to which water balance values apply.

Alternatively a separate water balance may be calculated, with the workings provided within the wastewater report.

Where a separate water balance model is used, the outcome will be to show the area (m^2) required for the hydraulic load (L/day) and the monthly depth (mm) of saturated soil for that area will indicate the required irrigated area or trench length.

*NOTE: **THE TABLES B6A, B6B ,B6C AND B6D SHOW FOR:**

Absorption trenches: the calculated area required for 600 mm wide by 450 mm deep absorption trenches, allowing for wet weather storage within the trench system.

When trenches are constructed 600 mm wide and 600 mm deep, the trench lengths below need to be multiplied by a factor of 0.78 (that is, a lesser total trench length is required).

Aerated wastewater systems: The irrigation area for aerated wastewater treatment systems is based upon some excess moisture in the irrigation area during winter, but limited to avoid saturation of the soil. The same area is required whether the effluent is surface applied or distributed by subsurface drip irrigation.

Wetlands and other evaporation based systems. Application areas will need to be based upon a water balance. Appropriate tables are set out in AS/NZS 1547 that provide design loading rates for evapotranspiration/absorption systems, mounds and irrigation systems. Where these tables are used, the design will need to specify them in the application.

The land application area will be fenced off (permanent or electric) to exclude stock and human access.

These tables are based upon consumption of rainwater (Table BC2). For systems using reticulated water as in Table B2, increase the area by 25% (a larger trench system, or greater irrigation area will be required).

The rainfall values used in the calculation of the trench lengths and irrigation areas were based upon the 70th percentile rainfall values for Tingha, Armidale, Jeogla and Lower Creek. Evaporation rates for Tingha were for Inverell Research Station, Armidale used Armidale values, and Jeogla and Mt Seaview rates for Lower Creek.

NOTE: On smaller allotments where heavy clays are present or where very high hydraulic loads are generated, trench lengths may exceed 100m. In these cases Council will require consideration of alternative application methods to absorption trenches.

Table B6A – Zone 1

These calculations for a 600 mm wide by 450 mm deep absorption trench

Daily waste water loading rate	Required trench length (m)	Irrigation area for AWTS (m^2)
Medium clays – Application rate of 5mm/day		
3 persons	55	89
4 persons	73	119
5 persons	91	148
6 persons	109	178
Light clays – Application rate of 8mm/day		
3 persons	34	51
4 persons	46	68
5 persons	57	85
6 persons	69	102
Clay loams – Application rate of 10mm/day		
3 persons	28	38
4 persons	37	51
5 persons	46	64
6 persons	55	77
Sandy loams – Application rate of 15mm/day		
3 persons	18	26
4 persons	25	35
5 persons	31	44
6 persons	37	52

Table B6B – Zone 2

These calculations for a 600 mm wide by 450 mm deep absorption trench

Daily waste water loading rate	Required trench length (m)	Irrigation area for AWTS (m^2)
Medium clays – Application rate of 5mm/day		
3 persons	48	83
4 persons	64	111
5 persons	80	139
6 persons	100	166
Light clays – Application rate of 8mm/day		
3 persons	30	50
4 persons	40	66
5 persons	50	82
6 persons	60	98
Clay loams – Application rate of 10mm/day		
3 persons	24	39
4 persons	32	51
5 persons	40	64
6 persons	48	77
Sandy loams – Application rate of 15mm/day		
3 persons	16	26
4 persons	21	34
5 persons	27	42
6 persons	32	50

Table B6C Zone 3

These calculations for a 600 mm wide by 450 mm deep absorption trench

Daily waste water loading rate	Required trench length (m)	Irrigation area for AWTS (m^2)
Medium clays – Application rate of 5mm/day		
3 persons	60	*114*
4 persons	80	*152*
5 persons	100	*190*
6 persons	120	*229*
Light clays – Application rate of 8mm/day		
3 persons	34	*59*
4 persons	45	*78*
5 persons	57	*98*
6 persons	68	*117*
Clay loams – Application rate of 10mm/day		
3 persons	27	*44*
4 persons	35	*59*
5 persons	44	*74*
6 persons	53	*88*
Sandy loams – Application rate of 15mm/day		
3 persons	17	*27*
4 persons	23	*37*
5 persons	28	*46*
6 persons	34	*55*

Table B6D Zone 4

These calculations for a 600 mm wide by 450 mm deep absorption trench

Daily waste water loading rate	Required trench length (m)	Irrigation area for AWTS (m^2)
Medium clays – Application rate of 5mm/day		
3 persons	50	*78*
4 persons	67	*104*
5 persons	84	*130*
6 persons	101	*156*
Light clays – Application rate of 8mm/day		
3 persons	33	*47*
4 persons	43	*63*
5 persons	54	*79*
6 persons	65	*94*
Clay loams – Application rate of 10mm/day		
3 persons	26	*37*
4 persons	35	*50*
5 persons	44	*62*
6 persons	53	*75*
Sandy loams – Application rate of 15mm/day		
3 persons	18	*25*
4 persons	24	*33*
5 persons	30	*41*
6 persons	36	*49*

7 Calculation of Areas for Nutrient Assimilation

Additional to the area required for the hydraulic loading on the land application area, t\he designer may either show calculations performed for assimilation of nitrogen and phosphorus based upon soil laboratory data, or may use Tables C7A, C7B and C7C.

Table B7A – Areas for Effective Nitrogen Utilisation –Primary Treatment

Daily wastewater volume (L)	Annual nitrogen load (kg)	**Area for nitrogen utilisation (m^2)**
2 bedrooms	5.1	**170**
3 bedrooms	6.8	**225**
4 bedrooms	8.5	**285**
5 bedrooms	10.2	**340**

Calculation accounts for 40% denitrification processes in the soil
See "Primary" and "Secondary" in Part A - Definitions

Table B7B – Areas for Effective Nitrogen Utilisation –Secondary Treatment

Daily wastewater volume (L)	Annual nitrogen load (kg)	**Area for nitrogen utilisation (m^2)**
2 bedrooms	2.1	**70**
3 bedrooms	2.8	**95**
4 bedrooms	3.5	**120**
5 bedrooms	4.2	**140**

Calculation accounts for 40% denitrification processes in the soil

Table B7C – Area Required for the Plant and Soil Assimilation of Phosphorus

Daily wastewater volume (L)	Annual phosphorus load (kg)	**Area for phosphorus utilisation (m^2) 3000 kg/ha P sorption**	**Area for phosphorus utilisation (m^2) 6000 kg/ha P sorption**
2 bedrooms	1.4	**155**	**95**
3 bedrooms	1.8	**200**	**120**
4 bedrooms	2.3	**255**	**155**
5 bedrooms	2.7	**300**	**180**

**NOTE: Soils on Granites, for all alluvial soils use P value of 3000 kg/ha, For soils on sediments and basalts use 6000 kg/ha together with 30 kg P/ha for plant assimilation*

For higher P sorption values, a further calculation will be required, that will result in a smaller area. Such calculations are to be supported by laboratory analysis of P sorption capacity.

Additional Phosphorus Calculation

The phosphorus load to the land application area may be assimilated by the grasses as shown in Table B7C and a soil binding capacity referred to as the phosphorus sorption capacity. This unique property of soil is related to its mineralogy and can only be measured in the laboratory. The effect of this phosphorus sorption capacity is that phosphorus that is excess to plant requirements may be

stored permanently in the soil and so prevent leakage of the phosphorus to the wider environment. Clay soils have varying degrees of phosphorus sorption capacity from extremely high (red soils of Dorrigo) to moderate (black soils in drainage lines). Sandy soils have only a limited phosphorus sorption capacity and may present significant leakage unless the level of phosphorus in the wastewater is minimised.

Reducing Nutrient Loads

The actual nutrient loading is dependent on the user of that system. To minimise environmental impact users should ensure food scraps and other kitchen wastes are not placed into the wastewater system but composted separately to minimise nitrogen levels. Phosphorus mainly results from the human diet and laundry products. To reduce the levels of phosphorus entering the drain field area, laundry products should be selected that are low in phosphorus. labelled P for no phosphorus and NP for no added phosphorus

Also, an important issue is the reduction of sodium levels flowing to the drain fields. Lower levels can be achieved by avoiding sodium rich laundry products.

8 Calculation of Total Nutrient Assimilation Area

Figure 4 represents a standard design layout for a septic tank and three absorption trenches in parallel. An alternative is to have the outflow line from the septic tank directed to the first absorption trench and then each absorption trench is interconnected at the opposite end to the inflow point as a series. The latter allow the effluent to drain from one trench to the next.

Another alternative configuration is to run the effluent into the centre of the first trench and the overflow to the centre of the next and subsequent trenches. Each of these methods is acceptable, and will often depend upon the preference of the installing plumber.

Other configurations are given in Section 3.5 of the Policy

An approximation for the total nutrient absorption area can be calculated using the total wetted area around the outside perimeter of the trenches. This area often forms part of the buffer zone. A simple calculation is shown in Figure 4 with typical results in Table B8.

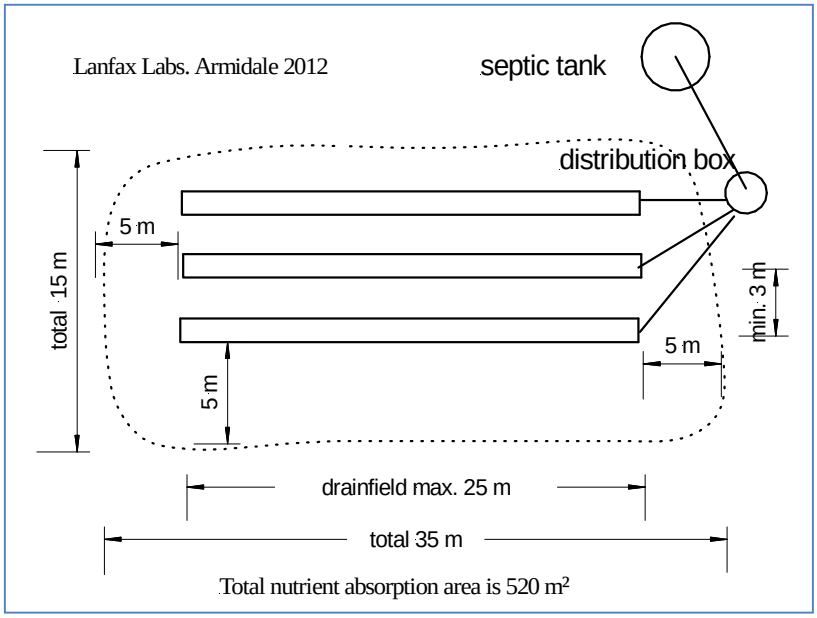


Figure B4: Nutrient assimilation area around trenches

Table B8 - The Nutrient Absorption Area Trench Systems

Configuration of trenches	Total assimilation area (m^2)
Single trench (20-25 m total)	265
2 parallel trenches (40-50 m total)	390
3 parallel trenches (60-75 m total)	520
4 parallel trenches (80-100 m total)	645

9 Reviewing Size of Land Application Area

The areas determined for hydraulics and nutrients, using the tables in this appendix, may now require modification so that the largest area becomes the design area.

EXAMPLE: *Suppose that the following areas were determined from the water balance, the soil texture and the nutrient area requirements, for three bedrooms (probable occupancy = four persons) on a medium clay in Armidale, utilising rainwater supply and discharging wastewater to a septic tank draining to absorption trenches.*

Total length of trenches	*= 64 m*	*(Table B6A)*
Number of trenches required	*= 3 @ 22 m*	
Area around the trenches	*= 520 m^2*	*(Table B8)*
Area required for nitrogen assimilation	*= 225 m^2*	*(Table B7A)*
Area required for phosphorus assimilation	*= 200 m^2*	*(Table B7C)*

Is the area around the trenches greater than both the area required for nitrogen and phosphorus?

If the answer is "YES" then the calculation for the number of trenches and the total length is correct.

Table B9 – Field Texture Classification

Group	Field Texture Grade		Behaviour of moist bolus	Ribbon length (mm)	Approx. clay content %
Category 1	**S**	Sand	coherence nil to very slight, cannot be moulded; sand grains of medium size; single sand grains stick to fingers	nil	< 5%
	LS	Loamy sand	slight coherence; sand grains of medium size; can be sheared between thumb and forefinger to give minimal ribbon of about 5 mm; discolours fingers with clay stain	about 5	about 5%
	CS	Clayey sand	slight coherence; sand grains of medium size; sticky when wet; many sand grains stick to fingers; will form minimal ribbon; discolours fingers with clay stain	5-15	5% to 10%
Category 2	**SL**	Sandy loam	bolus coherent but very sandy to touch; will form ribbon; dominant sand grains of medium size and are readily visible	15-25	10% to 20%
	FSL	Fine sandy loam	Bolus coherent; fine sand can be felt and heard when manipulated; will form ribbon; sand grains are clearly visible under a hand lens	15-25	10% to 20%
Category 3	**L**	Loam	bolus coherent and rather spongy; smooth feel when manipulated but with no obvious sandiness or "silkiness"; may be greasy to touch if much organic matter present;	25	about 25%
	SiL	Silt loam	coherent bolus, very smooth to silky when manipulated, will form ribbon	25	about 25%, silt 25%
	SCL	Sandy clay loam	strongly coherent bolus, sandy to touch; medium size sand grains visible in finer matrix; will form ribbon	25-40	20% to 30%
Cat	**CL**	Clay loam	coherent plastic bolus, smooth to manipulate;	40-50	30% to 35%

	SiCL	Silty clay loam	Coherent smooth bolus, plastic and silky to touch	40–50	30-35, >25%silt
	FSCL	Fine sandy clay loam	coherent plastic bolus, fine sand can be felt and heard when manipulated	40-50	30% to 35%
Category 5	**SC**	sandy clay	plastic bolus. Fine to medium sand can be seen, felt or heard in clayey matrix	50-75	35% to 40%
	LC	Light clay	plastic bolus; smooth to touch; slight resistance to shearing between thumb and forefinger	50-75	35% to 40%
	LMC	Light medium clay	plastic bolus; smooth to touch; slight to moderate resistance to ribboning shear	75	40% to 45%
Category 6	**MC**	medium clay	smooth plastic bolus; handles like plasticine and can be moulded into rods without fracture; has moderate resistance to ribboning shear	> 75	45% to 55%
	HC	heavy clay	smooth plastic bolus; handles like stiff plasticine; can be moulded into rods without fracture; has firm resistance to ribboning shear	> 75	50% +

Source: *McDonald, R.C., Isbell, R.F., Spreight, J.G., Walker, J and Hopkins, M.S. (1990) Australian Soil and Land Survey: Field Handbook. Second Edition. Inkata Press, Melbourne. Also Northcote (1979).*

Clay *confers cohesion, stickiness and plasticity to the bolus.*

Silt *confers silkiness.*

Organic matter *makes sandy soils feel cohesive and clay soils feel greasy.*

10 Aggregate Stability Test

The Emerson's Aggregate Stability test was developed for agricultural purposes. The initial part of the test simply involves placing air-dried peds (3-5 mm) into distilled water, or irrigation water. The results reflect the behaviour of that soil in a natural state. The second part of the test requires the remoulding of soil into a moist ball of about the same size as the original peds and testing these. These results reflect the likely behaviour of soils when they are mechanically ploughed while wet. Since we do not manipulate soils in constructing land application areas for effluent disposal, the second and subsequent parts of the Emerson test are irrelevant.

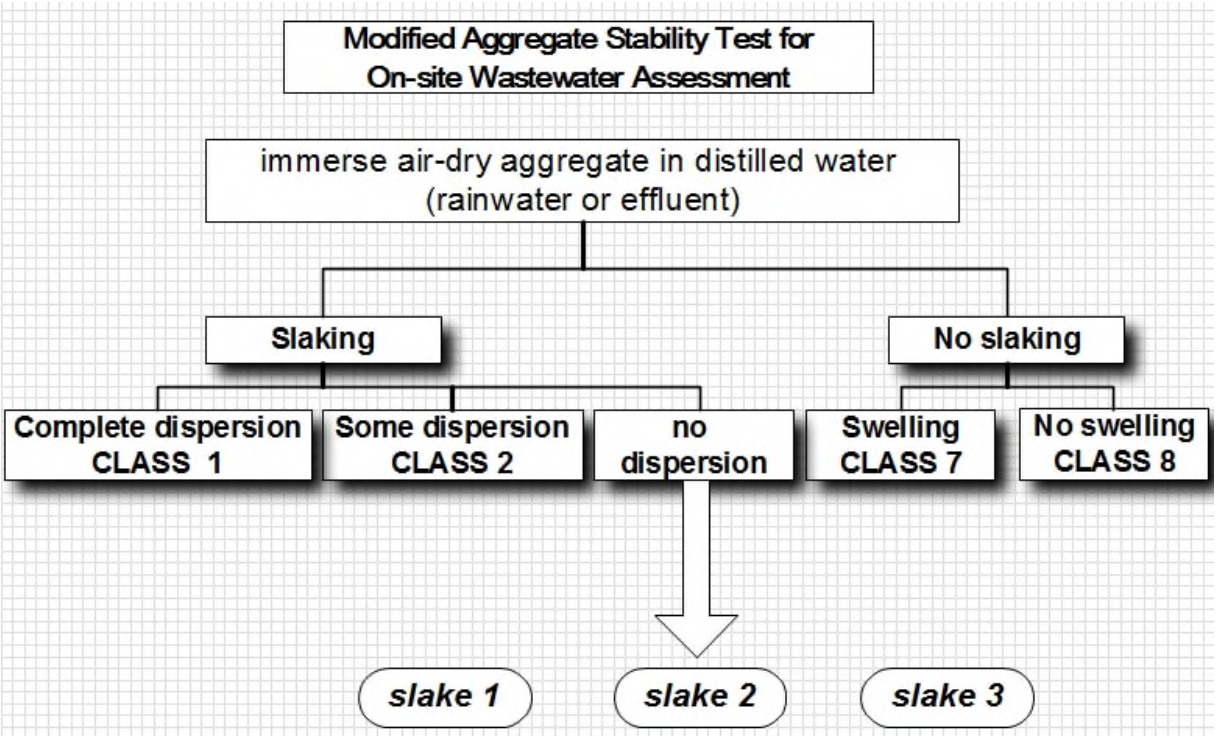


Figure 5: Modified Emerson Aggregate Test

The results of the modified Emerson test are simply reported as shown in the figure above.

*NOTE: **Slaking** is simply the loss of structural stability when the ped is placed in water. This slaking occurs because of absence of strong organic residues to glue the soil particles together. Surface soils are likely to be non-slaking, while most subsoils slake because of low levels of organic residues. Slaking is not a deterrent to land application of effluent.*

Dispersion occurs when the soil firstly slakes and then individual clay particles become suspended in the water, forming a cloud around the slaked ped. Some dispersive soils may be rectified by incorporating either gypsum or agricultural lime. Hence, the treatment land application areas with annual doses of lime or gypsum may be beneficial on susceptible soils.

Depending upon the quality of the effluent, in relation to its sodium adsorption ratio, effluent may be effective in minimising dispersion. Dispersive soils should be retested with a water of similar quality to the effluent.

Table B10 – Recommended Design Loading Rates for Trenches and Beds

Soil category	Soil texture	Structure	Indicative permeability (K_{sat})(m/d)	Design loading rate (DLR) (mm/d)			
				Trenches and beds			ETA/ETS beds and trenches
				Primary treated effluent		Secondary treated effluent	
				Conservative rate	Maximum rate		
1	Gravels and sands	Structureless (massive)	> 3.0	20 (see Note 1)	35 (see Note 1)	50 (see Note 1)	(see Note 4)
2	Sandy loams	Weakly structured	> 3.0	20 (see Note 1)	30 (see Note 1)	50 (see Note 1)	
		Massive	1.4 – 3.0	15	25	50	
3	Loams	High/ moderate structured	1.5 – 3.0	15	25	50	
		Weakly structured or massive	0.5 – 1.5	10	15	30	
4	Clay loams	High/ moderate structured	0.5 – 1.5	10	15	30	12
		Weakly structured	0.12 – 0.5	6	10	20	8
		Massive	0.06 – 0.12	4	5	10	5
5	Light clays	Strongly structured	0.12 – 0.5	5	8	12	8
		Moderately structured	0.06 – 0.12	(see Notes 2 & 3)	5	10	5 (see Notes 2, 3, & 5)
		Weakly structured or massive	< 0.06			8	
6	Medium to heavy clays	Strongly structured	0.06 – 0.5				
		Moderately structured	< 0.06				
		Weakly structured or massive	< 0.06				

NOTE: The treatment capacity of the soil and not the hydraulic capacity of the soil or the growth of the clogging layer govern the effluent loading rate in Category 1 and weakly structured Category 2 soils. Land application systems in these soils require design by a suitably qualified and experienced person, and distribution techniques to help achieve even distribution of effluent over the full design surface (see L6.2 and Figure L4 for recommended discharge method by discharge control trench). These soils have low nutrient retention capacities, often allowing accession of nutrients to groundwater.

To enable use of such soils for on-site wastewater land application systems, special design requirements and distribution techniques or soil modification procedures will be necessary. For any system designed for these soils, the effluent absorption rate shall be based upon soil permeability testing. Specialist soils advice and special design techniques will be required for clay dominated soils having dispersive (sodic) or shrink/swell behaviour. Such soils shall be treated as Category 6 soils. In most situations, the design will need to rely on more processes than just absorption by the soil.

If K_{sat} < 0.06 m/d, a full water balance for the land application can be used to calculate trench/bed size.

ETA/ETS systems are not normally used on soil Categories 1 to 3.

For Category 6 soils ETA/ETS systems are suitable only for use with secondary treated effluent

Table B11 – Recommended Design Irrigation Rates (DIR) for Irrigations Systems

Soil Category (see Note 1)	**Soil texture**	**Structure**	**Indicative permeability** (K_{sat}) (m/d)	**Design irrigation rate (DIR)** (mm/day)		
				Drip irrigation	**Spray irrigation**	**LPED irrigation**
1	Gravels and sands	Structureless (massive)	> 3.0	5 (see Note 2)	5	(see Note 3)
2	Sandy loams	Weakly structured massive	> 3.0			4
			1.4 – 3.0			
3	Loams	High/ moderate structured	1.5 – 3.0	4 (see Note 1)	4	3.5
		Weakly structured or massive	0.5 – 1.5			
4	Clay loams	High/ moderate structured	0.5 – 1.5	3.5 (see Note 1)	3.5	3
		Weakly structured	0.12 – 0.5			
		Massive	0.06 – 0.12			
5	Light clays	Strongly structured	0.12 – 0.5	3 (see Note 1)	3	2.5 (see Note 4)
		Moderately structured	0.06 – 0.12			
		Weakly structured or massive	< 0.06			
6	Medium to heavy clays	Strongly structured	0.06 – 0.5	2 (see Note 2)	2	(see Note 3)
		Moderately structured	< 0.06			
		Weakly structured or massive	< 0.06			

NOTE:

1 *For Category 3 to 5 soils (loams to light clays), the drip irrigation system needs to be installed in an adequate depth of topsoil (in the order of 150 – 250 mm of in situ or imported good quality topsoil) to slow the soakage and assist with nutrient reduction.*
2 *For Category 1, 2, and 6 soils, the drip irrigation system has a depth of 100 – 150 mm in good quality topsoil (see CM1 and M3.1).*
3 *LPED irrigation is not advised for Category 1 or Category 6 soils – drip irrigation of secondary effluent is the preferred irrigation method.*
4 *LPED irrigation for Category 5 soils needs a minimum depth of 250 mm of good quality topsoil (see M5 and CM7.1).*

Source: AS/NZS 1547:2012 Table M1 (page 160)

APPENDIX C

Appropriate Landscape Plants for Land Application Areas

Note: While much public issue has been made about native plants and their susceptibility to phosphorus from domestic effluent, other than plants the family of *Proteacea* (Banksias, Hakeas), native plants require phosphorus for growth. The issue with laundry detergents is the sodium concentration that may seriously affect all plants other than highly salt tolerant species. When in doubt about sodium, liquid laundry detergents are generally the lowest sodium products.

VEGETATION SUITABLE FOR LAND APPLICATION AREAS IN THE ARMIDALE REGION

Botanical Name	Approx Height	Common Name/Variety
Grasses		
Microlaena stipoides		
Pennisetum alopercuroides	40-80cm	Available as lawn turf
Poa lab		
Stipa spp.		

Ground cover/climbers		
Handenbergia		
Hibbertia scandens		Snake vine
Hibbertia stallaris		
Isotoma fluviatilis	Prostrate	
Scaevola albida		
Scaevola ramosissima		
Veronica plebeian		
Viola hederacea		Native violet

Sedges/Grasses/Small Plants		
Anigozanthus flavidus	2m	Kangaroo Paw
Baumea juncea	Sedge	
Bumea nuda	Sedge	
Baumea rubiginosa	Sedge	
Blandfordia grandiflora	30-90cm	Christmas Bell
Brachyscome diversifolia	Clump	Native Daisy
Carex appressa	Sedge	
Crinum pedunculatum	<2m	Swamp Lily
Cperus polystachyos	Sedge	
Dianella caerulea	Low plant	Blue Flax Lily
Epacris microphylla	50cm – 1m	
Gahnia spp.	Tall Grass	
Juncus spp	0.5m Rush	
Lomandra spp.	Grass	
Patersonia fragilis		Native Iris
Patersonia glabrate		Native Iris
Ranunculus graniticola	5cm	
Restio australis	Reed	
Tetratheca juncea	<30cm	
Viola hederacea		
Xyris operculate	<1m	Tall Yellow Eye

Shrubs		
Agonis flexuosa nana		
Baekea linifolia	1 – 2.5m	
Baekea utilis	1 – 2.5m	
Banksia aemula	1 – 7m	
Callistemon	1 – 2.5m	Red Clusters
Callistemon linearis	1 – 3m	
Callistemon salignus	3 – 10m	
Callistemon seeberi	1.5 – 2m	
Callistemon-shrub s-Citrina		
Callistemon viminalis	1 – 2m	Captain Cook
Correa alba		
Goodenia ovata	1 – 1.5m	
Euphorbia millii		
Hebe speciosa		
Jasminium officinale 'Grandiflorum'		
Kunzea capitata	1 – 2m	
Leptospermum flauesceni		
Leptospermum flavescens	<2m	Tea-tree
Leptospermum juniperinum	1m	Tea-tree
Leptospermum squarrosum	<2m	Tea-tree
Melaleuca deucssata	1 – 2 m	Cross-leaved honey myrtle
Melaleuca lanceolata	4 – 6m	
Melaleuca squamea	1 – 2m	
Melaleuca thymifolia		
Thunbergia alatra		
Westringa fruitcoa		

Trees		
Acacia elongata	>2m	
Acacia floribunda	2 – 4m	Gossamer wattle
Agonis flexuosa	1.5m	
Allocasuarina paludosa	0.5 – 2m	
Banksia intergrifolia		
Casuarina cunninghamiana	10 – 30m	River she-oak
Casuarina glauca	6 – 12m	Swamp oak
Hakea salicifolia		
Hakea saligna		
Leptospermum laeviegatum		
Melaleuca armillaria (sandy soil)		Sandy Soil
Melaleuca ericifolia	6m	
Melaleuca linariifolia (clay soil)	4 – 8m	Snow in summer
Melaleuca squarrosa	6m	

APPENDIX D

Examples of Current On-site Wastewater Management Systems

Refer to NSW Health website for accredited systems as required by Clause 41 (1) of the Local Government (General) Regulation 2005.

All new commercially available domestic wastewater treatment devices must be approved by the Director General of NSW Health and are subject to the requirements of such an approval.

Systems that are specifically designed for a particular lot may be exempt from Clause 41 (1), but off-the-shelf items such as septic tanks must be accredited.

Effluent distribution areas and reuse systems require only Council approval.

The current Australian and New Zealand Standard 1547 has a wealth of details of domestic wastewater management issues, but this POL 225 takes precedence over the Standard.

1 Selecting an Appropriate Wastewater System

An on-site wastewater system is installed where the house or commercial building cannot connect to a municipal sewer. Follow the process in Regulatory Section, Figure 2.1 to select an appropriate wastewater treatment system.

The aim of on-site wastewater management is to treat the domestic wastewater to a quality that permits the disposal of the effluent (treated wastewater) on the same allotment on which it was generated. That simply means 'treat for purpose' rather than treat to the highest standard possible.

2 Effective Operation of an On-Site Wastewater System

The most simplistic and traditional method of on-site wastewater treatment is through a septic tank and subsurface drain field (trenches). While other systems such as compost toilets and greywater irrigation have also been around for decades, recent innovations into the single or dual tank secondary treatment system have been popular where site constraints are not conducive to the traditional method. This section examines some of the options available but the selection is not limited to what is presented here.

3 Primary Treatment

A septic tank is a simple form of primary treatment system where all the wastewater generated in the home is directed to a single in-ground tank. That tank may be a single chamber, but preferably a baffled double chamber where the volumetric ratio is 2:1. Wastes flow into the larger chamber under gravity, and the effluent leaves the tank under gravity flow as shown in Figure E1. The invert (bottom of pipe) of the inlet is higher than the invert of the outlet, so that the house waste pipe always empties. Septic tanks in NSW must carry the Standards Australia certification and be approved by NSW Health.

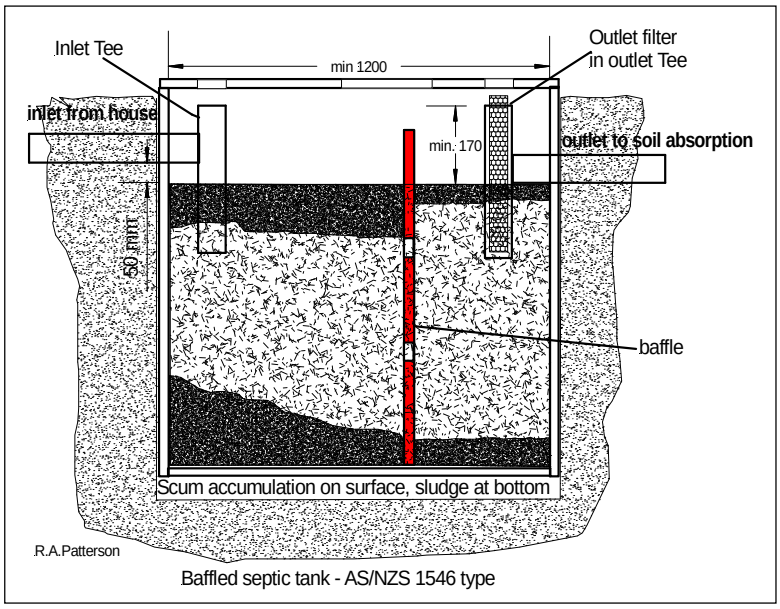


Figure D1: Typical cross section of approved septic tank

Operation of Septic Tank

The homeowner needs to understand that the septic tank is not a repository for all wastes that can be flushed down the toilet, disposed of through the kitchen sink, or treated with large volumes of water and laundry chemicals. The septic tank has limitation to what it can treat.

The clear volume in a septic tank, the lightly shaded areas in Figure D1, is sized to provide at least one day's wastewater volume. Exceeding that volume will cause solids to pass over into the drain fields and block the absorption field.

When solids enter the septic tank from toilet flush, kitchen sink, or bathroom drains, the solids break up and the less dense material floats to the surface to create a scum layer. Material more dense than water sinks to become sludge. By minimising the solids that enter the tank, the longevity of the effective operation of the anaerobic conditions can be maintained and the period between pump-outs extended. The scum is an essential part of the anaerobic (without oxygen) operation of the tank. This scum should be at least 50 mm thick and dry on the surface.

Maintenance of the Septic Tank

Periodic maintenance of the septic tank requires that the outlet filter, if fitted, is cleaned regularly (at least six monthly) by hosing the filter into the inlet access point of the tank.

At least annually, the scum layer should be checked to ensure that the depth of scum does not restrict the outflow of effluent. At least every three to five years, the septic tank may need to be pumped out by a licensed waste contractor; longer periods may apply when the system is loaded lightly. A septic tank does not require pumping-out just because it has a surface scum, it is the depth of the scum that indicates whether a pump-out is required.

A check that stormwater does not enter either the plumbing system or from the ground surface into the tank is imperative. The septic tank is unlikely to function correctly when overloaded by stormwater inflows. The size of the septic tank is selected on the daily volume of wastewater produced, with an allowance for scum and sludge build up over time.

Contingency Plans for Septic Tanks

As a minimum, the homeowner should be aware of the location of the septic tank and observe that the wastes are not coming out of the inspection ports, that the lid is not broken or the outlet filter is blocked causing the effluent to escape from the tank rather than through the outlet to the trenches.

In the event that the septic tank is overflowing or has been damaged, the homeowner should contact a licensed plumber and arrange for urgent repairs.

NOTE: The homeowner is legally required to maintain the on-site wastewater system according to the Approval to Operate and the principles of this Policy.

4 Secondary Treatment

When the receiving environment for the effluent is confined by a relatively small area, by proximity to environmentally sensitive areas, over shallow groundwater sites, or where the effluent may have a beneficial use as irrigation water, a secondary treatment process is added after the primary treatment, prior to land application of the effluent.

Simply, the secondary treatment is any process that will further reduce the biochemical oxygen demand (BOD), the total suspended solids, and the potential for bacterial contamination (through disinfection). Some secondary systems require electrical energy, others are passive (gravity systems) but almost all irrigation systems require pumping.

Aerated Wastewater Treatment Systems (AWTS)

These systems are engineered systems that have several compartments apart from the primary treatment chamber. The additional chambers are used for aeration, clarification, and irrigation in that order. Only AWTS that have been approved by NSW Health can be installed in NSW.

In the aeration chamber, air is added through a small compressor (240V or solar) and delivered through minute orifices at the bottom of the chamber. As fresh primary treated water displaces the aerated water, it overflows into a clarification chamber where solids settle as sludge and are later returned to the primary tank. Overflowing effluent from the clarification chamber passes over chlorination tablets and enters an irrigation chamber. From here the water is pumped to the irrigation field.

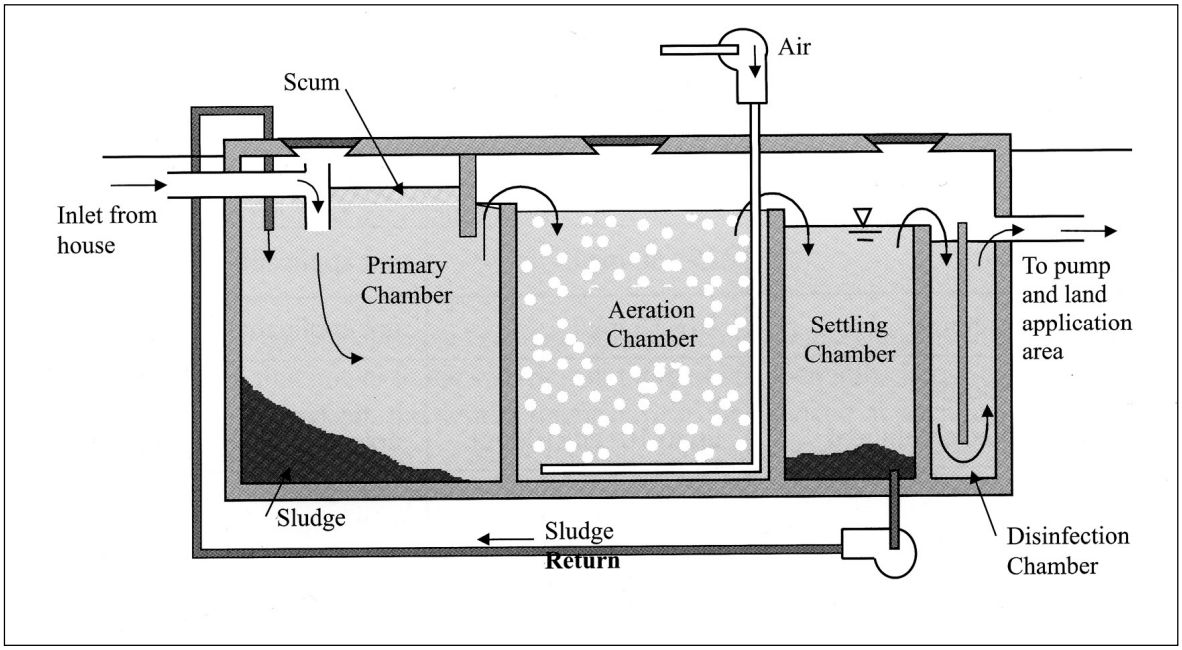


Figure 2: Cross section of typical aerated wastewater treatment systems (Source; DLG et al. 1998)

Operation of AWTS

The AWTS is designed to take all wastewater from the home and treat through the primary and secondary system to produce an effluent of a quality that has a BOD < 20 mg/L and TSS < 30 mg/L. To meet this performance, it is imperative that the system be protected from overloading by excess solids or large volumes of wastewater in the same way that the septic tank was managed.

The householder needs to understand the operation of the AWTS, have access to an operations manual and be aware of the alarm system that operates when the system is failing.

The restrictions that apply to what can be disposed of into a septic tank apply to an AWTS. Reducing the solids load and conserving water use are essential to the effective operation of all on-site systems.

Maintenance of AWTS

When Council approves the installation of an AWTS, the system may not be operated until:

1. The owners have a quarterly service contract, with an appropriately trained service operator, for a period of at least two years; and

2. The irrigation system must be installed ready to operate, with the grasses or vegetation already planted.

The service agent is required to provide a copy of the quarterly service report to the owner and a copy to Council within 14 days of the service supplied. Any defects will be rectified and a further report provided to Council as to that effect.

Contingency Plans for AWTS

The home owner needs to be aware that the AWTS has an alarm fitted to warn of pump or aerator failure within the AWTS. Failure of either or both of these mechanical systems will lead to production of a low quality wastewater than may lead to clogged irrigation fields. In worse cases, the failure may lead to an overflow of the system and a discharge of untreated water onto the surface around the AWTS.

The house owner, or occupier, needs to have the contact details to the local service agent so that the system may be rectified as soon as possible. Delaying repairs may result in more expenses than may otherwise occur. Failure of the system may also infringe the Approval to Operate and results in Council orders to repair.

5 Constructed Wetlands

Operation of a Constructed Wetland

Davison (2001) suggests that disposing of effluent, after treatment, in reed beds provides:

- Filtering action, thus reducing the risk of downstream clogging by suspended solids;
- Odour reduction by virtue of the removal of biochemical oxygen demand, (BOD);
- Some disinfection (but usually not sufficient to achieve the 30 cfu/100 mL faecal coliform concentration necessary to allow above ground irrigation;
- Phosphorus removal for a limited time (depending on P loading and media material)
- Nitrogen removal; and
- Minimal risk of mosquito breeding and direct human contact because water flows below media surface.

The two common types of systems are free water surface (typically shallow ponds with reeds and rushes) and subsurface flow wetland or reed beds (contains gravel supporting aquatic macrophytes).

Sizing of a Constructed Wetland

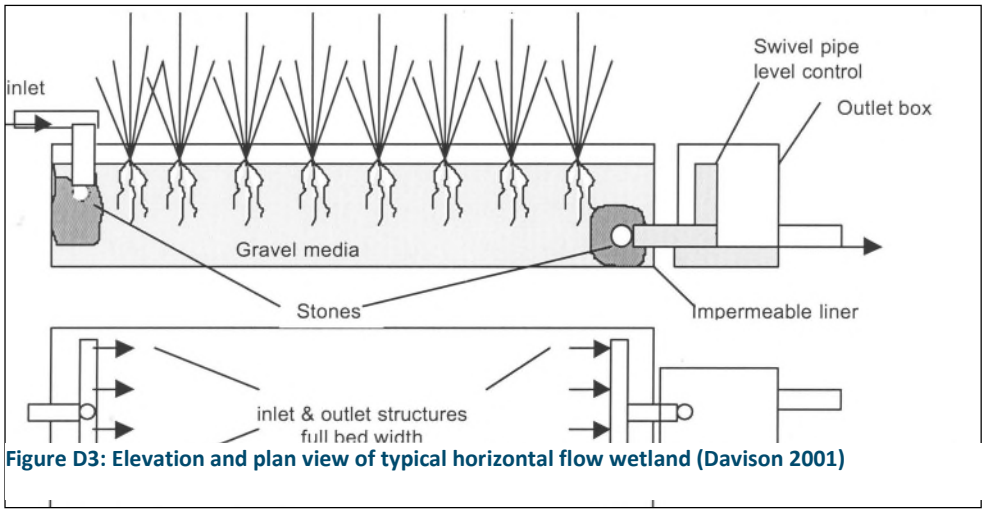


Figure D3: Elevation and plan view of typical horizontal flow wetland (Davison 2001)

Davison (2001) suggests that for a dwelling generating 500 L of wastewater per day, the approximate dimensions of a subsurface flow wetland are 6.3m x 2m or two beds in parallel, with a depth of 0.5m. Normally reed beds require minimal maintenance and the reeds may be harvested as a source of mulch.

Maintenance of Constructed Wetland

Periodic maintenance of the wetland plants to maintain their vigour is required by removing excess vegetation and dead plant material. The maintenance of the primary treatment system is imperative to reduce the solids carry-over. Excess effluent will need to be irrigated onto land.

6 Single Pass Intermittent Sand Filters

Operation of Sand Filters

Sand filters provide additional treatment to septic tank effluent prior to surface or subsurface soil absorption. Sand filters may be built above ground or below ground to suit the location and landscape conditions. Septic tank effluent should be pressure-dosed to the sand filter to provide even distribution of the effluent over the top of the sand filter.

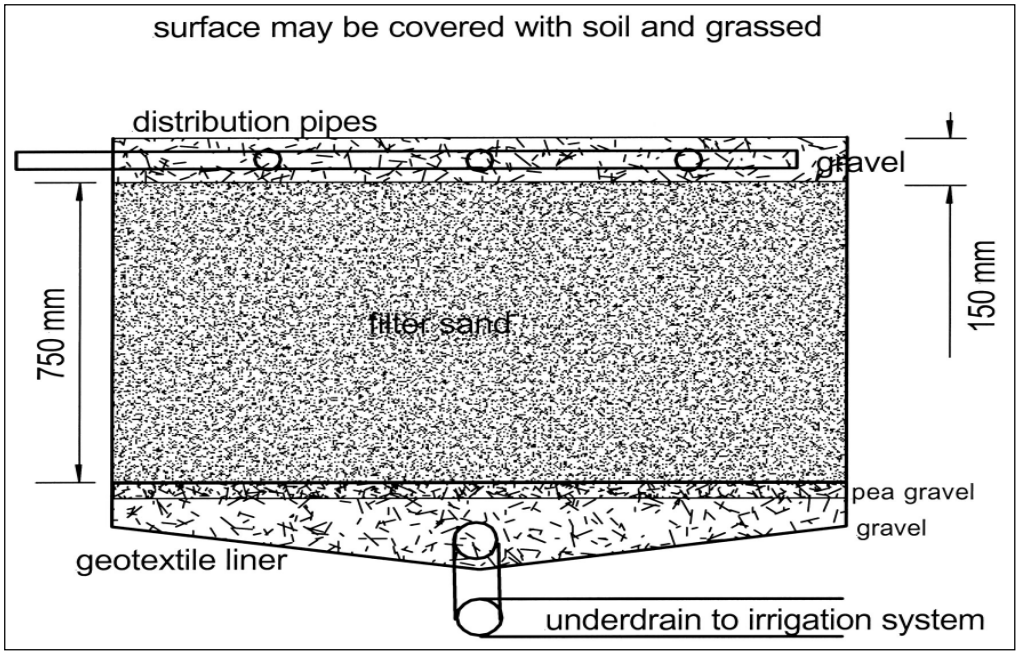


Figure D4: Typical domestic sand filter providing secondary treatment

Design Specifications:

Hydraulic loading rate: Less than 50 L m^{-2}.day (50 mm per m^2 per day)
Filter sands: Effective size 0.25 to 0.75 mm, uniformity coefficient <4
Dosing frequency: 12 - 48 times per day

Multiple Pass Sand Filters

Where portion of the effluent is routed back into the sand filter for a second or a third pass, additional treatment occurs that reduces the nitrogen load. Only by recirculating the effluent can nitrogen be removed.

Recirculating sand filters are no larger than single stage filter, but require a different configuration to the plumbing with an additional pump.

Maintenance of Sand Filters

Sand filters require minimal maintenance but they do require vigilance over the solids-carryover from the primary treatment system and maintenance of the pumps and distribution network.

7 Other Secondary Treatment Systems

The operational process of primary followed by secondary treatment can employ a range of active and passive treatment processes in the secondary phase. Since the secondary phase requires aerobic treatment and further solids removal, any process that can maximise these treatments is likely to produce a high quality effluent.

In Figure D5, the aeration and clarification chambers could effectively be replaced by:

- Wetland (horizontal or vertical flow)
- Sand filter (single pass or recirculating)
- Peat filter
- Mound
- Fabric filter

The operation, maintenance and contingency plans for each of these systems needs to protect the specific processes that result in secondary effluent, unique to each system.

Irrespective of the system, a general respect of the loading of the system by reducing solids and liquid loads on the primary treatment system will contribute to the longevity of the secondary system and the production of high quality effluent. Without adequate maintenance, no system will work forever and the more complex the system, the more rigorous the maintenance.

Each of the systems will have a unique set of operating conditions, maintenance procedures and contingency plans.

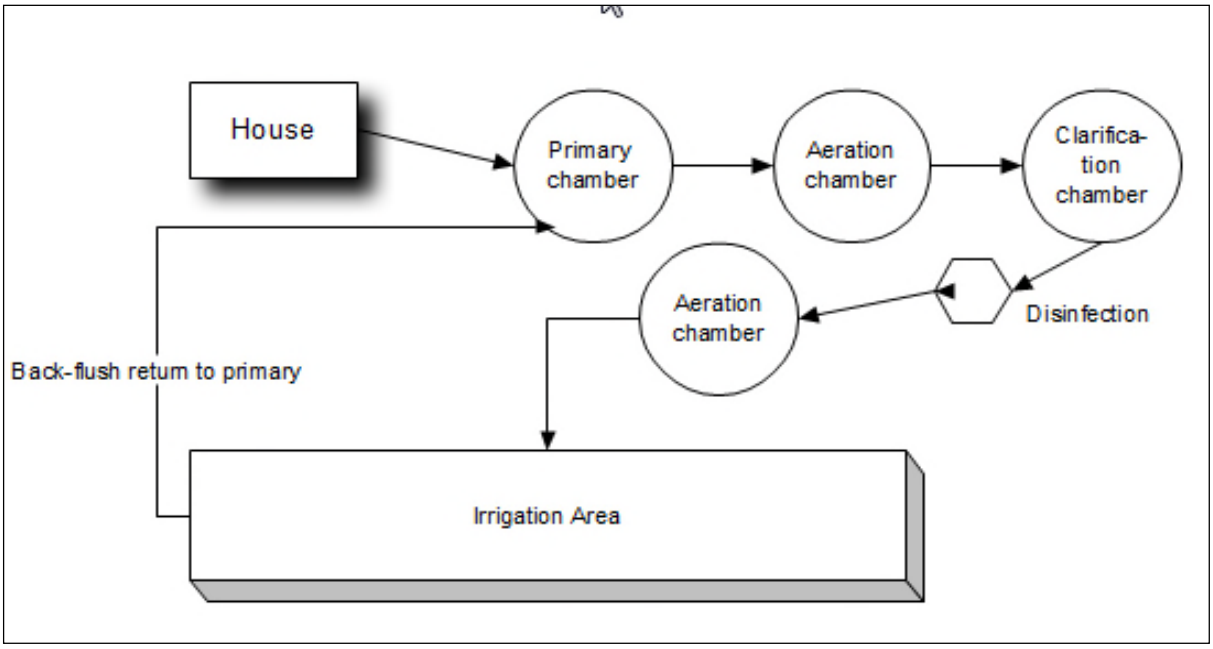


Figure D5: Typical layout of components in an aerated wastewater treatment system

8 Septic Tank Outlet Filters

Outlet filters – Several types of commercially available outlet filters can be retro-fitted to an existing primary treatment tank (septic tank). These filters reduce the carry-over of solids to the soil absorption area that may lead to clogging or failure of these areas. Where surges may be a problem, outlet filter minimises the flow-through of organic or solid matter to the absorption area. In a secondary treatment system, the filter minimises the carry-over of solids into the secondary treatment process.

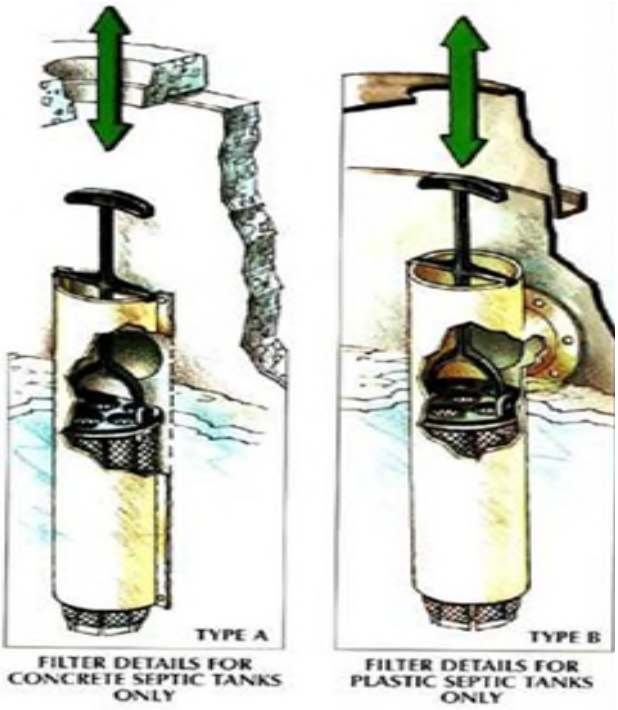


Figure D6: Location of outlet filter in septic tank (Source: www.everhard.com.au)

The above filters are available from Everhard Industries www.everhard.com.au (this is not an endorsement of the product). Similar products by other manufacturers are generally readily available through plumbing stores.

Maintenance of Outlet Filters

These outlet filters require periodic cleaning.

One acceptable method is to remove the filter and hose down the accumulated solids into the inlet access point of the same septic tank. The filters do not need to be really clean, just remove the excess build-up of scum. Some remaining scum on the filter assists the filtering process.

Do not clean with bleach, just water.

Ensure they fit correctly to allow liquid to pass the outlet.

9 Split Wastewater Systems

Operation of Split Systems

Wastewater generation in the home is split between the black water (toilet and kitchen) and the greywater (bathroom and laundry), The toilet wastes are collected in a compost toilet, to which the compostable material from the kitchen may also be directed. The greywater plus the screened water from the kitchen are either diverted (greywater diversion device (GDD)) or treated separately in a greywater treatment system (GTS).

10 Composting Toilets –Waterless

In these systems, toilet wastes pass from the pan down a chute and into a chamber similar in size to a conventional septic tank. All faecal matter and toilet paper and other compostable matter produced in the dwelling, such as vegetable scraps, may be disposed of to this system where it is broken down into compost by natural decomposer organisms. When fully broken down, the compost may not be used in gardens but it must be buried and covered.

A fan connected to a vent pipe produces negative air pressure within the composting chamber. This aims to draw all odours out and away from the toilet pan and the inside of the dwelling. A compost toilet should not have any offensive odour.

Dry composting toilets treat only toilet wastes, and all other liquid wastes from the shower, kitchen and laundry (sullage wastes or greywater) must be disposed of to another system. The composting toilet itself is likely to produce only a small amount of liquid wastes, about one litre per person per day. This watery water will need to be discharge to a small subsurface drain field.

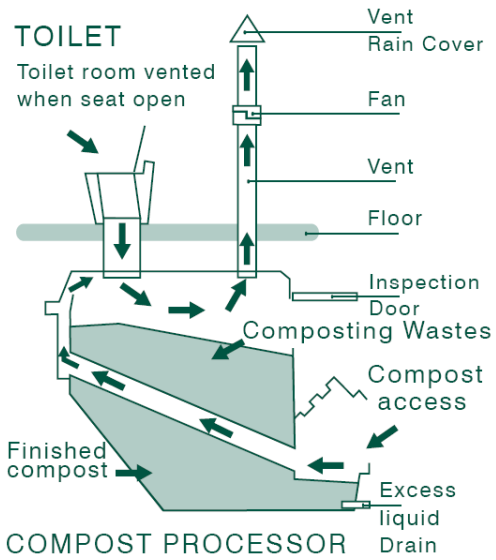


Figure D7: Dry composting toilet (source: www.clivusmultrum.com.au)

This is not an endorsement of the Clivus Multrum. Only certified systems may be installed in NSW. Such systems are detailed on NSW Health Website:
https://www.health.nsw.gov.au/environment/domesticwastewater/Pages/gts.aspx

Maintenance of Compost Toilet

Regular cleaning of the toilet room and pedestal are required as for any toilet.

The carbon to nitrogen ratio in the decomposing heap requires boosting with the addition of a carbon source as organic material, such as wood shavings or sawdust. At least weekly, additional carbon source material needs to be added to the composting wastes.

Drainage from the compost heap needs to be directed to a subsurface drainfield to reduce excess liquid in the compost.

On regular occasions, the compost needs to be removed from the chamber and buried. This compost may not be used for surface spreading or digging into gardens.

The home owner needs to observe the operation of the fan, the addition of carbon source, the drainage of excess liquid at least on a weekly basis. Any odour from the system indicates a problem with the compost heap to which a solution must be found immediately.

Contingency Plan for Compost Toilets

A ready source of carbon needs to be at hand. A spare fan, or access to a replacement fan, is essential.

11 Greywater Diversion and Treatment

Operation of Greywater System

The diversion of greywater is regulated under the Local Government Act. The policy in relation to greywater diversion is set out in Part 2.7 of this Policy. In sewered areas, the re-use of greywater may be carried out without Council approval in certain circumstances but where an on-site wastewater system is in place, the Council requires that an approval to install a greywater diversions device is submitted prior to installation.

A greywater treatment system requires an Approval to Install and an Approval to Operate in the same manner as an all-wastes system is approved.

Maintenance of a Greywater System

Depending upon whether the greywater is diverted or treated, the greywater system will ultimately discharge to a land application area. As for all other land application system, the chemistry of the wastewater and the soil conditions are paramount to effective in-soil treatment and the avoidance of loss of soil structural stability.

Reduced chemical additions to water that will become greywater needs to be addressed. The choice of chemicals that are low in sodium and low in phosphorus are essential.

Any filter attached to a greywater diversion device will required regular cleaning to remove solids and hair that will accumulate, potentially blocking the filter and causing the device to overflow.

A greywater treatment system will require the same maintenance as an all-waste treatment system, including maintenance of adequate aeration and pumps.

Contingency Plans for Greywater Diversion

In the event of excess wet weather, the homeowner needs to have an alternative to discharging the greywater to soils that may be very wet already. In a sewered locality, that contingency will be to discharge the greywater to sewer. In an unsewered area, the greywater may need to be diverted to subsurface drain fields rather than an irrigation area.

12 Filter Boxes and Pump Wells

Upgrading Existing Septic Tanks

Existing septic tanks that discharge effluent by gravity to a subsoil disposal area can be converted to a pressurised subsurface irrigation system (not drip irrigation) by installing a pump well with submersible pump and a pressure dosed convention trench or a Mini-trench. A pressure-dosed system can be installed above the septic tank and several areas can be irrigated by using a sequencing value, such as a K-Rain.

Figure D8: Septic tank flows into a filter tank, then a pump-well

Figure D9: Everhard Pump Well 250/450 L

The filter tank was manufactured by the plumber to remove additional solids from the effluent, additional to a septic tank outlet filter to produce a better quality of effluent for pumping.

The discharge from the filter tank flows into a pump well in which a submersible pump is activated by height of the water. Effluent is pumped to the mini-trench system.

13 Land Application Areas

The land application area is the final repository for the effluent that comes from the treatment system.

Wastewater is the term used for the water flowing from the house to the first treatment tank. From that point on, the water that has passed through a treatment system is called effluent.

Effluent from a primary treatment system has high biochemical oxygen demand (BOD) and high total suspended solids (TSS), high ammonia and high faecal coliforms. This effluent may cause serious health and environmental problems and must be discharged below ground. Although NSW Health in an advisory note states that primary effluent is to be discharged 300 mm below the surface, such a depth may not be appropriate under certain favourable soil conditions.

Effluent from a secondary treatment system has been further renovated by an additional treatment process or several treatments. The effluent has a reduced BOD, reduced TSS, the ammonia has been converted to nitrate and through disinfection with chlorine, the pathogenic bacteria have been reduced. Not all secondary treatment systems employ disinfection (chlorination or ultraviolet).

Where disinfection is used, the effluent may be surface irrigated, although during wet weather such practice may create polluted runoff, particularly for the nitrogen and phosphorus laden effluent.

An effective soil based application area is one that has been examined for its soil properties and the application area matched with the capacity of the soil to further treat the effluent of that quality, adequately percolate and evaporate the effluent and beneficially utilise the nutrients.

14 Traditional Trench Construction

The slots can be cut in the 100 mm PVC pipe with either a circular saw or a cut-off wheel. The slots should be about 3 mm wide and about 250 mm long, oriented along the length of the pipe, and offset from each other. Round holes can become blocked more easily by the aggregate. The pipe should not be socked with geotextile as the fabric will become fouled with a bacterial slime, preventing free drainage.

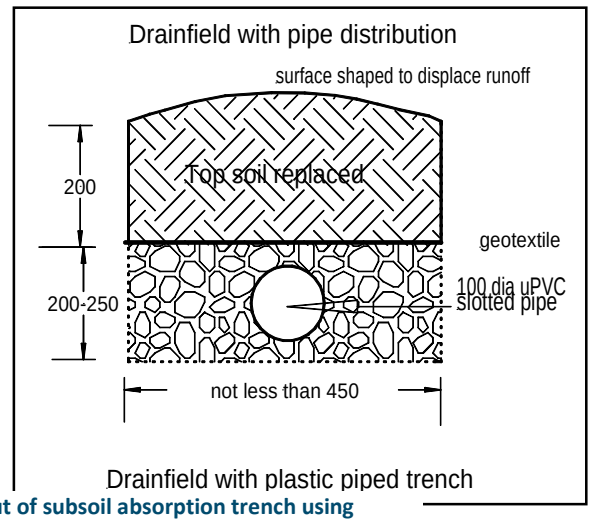


Figure D10: Layout of subsoil absorption trench using slotted pipe

Wet weather storage takes place in the aggregate so that by calculating the relative depth of effluent, all effluent can be contained below ground level when evaporation is low.

The clay subsoil removed during excavation of the trench must not be returned to the trench as backfill. During excavation, topsoil should be placed separately to the subsoil for later replacement over the gravel and geotextile.

The top of the trench must be left mounded to shed some rainfall and allow for consolidation

(settling) over time. Should the surface become a depression over time, the surface should be reshaped to provide for some rainfall shedding.

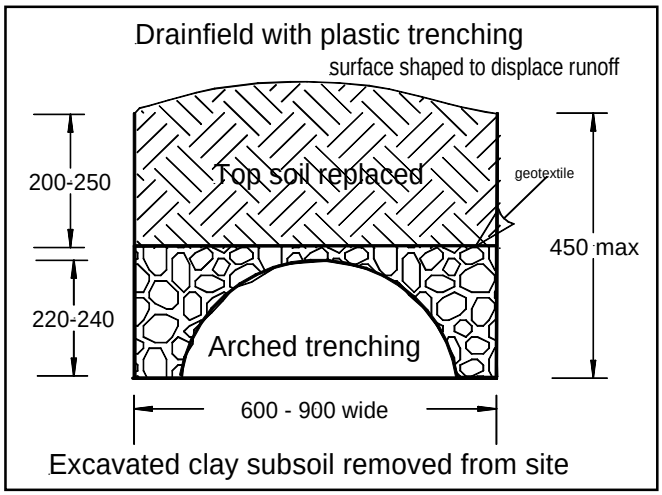


Figure D11: Conventional drainfield using corrugated arched trenching

The width of the trench is determined by the need to maximise evapotranspiration, shallow wide trenches provide greater capacity to lose water by evapotranspiration.

The depth of the trench depends upon the soil horizons. Shallow trenches (450 mm deep) are favoured in preference to deeper one. In some soils, the more permeable horizons may be deeper than 450 mm so trenches up to 900 mm deep may be used. A consideration is that capillary action becomes less efficient with increasing depth.

Three sizes of *Reln Drain™* are available, each 1520 mm long:

410 high by 550 wide; 350 high by 584 wide; and 230 high by 515 wide

NOTE: The higher drains suit the deeper trenches, trenches must be at least 150 deeper than the depth of the trenching.

15 Typical Multi-Trench Layout

Maximum trench lengths of about 20-25m avoid problems with distribution of the effluent. When more than one trench is required, several options for distributing the effluent may be implemented.

The effluent may be directed to either the end of each trench in series, that is the effluent flow from the first to the second and then subsequent trenches as set out in Figure D12. The effluent may be directed to the centre of each trench rather than the end, depending upon the preference of the plumber. In most cases the trenches will need to step down the landscape so that gravity will be the distributing force.

Figure D12: Three trenches in series

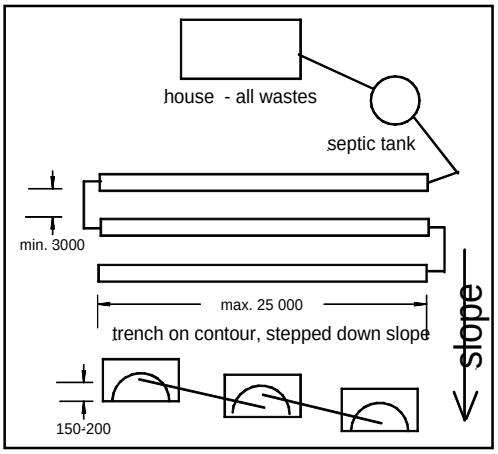


Figure D13: Distribution box – four outlets

Where all the trenches are to be loaded at the same rate, a distribution box will be required for gravity feed systems or a sequencing value where the effluent is pumped to the trenches.

Typical layout of distribution box as set out in Figure D13. The box was custom built by the plumber with an inlet higher than the outlets.

All the outlets are at the same height in the box and direct water to each of the absorption fields. The pipe to each of the absorption fields are not restricted to slope.

The box shown in Figure D16 is approximately 300mm x 300mm. (Illustrated box built by NWWS Tamworth)

The inlet and outlet diameters are chosen to avoid blockage. It is preferable that a septic tank filter is used when a distribution box is required.

16 Guidelines for Excavation of Trench

- Identify correct location for trenches
- Site trenches so bottom of each trench is level with the contour
- Maximum length of any one trench 25 m
- Step two or more trenches down the landscape as shown in previous drawing
- Separate adjacent trenches by at least 3 m centre to centre
- Dig trenches to meet design specifications - shallow trenches better than deep trenches
- Select an arched trenching to suit the depth of the trench
- Trench must be 150 mm deeper than top of the arched trenching
- Topsoil stockpiled separately for later use as backfill
- Clay subsoil to be removed from site and may be used for diversion drain
- Smeared surfaces (shiny surfaces created by the actions of the back-hoe bucket or teeth on wet or damp soil) to be raked or picked from bottom and sides of trench
- Treat surface of trench (sides and bottom) with lime or gypsum at rate of 1 bag (50 kg) per 25 m of trench (cut the top of the back and then distribute using a swinging action to coat the sides and the bottom with lime or gypsum)
- Lay trenching, overlapping as required
- Install end caps to trenching
- Install inlet from septic tank (100 OD) or distribution box (50 OD)
- Backfill to top of trench with gravel or other suitable hard material (<20)
- Cover gravel with geotextile to full width of trench
- Backfill only with topsoil, use subsoil elsewhere
- Leave trench surface mounded to allow for settlement and obvious location of trenches
- DO NOT use the back-hoe to compress the soil into the trench
- The top of the trench should be seeded with a lawn mixture and watered
- Install a diversion bank or cut-off drain upslope of the trench to remove stormwater as required

Figure D14: Lime spreading in trench

It is important that the final landscaping of the trenches needs to make them very obvious by the use of mounding. This serves not only to shed rainfall from the trenches but also identify them for avoidance by any traffic.

Maintenance of Trenches

- Fill depressions and maintain small mound over trench
- Maintain full grass cover
- Mow with light machinery to keep grasses short (short grasses allow better evapotranspiration)
- Remove grass clippings and use as compost or mulch elsewhere
- Keep vehicles and stock off the trench system (area may need to be fenced)
- Divert storm water away from absorption area
- DO NOT plant trees on the absorption area
- Plant small shrubs only away from edge of trench
- Inspect trench by walking over trench and looking for evidence of very wet area that not likely to be caused by rain

NOTE: Lime will increase the pH of the soil. Use on soils with pH less than 7. Gypsum will not affect pH. Use on soils with pH greater than 7.

8 Effluent Drip Irrigation Systems

Operation of Subsurface Drip Irrigation

Subsurface drip irrigation is suitable only for wastewater that has low levels of total suspended solids, that is treated to secondary standard.

Before pumping into the drip line, the effluent must be filtered to less than 150 micron to avoid clogging the emitters. A self-cleaning disc filter can be installed to reduce the need for cleaning. A return line on the drip line is set up as a flush-line which returns any water used for flushing back to the primary chamber of the treatment system. At high spots in the dripline layout, an air-release valve must be installed. A typical layout is set out in Figure 18.

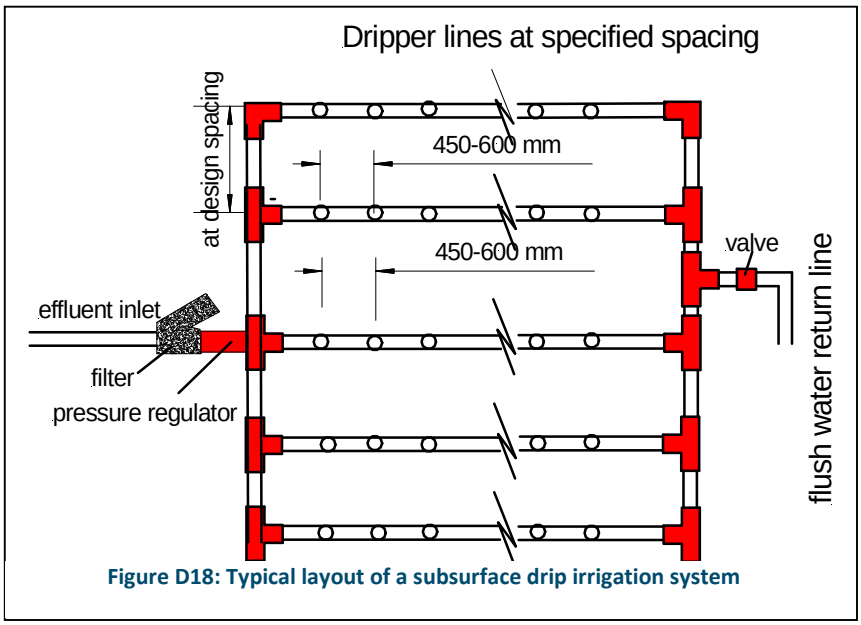


Figure D18: Typical layout of a subsurface drip irrigation system

Maintenance of a Subsurface Drip Irrigation System

The minimum maintenance should check the operation of each of the following component:

- Filter – automatic or manual
- Air-relief valve
- Backflush valve and line return to primary tank
- Pressure compensated drippers
- Pump with appropriate head and flow rate

Sequential Irrigation of Several Areas

Several sequential water distributors are available on the market. These devices operate so that upon each irrigation cycle the effluent is directed to the next outlet in the sequence. This outlet is connected to a different irrigation area as shown in Figure 19. Devices with four, six or eight outlets are commonly used so that by the time the sequence has returned to any one area, the soil has had time to adequately drain and return to unsaturated conditions.

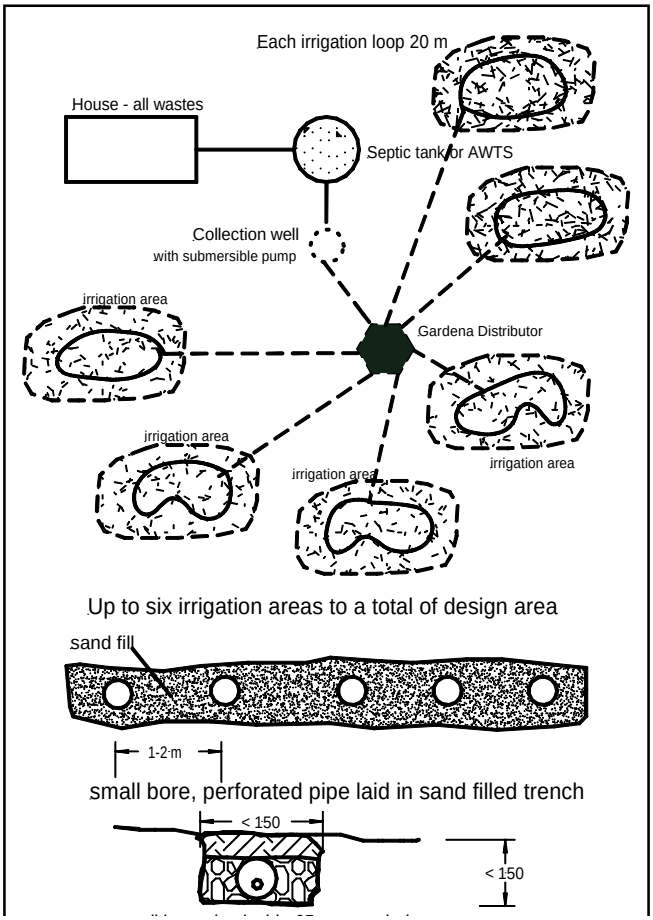


Figure D19: Typical sequential layout of multiple irrigation areas.

Maintenance of Sequencing Value

These valves require a minimum head of about 10 metres to operate and while many are suitable for effluent, excess solids in the effluent may render them ineffective. The home owner will need to observe the irrigation areas to determine whether the valve is operating as intended. A pre-filter will eliminate possible failures.

Table 1 – Water Conservation and Maintenance of an On-site Wastewater System

Kitchen	NEVER USE BLEACH
	Fit aerator to kitchen tap
	Install automatic dishwasher with highest WELS Star rating
	Wash only full loads in automatic dishwasher on economy setting
	Reduce amount of detergent used in dishwasher, avoid powder detergents with fillers
	Use low phosphorus detergents,
	Scrape plates before washing, do not rinse scraps off plate
	Place small strainer over plug hole (purchase at supermarket, about $2)
	Prevent vegetable scraps, peelings, tea leaves, coffee grinds for going down drain
	DO NOT use drain cleaners, harsh detergents
	DO NOT put greases or cooking oils down the drain, remove for composting
	DO NOT install or use a garbage grinder
	Take hot water from tap closest to heater
	Put cold water jug in fridge to avoid running water to get cold water from tap
	Fix leaking taps
Bathroom	Install low-flow pressure reducing shower roses
	Take shorter showers
	Shower in preference to bath
	Wash baby in baby bath rather than large bath
	DO NOT run water while brushing teeth or shaving
	Install aerator type basin spout
	Fix leaking taps
Toilet	Install dual flush 3/6 litre toilets (consult plumber on suitable type for distance to septic)
	Repair leaky toilet cisterns
	Minimise use of toilet paper,
	DO NOT flush facial tissues, paper towels or other personal hygiene products such as sanitary napkins, nappies or condoms down the toilet
	DO NOT use disinfectants, chlorine-based products to clean toilet
	DO NOT use coloured toilet flush cleaners
	DO NOT dispose of unwanted medicines down the toilet

Laundry	On average front loaders use less water than top loaders (varies from brand to brand)
	Front loaders generally use more electricity than top loaders
	Install machine with highest WELS star rating
	Set washing level to suit the load or wash only full loads.
	Distribute washing loads throughout the week rather than on one day
	Use “suds saver” if available for washing water
	Install filter to remove lint from washing
	Use low phosphorus detergents (NP labels preferable to P labels)
	Use low sodium detergents (choose liquids in preference to powders)
	You may find less than the recommended amount of detergent works well on rainwater
	Dissolve detergent in water before adding to machine
	Soak dirty clothes in detergent overnight before washing
	DO NOT use chlorine bleaches, whiteners, nappy soakers with sodium hypochlorite
	Fix leaky taps
	DO NOT wash paint brushes in laundry sink
	Reuse rinse water on gardens
Septic Tank	Starters, feeders or additives are not needed in the septic tank a weekly dose of a tablespoon of agricultural lime down one of the toilets will help reduce the effects of sodium in the soil absorption area
	Fit septic tank filter, maintain regularly - wash back into septic tank
	Divert stormwater away from tank and absorption area
	Check inlet and outlet inspection ports for surcharging effluent
	Have septic tank pumped out every 3-5 years and checked for breakages while empty, longer period of 5-8 years may apply to low occupancy homes
	Check drain field for wet spots, surcharging effluent
Aerated Wastewater Treatment System	Home owner must contract a service agent to check the AWTS on a three-monthly basis, including the irrigation area
	Conserve water conservation and reduce household use of chemicals
	Use low sodium and low phosphorus detergents

Definitions

Absorption – uptake of effluent or sullage or both into the soil.

Aerated waste treatment system (AWTS) – a system that uses the processes of aeration, clarification and disinfection to treat effluent from septic tanks to a standard that complies with the requirements of the relevant regulatory authorities.

Anaerobic digestion – decomposition of liquids and/or sludge in the absence of free oxygen.

Biochemical Oxygen Demand (BOD) – means the amount of dissolved oxygen consumed by microbiological action, normal expressed as BOD_5 where a sample is incubated over 5 days at 20°C. It is expressed as the number of milligrams of oxygen required by micro organisms to degrade the organic matter in a litre of water.

Black water – soil (toilet) wastes mixed with water.

Buffer distance – a distance measured in metres that represents the length of flow line between a wastewater disposal area and the high water mark of a waterbody or watercourse.

Cation exchange capacity – the ability of the soil to take up (bond with) ions such as sodium, calcium , magnesium and potassium.

Composting toilet – A "waterless" effluent treatment system that treats toilet wastes by composting as a result of natural decomposer organisms in the composting chamber.

Common effluent systems – a system in which septic tank effluent in a gravity reticulation system is piped from a number of residences to a central treatment and/or application system.

Complying Development – cannot be carried out on land in regional NSW that is within 20 m of a perennial watercourse identified as a 'blue line' on a topographic map

Effluent – being any matter or thing , whether solid or liquid or a combination of solids and liquids, which is of a kind that may be removed from a human waste storage facility, sullage pit or grease trap, or from any holding tank or other container forming part of or used in connection with a human waste storage facility, sullage put or grease trap.

Effluent application area – the area of land where it is intended to dispose of or apply effluent and any by-products of sewage from the management facility.

Evapotranspiration – the loss of moisture to the atmosphere by direct evaporation and also by transpiration through a plant's leaves.

Greywater – sullage wastes (eg laundry, shower, kitchen) excluding toilet wastes.

Groundwater – water which exists under the surface and within the soil, continuously in soil/rock below the water table.

Holding tank – a tank used for holding wastewater prior to pumping out, sometimes called a collection well.

Intermittent watercourse or stream – any stream, channel, canal or surface water drainage depression that forms a waterbody that flows during periods of rainfall or flooding.

Irrigation area – an area of prepared soil and aggregate through which a network of either perforated pipes is laid or spray irrigators are provided. Effluent is sprayed or permitted to percolate into the soil bed and is removed primarily by evaporation and transpiration by plants. The area outlined within these guidelines incorporates sufficient area of land to provide for the resting of effluent disposal areas through a rotational schedule.

Infiltration – the ability of the soil to accept effluent and rainfall at the surface.

Ped – an individual natural soil aggregate.

Permeability – the ability of the soil to "absorb" and transmit effluent through its profile.

pH – the measure of acidity or alkalinity measured on either a scale of 0 to 14 with 7 as a neutral point. From 0 to 7 is acid; from 7 to 14 is alkaline.

Phosphorus adsorption capacity – the ability of the soil to take up a bind phosphorus from the effluent, often called phosphorus sorption capacity.

Primary treatment – the separation of suspended material from wastewater by settlement and/or flotation in septic tanks, primary settling chamber, anaerobic process of treatment, prior to effluent discharge to either a secondary treatment process, or to a land –application system.

Pump-out effluent system – a normal septic tank system, followed by a holding tank, used for the storage of effluent that is pumped out by an approved contractor at regular intervals with a specified number of services per year. This effluent is transferred to Council's sewage treatment works for further treatment and ultimate disposal.

River – includes a natural stream of water flowing in a channel. Usually denoted by a blue line on a topographic map.

Secondary treatment – anaerobic and aerobic biological processing and settling or filtering of effluent received from a primary treatment unit. Effluent quality following secondary treatment is expected to be equal to or better than 20 mg/L five-day biochemical oxygen demand and 30mg/L suspended solids.

Septic tank – a tank used for the collection, primary settling and anaerobic treatment of household wastewater.

Sewage – includes any effluent of the kind referred to in paragraph (a) of the definition of waste in the dictionary to the Local Government Act 1993:

Wastewater – the discharge of water containing human wastes or water from bathroom , kitchen or laundry prior to any treatment. After treatment of any type it is called effluent.