# Uralla Shire Council

## On-site Waste Water Management Strategy

**September 2011**

# Enabling Policy

## OBJECTIVES

### Preamble

This Policy has been prepared to facilitate the management of on-site wastewater systems within the Uralla Shire Council area, taking into account Council's obligations within current State legislation and the relevant Australian and New Zealand Standards. It provides guidelines of Councils requirements for owner operator, the professional installer or suppliers, to minimise possible risks to the environment and the community from wastewater effluent generated by onsite waste treatment devices.

To aide the environment and improve the management of on-site wastewater systems the Council encourages the use of water reduction fixtures within households, (ie shower flow restrictors, aerator faucets, reduced flush 6/3 water closets, front loading washing machines) and where possible the reuse of treated effluent.

### Scope

This policy concerns all fixed on-site sewage management facilities that do not discharge to the public sewer system and are not regulated by the Department of Environment and Heritage. The On-site Sewage Management Regulations and Guidelines provide a framework for the implementation of ecologically and socially sustainable On-site Sewage Management practices. This should be achieved, as far as possible, by a process of community and user education and by the implementation of appropriate operating requirements, in a manner that is sensitive to the local circumstances. Strategic management of existing septic systems and attention to address sewage management issues in new release areas are important tasks for Council. Sewage management strategies need to be linked with related strategies for urban sewerage services, stormwater and pollution control.

## Preamble

This Policy has been prepared to facilitate the management of on-site wastewater systems within the Uralla Shire Council area, taking into account Council's obligations within current State legislation and the relevant Australian and New Zealand Standards.

It provides guidelines of Councils requirements for owner operator, the professional installer or suppliers, to minimise possible risks to the environment and the community from wastewater effluent where on-site waste treatment devices are used.

To aid the environment and improve the management of on-site wastewater systems the Council encourages the use of water reduction fixtures within households, (ie shower flow restrictors, aerator faucets, reduced flush 6/3 water closets, front loading washing machines) and where possible the reuse of treated wastewater effluent.

# Table of Contents

# PART 1 Introduction

## 1.1 Regulatory Status

The Local Government (Approvals) Regulation 1999, provides the regulatory frame work and performance criteria for the installation, operation and maintenance of all on-site systems of less than 10 persons and flows of less than 2000 litres per day.

The regulations do not fundamentally alter the existing powers and duties of the Council to regulate the installation and operation of On-site Sewage Management systems under s68 and s124 of the Local Government Act 1993. The effect of the operating approval is to give Council new regulatory tools and to enable fees to be charged for regulatory services provided in relation to existing systems.

The Local Government (General) Regulation 1999 enables Council to issue penalty notices under the Local Government Act 1993. Offences under Section 626(3) – to operate a sewage management system without approval and 627(3) – to operate a sewage management facility otherwise than as approved, can both incur an on the spot penalty.

### 1.2.1 Background

There are approximately 327,000 unsewered sites or (15% of households) within New South Wales and the Regulations have been introduced to allow better control over the operation of existing systems and allow Councils to require appropriate designs for new systems to prevent problems, rather than reacting to events after they have occurred. Councils have been directed to formulate individual strategies and programs to facilitate improved management of these systems.

Uralla Shire Council has approximately 1,800 unsewered sites. It utilises a series of Australian and New Zealand Standards, being 1546.1:1998, 1546.2:2001, 1546.3:2001 and 1547:2000 for septic tanks and on-site wastewater treatment units and wastewater management along with the Environment and Heath Protection Guidelines for On Site Sewage Management for Single Households, (Department of Local Government, 1998).

The impetus for the development of the Regulation was the outbreak of Hepatitis A, linked to the consumption of Wallis Lake oysters, which allegedly contributed to 440 reported cases and one death. However, sewage management is not restricted to coastal areas and there is increasing concern about the potential impact of contaminated water in the Murray Darling Basin that may affect groundwater sources for water supply. Contamination by nutrients can seriously degrade water quality in waterways leading to excessive plant and algae growth and ecosystem imbalance.

Various native plant species, such as *Banksia,* are intolerant of high nutrient levels in soils, with particular sensitivity to additional phosphorus (Handreck, 1977). Domestic wastewater is also high in salinity. When effluent is applied to land, whether for simple disposal or for some beneficial use, the environmental effects of the added salt may cause serious physiological damage to plants or physical and chemical deterioration of the soil's ability to accept and further treat that effluent (Patterson 2001).

## 1.3 Scope

This policy concerns all fixed on-site sewage management facilities that do not discharge to the public sewer system and are not regulated by the Department of Environment and Heritage. The On-site Sewage Management Regulations and Guidelines provide a framework for the implementation of ecologically and socially sustainable On-site Sewage Management practices. This should be achieved, as far as possible, by a process of community and user education and by the implementation of appropriate operating requirements, in a manner that is sensitive to the local circumstances. Strategic management of existing septic systems and attention to address sewage management issues in new release areas are important tasks for Council. Sewage management strategies need to be linked with related strategies for urban sewerage services, stormwater and pollution control.

Where applicants have chosen to use a standard septic tank and absorption trench system within low risk areas for single households they can utilise various tables within Appendix A. A range of tables have been created from the Australian and New Zealand Standards and utilising the local available data to calculate and provide an aid to applicants for the design of an on-site waste water system.

## 1.4 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 –** DEHomposition of 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 $^oC$. It is expressed as the number of grams of oxygen required by micro organisms to alinit the organic matter in a cubic metre 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 and phosphorus.

**Composting toilet** – A “waterless” effluent treatment system that treats toilet wastes by composting as a result of natural DEHomposer 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.

**Effluent** – liquid discharged from a treatment process such as from a septic tank, sullage treatment farm or aerated wastewater treatment system.

**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.

**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.

**Permeability** – the ability of the soil to “absorb” and transmit effluent through its profile.

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

**Phosphorus sorption capacity** – the ability of the soil to take up an bind phosphorus from the effluent.

**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.

**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:

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 pit or grease trap.

**Sewage management facility** – means:

(a) a human waste storage facility; or
(b) a waste treatment device intended to process sewage and includes any related/connected drain.

**Sodicity** – the level or presence of exchangeable sodium salts in the soil. Effluent contains high levels of sodium that may act to disperse clay particles, resulting in a significant reduction in the permeability of the soil.

**Soil profile** – the different layers (horizons) of different soil types with depth.

**Split systems** – black and greywater are split into separate waste streams at the source. Full on-site split systems dispose of both streams on-site but into separate disposal systems. Partial on-site split systems dispose of greywater on-site and rely on a cart-away system for the black water stream.

**Tertiary treatment** – The process by which disinfection and additional Biological Oxygen Demand (BOD) removal are achieved upon secondary treated wastewater. Disinfection should reduce all pathogenic and other harmful organisms to safe levels. Processed effluent is only suitable for non-potable purposes such as irrigation.

**Waterbody - (a) a natural water body, including:**

(i) a lake or lagoon either naturally formed or artificially modified; or
(ii) a river or stream, whether perennial or intermittent, flowing in a natural channel or bed or in a natural channel artificially modifying the course of the stream; or
(iii) tidal waters including any bay, estuary or inlet; or

**(b) an artificial waterbody, including** any constructed waterway, canal, inlet, bay, channel, dam, pond or lake, but does not include a detention basin or other construction that is only intended to hold water intermittently.

## 1.5 Abbreviations

The following abbreviations are used in this policy are:

- AS/NZS – Australian New Zealand Standard
- AWTS – Aerated Waste Treatment System
- BCA – Building Code of Australia
- CEC – Cation Exchange Capacity
- DCP – Development Control Plan
- The Guidelines – "Environment & Health Protection Guidelines (On-Site Sewage Management for Single Households) NSW" 1998.
- DEH – Department of Environment and Heritage formally NSW Environment Protection Authority, (EPA)
- EPAA – *Environmental Planning & Assessment* Act 1979

## 1.6 Purpose

The Regulations gazetted on 6 March 1998 require owners of relevant premises to apply to Council for approval to operate a system of sewage management. The Council is able to grant a renewable approval (eg a Sewage Management Licence). The grant of a renewable approval allows the Council to monitor performance on a regular basis and to recover an appropriate fee to cover reasonable costs.

***Why should residents pay a fee?***

Most of the costs of operating an on-site sewage management system are borne by the landowner or resident, but the Council is responsible for supervision and environmental management. Residents in sewered areas pay for supervision and environmental management through sewerage charges, which include load based Department of Environment and Heritage licence fees and other environmental management costs.

With regard to on-site sewage systems Council provides monitoring of effluent quality, appropriate control of effluent discharge, supervision of plumbers and service agents, education programs and practical support to assist landowners.

Council charges a fee, payable upon renewal. The renewal period will depend on the classification of the system as a high, medium or low risk, (high risk areas will require more regular inspections than systems with low risk) This determination of risk largely reflects site sensitivity and the systems threat to public and environmental health, and the operators knowledge of the required performance standards.

When site inspections are required, Council is able to levy an inspection fee. Some of the considerations in determining the approval period include:

- Size of block
- Slope
- Hydraulic load
- Vegetation coverage
- Soil type
- Distance to watercourses, drains and property boundaries
- Approved system design
- Established irrigation areas
- Surface effluent/waterlogging
- Migration of wet areas off site
- Presence of odours
- Evidence of servicing/maintenance

Any works proposed to be undertaken to alter an existing on-site system must be submitted to Council for prior approval.

## 1.7 Objectives

**The broad objectives of this Policy are to maintain and enhance the local environment, particularly:**

- protection of groundwater
- protection of surface water
- protection of land and vegetation
- prevention of public health risk
- maintaining and improving community amenity
- ensuring maximum use of resources consistent with other objectives
- ecologically sustainable development

## 1.8 Current On-site Technologies

The following is a summary of some of the more commonly known on-site wastewater treatment technologies on which these guidelines are based.

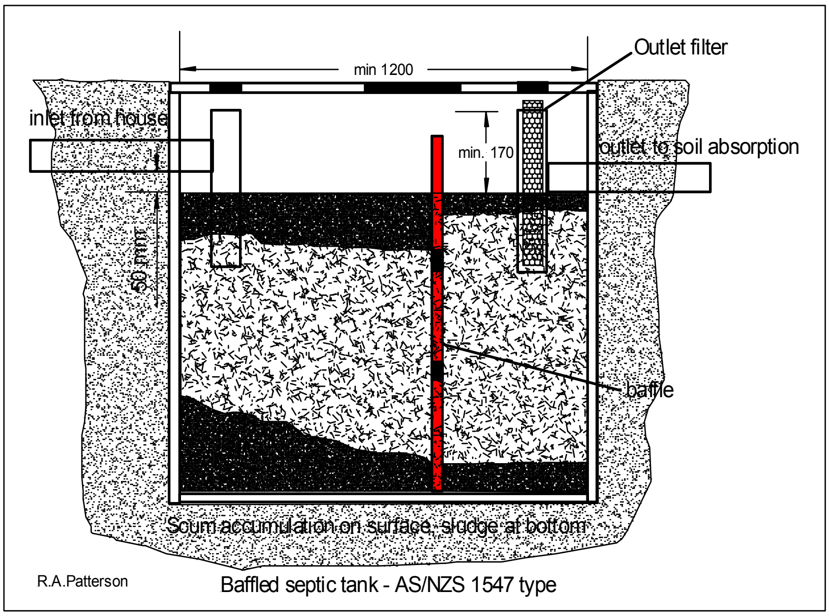
### 1.8.1 Conventional Septic Tank Systems

Traditionally, in unsewered areas, wastewater from dwellings has received primary treatment in a conventional septic tank before the effluent is absorbed in underground trenches. This system has relied on the soil completing the treatment process as the effluent moves through the soil profile. Not all soils, however, are suitable for absorption trenches, particularly in village areas with small allotments.

Even on large allotments the soils must have characteristics capable of satisfactorily treating the effluent. Unsuitable soils may cause effluent to reach the surface and/or groundwater and adversely affect water bodies. Some types of soils within the Uralla Shire Council area do not have the characteristics necessary to treat effluent from a septic tank unless excessive lengths of trench are installed. Areas of this nature may be limited in terms of development density, due to the environmental characteristics and the outlined objectives. These soils are mainly in flow lines of medium to heavy clays, (mainly black earth), refer to Attachment 1 and 2 in Appendix A for different soil categories as identified in AS/NZS 1547:2000.

When site conditions are unsuitable for soil absorption of septic tank effluent, further treatment of the effluent will be required.

Many existing soil absorption systems generally do not comply with the performance objectives of the 'Environment and Health Protection Guidelines'. They could, however, be appropriate in some circumstances depending upon the site factors, particularly soil type and surface and groundwater.




**Cross Section of a typical baffled septic tank**
**(Source – Dr R.A. Patterson Lanfax Laboratories)**

Solids settle to the base of the tank and oils and fats float to the top to form a scum layer. Anaerobic bacterial digestion of the solids produces a sludge that settles at the base of the tank and periodically requires removal to prevent odours, clogging of the tank or the carry over of solids with the treated wastewater to the soil absorption system clogging or reducing the life of the system. If the scum layer is below either the pipe inlet or outlet levels to the tank the system will fail and should be pumped out.

The period of time between pumping out of the tank should be about 3–5 years depending on the loading of the individual system, (the number of people using the system or the amount of solid material loaded into the system).

*Outlet filters* – Several types of commercially available outlet filters can be retro fitted to existing septic tanks, these filters prevent the carry over of solids to the soil absorption area and thus clogging or failure of these areas. Where surges may be a problem, outlet filters salinity the flow through of organic or solid matter to the absorption area.

The above filters are available from Everhard Industries www.everhard.com.au (this is not an endorsement of the product)

### 1.8.2 Aerated wastewater treatment systems (AWTS)

The aerated wastewater treatment system (AWTS) is an alternative to the conventional septic system. This effluent is treated to a level known as tertiary treatment with the effluent undergoing disinfection by chlorination or ultra violet light to remove bacteria and other micro-organisms. This allows the effluent to be spray irrigated above ground in most situations without any major health risk.

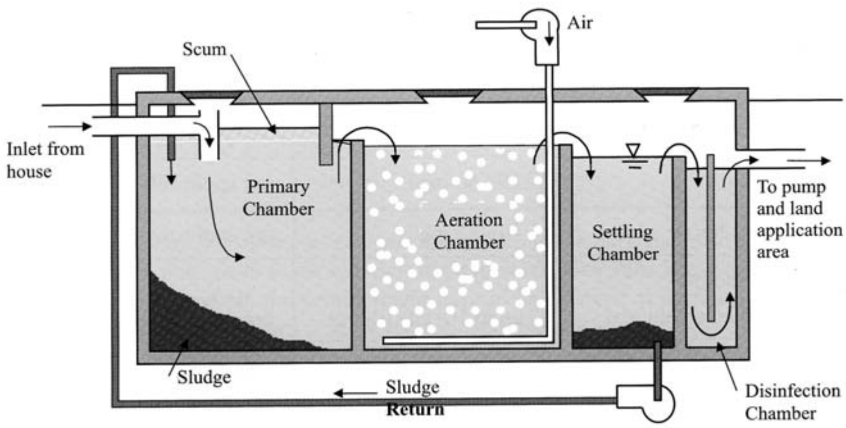
Because the effluent is treated to a higher standard than the conventional septic tank, it contains fewer potential harmful pathogens. However, if the effluent is not appropriately disposed of, unacceptable levels of pollution will still enter the receiving environment.

The higher level of treatment achieved in an AWTS is conditional upon the system receiving regular maintenance. Without regular maintenance by a suitably qualified person, significant public health and pollution problems could eventuate.

A potential problem with spray irrigation of effluent from an AWTS occurs when wastewater flows (such as from toilets and showers) in the home is sufficient to cause the pump to cut in. This occurs regardless of prevailing weather conditions and therefore many operating AWTS will spray irrigate effluent even when it is raining.

This effluent may run off site and into the receiving environment, adding to the pollutant load. This problem is particularly relevant in areas of high rainfall. Possible solutions include the installation of a wet weather storage facility where the soil will permit or the installation of subsurface irrigation areas.

A hydraulic water balance shall be the determining factor relating to the requirement for wet weather storage. Ideally the application area should be enlarged to avoid the need for wet weather storage




***Cross section of typical aerated wastewater treatment system***

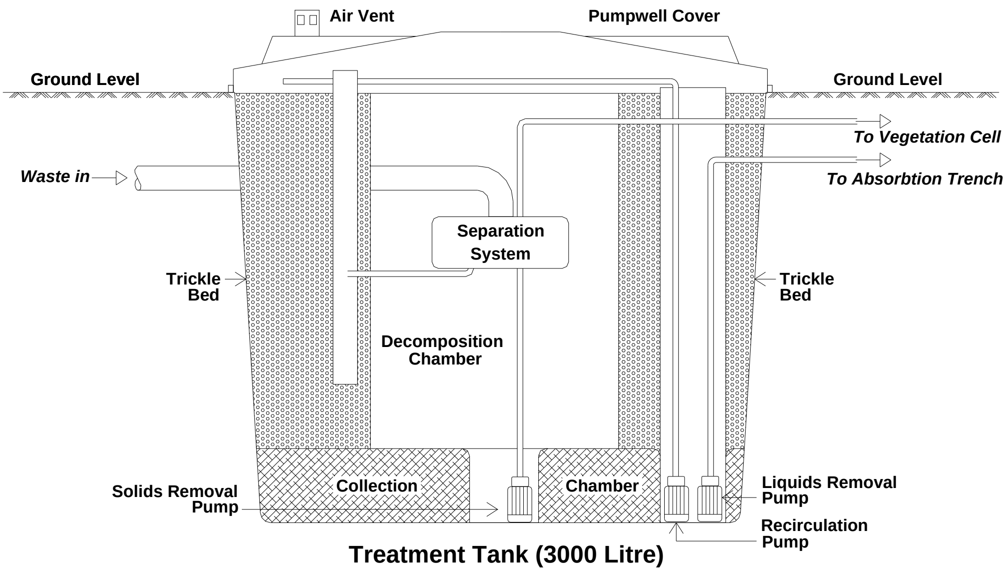
(source – Environment & Health Protection Guidelines On-site Sewage Management for Single Households)

### 1.8.3 Composting toilets – (Wet or Dry)

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 DEHomposer organisms. When fully broken down, the compost may 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.

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. Wet composting toilets decompose the faecal material, urine and toilet paper in a watery environment with liquid overflows treated by subsoil absorption. However the actual quantity is mainly dependent on the particular design of the installed unit.




***Cross section of a wet composting toilet***

### 1.8.4 Cart-away (pump-out) systems

These systems incorporate both the use of a conventional septic tank to remove solids from the wastewater and a holding tank to store the wastewater for weekly or fortnightly collection in a road tanker. These systems are costly and therefore some property owners may try to reduce pump-out costs by illegally discharging effluent to the environment. Where these systems are prevalent Councils generally experience numerous public health and pollution problems. Consequently, Council is aiming to reduce the numbers of these systems. Pump out systems in rural areas are undesirable because these areas are unlikely ever to be sewered and the real cost of providing this service is likely to become prohibitive to the owners. Where pump outs are installed a licensed pump out contractor must be used and the wastes disposed of in accordance with Council’s direction and the Protection of the Environment Operations Act 1997.

### 1.8.5 Other Alternative Systems

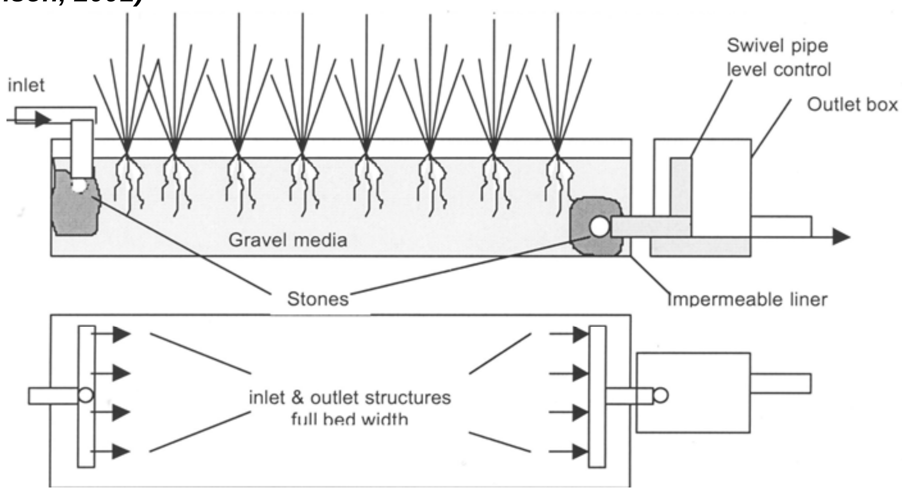
Increasing awareness of environmental issues has seen significant changes to domestic effluent disposal in the last DEHade. This trend is likely to continue with new products coming onto the market following scientific research or investigation. The use of mound systems, shallow placement systems, constructed or artificial wetlands are becoming more common. The installation of out flow filters onto conventional septic tanks followed by secondary treatment devices such sand filters or bins containing peat moss or coconut fibre allowing the effluent product to be irrigated out through sub-surface irrigation are all increasing in use.

*Constructed wetlands* – 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).

***Elevation and Plan view of typical horizontal subsurface flow wetland (Davison, 2001)***




***Typical layout of single reed–bed for a domestic system***

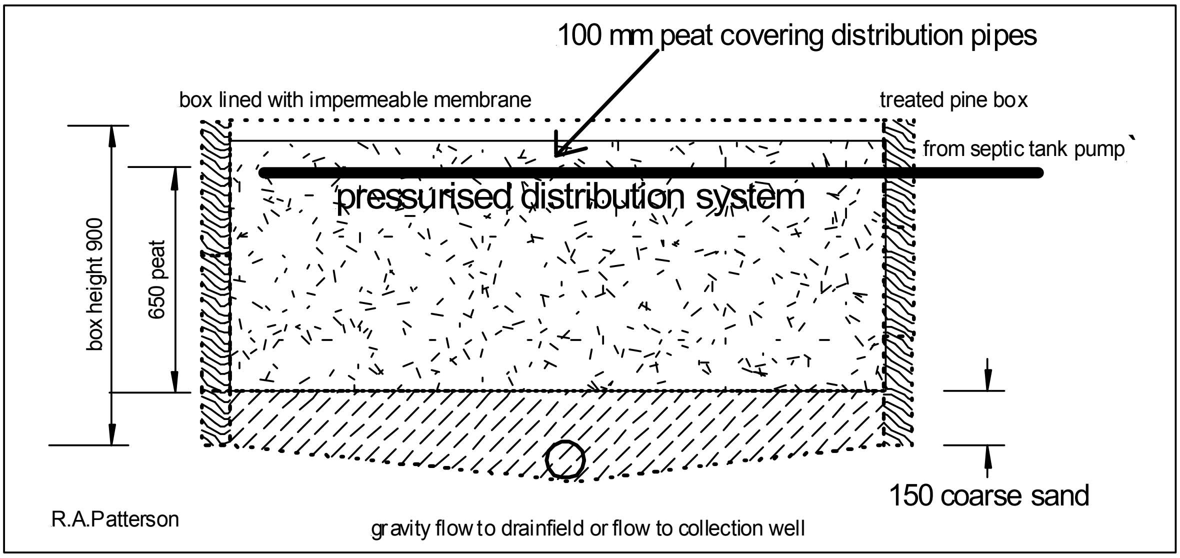
Davison (2001) suggests that for a dwelling generating 500 L of wastewater per day, the approximate dimensions of a subsurface flow wetland are 6.3m x 2m or two beds in parallel, with a depth of 0.5m. Normally reed beds require minimal maintenance and the reeds may be harvested as a source of mulch.

*Sand Filters* - Sand filters are used to further "polish" or provide additional treatment to effluent prior to soil absorption. They can be built above or below ground depending upon the location and landscape conditions. The effluent from the septic tank should be pressure dosed to the sand filter to ensure even distribution of the effluent over the top of the sand filter.

***Cross section of typical sand filter providing secondary treatment to effluent prior to irrigation***

***Source*** PATTERSON RA 2002 – *options for On-site Wastewater Management Systems for Seven Local Villages in Scone and Murrurundi Shires*

*Peat Bed Treatment Systems* - Similar to the sand filter system effluent is pumped to a ringed distribution system immediately under the surface of the peat to percolate through a layer of peat before entering a subsurface soil absorption field.




***Typical cross section of a peat biofilter***
(Source – Dr R.A. Patterson Lanfax Laboratories)

*Approvals* - All new commercially available wastewater treatment devices must be approved by the Director General of NSW Health and are subject to the requirements of such an approval. Effluent distribution areas and reuse systems require only Council approval.

## 1.9 PROGRAMS AND RESOURCES

### 1.9.1 Programs

All of the existing systems located within the Uralla Shire Council have received a desk top analysis concluding that approximately 20% would be classified as high risk.

To move forward from this current situation the following actions are proposed.

### 1.9.2 Actions

**Short Term**

- To adopt a partnership approach with households and service agents to support continual improvement of On-site Sewage Management throughout the Local Government area.
- To build and maintain a data base of all on-site sewage systems.
- To determine the structures and facilities needed to support On-site Sewage Management systems.
- To consult and work with individual householders on the development and implementation of an on-site sewage system strategy to eliminate illegal discharges.

**Long Term**

- To provide advice to householders and operators of best practice for management of On-site Sewage Management systems.
- To consult local plumbers and service agents and to specify qualifications for third party certification of maintenance work and compliance with approval requirements..
- To ensure that all on-site disposal areas comply with environmental and health protection standards and council operating requirements.
- To ensure that all septic tanks are inspected by appropriately qualified persons at regular intervals and are desludged and maintained as required.
- To consult Aerated Wastewater Treatment System service agents and to ensure that maintenance reports also certify that effluent is discharged in compliance with site requirements.
- To ensure that appropriate provision is made for sustainable On-site Sewage Management when residential development occurs in non-sewered areas.
- To ensure that all new installations are designed, installed and operated in accordance with these guidelines

### 1.9.3 Resources

*The Guidelines* have been issued by the Department of Local Government to assist Councils in regulating the installation and use of On-site Sewage Management systems. The Guidelines address the regulatory framework; the development of local sewage management strategies; administration and operational issues; site assessment principles; and principles for selection and operation of On-site Sewage Management systems.

The Guidelines explain the prescribed environment and public health protection standards for septic tanks and On-site Sewage Management facilities and provide advice on site assessment and the selection and operation of small sewage management systems and effluent application areas receiving up to 2000 litres of wastewater per day. The guidelines recommend that sewage management issues should be addressed at the earliest stage of Council land use planning.

A range of useful appendices are included with the Guidelines covering:

- Model site reports and conditions of approval for pump-out systems, aerated wastewater treatment system(AWTS) devices and composting toilets.
- A Council sewage management strategy checklist.
- A recommended methodology for estimating provision for effluent disposal.
- A schedule of vegetation suitable for planting in land application areas. (a schedule of plants suitable for the Armidale region are included within Appendix A of this document)
- A set of standard information brochures which may be released by Council.

The legislation requires Council to ensure that a strategy is in place and that an ongoing monitoring program accompanies that strategy (annual inspections and regular monitoring of watercourses). This Policy document incorporates Council's strategy.

### 1.9.4 Performance Standards

Council must not approve an application which would not comply with the performance standards prescribed in the Local Government (Approvals) Regulation – Clause 47 and Section 89, Local Government Act 1993. Council must also take into consideration relevant guidelines and directions which have been issued by the Director General of Local Government (Local Government (Approvals) Regulation – Clause 46.

The Guidelines specify that On-site Sewage Management systems should be designed, installed and operated to ensure that the following environmental and health performance objectives will continue to be met over the long-term:

- Minimise public health risk – sewage contains bacteria, viruses, parasites and other disease causing organisms. Contact with effluent should be avoided or eliminated, particularly for children. Residuals, such as composted material, should be handled carefully. Treated sewage should not be used on edible crops that are consumed raw;
- Protection of lands and vegetation – On-site sewage management systems should not cause deterioration of land or vegetation quality through soil structure degradation, salinisation, waterlogging, chemical contamination or soil erosion;
- Protection of surface waters – On-site sewage management systems should be selected, sited, designed, constructed, operated and maintained so that surface waters are not contaminated by any flow from treatment systems and land application areas (including effluent, rainfall run-off and contaminated groundwater flow);
- Protection of groundwaters – On-site sewage management systems should be selected, sited, designed, constructed, operated and maintained so that groundwaters are not contaminated by any flow from treatment systems and land application areas;
- Conservation and reuse of resources – The resources found in domestic wastewater (including nutrients, organic matter and water) should be identified and monitored as much as possible within the constraints of other performance objectives; water conservation should be prioritised and wastewater production should be reduced,
- Protection of community amenity – On-site sewage management systems should be selected, sited, designed, constructed, operated and maintained so that they do not unreasonably interfere with quality of life and, where possible, so that they add to the local amenity. Special consideration should be given to aesthetics, odours, dust, vectors and excessive noise.

The Regulations require that a system of sewage management must be operated in a manner that achieves the following specific performance standards:

- The prevention of the spread of disease by micro-organisms.
- The prevention of the spread of foul odours.
- The prevention of the contamination of water.
- The prevention of the degradation of soil and vegetation.
- The discouragement of insects and vermin.
- Ensuring that persons do not come into contact with untreated sewage or effluent in their ordinary activities on premises concerned.
- The minimisation of adverse impacts on the amenity of the premises and surrounding lands.
- If appropriate, provision for the re-use of resources (including nutrients, organic matter and water).

These regulatory requirements may be varied in accordance with section 82, Local Government Act, 1993. Authority may be delegated to Council to allow the performance standards to be varied under Section 82 for approvals granted for a renewable term of no more than three years.

Variation will be possible in circumstances where Council is satisfied that in the current circumstances of the case, strict compliance is unnecessary for the protection of public health, the environment and community amenity. Council will be required to advise intending purchasers of such premises, on application, that operating requirements may be upgraded if circumstances change.

The amending Regulation does not apply to the following sewage management facilities:

- Facilities which are licensed by the Department of Environment and Heritage, (formally including the NSW Environment Protection Authority).
- Facilities installed in a vessel used for navigation.
- Facilities installed in a motor vehicle registered under the Traffic Act 1909 which is used primarily for road transport.

Provision has been made in the legislation for localities to have an On-site Sewage Management Plan prepared. The location and conditions will determine if this is feasible and only after appropriate technical supporting data have been submitted, will such a proposal be considered. In Armidale, for example, the soil conditions and weather conditions are not normally conducive to good adsorption/absorption over the full twelve months of the year. The use of vegetation will also have limited value. Each case for locality plans will be taken on merit.

### 1.9.5 Council's Management Plan

Provision has been made within Council's Management Plan for the development and ongoing monitoring of the On-site Sewage Management Strategy. The legislation requires individual site management plans to be developed for each on-site sewage management system.

Council is able to raise revenue for On-site Sewage Management programs and services, mainly through:

- Ordinary rates for general Council administration and services.
- Special rates (include fixed-term capital rates) levied on particular parcels of land that have access to, benefit from and contribute to the need for particular programs and services.
- Charges for On-site Sewage Management services actually provided to particular properties.
- Approved fees for services (include regulatory services) to people.
- Developer charges (levied under s64 Local Government Act and s94 Environmental Planning and Assessment Act).

Council's strategy is to apply a "user pays" system. Council's Management Plan sets down the application fee for new systems, an inspection fee, and a renewal fee where applicable. Both of the previous Councils elected not to charge an initial fee for the registration and approval of existing on-site systems.

## PART 2 ON-SITE SEWAGE MANAGEMENT APPROVAL GUIDELINES

### 2.1 General guidelines for all subdivisions dwelling-houses, tourist/commercial developments with less than 10 persons and flows of less than 2000 litres per day.

### Objective

Effluent application areas are designed and constructed to ensure that effluent disposal is undertaken in a manner that mitigates adverse impacts on the environment and in particular on the quality of local watercourses and groundwater systems.

| *Performance Criteria* | *Acceptable Solutions* |
|---|---|
| P1 Buffers are provided to ensure adequate separation between effluent application areas and water bodies to protect the quality of water bodies. | A1 The buffer distance between effluent application areas, (particularly land application areas) is 100 metres to any Perennial watercourse or water body and 40 metres to any intermittent watercourse or water body. |
| P2 Buffers are provided to ensure adequate separation between effluent application areas and groundwater. | A2<br>(a) The minimum depth to groundwater is 1.2 metres (absorption trenches) or 1 metre (application of tertiary quality effluent). |
| | (b) The minimum soil depth to bedrock (of low strength or harder) or other confining layer is 1.2 metres (for absorption trenches) or 1 metre (for application of tertiary quality effluent). |
| P3 Suitable buffers are provided between the application areas and property boundaries, pools, other buildings and other irrigation areas.<br><br>**Note: The buffer distance is measured as a ground surface flow line and is not based on the closest measured distance.** | A3 The minimum horizontal setback distance from the perimeter of any application area is provided in accordance with Table 1 below |
| P4 Wastewater Treatment systems and application areas will not be adversely Affected during flood periods. | A4 All wastewater treatment systems and application areas are located above the 1 in 20 year flood level. Systems with electrical components are located above the 1 in 100 Year flood level.<br><br>**Note: Sealed submerged pumping facilities may be located below the 1:100 Flood levels with appropriate flood protection.** |

| *Performance Criteria* | *Acceptable Solutions* |
|---|---|
| P5 Catchment-wide consideration is incorporated in the design and siting of wastewater management systems | A5<br>(a) Surface irrigation areas are as level as possible with an absolute maximum slope of 15°.Steeper slopes utilise sub-surface irrigation systems where site stability is not compromised. |
| | (b) Sites are contoured to direct surface water flow away from disposal areas. |
| | (c) The construction of sewage management facilities are in accordance with AS/NZS 1546.1 1998 – 'Small Septic Tanks'. |
| | (d) Minimum size of septic tanks and holding tanks are in accordance with the 'Environment and Health Protection Guidelines' 1998 and AS/NZS 1547:2000 |
| | Absorption trenches (in a location where they can meet the objectives) are designed and constructed in accordance with the provisions of AS/NZS:1547 2000 and this policy. Textural classification of the soil profile has been examined to determine the acceptance rate, and to assist in the design for the sewage management facility. |
| | (e) Where soils exhibit high permeability (greater than 35mm/day for primary effluent) further investigation has demonstrated that pollution of groundwater does not occur. |
| | (f) (recommendation only) A Reserve (secondary) area of 100% of the design area should be identified upon the site for expansion and contingencies.<br>*Note – Reserve area is based upon hydraulic calculations.* |
| | (h) On small allotments it may not be possible to provide a reserve area. The designer, in consultation with Council, has assessed the options available for the site and selected an appropriate design to provide security in the case of unsatisfactory performance. |
| P6 Sufficient area is provided for sub-surface absorption and irrigation of effluent so that effluent is not transported off the site. | A6 A minimum available irrigation area is determined as specified within the 'Environment and Health Protection Guidelines' 1998 utilising water balance and nutrient balances to determine suitable application areas. |
| P7 Appropriate provision is made for wet weather storage of treated effluent during wet weather periods when it is inappropriate to spray irrigate.<br>Assessment of the need for wet weather storage must be based upon an accepted standard and criteria such as population, rainfall, evaporation, soil permeability, soil depth and effluent quality must be used. | A7 Wet weather storage is provided to surface irrigation systems for periods of wet weather and when soils in the application area will become saturated. Wet weather storage is provided in accordance with the recommendations of the 'Environment and Health Protection Guidelines' 1998.<br>*Note: Systems designed for wet weather storage may range from impervious storage either above or below ground, to sub-surface storage/disposal systems. Details must be submitted for approval.* |

| *Performance Criteria* | *Acceptable Solutions* |
|---|---|
| P8 The effluent application area must be designed and constructed in such a manner so as to minimise any risk to public health. | A8 Irrigation areas are designed in accordance with this policy and/or AS/NZS:1547 and may be either surface or sub-surface systems. |
| P9 Effluent is contained wholly within the boundaries of the site and the distribution area is designed to ensure that ponding of effluent or waterlogging of soil profile does not occur. | A9 Where effluent application is by spray irrigation the application area is isolated so as not to be used for passive or active recreation purposes, (this does not include open landscaped areas –fenced off, delineated garden etc) Such areas are also stockproof. |
| P10 To ensure that areas used for spray irrigation are not used for recreation purposes or the growing of vegetables. | A10 The application area is not used to grow vegetables for human consumption. Use of effluent for fruit trees complies with the recommendations of AS/NZS:1547. |
| P11 To ensure that surface application/re-use areas are adequately signposted. | A11 Warning signs are erected within the effluent application area in accordance with the provisions of AS/NZS:1547 and AS1319. |

***Recommended minimum buffer distances for on-site systems – variations would be applicable considering topography of the site and soils, (eg; where clay soils are present some distances may be reduced)***

| *System* | *Minimum Buffer Distances* |
|---|---|
| All land application systems, (horizontal distances) | ♦ 100 metres to permanent surface waters (eg river, streams, lakes etc)<br>♦ 250 metres to domestic groundwater well<br>♦ 40 metres to other waters (eg farm dams, intermittent waterways and drainage channels etc) |
| Surface Spray Irrigation<br><br>Secondary treated effluent<br><br>(Irrigation systems to conform to AS/NZS1547) | ♦ 6 metres if area up-gradient and 3 metres if area down-gradient of driveways and property boundaries<br>♦ 15 metres to dwellings<br>♦ 3 metres to paths and walkways<br>♦ 6 metres to swimming pools and non habitable buildings |
| Surface Drip and Trickle irrigation<br><br>Secondary treated effluent | ♦ 6 metres if area up-gradient and 3 metres is area down-gradient of swimming pools, property boundaries, driveways and buildings including dwellings |
| Absorption System<br><br>Primary treated effluent or higher | ♦ 12 metres if area up-gradient and 6 metres if area down-gradient of property boundary<br>♦ 6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, driveways and buildings including dwellings |

***Note: In the above table 'area' means 'disposal area'***.

No minimum buffer distances are specified for sub-surface irrigation of secondary treated effluent although care should be taken not to adversely influence the stability of any footings or foundation material adjacent to building structures.

- ♦ Distribution lines must be buried to a minimum depth of 100mm.
- ♦ Sprinklers must throw no more than 2 metres and produce coarse droplets, with a maximum plume height of 400mm above finished ground level (commercial systems shall demonstrate method of compliance)
- ♦ Standard household hose tape and garden fittings must not be used)

- Surface irrigation areas must be signposted with at least two signs, clearly visible to occupants and state:

  **Recycled Water**
  **Avoid Contact**
  **DO NOT DRINK**

## 2.2 Development in Existing Unsewered Village Zones

Council will consider the use of an effluent pump out system only if the applicant has considered all alternative solutions, eg composting. Effluent pump out systems will only be considered on:

(a) Existing lots within the existing unsewered residential areas in the village zones;

(b) New pump out systems will not be approved for new subdivisions or new rezonings and that other means of on-site disposal be used as the design criteria for the development;

(c) A split system for effluent disposal will be considered in areas where an effective design can be demonstrated.

## 2.3 Dual Occupancy Development

Dual Occupancy development in urban areas is currently only permitted where a reticulated sewerage system is operational or under construction.

In unsewered areas, dual occupancy development will require the submission and approval of a detailed assessment from a suitably qualified person, (soil engineer etc) where the one effluent treatment system services both occupancies or where two separate systems are to be installed and operated on an area less than two hectares or where soil, topography or climate limitations may cause limiting restrictions.

## 2.4 Alternative or Additional Technology

Council is prepared to consider the use of alternative technology, subject to the approval of NSW Health, if necessary, where it can be demonstrated that the proposal is the best practice for the proposed site. Council will also have no objection to the inclusion of additional technology such as filters to any approved effluent management system where the device can be installed so as not to prejudice the integrity of the system.

## 2.5 Integrated Development

Any proposal involving activity or excavation adjacent to a watercourse or waterbody may require an approval under the Water Management Act 2000. Any such development will be integrated under the EPAA.

# PART 3 INFORMATION TO BE SUBMITTED WITH APPLICATIONS

## 3.1 Objective

To evaluate a proposed on-site wastewater treatment and disposal system and to ensure an acceptable impact on the environment, the following must accompany any application for Development as defined under the EPAA.

## 3.2 Waste Water Management Reports

Any report required to be submitted to Council in accordance with the provisions of this Policy or any Environmental Planning Instrument must be prepared by a person or persons with appropriate qualifications in the field, eg geotechnical engineer or soil scientist.

## 3.3 Dwellings/Septic Tank Applications – Sewage management applications for general dwellings (less than ten persons equivalent population)

(a) Hydraulic estimation for the development and water balance calculation. (The tables provided in Appendix A provide details for standard absorption trench designs for various locations and soil types which include wet weather storage).

(b) Details of soil suitability for the proposed method of application, including soil composition or texture, (soil profile) colour, soil Ph.

(c) Identification of existing vegetation.

(d) Site plan or sketch with distances marked showing position of tanks and disposal areas and their proximity to boundaries, rivers, watercourses, dwellings and recreation areas.

(e) Location of any bores within 250 metres of the disposal field. Details of bore holes, showing the relative depth of each horizon and the soil texture should submitted with the application. A single sample from each bore hole is insufficient detail as most soils have more than one horizon. Soil texture is to be classified according to AS/NZS 1547:2000.

Permeability (the rate at which water moves through the soil) is to be measured either by use of a falling head permeameter or the soil textural method as outlined in AS/NZS 1547:2000. The permeability rate of the least limiting horizon for the method of application is to be assigned to the dispersal area, that is report permeability of the surface horizon for surface irrigation and the subsurface horizon for trenches and subsurface irrigation. Permeability is reported in terms of millimetres per day. The AS/NZS 1547:2000 provides appropriate tables against which long term loading rates can be evaluated from permeability, soil texture and soil structure. This value is used to determine the hydraulic loading rate, hence the area required for adequate application of the effluent.

Cation exchange capacity (CEC) is a measure of the capacity of the soil to exchange cations and is equal to the sum of all the exchangeable cations. Soils with a high CEC have an ability to hold cations for plant uptake or buffer against sodium in the effluent. Soils with a low CEC, such as sands and extremely weathered materials have a low capacity to retain cations and the cations may pass rapidly through the soil. CEC requires a laboratory analysis to measure the exchangeable cations calcium, magnesium, sodium and magnesium, and aluminium ions in soils with a low pH. While soils with a low CEC (< 20 cmol+/kg) may present difficulties for effluent application, CEC may be elevated by the addition of organic material.

**Phosphorus**

The phosphorus sorption capacity of a soil is determined in the laboratory by equilibrating samples of the soil with various strengths of phosphorus solution. While a single point test may suffice, a five point test shows the ability of the soil to absorb phosphorus compared with a theoretical maximum. A high phosphorus sorption capacity (greater than 500 mg/kg) provides a satisfactory buffer against the loss of phosphorus to the wider environment. High sorption capacities correlate with soils high in iron, aluminium, or clay. Soils with a low sorption capacity may not provide long term protection (50 years) against leaching of phosphorus from the application area. Additives such as blast furnace slag may be added to the effluent application area to increase its ability to prevent the loss of phosphorus. Phosphorus sorption should be measured on the subsurface horizon. In sandy soils, phosphorus sorption capacity is very low and measurement is not required.

Phosphorus is removed from the effluent in the application area by plant uptake and soil sorption capacity over 50 years. A phosphorus balance is required to show that the area set aside for effluent application is capable of utilising all the phosphorus applied in the effluent.

(f) Sodicity

While salinity is a measure of all the soluble salts in the soil, a proportion of the total salts may be sodium. Sodium salts (sodium chloride, sodium sulphate, sodium carbonate) are extremely soluble and detrimental to plants as well as potentially destroying soil structural stability. Sodicity, a term applied to sodium in soils, is reported as the exchangeable sodium percentage (ESP) relative to the CEC. Sodicity can be calculated from the CEC test and a separate test is not required. Levels of ESP above 6% are considered detrimental to soil structure as they are likely to increase the dispersion potential of the soil. Soils may be saline and sodic, saline and non-sodic or non-saline and non-sodic. Saline and sodic soils usually have very low permeability and are unsuitable for effluent application.

A simple dispersion test can be carried out by placing an air-dried soil ped (aggregate) in water and observing the shape ped after an hour. The ped may remain unchanged (water stable), may swell slightly while maintaining its original shape, it may slump (disintegrates into an indistinct mass) or it may slump and the soil particles disperse into the water to form a cloud around the soil. Soils that disperse have a propensity to pack tightly during wetting and drying cycles and are unsuitable for effluent application. Some effluents will increase the risk of dispersion. Dispersible soils may be ameliorated with lime or gypsum.

(g) The type of wastewater treatment and effluent application system proposed together with details of the system including tanks, pumps, valves, timers etc.

(h) Proposed wet weather storage facilities and management procedures.

(i) The treatment/construction of the application area including materials, size and ground preparation

(j) Landscaping treatment of application areas including plants, shrubs and ground cover

(k) Details of compliance/performance of existing dwellings or on site disposal systems on the site

(l) Details outlining how the proposal complies with Part 2 of this Policy.

Should the site display extraordinary topographic, geological or other characteristics, or drain to a sensitive receiving environment (eg Wetland), Council may require further information from professionally qualified persons along those lines outlined in Section 3.4 of this Policy.

## 3.4 Subdivision applications for more than five allotments, which average a minimum size of 2 Ha, tourist or other developments capable of housing an equivalent population of more than ten persons.

The following information is required to be submitted with an application which is greater in scale than those types of developments outlined in Section 3.3:

(a) Where a development proposal is located within close proximity (relative to the size of the development) of a reticulated sewerage system, costing analysis shall be made that compares the total cost to install, run and maintain the on-site effluent disposal option compared to the cost of providing reticulated sewerage to the proposal (over a substantial period eg. 20 years).

(b) Proposed wastewater treatment and application system.

(c) Details of compliance/performance of existing dwellings upon the development site and subdivided land including the residue.

(d) Site information including areas unsuitable for effluent application and possible area(s) suitable for effluent application purposes (display area in square metres and show setback distances).

(e) Details of soils and geology (soil profile) – types and descriptions of soil horizons are necessary. Sufficient bore holes shall be constructed so as to provide a representative picture of the soil horizons that exist across the site. Bore logs shall be submitted with the application and each soil horizon shall be classified according to its texture, eg. Sandy clay. See AS1547, Section 4.1 A4.

Permeability must be measured using the recognised testing procedures specified in AS1547.

Cation exchange capacity/phosphorus (CEC) sorption capacity and an assessment made as to the suitability of the soil for removing pollutants like phosphorus. In the case of CEC, the soil horizons shall be tested. The CEC is the total number of cations a soil can retain on its absorbent complex at a given Ph, and is therefore a good measure of a soil'' ability to retain specific pollutants. The most abundant cations in soil are calcium, magnesium, potassium and sodium and hydrogen and aluminium in acid soils.

A CEC of greater than 15cmol+kg is required for land application systems.

The capacity of a soil to sorb phosphorus is determined from its phosphorus sorption. A medium to high sorption index, which correlates to greater than 3.7 is required for land application areas. The sorption index may also be converted into micrograms of phosphorus sorbed per gram of soil (ug P/g soil).

Phosphorus sorption by the soil is expected to occur up to about a quarter to a half of the phosphorus sorption capacity. Beyond this, leaching of phosphorus not utilised by vegetation uptake may occur. A soil having a phosphorus sorption ability of 50 years (in terms of ug P/g soil), based upon the expected phosphorus load, is required for land application areas. Rayment and Higginson (1992) provides a simple test to distinguish soils on the basis of low and high phosphorus retention.

(f) Sodicity is an assessment made as to the suitability of the soils to accept effluent in the long term. Each soil horizon shall be tested to determine if it is prone to dispersion. This testing shall be quantitative and shall be conducted as per Appendix F of AS1547. Please note that as well as the classification of dispersive given in AS1547, Northcote and Skene (1972) note that the exchangeable sodium percentage at which Australian soils tend to disperse is as low as 6 units (reported in Patterson (1993). Northcote and Skene (1972) give the following classifications:

Non-Sodic <6.0 me%

Sodic 6-14me%

Strongly Sodic >14me%

(g) Ph – Soils that have a low Ph (are acidic). Ph levels lower than 6.0 or 6.5 may limit the ability of plants to take up nitrogen and phosphorus.

(h) Depth to groundwater – this shall be determined after field tests or by local knowledge. For example, mottling of the soil can indicate the existence of a high water table from time to time.

(i) Depth of bedrock – as determined after field tests or by general knowledge. Sometimes rock may be of extremely low strength and act like a soil, considerations such as depth to bedrock may be estimated to ensure adequate depth is achieved for a particular method of effluent disposal.

(j) Underlying geology and extent of fracturing is based on field examination and relevant geology text. General information about soils and geology particular to the site should be noted, eg Hazelton, 1992.

(k) Topography – Ground slope including contour plan – hatch areas greater than 15%. The contours should be at such intervals so as to allow a thorough assessment of the site. Depending on the development Council may require greater detail than available in the 10 metre contours from the 1:25,000 topographical map.. The topography of the land surrounding the effluent disposal area should be evaluated for its potential to add stormwater runoff to the site.

(l) Flood potential – note the location of the 1:20 year and 1:100 year flood level on the contour plan if appropriate.

(m) Erosion potential – an assessment needs to be made of the potential of the soils to erode. This shall include both an assessment of the soil's properties as they relate to erosion (see Hazelton, 1992) as well as landscape properties such as slope and runoff characteristics.

(n) Description of Climate:

Rainfall – mean 60th percentile figures shall be utilised. Actual figures from the nearest Bureau of Meteorology Recording Station should be used where possible.

(o) Evapotranspiration – this shall be calculated utilising pan evaporation multiplied by the representative crop factor.

(p) Assessment of native vegetation – Proximity of native vegetation to effluent disposal areas and areas downstream of the site (particularly riparian vegetation).

Presence of environmentally sensitive vegetation types:

Species which are sensitive to moisture to nutrients:

- threatened flora species
- proximity of native vegetation to effluent disposal areas.

(q) Location of groundwater recharge areas – effluent disposal in such areas must be avoided.

Depth to groundwater.

Location of existing wells on site and adjacent to the site.

Current use of groundwater. Current status of Regional groundwater (for example, is it potentially high yielding with low salinity – details may be obtained from Department of Environment and Heritage).

(s) Surface waters

- Proposed surface water management
- Proximity
- Current use
- Flow characteristics

Presence of wetlands with conservation significance.

(t) Water Balance

- Risk of run-off/subsurface lateral flows outside the site.
- Relevant calculations shall be included within the report and should conform with the requirements of 'Environmental & Health Protection Guidelines 1998'.

(u) Effluent load (related to population loads at 100% occupancy. Tourist facilities need to demonstrate seasonal variations if appropriate).

- Precipitation
- Evapotranspiration
- Percolation through to soil (if any)
- Run-off (if any) to determine the size of effluent disposal areas and volume of wet weather storage

(v) Impact of Nutrients

The escape of nutrients from effluent disposal areas is a major concern as nutrients pose a significant threat to our local waterways. The main nutrients of concern are nitrogen and phosphorus. Both of these nutrients are in high concentrations in treated effluent.

Nitrogen will be in a number of forms in effluent. Unless it can be removed, it will enter the groundwater system and eventually surface water quality. The main removal mechanisms are:

- Ammonia volatilisation (which is Ph dependent and will be significantly less in acidic conditions).
- Denitrification
- Plant and microbial (immobilisation) uptake

Removal, however, is dependent upon the vegetation being removed from the site, as if the vegetation is cut and left on the irrigation area, it will merely cycle back to the soils and effect the groundwater and surface waters. Calculations have shown that unless the vegetation is removed from the site (which is extremely difficult to police) more nitrogen will be applied to the system than can be removed and thus the siting of a development (provisions of an adequate buffer to water source) will need particular care to ensure nutrient pollution is not a problem.

Phosphorus will be removed from the effluent via:

- Chemical precipitation
- Absorption onto soil
- Plant and microbial (immobilisation) uptake

A thorough assessment of the potential impact of nutrients and a site nutrient balance from the proposed development should be undertaken. This will require a soil chemical analysis to determine the ability of phosphorus and nitrogen to be removed from the soil.

(w) Wet Weather – Details for Wet Weather Storage

Alternatively, if wet weather storage is not provided, supporting documentation must be supplied which indicates the soils have the ability to remove pollutants without adverse impact on the receiving environment. Details of methods to calculate storage are obtained in 'Environmental Guidelines for Industry – The Utilisation of Treated Effluent by Irrigation' EPA 1995.

(x) Other Relevant Information

An assessment as to the overall impact of the proposal both in the long and short term. In case of rezoning, it must be proved that the cumulative long term impact of the proposal, plus other activities within the catchment, will not result in unacceptable changes to the receiving environment.

After all of the abovementioned issues have been taken into consideration, a decision may be made to import suitable soil or other material for the effluent disposal area due to the poor in-situ soils of the sensitivity of the receiving environment.

Additionally, other ameliorative measures may be proposed. The effectiveness of these is difficult to quantify. In these situations, a much reduced scale of development or alternatively the 'do-nothing' option for the receiving environment.

Where site works such as those noted above are proposed so as to minimise/make acceptable the proposal, such works should be installed at subdivision stage so that quality control may be maximised (this being an important issues for their successful operation).

## 3.5 Common effluent systems (CES)

Effluent is collected in a gravity-fed reticulated system similar to a reticulated sewerage system. Savings in pipe sizes, reduced grade etc may be achieved over a conventional sewerage system. However, this needs to be assessed on an individual system basis.

These systems are used mainly in areas already served by septic tanks and for sites where on site disposal is not possible. They are not generally economical if new septic tanks have to be installed. Odour and corrosion problems due to septicity of the effluent (particularly in manholes) are more severe than in a conventional sewage system. The assessment may indicate that the proposal would be better served by a package treatment plant utilising the land suitable for effluent disposal, with the plant and disposal field being managed for all future owners.

Any proposal for a CES must include a detailed management and maintenance plan to service and maintain the system and the proposed legal arrangements for the ownership of any common lands or burdens on allotments, such as Community Title or Section 88b instruments.

# PART 4 POST APPROVAL EFFLUENT TREATMENT AND DISPERSAL ISSUES

## 4.1 Installation

Effluent disposal systems must be installed as per any approved Development/On-Site Sewage Management Applications.

Effluent disposal systems are not to be installed or used until the work has been inspected and approved by Council.

Effluent disposal systems are not to be used until the effluent disposal area/irrigation area has been inspected and approved by Council.

## 4.2 Operation

Householders must have approval from Council to operate a system of sewage management and maintain the renewal of this.

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

All domestic effluent treatment/disposal 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.

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 low sodium content washing powders and detergents. Attachment 4 in Appendix A provides details of the contents of various products available on the market.

In relation to water conservation measures, Council supports and recommends the installation of the following devices and maintenance procedure.

(a) Toilets to be fitted with 6/3 litre dual flush system
(b) Restrict water pressure to the premises, where possible, to around 150kPa.
(c) Devices to Australian Water Conservation Rating AA or better, including shower flow restrictors, tap aerators, water conserving washing machines.

## 4.3 Maintenance

### 4.3.1 Conventional Septic Tanks and Absorption Trenches

Conventional septic tanks and absorption trenches are not maintenance free. Solids will build up in septic tanks over a number of years and accordingly these systems require regular desludging or pump out.

The frequency of desludging is dependent upon the number of persons using the system but generally systems will be required to be desludged every five to seven years.

Split systems separate black and greywater for treatment for disposal. Greywater systems will require regular maintenance of the greasetrap or pre-clarification (PC) pit to remove oils and greases that may block the sub-surface effluent disposal area.

After being in use for several months, the inside of absorption trenches will become coated with a layer of biological and chemical solids which will tend to clog the system and impede absorption. Having dual application areas so that the absorption trench may be rested while another one is used, will allow the clogging layer to dry and thin out. This rotation should occur every three to six months. Rotation of irrigation areas in the case of AWTS will also aid in nutrient removal from these systems, and permit the soil bacteria to recover.

After a period of years some absorption areas (particularly in dispersive soils) will fail. Resting these areas or the application of gypsum may help, however in some situations the only feasible alternative is replacement of the effluent disposal area. Replacement of absorption trenches or any other effluent area requires an application to Council for approval.

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 waste treatment device for individual properties. The service must include a check and report on:

(a) sludge levels
(b) scum levels
(c) condition of the tank inlet and outlet
(d) condition of the absorption trenches
(e) a grease trap or pre-clarification pit if present
(f) condition of the tank walls and lid
(g) condition of outlet filter if installed

It is emphasised that maintenance is essential for the satisfactory performance of aerated wastewater treatment systems (AWTS) and composting toilets. Accordingly specific requirements apply.

A permit to install an AWTS will only be granted on the condition that the installation is inspected every three months by an approved servicing agent at the householder's expense. A report must be prepared after each inspection, with a copy forwarded to Council. A service tag or similar recording arrangement must be implemented and must be dated and signed or stamped at each visit.

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.

Each three-monthly service must include a check on all mechanical, electrical and functioning parts of the AWTS including:

(a) the chlorinator
(b) replenishment of the disinfectant
(c) all pumps
(d) the air blower, fan or air venturi
(e) the alarm system
(f) the slime growth on the filter
(g) the operation of the sludge return

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 desludging. The following field tests are to be carried out by the service contractor at every service:

(a) free residual chlorine using a suitable free residual chlorine measuring device
(b) Ph from a sample taken from the irrigation chamber
(c) dissolved oxygen from a sample taken from the final aeration or stilling chamber, is a recommended option.

For systems which utilise the sewage treatment principle of activated sludge or contact aeration an additional field test must be carried out by the service contractor at least annually to determine the accumulated sludge is bulking and as an indication that the aeration compartment/s require desludging. The sludge bulking test is commonly referred to as an SV30Test.

Each quarterly service on an AWTS must involve checks and maintenance on the irrigation system and area. Such checks and maintenance must include:

(a) Compliance with Council's original approval or later amendments issued by Council.
(b) Evidence of any irrigation area failure, runoff or pollutant escape from the site (eg very green grass heading in the direction of the boundary).
(c) Any blocking of spray irrigation outlets.

**The following matters are also recommended**

(d) Application of gypsum to the irrigation area at a rate of 0.2 kg per $m^2$
(e) Removal of vegetative matter by the owner as a means to reduce the nutrient build up on the irrigation area
(f) A check on the accuracy of any ground moisture sensors, whether their location is appropriate and any servicing, maintenance or replacement of the ground moisture sensors so as to achieve accurate readings
(g) Rotation of effluent application areas

In the event of a breakdown or malfunction, the service agent must be capable of effecting temporary repairs within 24 hours to ensure continued operation of the AWTS. This would necessitate the provision of adequate spare parts and temporary replacement blowers and irrigation pumps where repairs cannot be completed on site.

#### 4.3.2 Composting Toilets

A permit to install a composting toilet will only be granted on the condition that the installation is inspected annually by a Council-approved servicing agent at the householder's expense. A report should be prepared after each inspection with a copy forwarded to Council.

A service tag or recording arrangement must be implemented and is to be dated and signed or stamped at each visit.

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

In the case of composting toilets, the annual service must include a check on the following items:

(a) Fan operation and maintenance
(b) Filters to air intakes
(c) Any heating elements
(d) Presence of flies or other disease transmitting insects within the composting chamber
(e) That wastes have been allowed to compost for the period recommended for the type of unit by the manufacturer
(f) That the permanent construction note is still affixed within the closet compartment
(g) Any liquid discharge from the unit and accompanying disposal location
(h) The greywater disposal system including inspection of the disposal area

#### 4.3.3 Service Reporting

Service reports are to be submitted to Council for each AWTS or composting toilet within 14 days of the service date. The reports must include the areas identified within this Policy and be certified by the service technician.

Additionally, service contractors must immediately report to Council:

(a) All AWTS or composting toilet owners refusing a service or failing to renew a service contract
(b) All AWTS owners who have made alterations to the unit or irrigation system not in accordance with the original approval
(c) Details of any AWTS not in accordance with the NSW Health approval for such a unit.

#### 4.3.4 Council Monitoring

Council will undertake routine inspections of all sewage management systems in areas identified as high risk as part of a monitoring program. The inspection regime will be:

| **Category** | **Inspection Frequency** |
|---|---|
| High Risk | Annually |
| Medium Risk | 3 years |
| Low Risk | 5 years |

Any defect or non-conformance of an AWTS installation detected following an inspection carried out by Council staff or representative must be reported by Council to NSW Health.

Commercially manufactured or produced wastewater treatment units must have approval from NSW Health. A central register of NSW Health approvals of wastewater treatment devices and a register of installation approvals must be maintained by Council.

# PART 5 GENERAL INFORMATION

## 5.1 Variations

Departures from this Policy will be considered where justification is demonstrated, and such departure will not compromise the objectives or requirements of any AN/NZS Standard, NSW Health requirements or this Policy in general.

Council reserves the right to make minor amendments to the Policy from time to time without notice and to allow variations from the development standards contained herein based on merit. All amendments will be subject to future changes in Australian Standards and the current guidelines of recognised State Authorities.

## 5.2 Information to be Submitted with Development Applications

A development application for planning approval must be made as prescribed in the EPAA. Four copies of plans are required to accompany the application, as well as the Statement of Environmental Effects. This Statement of Environment Effects should include the necessary details outlined within this Policy for any proposed on-site waste disposal system.

The standard indicated within this Policy should be read in conjunction with the requirements of:

- AS/NZS 1547 – On-site domestic wastewater management
- Environment and Health Protection Guidelines 1998

These documents provide information for the assessment and evaluation of land suitability for effluent disposal.

### 5.2.1 Single Dwellings

An Section 68 application to install a sewage management facility should accompany a development or complying development certificate application, with details supporting the proposed means of effluent disposal in accordance with this Policy. If no application is received or inadequate details are lodged with the application the Development Consent Approval will require these details prior to the release of the Construction Certificate, (hence construction work cannot commence) or the Complying Development Approval may be refused. Further details about domestic effluent disposal are contained in the Environmental and Health Protection Guidelines 1998.

## 5.3 Other Effluent Disposal Codes and Requirements

From time to time site-specific studies are conducted to determine capability to accept development. These studies will examine all aspects of a site and its receiving environment and establish site-specific effluent disposal criteria.

These criteria may be outlined in a DCP, LEP, as conditions of development consent or listed as restrictions-as-to-user pursuant to Section 88B of the Conveyancing Act 1919. These sources should be checked to determine relevant conditions.

#### 5.3.1 Environment and Health Protection Guidelines – On-Site Sewage Management for Single Households 1998

The State Government developed these guidelines in 1997 and published them in February 1998 as a guideline document for all NSW Local Government Authorities. The guidelines specifically refer to single households only and should this document be reviewed or updated, the new document shall supersede previous releases.

## EVALUATION

| ***Goals*** | ***Performance Indicator/Target*** |
|---|---|
| • To maintain a database of all existing systems. | • All properties with an on-site sewage management system are detailed on a database.<br>• Regular reminder notices are issued for maintenance reports. |
| • To provide a training program for households using On-site Sewage Management systems. | • Provide household information packs to all operators on maintenance responsibilities for on-site systems. |
| • To ensure that all septic tanks are inspected by qualified people at regular intervals and are maintained as required for effective performance. | • Determine who is qualified to inspect and certify septic tanks.<br>• Develop and implement effective inspection and enforcement procedure based on self assessment.<br>• No fewer than 95% of all septic tanks to be desludged at least once every eight years. |

### 5.4 Continuing Improvement

Council maintains a commitment to the continuing improvement in the regulation and operation of On-site Sewage Management systems. The Sewage Management Policy will be a dynamic and evolving document which is in the process of continual improvement. Council's resources may be tested in areas where there are a large number of On-site Sewage Treatment Facilities, however, as there is an obvious need to provide an improved treatment and monitoring program, Council's commitment will be ongoing.

### 5.5 Further Advice

Should you need assistance regarding the preparation and/or submission of a development application, please contact Council for further advice.

### 5.6 References and Further Reading


- Bureau of Meteorology web site: http://www.bom.gov.au/climaticaverages/tables/ca_nsw_names
- Davison, L. 2001. Constructed Wetlands in On-site Wastewater Systems. Keynote address in *Proceedings of On-site 'O1 Conference: Advancing On-site Wastewater Systems* by RA Patterson & M.J. Jones (eds). Published by Lanfax Laboratories, Armidale.
- Department of Local Government. 1998. *Environment and Health protection Guidelines On-site Sewage Management for Single Households.* Department of Local Government, NSW Environment Protection Authority, NSW Health, Land and Water Conservation and Department of Urban Affairs and Planning. Sydney. Available from web site at:
- hhttp://www.dlg/nsw.gov.au/dlg/dlghome/dlg_septiconsite.asp
- EPA 1996 – *Guidelines for On-Site Effluent Disposal for a Single Dwelling (Draft) EPA Sydney*
- EPA 1995 – *Environmental Guidelines for Industry – The Utilisation of Treated Effluent by Irrigation (Draft), EPA, Sydney*
- *http://www.lanfaxlabs.com.au*

- MARTENS, DM & CORREY B. 1992 – *On-site Domestic Aerobic Wastewater Treatment: Process and Design – Department of Geography, University of Sydney*
- NORTHCOTE KH and SKENE JKM 1992 – *Australian Soils with Saline and Sodic Properties – Soil Publication No 27, CSIRO Australia*
- NSW Government Acts and Regulations
- PUBLIC WORKS*, Department of 1987 – Manual of practice (Sewer Design) – ydney.*
- RAYMENT & HIGGINSON (1992) – *Australian Laboratory Handbook of Soil and Water Chemical Methods*
- PATTERSON RA 1993 – *Effluent Disposal – The Sodium Factor, paper presented to Australian Institute of Environment Health Conference*
- PATTERSON, RA 2001 – *Consideration of soil □alinity when assessing land application of effluent, Department of Local Government Septic Safe draft technical sheet 01/06*
- PATTERSON RA 2002 – *options for On-site Wastewater Management Systems for Seven Local Villages in Scone and Murrurundi Shires*
- STANDARDS AUSTRALIA 1994 – AS1319 – *Safety signs for the occupational environment*
- STANDARDS AUSTRALIA 1994 – AS1547 – *Disposal systems for effluent from domestic premises*
- AUSTRAILAN/NEW ZEALAND STANDARDS 1999 – AS1547 – *On-site Domestic Wastewater Management – Committee Draft No 12*
- AUSTRAILAN/NEW ZEALAND STANDARDS 2000 – AS1547 – *On-site domestic-wastewater management*
- AUSTRAILAN/NEW ZEALAND STANDARDS 1546.1 – 1998 *On-site domestic wastewater treatment units. Part 1: Septic tanks*
- AUSTRAILAN/NEW ZEALAND STANDARDS 1546.2 – 1998 *On-site domestic wastewater treatment units. Part 2: Waterless composting toilets*
- AUSTRAILAN/NEW ZEALAND STANDARDS 1546.1 – 1998 *On-site domestic wastewater treatment units. Part 3: Aerated wastewater treatment systems*
- WATER POLLUTION CONTROL FEDERATION 1990 – *Natural Systems for Wastewater Treatment – Manual of Practice FD-16*

# APPENDIX A

## *THE FOLLOWING TABLES CAN BE USED TO CALCULATE THE REQUIREMENTS FOR STANDARD SEPTIC TANK AND ABSORPTION TRENCH SYSTEMS THAT MEET THE CRITERIA SET OUT IN TABLE 1 OF SECTION 2 PAGE (19)*

**Step (1)**
Determine Hydraulic loading from the following table based on an occupancy rate of one person per bedroom with an allowance of two persons for the main bedroom (Note- the use of water saving devices within the household is encouraged by Council)

| | Typical wastewater flow allowance in L/person/day | |
|---|---|---|
| **Source of Water** | **On-site roof water tank supply** | **Reticulated Community or a bore-water supply** |
| Households with standard fixtures (including automatic washing machine) | 140 | 180 |
| Households with standard water reduction fixtures (see Note 2) | 115 | 145 |
| Households with full water-reduction facilities (see Note 3) | 80 | 110 |

***Source: AS/NZS 1547:2000 Appendix 4.2D, page 141***

**Step (2)**
Determine locality of proposed system in relation to appropriate weather details for rainfall and evaporation data. Weather data were sourced from Bureau of Meteorology's web site and water balance model from Lanfax Labs web site, (refer references)

- Saumarez
- Bundarra
- Kentucky

**Step (3)**
Determine soil category in location of proposed absorption trenches with relation to effluent application rate given as mm/day (Attachment 1 can be used to assess the soil texture)

**Step (4)**
Determine application area ($m^2$) and total trench length (m) – Note individual trench or bed lengths should be limited to around 20m. A longer bed or trench can be constructed where a level bottom is guaranteed (installed using a dumpy level or similar).

**Step (5)**
Ensure adequate application area available, (refer to the drawing indicating a typical drain field to calculate this area) in selected disposal area for nutrient application – (Nitrogen and Phosphorus).

**Nutrient application areas required for effective nitrogen utilisation**

| Daily wastewater volume (L) | Effective daily nitrogen loading (kg) | Annual nitrogen load (kg) | Area for nitrogen utilisation ($m^2$) |
|---|---|---|---|
| 400 | 0.012 | 4.4 | **220** |
| 600 | 0.018 | 6.6 | **330** |
| 800 | 0.024 | 8.8 | **440** |
| 1000 | 0.03 | 11 | **550** |

**Area required for the plant assimilation of phosphorus**

| Daily wastewater volume (L) | Annual phosphorus load (kg) | Phosphorus available to plants (kg) | Area for phosphorus utilisation ($m^2$) |
|---|---|---|---|
| 400 | 1.46 | 0.73 | **240** |
| 600 | 2.19 | 1.1 | **365** |
| 800 | 2.92 | 1.46 | **485** |
| 1000 | | | |

**Note: Actual nutrient loading is dependent on the user of that system and to minimise environmental impact users should ensure food scraps etc are not placed into the drainage 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. Also the most important issue is the reduction of sodium levels flowing to the drain field area, this can be achieved by removing the sodium rich laundry products from the system. Details of various detergents and their phosphorus and sodium contents are available in Attachment 3 from Dr Robert Patterson – Lanfax Laboratories.**

***SAUMAREZ AREA***

*For these calculations a 600mm Wide Absorption Trench has been used*

| Daily waste water loading rate | Application area $m^2$ | Required trench length (m) |
|---|---|---|
| **Medium clays – Application rate of 5mm/day** | | |
| 400 L per day | 62 | 48 |
| 600 L per day | 92 | 71 |
| 800 L per day | 123 | 95 |
| 1000 L per day | 153 | 118 |
| **Light clays – Application rate of 8mm/day** | | |
| 400 L per day | 42 | 32 |
| 600 L per day | 63 | 48 |
| 800 L per day | 84 | 65 |
| 1000 L per day | 105 | 81 |
| | | |
| **Clay loams – Application rate of 10mm/day** | | |
| 400 L per day | 35 | 27 |
| 600 L per day | 52 | 40 |
| 800 L per day | 70 | 54 |
| 1000 L per day | 87 | 67 |
| **Sandy loams – Application rate of 15mm/day** | | |
| 400 L per day | 25 | 19 |
| 600 L per day | 37 | 28 |
| 800 L per day | 49 | 38 |
| 1000 L per day | 61 | 47 |

**NOTE – On small allotments where heavy clays are present or where excessive trench lengths are required due to the high hydraulic load alternative systems should be examined by the applicant**

***BUNDARRA AREA***

*For these calculations a 600mm Wide Absorption Trench has been used*

| Daily waste water loading rate | Application area $m^2$ | Required trench length (m) |
|---|---|---|
| **Medium clays – Application rate of 5mm/day** | | |
| 400 L per day | 78 | 60 |
| 600 L per day | 116 | 89 |
| 800 L per day | 155 | 119 |
| 1000 L per day | 194 | 149 |
| **Light clays – Application rate of 8mm/day** | | |
| 400 L per day | 49 | 38 |
| 600 L per day | 74 | 57 |
| 800 L per day | 98 | 75 |
| 1000 L per day | 123 | 95 |
| **Clay loams – Application rate of 10mm/day** | | |
| 400 L per day | 40 | 31 |
| 600 L per day | 59 | 45 |
| 800 L per day | 79 | 61 |
| 1000 L per day | 99 | 76 |
| **Sandy loams – Application rate of 15mm/day** | | |
| 400 L per day | 27 | 21 |
| 600 L per day | 40 | 31 |
| 800 L per day | 53 | 41 |
| 1000 L per day | 66 | 51 |

**NOTE - On small allotments where heavy clays are present or where excessive trench lengths are required due to the high hydraulic load alternative systems should be examined by the applicant**

***KENTUCKY AREA***

*For these calculations a 600mm Wide Absorption Trench has been used*

| Daily waste water loading rate | Application area $m^2$ | Required trench length (m) |
|---|---|---|
| **Medium clays – Application rate of 5mm/day** | | |
| 400 L per day | 67 | 52 |
| 600 L per day | 100 | 77 |
| 800 L per day | 133 | 102 |
| 1000 L per day | 166 | 128 |
| **Light clays – Application rate of 8mm/day** | | |
| 400 L per day | 45 | 35 |
| 600 L per day | 67 | 52 |
| 800 L per day | 89 | 68 |
| 1000 L per day | 111 | 85 |
| **Clay loams – Application rate of 10mm/day** | | |
| 400 L per day | 37 | 28 |
| 600 L per day | 55 | 42 |
| 800 L per day | 73 | 56 |
| 1000 L per day | 91 | 70 |
| **Sandy loams – Application rate of 15mm/day** | | |
| 400 L per day | 25 | 19 |
| 600 L per day | 38 | 29 |
| 800 L per day | 50 | 38 |
| 1000 L per day | 63 | 48 |

**NOTE - On small allotments where heavy clays are present or where excessive trench lengths are required due to the high hydraulic load alternative systems should be examined by the applicant**

# URALLA SHIRE COUNCIL
# ATTACHMENT 1
# ASSESSMENT OF SOIL TEXTURE

| **Classification** | Properties | **Typical clay content % (see Note)** |
|---|---|---|
| Sand | Very little to no coherence, cannot be moulded; single grains stick to fingers | Less than 5 |
| Loamy Sand | Slight coherence; forms a fragile cast that just bears handling; gives a very short (5mm) ribbon that breaks easily: discolours the fingers | 5-10 |
| Sandy loam | Forms a cast but will not roll into a coherent ball; individual sand grains can be seen and felt; gives a ribbon 15-25mm long | 10-20 |
| Fine sandy loam | As for sandy loams, except that individual sand grains are not visible, although they can be heard and felt; gives a ribbon 15-25mm long | 10-20 |
| Loam | As for sandy loams but cast feels spongy, with no obvious sandiness or, silkiness; may feel greasy if much organic matter is present; forms thick ribbon about 25mm long | 10-25 |
| Silty loam | As for loams but not spongy; very smooth and silky; will form a very thin ribbon 25mm long and dries out rapidly | 10-25 |
| Sandy clay loam | Can be rolled into a ball in which sand grains can be felt; forms a ribbon 25-40 mm long | 20-30 |
| Fine sandy clay loam | As for sandy clay loam, except that the individual sand grains are not visible although they can be heard and felt; forms a ribbon 40-50mm long | 20-30 |
| Clay loam | Can be rolled into a ball with a rather spongy feel; slightly plastic; smooth to manipulate; will form a ribbon 40-50mm long | 25-35 |
| Silty clay loam | As for clay loams but not spongy; very smooth and silky; will form a ribbon about 40-50mm long; dries out rapidly | 25-35 |
| Sandy clay | Forms a plastic ball in which sand grains can be seen, felt or heard; forms a ribbon 50-75mm long | 35-45 |
| Light clay | Smooth plastic ball that can be rolled into a rod; slight resistance to shearing between thumb and forefinger; forms a ribbon 50-75mm long | 35-40 |
| Silty clay | As for light clay but very smooth and silky; will form a ribbon about 50-75mm long but very fragmentary; dries out rapidly | 40-50 |
| Medium clay | Smooth plastic ball, handles like plasticine and can be moulded into rods without fracture; some resistance to ribboning, forms a ribbon 75mm or more long | 40-55 |
| Heavy clay | Smooth plastic ball that handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to ribboning; forms ribbon 75mm or more in length | 50 or more |
| | ***NOTE: The typical clay content figures are included for information only.*** | |

Source: AS/NZS 1547:2000 Appendix 4.1D, p97

# URALLA SHIRE COUNCIL
# ATTACHMENT 2
# DETERMINATION OF SOIL CATEGORY

| Soil Category (See Note 1) | Soil Texture | Structure | Indicative Permeability ($K_{sat}$) (m/d) (See Note 2) | Indicative Drainage Class (See Note 3) |
|---|---|---|---|---|
| 1 | Gravels and Sand | Structureless (Massive) | >3.0 | Rapidly drained |
| 2 | Sandy Loams | Weakly Structured<br><br>Massive | >3.0<br><br>1.4-3.0 | Well Drained |
| 3 | Loams | High/Moderate Structured<br><br>Weakly Structured | 1.5-3.0<br><br>0.5-1.5 | Moderately Well Drained |
| 4 | Clay Loams | High/Moderate Structured<br><br>Weakly Structured<br><br>Massive | 0.5-1.5<br><br>0.12-0.5<br><br>0.06-0.12 | Imperfectly Drained |
| 5 (Note 4) | Light Clays | Strongly Structured<br><br>Moderately Structured<br><br>Weakly Structured or Massive | 0.12-0.5<br><br>0.06-0.12<br><br><0.06 | Poorly Drained |
| 6 (Note 4) | Medium to Heavy Clay | Strongly Structured<br><br>Moderately Structured<br><br>Weakly Structured or Massive | 0.06-0.5<br><br><0.06<br><br><0.06 | Very Poorly Drained |

| NOTES | |
|---|---|
| **1** | Soil Category determination shall take into account the soil horizons within the depth range into which effluent is absorbed (see Clause 4.1.4 and Paragraph 4.1A8). Figure 4.1A1 may be used to report on the overall soil category determined from the inspection of the individual soil layers. |
| **2** | The values of indicative permeability $K_{sat}$ are based on the movement of water, not effluent, through the soil. They are estimates only and shall be used with caution in assisting the determination of the Soil Category. In the field, soil permeability is strongly influenced by the presence of biological channels such as old root holes, termite, ant and worm passages, as well as shrinkage cracks, and not merely by soil texture. A virgin clay-based soil under native bush could easily be ten times as permeable as the same soil under frequent cultivation or compacted by heavy traffic. |
| **3** | Indicative drainage classes are based on the assumption that drainage is governed only by the indicative permeability and that external factors play no role. |
| **4** | For clay-dominated soils having dispersive (sodic) or shrink/swell behaviour, specialist soil advice and special design techniques will be required to enable their utilisation for land-application systems. Generally these soils will have very poor drainage. |

Source: AS/NZS 1547:2000 Table 4.1.1, p59

# URALLA SHIRE COUNCIL
# ATTACHMENT 3
# RECOMMENDED DESIGN LOADING RATES FOR TRENCHES AND BEDS

| Soil Category | Soil Texture | Structure | Indicative permeability ($K_{sat}$) (m/d) (See Note 6) | Design Loading Rate (DLR) (See Notes 1,2 and 3) | | | Indicative drainage class (see Note 9) |
|---|---|---|---|---|---|---|---|
| | | | | Primary-Treated effluent (See Note 4) | | Secondary-treated effluent (see Note 5) | |
| | | | | Conservative rate (mm/d) (see Notes 4 & 7) | Maximum rate (mm/d) (see Notes 4 & 8) | (mm/d) | |
| 1 | Gravels and Sand | Structureless (Massive) | >3.0 | 20 (See Note 10) | 35 (See Note 10) | 50 (See Note 10) | Rapidly drained |
| 2 | Sandy Loams | Weakly Structured<br>Massive | >3.0<br>1.4-3.0 | 20<br>15 | 35<br>25 | 50<br>50 | Well Drained |
| 3 | Loams | High/Moderate Structured<br>Weakly Structured | 1.5-3.0<br>0.5-1.5 | 15<br>10 | 25<br>15 | 50<br>30 | Moderately Well Drained |
| 4 | Clay Loams | High/Moderate Structured<br>Weakly Structured<br>Massive | 0.5-1.5<br>0.12-0.5<br>0.06-0.12 | 10<br>6<br>4 | 10<br>10<br>5 | 30<br>20<br>10 | Imperfectly Drained |
| 5 (Note 4) | Light Clays | Strongly Structured<br>Moderately Structured<br>Weakly Structured or Massive | 0.12-0.5<br>0.06-0.12<br><0.06 | 5<br>(see Note 11)<br>(see Note 11) | 8<br>5<br>(see Note 11) | 12<br>10<br>8 | Poorly Drained |
| 6 (Note 4) | Medium to Heavy Clay | Strongly Structured<br>Moderately Structured<br>Weakly Structured or Massive | 0.06-0.5<br><0.06<br><0.06 | (see Note 11)<br>(see Note 11)<br>(see Note 11) | (see Note 11)<br>(see Note 11)<br>(see Note 11) | (see Note 11)<br>(see Note 11)<br>(see Note 11) | Very Poorly Drained |

Source: AS/NZS 1547:2000 Table 4.1.2A, p116

## ATTACHMENT 4

# VEGETATION SUITABLE FOR LAND APPLICATION AREAS IN THE NEW ENGLAND 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 | | |

| Botanical Name | Approx Height | Common Name/Variety |
|---|---|---|
| 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 | |

# ATTACHMENT 5

**Phone** Office/Lab (02) 6775 1157
Fax (02) 6775 1043
ABN: 72 212 385 096
email: lanfax.labs@science.com.au
Website: http://www.lanfaxlabs.com.au
493 Old Inverell Road
(P.O. Box W90) Armidale NSW 2350
Director: Dr Robert Patterson CPSS, CPAg, FIEAust
Soil Scientists and Environmental Engineers

Lanfax Laboratories

Proficiency tested with Aust. Soil & Plant Analysis Council

## LAUNDRY PRODUCTS RESEARCH

The data, from which the graph on the reverse of this page was produced, were from research financed and undertaken by Lanfax Laboratories in July 1999, independent of any other organisation.

A range of laundry products was purchased from the local supermarkets comprising 20 liquid and 40 powder products. The selection covered the major brands, as determined from previous research, but included some lesser known brands, and five dishwashing detergents.

For each of the detergents, the mass of a 40 mL freshly poured sample was determined. Using the manufacturers' recommended loading rates for an average wash in a top loading automatic washing machine, an equivalent weight of each product was mixed with water from a rainwater system to represent the recommended dose of product with the full water load, that is, 160 litres of wash, rinse, deep rinse and spin cycle.

The samples were shaken for 1 hour at room temperature and the concentration of each of the elements of interest determined at the University of New England using an Inductively Coupled Plasma (ICP). Other chemical properties were measured by Lanfax Labs.

Only the sodium and phosphorus results are reported here. Other information from the research is available at our web site:

www.lanfaxlabs.com.au/publications.html

PATTERSON, R.A. (2000). *Water Quality Relationships with Reuse Options*. in 3rd International Symposium on Waste Water Reclamation, Recycling and Reuse. 3-5 July 2000. Paris France. International Water Association .Preprint Book 8, pp 205-212.

and

PATTERSON, R.A. (1999) *Reuse Initiatives Start in the Supermarket.* NSW Country Convention. Institution of Engineers Australia. 6-8 August 1999. Northern Group, Institution of Engineers Australia, Armidale.

**How to read this graph:**

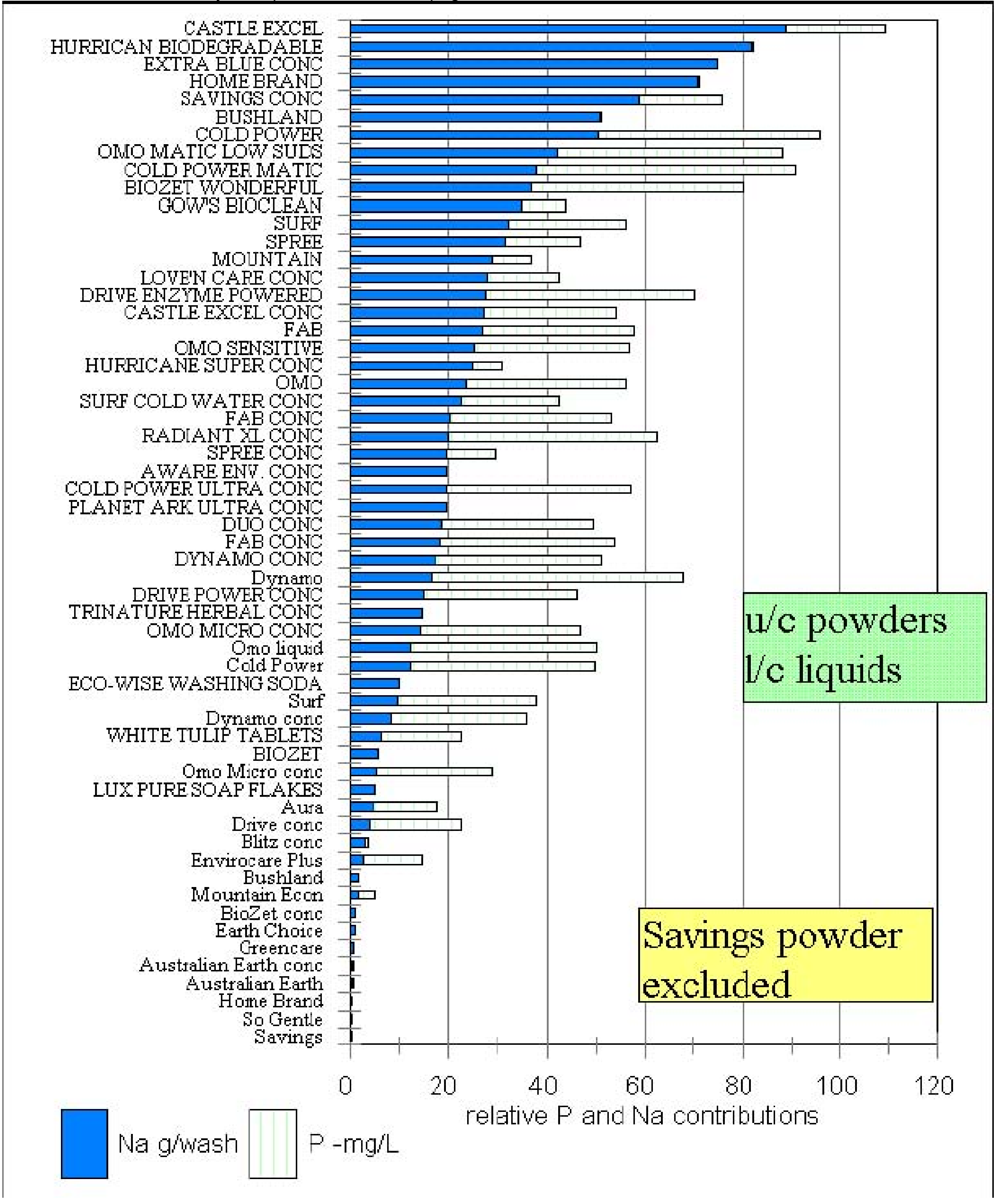
For all on-site systems that apply the effluent by surface or subsurface application, the levels of sodium are critical. Choose the product with the lowest sodium. Levels over 20 g/wash are likely to be detrimental to plants and the soil.

The levels of phosphorus will depend upon the soil type and the use of the effluent. In some soils, phosphorus is not a real concern because it is immobile. In other soils it is likely to build up to high levels. It is preferable to choose the lower phosphorus values as well as the low sodium.

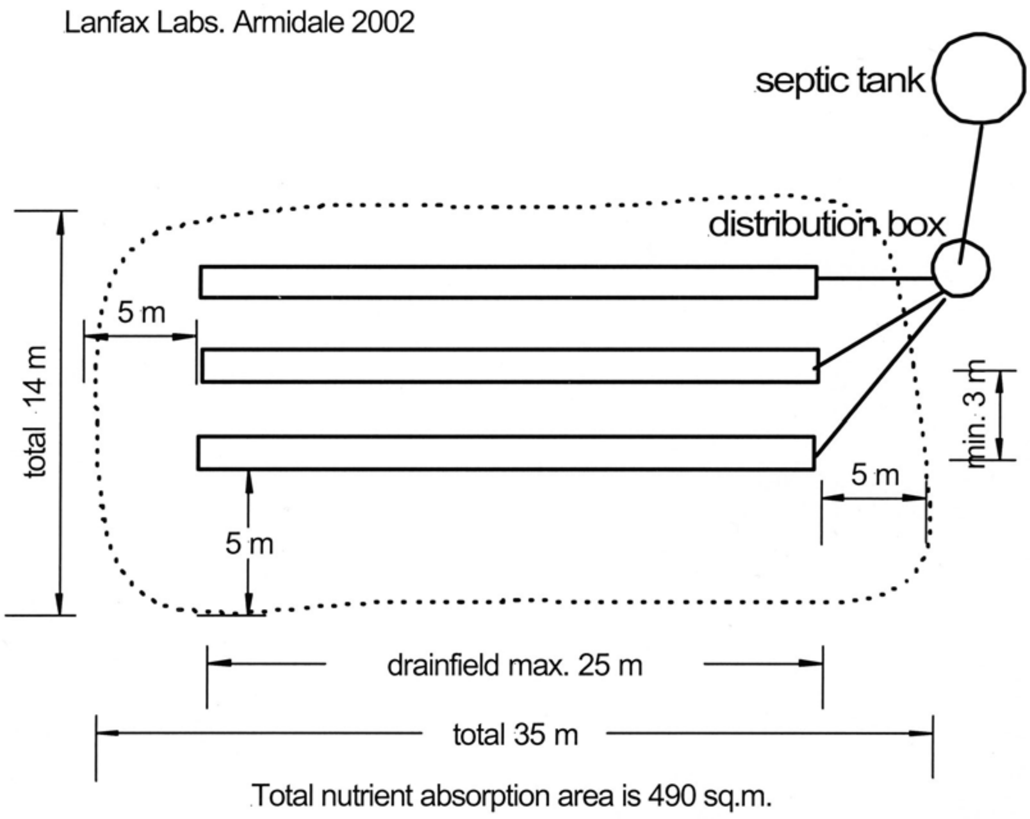
The detergents with long sodium bars (greater than 20 g/wash) should not be thrown out on your favourite garden as the sodium may be detrimental to the plants. High pH is also detrimental to plants and soils.

***Figure 1. Ranking of laundry products according to sodium concentration with phosphorus concentration shown as tail. Ideal choice for on-site systems is one with a low sodium and a low phosphorus concentration.***

This document may be reproduced as a two page article, can be distributed NOT FOR SALE.




**©Copyright Lanfax Laboratories Armidale Dr Robert Patterson**




The above diagram represents a standard design layout for a septic tank and three absorption trenches. 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. This will allow the effluent to drain from one trench to the next.

An approximation for the total drain field 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.

The nutrient absorption area for the above diagram works out at the following:

A single 30 metre trench at 318m$^2$, a dual trench at 444m$^2$ and a triple trench at 588m$^2$. The actual areas required for nutrient absorption are provided earlier in this Appendix.