campbelltown
city council

Wastewater Management and Water Recycling Strategy 2009

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Please note the information contained within the Wastewater Management and Water Recycling Strategy (WMWRS) is intended as a guide for residents. The content of current legislation or associated guidelines or standards should be verified as it may take precedence over information contained within the WMWRS.

PART A: Introduction

The Campbelltown Local Government Area (LGA) encompasses an approximate area of 312 km^2 and is approximately 50 km southwest from the Sydney Central Business District (CBD). It is estimated that there are more than 300,000 domestic wastewater management systems (WMS) across NSW. Campbelltown LGA contains approximately 1000 systems consisting predominantly of septic tank and absorption trench or aerated wastewater treatment systems. The existing domestic wastewater management systems vary in age, design, installation, user hydraulic loading and operation. Varying levels of knowledge amongst owners/occupiers of premises with WMS and system construction and maintenance standards, have an immediate effect on the performance of these systems.

In the LGA, there are suburbs that are not connected to Sydney Water Corporations (SWC's) reticulated network of sewerage infrastructure. These unsewered areas include: Long Point, Minto Heights, parts of Ingleburn (North-Eastern Zone), Kentlyn, Wedderburn (South-Eastern Zone), Denham Court, Varroville (North-West Zone) and Menangle Park and Gilead (South-West Zone).

The Georges River Catchment comprises rocks mostly of the Triassic Age. The overlying rocks are the Wianamatta Shales and are underlain by Hawkesbury Sandstone (Appendix 2). The topography varies considerably, increasing in scale and altitude to the South. Generally the topography is gentle rolling hills. According to *Groundwater in NSW "assessment of pollution risk",* there is a low to moderate risk of groundwater pollution. Groundwater is fit for consumption in the sandstone regions, but extremely saline in the predominantly shale/siltstone dominated areas.

Background

In March 1998, the NSW Minister for Local Government introduced the Local Government (Approvals) Amendment (Sewage Management) Regulation 1998 and Environment and Health Protection Guidelines, in response to all wastewater management systems being recognised across the state as a significant source of pollution and risk to public and environmental health. The above Regulation has been reviewed and all relevant legislation is now contained within the Local Government (General) Regulation 2005.

The influence for the introduction of this new legislation was the Wallis Lake incident. Four hundred members of the public became severely ill from Viral Hepatitis A after consuming shellfish and oysters from the region. Viral Hepatitis A is only found in humans, the source being from human effluent/wastewater. Faulty and incorrect operation of on-site wastewater management systems were suspected as the source of human wastewater and effluent.

Scope

This Wastewater Management and Water Recycling Strategy (WMWRS) aims to be a practical guide in outlining both Council's and the system owner's responsibilities in maintaining, monitoring, assessing and reporting on wastewater management systems and private recycled water schemes with specific reference to the circumstances present in the LGA.

For the purpose of this strategy the LGA is divided into four inspection zones grouped via suburbs, soil and geology types in the area. These are the Northeast, Northwest, Southwest and Southeast inspection zone.

The WMWRS applies to all wastewater management systems located in the LGA. It affects all sewered and unsewered urban and rural properties or properties that are reusing or disposing of wastewater onsite and offsite (commercial/industrial enterprises).

Purpose

The purpose of the WMWRS is to outline a framework for Council to:

i) Manage and regulate wastewater management systems in the Campbelltown LGA as outlined in the Local Government Act 1993 and Local Government (General) Regulation 2005

ii) Issue an “Approval to Operate” to owners of the property

iii) Establish a database of all wastewater management systems (domestic, commercial and industrial) in the Campbelltown LGA

iv) Implement a field auditing and testing procedure

v) Improve the response to commercial wastewater management/water recycling systems and ensure they are operating in accordance with the appropriate standards and guidelines

vi) Outline Campbelltown City Council's guidelines/recommendations on effluent distribution, decommissioning of disused septic tanks and other key waste water management issues

vii) Encourage cooperation with landowners, tenants, operators, service agents, plumbers/drainers and installers to support continual improvement of wastewater management systems

viii) Ensure wastewater management systems reporting is included in environmental reports such as the State of the Environment Report

ix) Implement an ongoing education program and provide guidance regarding wastewater management systems, grey water reuse and water recycling schemes.

Objectives

The objectives of this strategy are:

i) **Prevention of public health risk:** wastewater/effluent may contain high levels of potentially harmful bacteria, viruses, parasites and other disease-causing organisms. Therefore contact with effluent or associated residuals (such as composted materials) should be eliminated or minimised. Insects (mosquitoes) can also act as vectors for disease. Treated wastewater/sewage/effluent should not be used on edible crops that are consumed raw

ii) **Protection of land and vegetation:** wastewater management systems should not cause any deterioration of land and vegetation quality through soil structure degradation, salinitisation, water logging, chemical contamination or soil erosion

iii) **Protection of surface water:** wastewater management systems should be selected, sited, designed, constructed, operated and maintained to ensure surface waters are not contaminated by any flow from either the vessel/system (eg septic tank) or effluent application areas (including effluent, rainfall runoff and contaminated groundwater flow);

iv) **Protection of Groundwater:** wastewater management systems should be selected, sited, designed, constructed, operated and maintained to ensure that groundwater will not be contaminated by any flow from either the vessel/system (eg septic tank) or effluent application areas;

v) **Conservation and reuse of resources:** the resources in domestic wastewater (including nutrients, organic matter and liquid) should be identified and utilised as much as possible. Water conservation should be practiced and wastewater production should be minimised.

vi) **Protection of community amenity:** wastewater management systems should be selected, sited, designed, constructed, operated and maintained so that they do not unreasonably interfere with the quality of life and adversely impact on amenity. Special consideration should be given to aesthetics, odour, dust, buffer distances, vectors and excessive noise.

PART B: Legislation, Australian Standards, Guidelines and other Regulatory Authorities

Legislation

Council is governed by legislation and has a number of legal avenues available when seeking compliance with respect to wastewater management systems. The principal provisions are contained under Local Government Act 1993 and the Local Government Regulation (General) 2005. This legislation is effectively underpinned by a number of Australian Standards, related guidelines and general environmental provisions incorporated within the Protection of the Environment Operations Act 1997.

Local Government Act 1993 and the Local Government (General) Regulation 2005

This legislation:

a. specifies requirements for design, installation, alteration and operation of domestic onsite sewerage management systems, under section 68 and section 68A of the Act, and allows fees to be charged under section 68

b. specifies the requirement to obtain approval to operate and install a waste management system

c. specifies information required to accompany an application to operate, install or alter an onsite sewage management system

d. clarifies accreditation roles and responsibilities of Health NSW

e. describes minimum performance criteria for the installation and operation of on-site sewage management systems

f. provides regulatory and enforcement mechanisms including the issue of an Order where public health or the environment is at risk

g. states Penalty Notices under the Act may be issued depending on circumstances including the failure to obtain approval or to comply with an approval or Order issued under the Local Government Act.

Water Industry Competition Act 2006

The Water Industry Competition Act 2006 encourages competition in relation to the supply of water, the provision of sewerage services and the development of infrastructure for the production and reticulation of recycled water.

Some commercial Wastewater Management Systems and Private Recycled Water Schemes will be regulated by the Water Industry Competition Act 2006 as the by-product of recycled water (if Water Quality Standards are achieved) can potentially be traded or used to provide a service (eg providing recycled water for particular uses).

The Independent Pricing and Regulatory Tribunal (IPART) is the regulatory authority in relation to the licensing, trading, sale, service and provision of recycled water and infrastructure to an external agency or purchaser. However Local Government Authorities (councils) are still required to assess and approve any system that proposes

to use wastewater, sewage or effluent as a source of water and potentially provide recycled water as a product.

Australian and New Zealand Standards

Australia and New Zealand Standards are a set of best practice dcouments that encompass a broad range of topics including site evaluations, management and design specifics of wastewater management systems. The standards below shall be used when planning to install and operate a domestic wastewater management system or private recycled water scheme:

- **AS/NZS 1546.1:2008** On-site domestic wastewater treatment units Part 1: Septic Tanks
- **AS/NZS 1546.2:2008** On-site domestic wastewater treatment units Part 2: Waterless composting toilets
- **AS/NZS 1546.3:2008** On-site domestic wastewater treatment units Part 3: Aerated Wastewater treatment systems
- **AS/NZS 1547:2000** On-site Domestic Wastewater Management.
- **AS/NZS 3500:2003** National Plumbing and Drainage Standards

AS/NZS 3500:2003 National Plumbing and Drainage Standards and NSW Code of Practice – Plumbing and Drainage 3rd Edition 2006

The National Plumbing and Drainage Standard (AS/NZS 3500.2003) and the NSW Code of Practice – Plumbing and Drainage 3rd Edition 2006 are extremely relevant to licensed plumbers, drainers and installers who conduct repairs and alterations to existing wastewater management systems and new installations of wastewater management systems or private recycled water schemes. These standards cover the requirements for the design and installation of any plumbing and drainage work.

Guidelines

Environmental and Health Protection Guidelines

The *Environmental & Health Protection Guidelines: On-site Management for Single Households* was released in 1998 by the Department of Local Government and has been issued to assist councils in regulating the installation and operation of wastewater management systems. The guidelines act as a technical document providing practical information regarding the management of wastewater management systems. These guidelines recommend:

i) that Council develop, implement and regularly review a Sewage (ie waste water) Management Strategy

ii) that environment and health issues be considered by Council when approving the installation and operation of wastewater management systems

iii) the development of conditions of Approval to Operate on-site sewage management and facilities

iv) ongoing community education

v) that a longterm program of on-site sewage management facility audits (site assessments) be implemented to monitor the performance and impact of on-site sewage management facilities on the wider environment.

NSW Guidelines for the Management of Private Recycled Water Schemes

The NSW Interim Guidelines for Private Recycled Water Schemes were introduced in 2007 by the Department of Water and Energy. This document assists local authorities, owners, developers, water industry suppliers and manufacturers in designing, manufacturing, installing, operating and monitoring commercial wastewater systems and private recycled water schemes.

NSW Guidelines for Greywater Reuse in Sewered, Single Household Residential Premises

The NSW Guidelines for Greywater Reuse in Sewered, Single Household Residential premises were introduced in 2007 by the Department of Water and Energy (formerly known as Department of Energy, Utilities and Sustainability). This document assists local authorities, owners, water industry suppliers (manufacturers and suppliers) and installers (plumbers and drainers) in designing, installing and operating Domestic Greywater diversion devices and greywater treatment systems.

Owners, landholders, developers, installers (plumbers and drainers) considering the installation of a greywater management system are encouraged to access this guideline.

Other Regulatory Authorities

NSW Health

NSW Health accredits the design requirements and specifications for domestic wastewater management systems (Septic tanks, Collection Wells, Aerated Wastewater Treatment Systems, Greywater Treatment Systems, Composting Toilets, Incinerating Toilets) of up to 10 person capacity. Before any domestic wastewater management system can be marketed, purchased, installed and operated, such systems must be accredited by NSW Health. It is **prohibited and unlawful** to sell or install any such wastewater management system that is not accredited by NSW Health. A list of approved Wastewater Management Systems can be obtained from NSW Health's website at http://www.health.nsw.gov.au/.

PART C: Wastewater Management And Water Recycling

Wastewater Management System Operation and Maintenance

A wastewater management system is a miniature wastewater/sewage treatment plant that can vary in shape, size, type (domestic, commercial, industrial), performance, operation, treatment and discharge water quality. If a wastewater management system is misused, overworked or incorrectly operated and maintained, it will not function satisfactorily and perform to its operation standards.

It is both the owner's and Council's responsibility to monitor system performance. A Private Recycled Water Scheme can be a large wastewater management system that provides treated effluent (highest quality of treated effluent - Recycled Water), for reuse onsite and potentially offsite to customers.

A functional wastewater management system will have a thriving bacterial culture (anaerobic bacteria), and a non-oxygenated environment generated by a crust layer (within the primary septic tank) through which metabolic activities break down wastewater contents (eg human waste, biological waste, soap, scum).

If only primary treated effluent (Septic tank liquid waste) occurs, then the effluent shall only be distributed through a sub-soil effluent application area. The effluent is managed by soil micro-organisms and absorption through the soil. If secondary treated effluent (eg Aerated Wastewater Treatment System liquid waste only) occurs, then the effluent shall be distributed on the surface or sub-surface via an approved effluent distribution system in an Effluent Application Area (EAA). The vegetation located within the EAA (grass, ornamental gardens and shrubs) will remove (absorb) some of the effluent (liquid and nutrients) through the root system and utilise the liquid and nutrients as a food source through the functioning of the plant (photosynthesis and transpiration). Simultaneously, the soil will absorb some of the effluent (liquid) through absorption/infiltration and evaporation will occur from the surface of the soil, by the action of continuous rotation of sprinklers and regular maintenance of the approved effluent application areas.

However, circumstances can arise where mechanical equipment (pumps and aeration blowers) deteriorate and require replacement/repair. Electrical surges or disconnection can occur and system performance declines from a lack of general maintenance. Where a circumstance inhibits the performance and function of the wastewater management system, it will directly or indirectly affect wastewater treatment and soil absorption/filtration capabilities of an EAA. These occurrences, combined with unsafe and poor` effluent application practices, can result in serious environmental and public health risks.

Wastewater Management Systems

The following are regarded as Wastewater Management Systems:

i) Tanker Pump-out system (Septic tank/Collection well waste removed offsite via tanker truck)
ii) Septic tank/collection well to on site absorption trench system
iii) Septic tank/collection well to trans-evaporation bed disposal system
iv) Aerated Wastewater Treatment System (AWTS) to on site disposal via either surface spray/sub-surface/ absorption trench and trans-evaporation effluent distribution system
v) Wet dry and waterless composting toilet systems
vi) Pan

vii) Cesspit
viii) Private Recycled Water Scheme (i.e. Greywater Diversion Devices and Greywater Treatment Systems)
ix) Commercial/Industrial Wastewater management systems
x) Any other wastewater management system located onsite that stores, treats and disposes of wastewater/effluent on the premises.

Effluent Distribution Systems

There are five common effluent distribution systems in place in the Campbelltown LGA. These are:

i) Absorption trench system – applicable for both AWTS and primary septic tank systems

ii) Trans-evaporation bed systems – applicable for both AWTS and primary septic tank systems

iii) Fixed Pop-up Surface Spray Sprinkler system - applicable for AWTS only

iv) Moveable effluent distribution line with attached low volume plume sprinklers - applicable for AWTS only

v) Pressurised sub-surface effluent distribution system – grid/matrix of interconnected lines with emitters discharging pressure dose amounts of treated effluent into the top 100 – 150mm of topsoil - applicable for AWTS only.

Inspection Program and Risk Classification

Wastewater management systems operating within the Campbelltown LGA will be given a risk based classification.

The risk classification and associated inspection frequency can be divided into three categories for Domestic Wastewater Management Systems (DWMS) and two categories for Commercial Systems (Commercial/industrial Wastewater Management Systems or Private Recycled Water Schemes) (CIWMS). They are as follows:

Table 1: Risk Classification and Inspection Frequency for DWMS

Risk Classification	Inspection Frequency (Years)
High	1
Medium	3
Low	5

Table 2: Risk Classification and Inspection Frequency for CIWMS

Risk Classification	Inspection Frequency (Years)
High	1
Medium/Low	3

NOTE: Additional inspections may be carried out at any time at Council's discretion.

The risk classification will be made during application assessment and is based on a number of criteria in relation to the performance, operation and condition (structural integrity) of the system; allotment size; specific site constraints (such as buffer zones, soil type/condition, drainage, slope, number of building occupants and groundwater conditions; possible impacts on public health; water quality; soils; native vegetation and community amenity. These are based on guiding principles from the *Environmental & Health Protection Guidelines - On-site Sewage Management for Single Households 1998* and *Australian Standard 1547:2000 On-site domestic-wastewater management.*

All newly installed wastewater management systems will be classified as high risk in the first year of system operation. The risk classification may then be varied for subsequent approval terms based on the outcome of the application renewal assessment process.

All wastewater management systems that have been identified as a FAILED system will not be issued an approval until the system is replaced or repaired to Council's satisfaction.

Inspection Zones

For administration purposes the LGA has been divided into a number of inspection zones as discussed below.

North Eastern Inspection Zone

This zone encompasses Long Point, Ingleburn, Minto Heights, and Macquarie Fields. These suburbs are underlain by Hawkesbury sandstone, which are overlain by sandy loam soils. The depth of soil varies and some areas contain high clay content. Coarse fragments exist in the lower horizons. Based on the geology and soil type, all wastewater management systems in this area face any number of the following limitations:

- rocky outcrops
- hard setting surfaces
- low soil fertility
- high clay content in soil horizons
- acidic soils (inhibiting vegetation growth)
- soil remediation is commonly needed in most cases where AWTS installation is being contemplated.

South Eastern Inspection Zone

This zone encompasses Wedderburn and Kentlyn. The suburbs are underlain by Hawkesbury sandstone, which are overlain by sandy loam soils. The depth of soil varies and some areas contain high clay content. Coarse fragments exist in the lower horizons. Based on the geology and soil type, wastewater management systems are challenged with similar site and soil constraints as the North Eastern Zone.

South West and North West Inspection Zone

The South west zone encompasses Gilead and Menangle Park. Menangle Park is particularly predominated by sandy soils and underground springs which run freely after the onset of wet weather.

The North west zone encompasses Denham Court, Varroville and Gregory Hills. These suburbs are underlain by Wiananmatta shales. The soil landscape overlaying this geology is clay dominated and varies from clay loams to heavy clays. Based on the

geology and the soil type associated with this area, wastewater management systems of all types are challenged with site and soil constraints of water logging, low infiltration and permeability, undulating slopes and increased potential runoff due to low infiltration.

Owner and Tennant Notification Procedure

Prior to Council completing a monitoring inspection, an introductory or renewal letter will be sent to the default mailing address (owner's residential address OR nominated Managing Agent's address) notifying the owners/managing agents of the owners responsibility to renew or apply for an Approval to Operate. Upon receipt of an application to operate, Council as part of the application assessment process will contact the owner to make arrangements to conduct an inspection of the system.

Field Inspection Procedures

A " Wastewater Management System Inspection Sheet" will be completed on site by Council's Officer.

Matters to be considered during the inspection are as follows:

- **Absorption trenches** - will be inspected for effluent surcharge on surface, damage by vehicles/livestock, adequate fencing to restrict vehicle/livestock access, saturation of soils (instability of surface, sogginess) odour and vermin habitation (mosquito breeding area)

- **Sludge levels** - will be measured in primary septic tanks

- **Odour** - if present may suggest that desludging of tank required

- **System Location** - the location of wastewater management system, effluent application area and any other structures adjacent to the system and documentation of problems that are currently occurring

- **Distribution lines and sprinklers** - existing movable surface effluent distribution lines will be inspected for length, whether sprinklers attached and operational, spaced 2-3 metres apart or drip/trickle lines attached, operational, and distributing the effluent evenly

- **Disposal Area** - check for surface ponding of effluent;

- **Septic Tank and Holding Wells** - check for cracked or missing lids;

- **Warning Sign** - check for correct signage for Aerated Wastewater Treatment Systems and effluent application areas;

- **Treatment Tank** - if there is an Aerated Wastewater Treatment System, the lid will be lifted and the internal mechanics checked. This includes checking that chlorine tablets have been replenished, Ultra Violet lamp is operational, aeration blower is operational and internal chambers are stable and satisfactory.

Common Issues encountered in field inspections

Common issues identified with a variety of on-site systems include:

All Wastewater Management Systems

- A consistent and offensive wastewater/effluent odour, indicating a potential problem with the absorption trench or primary septic tank in need of a de-sludge waste removal

- Cracked lids/open inspection holes, which encourages vermin and is a safety issue

- Some residents being unaware that their property is unsewered. Generally this is a problem with properties that are newly tenanted or owners who have recently purchased the property

- Decoration and ornamental objects such as ponds, plant containers, or garden features or backfilled material being placed adjacent or on top of systems, restricting access to wastewater management systems and potentially effluent application areas.

Aerated Wastewater Treatment Systems

- Owners of Aerated Wastewater Treatment Systems may be under the assumption that final liquid product after treatment is of drinking water quality, therefore are using it in inappropriate places or for inappropriate uses

- Owners of Aerated Wastewater Treatment Systems with surface spray effluent distribution using high-powered sprinkler head attachments or other distribution equipment (illegal under Australian Standards 1547:2000), resulting in increased aerosol drift of the mist over unacceptable distances

- Effluent distribution via surface spray (eg movable effluent distribution line or fixed surface spray) which has the potential or is being discharged onto edible plants, vegetables and fruit trees, entering and being discharged into swimming pools, dams and around domestic animals

- Effluent distribution lines must be purple or black in colour. Many owners/operators have attached traditional green garden hoses. This is not an approved piece of equipment for effluent distribution as it has the capacity to be connected to the domestic water supply system and can be mistakenly be used for the purposes of potable water supply. This is dangerous, as cross contamination occurs or unfamiliar persons may mistake the effluent being discharged as potable water (tap water)

- No chlorine tablets located in Aerated Wastewater Treatment System reducing the effectiveness of the system in treating effluent and resultant discharge waster quality

- No Ultra Violet (UV) lamp in operation or connected reducing the effectiveness of the system in treating effluent and resultant discharge waster quality

- Extremely strong chlorine smell coming from Aerated Wastewater Treatment System. This indicates an extremely high free residual chlorine reading. Excessive chlorine can eradicate beneficial micro-organisms in the soil and destroy the vegetation (grass, lawns, shrubs etc) and has the ability to bond with other natural elements (found within or on the surface of the soil) to form carcinogenic compounds

- Internal components of Aerated Wastewater Treatment System are shattered, corroded or not functional and chlorine tablet holder tubes missing reducing the effectiveness of the system in treating effluent and resultant discharge waster quality

- A great deal of information can be obtained from the visual inspection of the irrigation chamber i.e. scum, oil, solids overflow, odour, turbidity of effluent etc. These can indicate problems such as sludge build up, hydraulic overload, flooding and excessive use of detrimental cleaning products (bleach type products, caustic soda, large volume of disinfectants, chemical cleaners). Chemicals like oils, paints, pesticides, herbicides should never be discharged into your wastewater management system, as it will kill the helpful bacteria, potentially causing problems and odour.

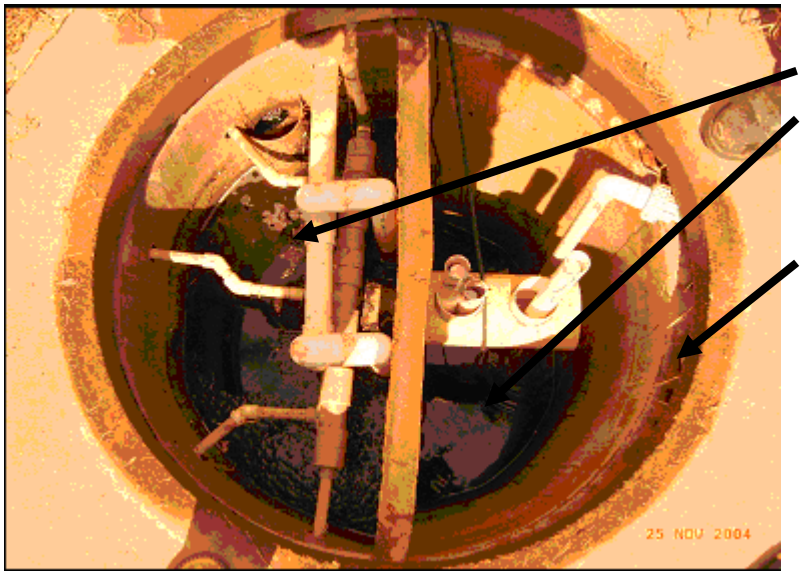
Photo 1: A typical twin tank AWTS system. The box like structure on top of the secondary tank is the blower, which provides aeration. The tank in the foreground is the primary settling tank.

Photo 2: The irrigation chamber (the inspection hole located closest to the blower)

Chlorine tube holders' wire restraints corroded and broken.

Missing tube in front of outlet

Photo 3: Clarification and irrigation chamber in a single tank AWTS. Note: Excessive amounts of scum in the final treatment chamber indicate a problem within the system.



Effluent Distribution Systems

Evaportranspiration Bed and Absorption Trench Systems

- Heavy objects placed on evapo-transpiration bed and absorption trench systems – (crushing, restricting pipe flow and leading towards trench failure)
- Absorption trenches/ evapo-transpiration beds/effluent application areas not being regularly maintained by mowing
- Ingrown roots from nearby grass, shrubs and trees into septic tanks, collection wells or effluent distribution areas
- No internal perimeter fencing located around the effluent application area (absorption trench system) to restrict and prohibit vehicular and livestock access.

Aerated Waste Water Effluent Distributions Systems

NSW Health specifies that all effluent distribution lines (surface irrigation hoses) must have sprinklers attached. Problems associated with certain sprinklers/hose fittings discharging treated effluent include:

- Blockage of certain sprinklers with small orifices where seed or hair can potentially block the sprinkler
- Owners or occupiers using high powered and elevated spray head attachments
- Surface spray distribution being located and used near fruit trees, vegetable gardens, dams, and dwellings
- Attachment of domestic green garden hoses to an Aerated Wastewater Treatment System, instead of a black or lilac effluent distribution line (poly pipe)

- The use of short black hoses with single end outlets. This is not acceptable, as this method of effluent distribution causes excessive effluent ponding and runoff (especially during heavy rain)

Photo 4: Failed Absorption Trench below. This photograph shows where effluent has broken through one end of the trench, forming a round shaped plume. During inspection of this site, water was observed escaping from the plume while the washing machine was operating.

Photo 5: Close up of water escaping from effluent plume. Note greyish appearance and scum layer. Insects and maggots were observed breeding in this area.

Non Accredited Wastewater Management Systems

Any proposed wastewater management system for use on ***a residential dwelling*** (larger than 10 person occupation) that is not accredited by NSW Health, is to comply with the requirements of Part E of this strategy.

Disused Wastewater Management Systems

Where any wastewater management system of any type or nature is no longer in use, Council requires decommissioning of the tank in accordance with guidelines issued by NSW Health **(Advisory Note 3 – May 2006:** Destruction, Removal or Reuse of Septic Tanks, Collection Wells and Aerated Wastewater Treatment Systems). Details of these requirements may be found on NSW Health's website at:

http://www.health.nsw.gov.au/public-health/ehb/general/wastewater/adnote3.pdf

These requirements are summarised as follows:

- Under no circumstances are septic tanks, collection wells, Aerated Wastewater Treatment Systems, etc, to be reused as vessels for holding water (rainwater/stormwater) for internal household domestic purposes where people may come into contact with and consume the water. The septic tank must be either removed from the property or filled in using clean fill

- Before filling with clean fill (ie sand/gravel/soil), the bottom and sides of the septic tank, collection well or decommissioned AWTS should be punctured to allow rain and groundwater movement

If not properly decommissioned, disused septic tanks may be dangerous, as inspection holes may be lifted, allowing small pets and children to enter into the tank.

Failing Wastewater Management Systems

Where a wastewater management system is found to be performing unsatisfactorily and is a risk to the environment and/or public health, Council will require the system to be suitably upgraded or rectified. These systems will be required to be rectified prior to an Approval to Operate being issued.

Council may conduct a field inspection and provide advice regarding the cause of the problem. A professional wastewater consultant may need to be engaged. All repairs and modifications to the wastewater management system are the responsibility of the owner. However, if repairs and modifications are required, Council will need to be informed and the owner will need approval from Council or alternatively an Order may be served requiring rectification or system upgrade works to be undertaken.

Illegal Installation of Wastewater Management Systems

Where a Wastewater Management System has been installed illegally, Council will require compliance with procedures contained in 'Approval to Install New Wastewater Management System' section of this strategy. A wastewater report from a suitably qualified environmental consultant at the owner's expense will be required to be submitted. All appropriate applications must be lodged with Council and all associated fees paid.

If the illegally installed wastewater management system is found to be installed in a manner that is a risk to the environment or public health, then the owner will be required to make modifications and/or to replace/relocate the wastewater management system.

Dual Occupancy

Any dual occupancy premises has the potential to be occupied by unrelated persons, therefore posing health risks to other individuals. Accordingly, any proposal for a new or altered system for a dual occupancy premises, shall comply with the following requirements:

i) each dwelling shall have its own independent sewage management facility, including an independent effluent application area

ii) effluent distribution systems for any wastewater management system shall be sub-surface irrigation, or fixed surface irrigation

iii) effluent distribution systems must be fenced (including provision for an access gate) to impede access of persons, vehicles and livestock.

NOTE: Council will assess each application based on its merits.

Flood Potential

1% Annual Exceedence Probability (AEP) (1:100) Flood Contours

All components of the wastewater management system or private recycled water scheme (tanks) shall be located above the 1% AEP (1:100) flood contour (the tank/s shall be located on flood free land).

5% AEP (1:20) Flood Contours

No portion of the effluent application area is permitted to be located below the 5% AEP (1:20) flood contour.

Where there is potential for the effluent application area to be inundated by surface water run-off from roads or other properties, swales, dish drains or bunding shall be constructed upslope of the effluent application area. Such works are to direct the water away from such areas and shall be installed when directed by Council to reduce the potential for contaminated water to leave the site.

NOTE: Where an approval to operate is to be renewed for a system on land that is flood affected, measures will be taken to protect the wastewater management system and effluent application area from being inundated by flooding. Such systems are capable of being approved under the terms of this strategy and will be assessed based on the merits of the situation.

Buffer Distances

Buffer distances have been adopted from the Environment & Health Protection Guidelines – On-site Sewage Management for Single Households and are listed in table 3.

Table 3. Buffer Zone Distances – (applicable to both Commercial/Industrial and Domestic installations)

Effluent Distribution System and Application Areas	***Buffer Distances – Primary Effluent from exit of system***	***Minimum Buffer Distances - Secondary treated Effluent from exit of system***
All effluent application areas	• 100m to permanent surface waters • 250m to domestic groundwater well • 40m to intermittent waterways, natural and constructed wetlands, lakes, dams and water bodies.	• 100m to permanent surface waters • 250m to domestic groundwater well • 40m to intermittent waterways, natural and constructed wetlands, lakes, dams and water bodies.
Surface Spray Effluent Distribution System - Semi-Fixed Lilac Capped Turf-valve	• Not Applicable	• 6m if area up gradient and 3m if area down gradient to property boundary • 15m to dwellings and buildings • 3m to paths, walkways and driveways • 6m to swimming pools.
Surface Spray Effluent Distribution System – Fixed Surface Pop Up Sprinklers	• Not Applicable	• 6m if area up gradient and 3m if area down gradient to property boundary • 15m to dwellings and buildings • 3m to paths, walkways and driveways • 6m to swimming pools.
Surface Drip and Trickle effluent Distribution System	• Not Applicable	• 6m if area up gradient and 3m if area down gradient of swimming pools, property boundaries, driveways, dwellings and buildings.
Sub-surface Effluent Distribution System	• Not Applicable	• 6m if area up gradient and 3m if area down gradient of swimming pools, property boundaries, driveways, dwellings and buildings.
Absorption Trenches, Evapo-transpiration Beds, or Wetland and Mound Systems	• 12m if area up gradient and 6m if area down gradient of property boundaries. • 6m if area up gradient and 3m if area down gradient of swimming pools, driveways, dwellings and buildings.	• 6m if area up gradient and 3m if area down gradient of swimming pools, property boundaries, driveways, dwellings and buildings.

Note: The above buffer distances relate to any other wastewater management system or private recycled water scheme. It is Council's discretion to consider modified buffer zones in relation to site constraints, water quality, system type, hydraulic loads and proposed or existing reuse systems.

Additional Buffer Zone Distances

Market gardens and orchards: - Any proposed new system or replacement system for a property that incorporates market gardens/orchards shall comply with the following:

i) Fixed Surface Distribution System: a minimum buffer distance of 40m shall be provided between the proposed effluent application area and any market garden or orchard

ii) Sub-Surface Distribution System: a minimum buffer distance of 20m if proposed effluent application area is up-gradient and 10m if proposed effluent application area is down-gradient of any market garden or orchard

iii) The effluent application area is required to be fenced

iv) Fruit and/or vegetables are not to be grown on top of or within the effluent application area(s) and associated buffer zones.

Greywater Management and Reuse

Reuse Greywater

Greywater generally includes wastewater from showers, baths, hand basins, laundry tubs, spa baths (depends on size) and washing machines. Wastewater from toilets, kitchens, and dishwashers is considered as Blackwater (grossly contaminated). In addition, wastewater from spas which contain too much fat or are too acidic or alkaline are not safe for reuse.

There are two methods for reusing greywater. The first involves the re-use of untreated greywater (Greywater Diversion Devices - GDD) and the second involves the re-use of treated Greywater (Greywater Treatment Systems - GTS).

Used responsibly and appropriately, greywater can be distributed to garden, lawns and plants, thereby saving water.

Legislation And Greywater Regulations

The Local Government Act 1993 and Local Government (General) Regulation 2005 regulate the installation and operation of Domestic Greywater Treatment Systems and Greywater Diversion Devices.

The responsibility is placed on the owner/operator to ensure that the system is operating and performing correctly in accordance with legislation, greywater reuse guidelines and Council requirements.

Greywater Diversion Devices - GDD

Greywater diversion devices involve the installation and operation of a registered greywater diversion device to redirect untreated greywater to the garden or lawn via a sub-surface effluent distribution system.

There are two main types (gravity diversion and pump diversion) of greywater diversion devices and choosing the most appropriate device for a site should be made carefully with consultation with a qualified person (licensed plumber/drainer) and Council.

Greywater diversion devices in **sewered** areas do not require approval to install the device from Council subject to complying with the following:

i) Compliance with Clause 75A of the Local Government (General) Regulation 2005 and NSW Plumbing and Drainage Code of Practice

ii) The dwelling must not be connected to an onsite wastewater management system

iii) All greywater diversion devices must have the Watermark licence – accreditation from SAI Global

iv) Greywater is to be applied to the garden or lawn by a sub-surface distribution system ONLY. This will reduce human contact and exposure to the untreated greywater. Sub-surface distribution systems are to be installed not less than 100mm below the ground surface

v) Sub-surface distribution systems must be a minimum of one metre from all property boundaries

vi) Greywater is only utilised during prolonged warm/dry periods (eg droughts), with volumes limited to those needed to meet plant water requirements

vii) Garden-friendly washing detergents/detergents that are biodegradable, low in phosphorus, sodium, boron, chloride and salt are used – consider using a liquid washing detergent or powder concentrate

viii) Greywater is diverted to sewer during periods of wet weather

ix) Greywater is not diverted when using bleach, or hair dyes and similar natured products

x) Greywater is not to be used on vegetable gardens supplying food crops that are eaten raw or undercooked or where fruit has fallen to the ground, as this would pose an unacceptable health risk.

xi) Greywater shall not be stored for more than 24 hours

xii) The device is to be installed by a qualified person (licensed plumber/drainer)

If you live in a non-sewered area, then you will need to have an approval to install the device from Council.

Domestic Greywater Treatment Systems (DGTS)

Greywater treatment systems involve the installation and operation of an accredited domestic greywater treatment system (DGTS) to treat greywater, enabling reuse for toilet flushing, washing machines and on gardens and lawns. The reuse of treated greywater for flushing of toilets and laundry uses is only permitted if the system accreditation allows such uses.

It is important to consider which Domestic Greywater Treatment systems have been designed to achieve a level of water quality that is suitable for particular reuse (lawn irrigation or toilet flushing). It is still prohibited to be reused for the following activities:

- Handheld hosing

- Washing/hosing of paths/drive ways and motor vehicles
- Watering plants that will be eaten raw or where fruit has fallen to the ground.

The requirements for installing a domestic greywater treatment system are similar to that of a Domestic Wastewater Management System. To apply for an Approval to install a domestic greywater treatment system, the following information will need to be submitted to Council for determination.

- Site and Soil Assessment (Wastewater Feasibility Study) including commentary on:
    - Soil composition
    - Vegetation (native and exotic)
    - Topography
    - Climate
    - Geology
- Site Plan (A3 Size & 1:100 Scale) indicating:
    - The wastewater management system (eg Aerated Wastewater Treatment System)
    - The greywater distribution system (eg sub-surface distribution system) and effluent application area (eg 600 sqm of lawn)
    - Any buildings or facilities on site
    - The property boundaries
- Drainage Plan – System location (A3 size & 1:100 Scale) indicating:
    - Position and type of fittings
    - Position of drainage lines
    - Position of yard gully
    - Position and type of wastewater management system
    - Position and type of effluent application area/s
    - Position and type of fixed sprinklers/subsurface distribution system and lines
    - Position of warning signs
- Manufactures specifications
- NSW Health Accreditation

- Dwelling floor plan (A3 size & 1:100 scale)
- Landscape plan (A3 size & 1:100 scale)

PART D: Approval Requirements - Domestic Wastewater Management

Approval To Install A New Domestic Wastewater Management System

Any person wishing to install a new wastewater management system of any type must, prior to installation, lodge an application with Council in accordance with the requirements of Section 68 of the Local Government Act 1993. The following items must be lodged in support of any application:

- Completed application form

- A detailed site and soil assessment and design recommendation prepared by an appropriately qualified person

- A detailed site plan (A3 scale 1:100 maximum) showing the proposed location of the wastewater management system, all proposed and existing buildings, physical site constraints (watercourses, dams and steep terrain), aspect, landform and vegetation types and coverage

- A detailed drainage plan (A3 scale 1:100 maximum) showing all drainage works from the dwelling, buildings, wastewater management system and effluent application area and a 100% reserve area for future effluent application areas if required. The drainage plan will show all effluent distribution systems:

  Aerated Wastewater Treatment Systems:

  - Semi-fixed Movable Surface Spray (Lilac-capped turf valves)
  - Fixed Pop up Surface Spray
  - Surface Drip/trickle system (lilac coloured distribution lines)
  - Sub-surface drip emitter system (lilac coloured distribution lines)

  Septic tank and Collection Well Systems

  - Absorption Trench systems
  - Evapo-Transpiration Bed Systems.

An approval to install is required to be obtained prior to the commencement of any works to install a WMS.

Council officers will conduct the following inspections as part of the application assessment and during installation of the WMS:

The application form to install a new system incorporates an application for the approval to operate. The approval to operate will be issued once the system is operational and all inspections relating to the installation of the system are complete and satisfactory. Council will mail out an approval renewal letter prior to the expiry of the initial 12 month approval to operate term.

In preparing an application to install a domestic Wastewater Management System applicants are advised to refer to this strategy, AS/NZS 1547:2000 and Council's Guideline **"Minimum requirements for Wastewater Management Systems - Consultant and Report Guidelines**" as a point of reference.

Another useful reference is *Environmental & Health Protection Guidelines: On-site Management for Single Households*, which was released in 1998 by the Department of Local Government.

Approval to Operate an existing Domestic Wastewater Management System

Council will mail the owners of a WMS a renewal letter prior to the expiry of the current Approval to Operate. The renewal letter will request the owners to submit an application for renewal and pay the required application fee. Applications will only be accepted upon payment of the application fee. Upon registration of the application, Council will contact the owner to arrange a suitable time for inspection (for application assessment purposes).

Council has adopted an approval fee for cost recovery for the implementation of the strategy including inspections, production and distribution of educational material and other associated administrative expenses. The fees for inspections and the approval have been determined in accordance with Section 608 of the Local Government Act 1993.

Existing domestic wastewater management systems will be given a risk classification (or have any existing classification reviewed) upon inspection and be assessed with a view to issuing with an Approval to Operate.

The "Approval to Operate" is issued once the field inspection has been completed and the following occurs:

- Any legislative and or operational compliance works requested have been completed
- Repair works to the system and effluent application area have been completed
- Replacement of an existing non-functional (failing) system with a newly installed system approved by Council
- All required reinspections are complete and satisfactory
- All notices and orders are complete and satisfactory
- All fees are paid.

PART E: Approval Requirements – Commercial/Industrial Wastewater Management Systems or Private Recycled Water Schemes

Approval to Install a new Wastewater Management System or Private Recycled Water Scheme

Commercial/industrial Wastewater Management Systems or Private Recycled Water Schemes are generally designed to receive and treat small to medium hydraulic wastewater loads and generally the size of these systems will vary.

Any proposed wastewater management system or private recycled water scheme expected to receive an equivalent daily hydraulic wastewater load larger than 10 Equivalent Persons (EP) up to 2500 EP will be considered as a commercial system.

All commercial systems of any type require both installation and operational approvals from Council. An application to Council for the installation of any commercial system is to include, but is not limited to, the following information:

- Completed application form
- A detailed site and soil assessment (wastewater feasibility study) and design recommendation prepared by an appropriately qualified person
- A detailed report incorporating a site plan (A3 scale 1:100 maximum) showing the proposed location of the wastewater management system, all proposed and existing buildings, site contours, physical site constraints (watercourses, dams and steep terrain), aspect, landform and vegetation types and coverage
- A detailed drainage plan (A3 scale 1:100 maximum) showing all drainage works from the dwelling, buildings, wastewater management system and effluent application areas. The drainage plan will show all effluent distribution systems:
    - Fixed Pop up Surface Spray (lilac coloured distribution lines)
    - Surface Drip/trickle system (lilac coloured distribution lines)
    - Sub-surface drip emitter system (lilac coloured distribution lines)
- System design specifications and plan (A3 scale 1:20 maximum) showing all the system mechanics, dimensions and relevant information.
- Influent and effluent quality data and testing regime
- Monitoring and maintenance requirements and schedule
- System management plan (operation, maintenance and emergency procedures)
- Risk assessment of all hazards identified onsite and in relation to wastewater management and recycling

Council officers will conduct the following inspections as part of the application assessment and during installation of the WMS:

- Site inspection - prior to assessing the application to install
- Drainage Lines - (internal and external) prior to backfilling or covering
- Tank Installation
- Effluent application/area effluent distribution system
- Final inspection - once all works are complete and the system is commissioned. The inspection is a prerequisite prior to issuing an Approval to Operate.

Note: Refer to the Interim NSW Guidelines for Management of Private Recycled Water Schemes.

Approval To Operate Existing Commercial Wastewater Management System Or Private Recycled Water Scheme

Council will mail the owners of a WMS a renewal letter prior to the expiry of the current Approval to Operate. The renewal letter will request the owners to submit an application for renewal and pay the required application fee. Applications will only be accepted upon payment of the application fee. Upon registration of the application Council will contact the owner to arrange a suitable time for inspection (for application assessment purposes).

Council has adopted an approval fee for cost recovery for the implementation of the strategy including inspections, production and distribution of educational material and other associated administrative expenses. The fees for inspections and the approval have been determined in accordance with Section 608 of the Local Government Act 1993.

Existing commercial wastewater management systems and/or private recycled water schemes will be given a risk classification (or have any existing classification reviewed) upon inspection and be assessed with a view to issuing an Approval to Operate.

The "Approval to Operate" is issued once the field inspection has been completed and the following occurs:

- Any legislative and or operational compliance works requested have been completed
- Repair works to the system and effluent application area have been completed
- Replacement of an existing non-functional (failing) system with a newly installed system approved by Council
- All required reinspections are complete and satisfactory
- All notices and orders are complete and satisfactory
- All fees are paid.

Note: where effluent from a WMS or a Private Recycled Waste Scheme is to be used as a resource and traded or sold, the applicant is to make contact with IPART, to consider their requirements.

PART F: Further Information

Further information is available from:

- Council's Website - Wastewater Management and Water Recycling Section
- Councils customer service counter - detailed colour pamphlets and fact sheets
- Councils Environmental Health Officer – Wastewater Management is available for information, appointments, discussions and site inspections
- Council's Planning and Environment Division can be contacted on 4645 4604 to assist with inquiries regarding on-site systems
- Department of Water and Energy website and "waterforlife" website

PART G: Glossaries

Glossary of Terms

Terms	Description/Definition
Absorption	The absorption and/or uptake of effluent into the soil by capillary action (AS 1547).
Aerated Wastewater Treatment System	A wastewater treatment process typically involving, settling of solids and floatation of scums, oxidation and consumption of organic matter through aeration, clarification (secondary settling of solids) and disinfection of wastewater before effluent distribution.
Audit	An official inspection and examination.
Aerobic	Dissolved or free oxygen is present in the wastewater.
Anaerobic	Dissolved or free oxygen is not present in the wastewater.
Approval to Install	For the installation, construction or alteration of wastewater management system or recycled water scheme, written approval to install, construct or alter a wastewater management system must be obtained from Council prior to any works being undertaken. This is a requirement under the Local Government Act 1993 and the Local Government (General) Regulation 2005.
Approval to Operate	Approval is required from Council to operate a wastewater management system or private recycled water scheme. To operate a system of wastewater management or private recycled water scheme means to hold or process, or reuse or discharge, sewage or by products of sewage (whether or not the sewage is generated on the premises on which the wastewater system is operated) as defined under section 68 and 68A of the Local Government Act 1993.
Authority's Sewer (Sydney Water Corporation)	Centralised sewerage system, consisting of sewage, waste, trade waste, wastewater and by-products, transport network, pumping stations and treatment systems, designed to service multiple users concurrently.
Best Management Practice	Those approaches that have been developed to prevent or minimise water pollution at source, or as close to the source as practicable. They include those determined to be the most effective and practical ways of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality standards.
Biological Oxygen Demand (BOD)	A measure of the dissolved oxygen required for the breakdown of organic material on the effluent; usually refers to a 5 day test (BOD_5), which typically represents 70 – 80 % of the total BOD in a sample; expressed in milligrams per litre (mg/L).
Biological Film (zoogoeal film)	Gelatinous like film that forms on the surfaces of inert materials. Forming the media in a biological filter, it can contain bacteria, protozoa and fungi, and is the site where organic matter in the wastewater is oxidised or degraded.
Bio-solids	Primarily organic solid product produced by wastewater treatment processes. The solids become bio-solids when they come out of a digester or other treatment process and can be beneficially used. Until such solids are suitable for beneficial reuse they are defined as wastewater solids.

Terms	Description/Definition
Blackwater	Human excreta and water grossly contaminated with human excreta, for example toilet wastewater (although not strictly water-based, human excreta entering waterless composting toilets is considered as 'blackwater'). Also includes other waste from kitchen sinks and dishwashers.
Buffer Distance	The distance that a wastewater management system, effluent application area and distribution system must be situated from a habitable building, boundary, driveway, path, recreational facility, watercourse, body of water, environmentally sensitive area or other feature as specified by Council.
Cation Exchange Capacity (CEC)	Measure of the ability of a soil to attract and hold cations by electrical attraction. Three important plant nutrients are the cations calcium (Ca_2^+), magnesium (Mg_2^+) and potassium (K^+). <3 cmol(+)/kg considered severe restriction. Soil remediation is needed in these cases.
Centralised Sewerage System	The collection of all sewer and sewerage works. Usually consists of a wastewater transport (sanitary drainage system and/or road tanker) and centralised wastewater management facility for many premises.
Centralised Wastewater Management Facility	A facility vested in the *Local Authority* and designed for the management of wastewater and/or septage generated by many households. Examples of possible facilities are: Package treatment plants Full scale sewage treatment plants *Bio-solids* management facilities *Effluent* re-use facilities *Effluent* discharge facilities.
Collection Well	A tank used for holding wastewater prior to pumping out to an effluent application area (EAA) set by Council or removed by an accredited/authorised waste removal company.
Compost	Material resulting from the controlled microbiological transformation of organic materials under aerobic and thermophilic conditions.
Commercial Wastewater	The used or contaminated water from any commercial/industrial and manufacturing process or activity consisting of all-waste, greywater, blackwater or any associated liquid discharge.
Constructed Wetland	Constructed area where the water surface is near ground level for a prolonged period to maintain saturated soil conditions and promote associated vegetation. A system of further treatment of effluent consisting of a bed of rock or other durable media in which wetland plants are grown.
Council	For the purpose of this strategy refers to " Campbelltown City Council".
Denitrification	Transformation of nitrate into the gaseous NO and N forms; denitrification is an anaerobic process carried out by micro-organisms; it can occur only if the soil becomes oxygen deficient (for example, as a result of waterlogging).
Desludging	Withdrawing or removal of accumulated sludge, scum, and liquid from the primary septic tank or any other tank.
Design Irrigation Rate (DIR)	The loading rate that applies to the irrigation of an effluent application area (EAA) with effluent of a secondary quality. It is expressed in L/m^2/week or mm/week. If a surface spray effluent distribution system is used, the secondary effluent is subject to continuous disinfection.

Terms	Description/Definition
Disinfection	A process that destroys, inactivates or removes all pathogenic micro organisms.
Domestic Wastewater	Wastewater arising from household activities, including wastewater from bathrooms, kitchens, hand basins, laundries, ensuites, spa baths (not spas), toilets and bidets.
Effluent	The liquid discharged from a wastewater management system, private recycled water scheme or treatment unit.
Effluent Distribution System	A system that will distribute effluent evenly through the means of gravity or mechanical pump system into a series of surface lines connected and/or attached to surface sprays or surface drippers or sub-surface emitters or sub soil systems (absorption trenches, evapo-transpiration beds).
Electrical Conductivity (EC)	EC is an electrical measure of the concentration of salts in solution; the salts that occur in significant concentration amounts in domestic wastewater are the chlorides, sulphates and bicarbonates of sodium, potassium, calcium and magnesium; in water these salts dissociate into charged ions and the EC of the solution is proportional to the concentration of these ions. The units are deciSiemens per metre (dS/m) at 25°C. EC greater than 4 dS/m is considered a severe restriction for wastewater management and application.
Emersion Aggregate Test (EAT)	EAT is a measure of the structural stability of a soil. Stable soils have a EAT of between 4 and 7
Environment	Surroundings, including built and natural landscapes, and physical resources, community and neighbourhood relating to health, aesthetic, social, economic and cultural conditions.
Environmentally Sensitive Area	Definition found in *The Local Government (General) Regulation 2005 and Environmental Planning and Assessment Regulation 2000.*Includes any land or area: within 100 metres of a natural water body, wetland, or coastal dune field, or with a high watertable, or with highly permeable soils or acid sulphate, sodic or saline soils, or within a drinking water catchment, or within the water catchment area of an estuary where the entrance to the sea is intermittently open.
EPA	Environment Protection Authority
Equivalent Population (EP)	A measure typically used on the design of wastewater management systems. Because there are differences in wastewater generation rates between premises with and without reticulated water supplies, and premises with dry composting toilet technologies, it is usually easier to stipulate design limits by an equivalent number of people rather than the total flow.
Evapo-transpiration	Removing water from soil by evaporation and from plants by transpiration.
Exchangeable Sodium Percentage (ESP)	A measure of sodicity (exchangeable sodium in the soil). High levels adversely affect soil stability and plant growth. Soils with an of ESP>5 are considered at risk of showing adverse structural impacts.
Exclusion Area	Areas that can be expected to be unfavourable for wastewater management systems, effluent application areas and effluent distribution systems such as building platforms, rocky outcrops and poor soils.
Faecal Coliforms (Also known as thermo tolerant coliforms)	A type of bacteria that live only in the gut (stomach, large and small intestine) of warm-blooded animals. Can be detected in the general environment if that environment is contaminated with human excreta, and therefore can act as an indicator of recent faecal contamination by wastewater management systems.

Terms	Description/Definition
Greywater	Domestic wastewater from baths, showers, hand basins, laundries and spa baths, specifically excluding water closets, kitchen and urinal wastes. Greywater does not normally contain human waste unless laundry tubs or basins are used to wash and rinse soiled clothing or nappies.
Human excreta	Human faeces and urine.
Human Waste	Means human faeces and urine (LGA 1993).
Human Waste Storage Facility (HWSF)	Device for holding or disposing of human waste, including a cesspit, chemical closet and pan toilet (LGA 1993).
Human Waste Treatment Device (HWTD)	Device for treating human excreta and other wastewater, including a septic tank, aerated wastewater treatment system, septic closet, water closet, humus closet and combustion closet (LGA 1993).
Householder/s	The individual/s (either owner or tenants) residing or living at the premises that is generating waste, sewage, wastewater, influent and effluent.
Hydraulic Loading Rate (Hydraulic Load)	The amount of liquid applied to land over a specified time interval. Can be expressed as either a depth or a volume (1 millimetre of application equal to one litre per square metre).
Landform element	An area with a definable slope, toposequence, position, and land surface features. Landform elements typically have characteristic dimensions of greater than 40m and less than 600m diameter. Examples are hillcrests, footslopes, swales and levees. Seventy types of landform elements are described in Speight, J G (1990).
LGA	Local Government Area.
Nitrification	Transformation of inorganic ammonium (NH_4+) into nitrate (NO_3-).
Nitrogen	Within septic tank effluent, the Total Nitrogen concentrations consist of about 75% Ammonium and 25% Organic Nitrogen. In an unsaturated zone under a disposal field, aerobic activity results in almost total conversion of ammonium into nitrate. As a result, nitrogen in the form of Nitrate (NO_3) reaches groundwater and is highly mobile due to its solubility.
Nutrients	Chemical elements that are essential for sustained plant or animal growth. The major nutrients for plant growth are nitrogen, phosphorus and potassium. In excess, nitrogen and phosphorus are potentially serious pollutants encouraging nuisance growth of algae and aquatic plants in water and (in the case of nitrate) posing a direct human health risk and a threat to the environment.
Nutrient Loading	The amount of Total Nitrogen and Total Phosphorous applied to land or effluent application area (EAA) over a specified time period.
Onsite Sewage Management System(OSMS)	A Wastewater Management System that stores, treats and disposes of wastewater onsite incorporating all tanks, pumps and specialised equipment and effluent application area and effluent distribution system.
Operate a Wastewater Management System	To hold, process, reuse or otherwise dispose of sewage, waste, effluent or wastewater or by products of sewage, waste, effluent or wastewater as defined under section 42 of the Local Government (General) Regulation 2005.
Organic Matter	Material consisting of chemical compounds based upon carbon skeletons (protein, carbohydrates and fats); may be present in dissolved, suspended and colloidal form; it is usually measured as BOD in a liquid.

Terms	Description/Definition
Organic Matter Loading	The amount of organic matter applied to land over a specified time interval. The amount of organic material in effluent is usually expressed as BOD.
Pathogens	Microorganisms that are potentially disease causing; these include but are not limited to bacteria, protozoa and viruses.
Percolation	The decent of water through the soil profile.
Permeability	The general term used to describe the rate of water movement through a soil profile.
pH	A measure of hydrogen ion concentration. It is an indicator of acidity and alkalinity and ranges form 0-14, where 0 is the most acid, 14 the most alkaline, and 7 neutral. A pH of between 6 and 7.5 is the best for the majority of plants.
Potable	Water of a quality suitable for drinking and domestic use that does not deteriorate on storage and that does not contain pathogenic organisms.
Primary Septic Tank	A single or multiple chambered tank through which wastewater is allowed to flow slowly to permit suspended matter to settle and be retained, so that organic matter retained therein can be decomposed (digested) by anaerobic bactericidal action in the liquid. The term covers tanks used to treat all waste, greywater or blackwater.
Primary Treatment	The separation of suspended material from wastewater by settlement and/or floatation in primary septic tanks, primary settling chambers prior to effluent discharge to either a secondary treatment, or to an effluent application area.
Regulatory Authority	An authority that is empowered by statute to be responsible for managing or controlling an aspect of onsite domestic wastewater management.
Effluent application area (REAA)	An area of land specifically designated for the application of effluent and any by-products of sewage, disposal of effluent and any by-products of sewage from a wastewater management system, or to which the effluent and by-products are intended to be applied.
Reserve Area	An area set aside for future use as an EAA to replace or extend the original EAA.
Residual Chlorine	Chlorine remaining in solution after a specified period of contact between the solution and the chlorine.
Restricted Reuse	Medium or Low Risk exposure category (NSW Guidelines for Management of Private Recycled Water Schemes- Urban distribution, with the restricted public access during distribution and meeting the Medium range of water quality levels for reuse for certain applications Or Water Management system and effluent application areas only of reclaimed effluent treated to a water quality level less than stated in the guidelines.
Reticulated Water Supply	The provision by a water authority of water for potable and non potable uses to households through a networks of pipes.
Run off	The part of the precipitation and/or effluent distribution that becomes surface flow because it is not immediately absorbed into or detained on the soil.
Run on	Surface water flowing on to an effluent application area (EAA) as a result of run-off occurring higher up the slope.

Terms	Description/Definition
Sanitary Drainage System	An assembly of pipes, fittings and apparatus used to collect the discharge from the sanitary plumbing system and convey it to a wastewater management system or centralised wastewater management facility.
Sanitary Plumbing System	An assembly of pipes, fittings, fixtures and appliances used to collect wastewater from household drains and convey it to the sanitary drainage system.
Saturate Hydraulic Conductivity (Ksat)	Drainage capacity of soils <5 Ks is considered a severe restriction because they are prone to waterlogging. Ksat should be determined from the soil layer within the top 1m of soil that is the most likely to have the lowest Ksat (ie clay or poor structure).
Scum	The floating material that collects at the top of a primary wastewater system or primary septic tank, including oils, grease, soaps and plastics.
Secondary Treatment	Aerobic biological processing and settling or filtering of effluent received from a primary septic tank or treatment unit. Effluent quality following secondary treatment is expected to be equal to or better than 20g/m^3 5-day biochemical oxygen demand (BOD5) and 30 g/m^3 suspended solids.
Septage	The pump out contents of a primary septic tank (or primary compartment of an AWTS) removed during desludging operations, which includes scum, sludge and tank liquid.
Septic Wastewater	Wastewater that contains no dissolved oxygen. It is black, has a foul odour and contains high numbers of pathogenic organisms.
Setbacks	The distance that a wastewater system must be situated from any facility, boundary or body of water.
Sewerage	The network of collection drains carrying wastewater or effluent away from properties for off-site treatment.
Sewerage Work	Means the construction, alteration, extension, disconnection, removal, ventilation, flushing, cleansing, maintenance, repair, renewal or clearing of any sewerage service pipes or fittings or fixtures communicating or intended to communicate, directly or indirectly, with: A septic tank, an effluent or a sullage disposal system; or Any sewer of a Council, and includes work of sanitary plumbing and work of house drainage.
Sewerage Management	Any activity carried out for the purpose of holding or processing, or reusing or otherwise disposing of, wastewater, effluent, *sewage* or by-products of *sewage.*
Sludge	The semi-liquid solids that settle from wastewater.
Slope %	The gradient of the land. Slopes exceeding 10 – 15% can prove problematic to irrigation systems. In these cases terracing of the landscape may need to be undertaken.
Sodic	A soil condition in which the percentage of exchangeable sodium is high enough to cause significantly increased clay dispersivity, decreased soil structure stability and to potentially decrease soil permeability.
Soil Absorption System	Includes leach drains, drain fields, absorption trenches, seepage beds and seepage pits, subsurface effluent application areas that rely on the capacity of the soil to accept and transmit the applied hydraulic load.
Sodium Adsorption Ration (SAR)	The amount of sodium taken up by soil. High sodium concentrations can cause clay dispersion.

Terms	Description/Definition
Split System	Wastewater management system in which a septic tank accepts waste directly from the toilet and kitchen, and treated wastewater is directed to an effluent application area. The remainder of the wastes are drained to another effluent application area through a sullage tank (Collection well) or greywater treatment system.
Suspended Solids (SS)	in wastewater analysis: solids retained after filtration through a glass fibre paper followed by washing and drying at 105° C, or by centrifuging followed by washing and removal of the supernatant liquid; expressed in milligrams per litre (mg/L).
Treated Wastewater	(in this strategy) wastewater that has received treatment via a human waste treatment device or any waste (solid or liquid) that has received treatment by a wastewater management system.
Vectors	Insects, or animals, such as flies, mosquitos or rodents, that are attracted to the putrescible organics material in wastewater and wastewater management or treatment systems, and that spread disease.
Waste	a. 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 b. Trade waste, being any matter or thing, whether solid, gaseous or liquid or a combination of solids, gases and liquids (or any of them), which is of a kind that comprises refuse from any industrial, chemical, trade or business process or operation, including any building or demolition work
Wastewater	The used or contaminated water arising from any activities occurring within dwellings, institutions or commercial facilities consisting of all-waste, greywater or blackwater.
Wastewater Management System	A Wastewater Management System stores, treats and disposes of wastewater, sewage, influent and effluent onsite incorporating all tanks, pumps, specialised equipment, effluent application areas and effluent distribution systems.
Watercourse/Waters	Means the whole or any part of: any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea) any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.
Water table	The upper surface of groundwater below the soil that is permanently saturated with water.
Waterless Compost Toilet	Humus closet, biological toilet waterless system that uses the principle of composting to break down human excreta to a humus type of material. The liquid fraction is evaporated or directed to an appropriate management system.
Wet Composting Toilet	Treats all household and domestic wastewater and putrescible household organic solid wastes such as food waste. Uses the principle of aerobic composting to break down the solid waste; the liquid component is directed to an effluent application area (EAA) after passing through the accumulation of solids.

Glossary of Conditions for Installation of Waste Water Management Systems

Domestic Wastewater Management Systems

1. Installation Inspections:

1.1 The following inspections must be carried out by Council on the approved Wastewater Management System in accordance with Clause 21 of the Local Government (General) Regulation 2005. AT least 48 hours notice shall be given to Council to allow for the inspection and approval of:

a) Internal drainage lines before the floor is laid or poured.

b) External drainage lines before backfilling of trenches (pipe inspection).

c) The installation of Wastewater Management System (tank Inspection).

d) The installation of the effluent application area (EAA) and Effluent Distribution System (EDS) (Irrigation Inspection).

e) The connection of the Wastewater Management System to electrical source and commissioning of system (Final Inspection).

f) On completion of the installation of the onsite wastewater management system incorporating the approved effluent application area (EAA) and effluent distribution system (EDS) a certificate of completion/compliance (Commissioning Sheet) shall be furnished to Council. The certificate must certify that the system has been installed, inspected, commissioned, tested and performs in accordance with the attached Conditions of Approval and the Department of Local Government Environment and Health Protection Guidelines: Onsite sewage management for single households 1998.

Advisory Note:

Work not to proceed beyond each inspection stage until confirmation of a satisfactory inspection result has been obtained.

2. Approved Plans and Documentation:

2.1 The proposed Wastewater Management System, including the Effluent Application Area (EAA) and Effluent Distribution System (EDS) must be installed in strict compliance with the attached plan/s endorsed with Councils approval stamp and all associated documentation submitted with the application, except where varied by the attached conditions of consent.

Advisory Note:

a) The installation of the wastewater management system is approved for the < (Insert number of bedrooms)> bedroom dwelling with a maximum occupation of < (Insert Number of people)> persons, at any one time.

b) The approved wastewater management system must be operated in accordance with the following:
   i. <insert size of EAA>
   ii. <insert type of EDS>
   iii. <insert No. of people> residing at the premises only.

iv. <insert No. > of Bedrooms inhabiting the dwelling.

2.2 Any increase in the number of bedrooms or the number of people residing at the subject property may require modification to Wastewater Management System including, the Effluent Application Area (EAA) and Effluent Distribution System (EDS) with related documentation to be assessed, reviewed and approved by Council.

No alterations or additions to the dwelling, or its occupancy or use, which may impact on the wastewater management system or its effluent loading/capacity, are permitted without the express and separate written approval of Council.

2.3 The installation of the wastewater management system is approved for treatment of all wastes (water closets, bidets, showers, baths, hand basins, kitchen sinks, dishwashers, washing machines etc) from the dwelling only.

3. National Plumbing and Drainage Standards:

3.1 All house sewer and plumbing works shall be carried out in accordance with the requirements of AS/NZS 3500: 2003 National Plumbing & Drainage Standards and National Plumbing and Drainage Code.

3.2 All installation, plumbing and drainage works associated with the wastewater management system, Effluent Application Area (EAA) and Effluent Distribution System (EDS) shall be carried out in accordance with the requirements of ASNZS 1547:2000 Onsite Domestic Wastewater Management.

4. Approval to Operate – Performance and Operation of the Wastewater Management System

4.1 Prior to the owner operating the Wastewater Management System including effluent application area and effluent distribution system, an Approval to Operate must be obtained. The initial Approval to Operate will be issued to the owner subject to satisfactory final inspection of the system installation.

5. Water Saving Devices.

5.1 Water reduction technologies such as AAA rated water savings devices (shower roses, dishwasher/s and washing machine suds savers) shall be installed to minimise the consumption of water in the dwelling and hydraulic load through the wastewater management system, effluent application area and effluent distribution system.

6. Wastewater Management Systems, Effluent Application Areas & Effluent Distribution System – Pipe work and Fittings

6.1 All wastewater management systems, effluent application areas & effluent distribution system - pipe work and fittings shall comply with AS 2698 *Plastic pipes and fittings for irrigation and rural applications*" and in particular:-

a) All effluent distribution systems pipe work shall be lilac (purple) in colour.

b) Standard household fittings shall not be used.

c) The effluent distribution system shall not be capable of connection with the reticulated potable water supply.

d) Soaker hoses, garden hoses of any type and colour, rotating, elevated or swinging garden sprinklers, standpipes and standard water hose fittings shall not be used at any time to convey or distribute effluent to the effluent application area.

e) Reinforced heavy duty hose/s of a type which is not compatible with, or capable of being cross connected with, a reticulated potable water supply may be used to discharge effluent within the effluent application area.

7. All Wastewater Management Systems, Effluent Application Area/s (EAA) & Effluent Distribution System/s

7.1 All effluent from the Wastewater Management System shall be managed wholly within the premises effluent application area/s of <XXXX> square metres by the approved effluent distribution system as indicated in the attached plan or diagram approved by Council.

7.2 All effluent distribution systems (surface and sub-surface) pipe work shall be solid lilac (purple) in colour advising “RECLAIMED EFFLUENT, DO NOT DRINK. AVOID CONTACT”.

7.3 The wastewater management system treatment tanks shall be sealed with an approved epoxy resin to the satisfaction of Council.

7.4 The wastewater management system shall have a minimum of 100mm clearance between the base of the main lid and ground level.

7.5 Permanent underground electrical supply shall be installed to the Wastewater Management System.

7.6 The effluent application area shall be prepared by covering with at least 200 mm of absorbent soil (mixture of course river sand and top soil) spread/ripped over the existing surface.

7.7 The effluent application area shall be well grassed at all times and be regularly mowed, and maintained to a length of 100–150 mm to aid in the efficiency of the effluent distribution system and prevention of overgrown vegetation.

7.8 The effluent application area shall be well grassed or turfed to the satisfaction of Council prior to:

a) In the case of new dwellings, issuing of an Approval to Operate to the owners and issuing the Certificate of Occupation to the owners.

b) In the case of existing dwellings, commissioning of system, final Inspection being completed and issuing an Approval to Operate to owners.

7.9 All stormwater and seepage from elevated land adjacent to and surrounding the Wastewater Management System, effluent application area & effluent distribution system shall be diverted away to Councils Satisfaction without nuisance by earth mound berms (height 100mm – 200mm, width 150mm) and dish drains.

7.10 The effluent application area shall have any depressions filled with cleaned soil.

7.11 No paths, barbecues, entertaining or play areas, pergolas, concrete surfaces, garages or other structures shall be constructed over any portion of any buffer zone of the effluent application area.

7.12 Fruit, vegetables or any other matter grown for human consumption or enterprise purposes shall not be irrigated or applied with any effluent (treated or untreated) from any wastewater management system.

7.13 The Wastewater Management System, effluent application area & effluent distribution system shall be adequately protected with no possible access by vehicles (Car, tractor, truck etc) and/or livestock (horses, cattle etc) to cause damage to and/or destruction of any components within the area. Such work(s) shall be carried out to Councils satisfaction.

8. Septic Tank & Collection Well Systems & Effluent Distribution System. (EDS – Soil Absorption/Trans-Evaporation Systems)

8.1 No deep rooting trees or shrubs should be grown over the effluent application area & effluent distribution system.

8.2 A licensed plumber and drainer shall carry out all plumbing and drainage work.

8.3 A minimum of <qty> absorption trenches or trans-evaporation bed systems shall be installed.

8.4 Installation of each absorption trench/trans-evaporation bed shall comply with the following:

a) The minimum length of each absorption trench/trans-evaporation bed shall be <measurement> metres.

b) The minimum width of each absorption trench/trans-evaporation bed shall be <measurement> metres.

c) Individual lengths of absorption trenches or trans-evaporation beds shall not exceed 20 metres.

9. Tanker Pump out System

9.1 The collection well shall be emptied at least every two (2) weeks, or more frequently if required, and the contents removed and lawfully disposed of by a licensed liquid waste removal contractor.

9.2 Any exposed PVC (Class 12) pump-out line / effluent suction pipe shall be adequately protected against impact damage.

9.3 The pump-out line from the collection well shall terminate at the property boundary closest to the road and is to be fitted with a 50mm or 65mm Kamlock fitting and approved dust cover or plug. The necessary fitting, dust cover, plug and adaptor may be purchased from the sanitary contractor/licensed liquid waste removal contractor.

9.4 The owner/licensee shall maintain service contract arrangements with a suitably licensed waste removal contractor for the regularly fortnightly waste removal service.

9.5 A graduated dipstick of copper material not less than 13mm in diameter shall be provided to the collection well. The highest graduation must indicate when the collection well is full.

9.6 The lids of tanks are to be free of any soil or vegetation from the top of the septic tank and collection well (entire Tanker Pump-out system). The concrete join between the lid and the tank shall remain exposed (minimum 100mm height clearance) to ensure surface water cannot enter the tank.

9.7 The lids and access opening covers shall be accessible and rendered watertight.

9.8 The inspection holes on the tanks are to be clear and easily accessible.

9.9 The septic tank and collection well (entire Tanker Pump-out system) must be pumped out immediately by a suitably licensed waste removal contractor, if there is evidence and or potential that the system is approaching a level where surcharge into the environment is likely.

9.10 The primary chambers of the septic tank shall be pumped out/ desludged by a suitably licensed waste removal contractor at a regular frequency (i.e. every 3 to 5 years), or when scum and sludge occupy 2/3 of the volume of the septic tank and / or as directed by Council.

Advisory Note:
the chambers shall be pumped out / desludged equally, to combat adjacent chambers collapsing due to hydrostatic pressures.

9.11 The effluent from the Tanker Pump-out system shall not be used for irrigation or discharged onto any land or into any watercourse or drainage system.

10. Aerated Wastewater Treatment Systems (AWTS's)

10.1 Located visually on the Aerated Wastewater Treatment System treatment tanks or adjacent here to, there shall be displayed one (1) warning sign advising that reclaimed effluent is being used for irrigation. The sign shall be on a **GREEN** background with **WHITE** lettering at least 20mm high. The warning signs shall state **"RECLAIMED EFFLUENT< DO NOT DRINK, AVOID CONTACT".**

11. Aerated Wastewater Treatment Systems - Annual Service Contract

11.1 The owner/licensee shall enter into an annual service contract with a Council authorised service contractor for the regular servicing and mechanical maintenance of the AWTS system at quarterly (3 months) intervals.

12. Aerated Wastewater Treatment Systems and Effluent Distribution System (EDS)- Semi-fixed (Lilac Capped Turf-valve) Surface Spray or Fixed Surface Spray.

12.1 **Semi-Fixed Surface Spray (Lilac Capped Turf-valve)**

a) All effluent from the approved wastewater management system shall be managed wholly within the effluent application area/s of < SIZE INSERT MERGE field) square metres as indicated in the attached plan or diagram.

b) Within or adjacent to the effluent application area there shall be displayed two (2) warning signs advising that reclaimed effluent is being used for effluent distribution. The sign shall be on a GREEN background with WHITE lettering at least 20mm high. The warning signs shall state “RECLAIMED EFFLEUNT, DO NOT DRINK, AVOID CONTACT”.

c) The wastewater management system shall have a minimum of one (1) underground (100mm below the surface) solid lilac (purple) attached with <Qty> lilac capped coupling valves (Turf-valves) installed at ground level.

d) A minimum of one <length of line> metre surface solid lilac effluent distribution line shall be attached at all times to a lilac capped coupling valve.

e) Attached to the surface lilac (purple) effluent distribution line shall be a minimum of four (4) lilac (purple) metal dome sprinklers, with minimum two (2) – three (3) metre spacings between each.

f) The lilac (purple) effluent distribution line shall only be located in the approved effluent application area/s as indicated in the attached plan or diagram.

g) The lilac (purple) metal dome sprinklers shall be low volume spray heads, which are not capable of producing aerosols.

h) The metal dome sprinklers shall have a plume height of less than 600mm.

12.2 Fixed Surface Spray

a) All fixed surface spray distribution lines and the main distribution line to the tank must be buried to a minimum depth of 100mm below the finished ground level.

b) All fixed surface spray distribution pipes/lines and the main distribution pipe/line shall be of purple/lilac coloured with “Do Not Drink” printed and/or tagged on the line.

c) A distribution box (Indexing valve) shall be installed to rotate between all effluent distributions lines installed.

d) All effluent from the approved wastewater management system shall be managed wholly with the effluent application area/s of <INSERT MERGE TYPE> square metres as indicated in the attached plan or diagram.

e) Within or adjacent to the designated related effluent application area there shall be displayed two (2) warning signs advising that reclaimed effluent is being used for irrigation. The sign shall be on a **GREEN** background with **WHITE** lettering at least 20mm high. The warning signs shall state **“RECLAIMED EFFLEUNT< DO NOT DRINK, AVOID CONTACT”.**

13. Aerated Wastewater Treatment Systems & Effluent Distribution System (EDS) – Drip/Trickle or Sub-surface Irrigation System

13.1 All drip/trickle effluent distribution lines shall be covered with a layer of 100mm of mulch.

13.2 All drip/trickle effluent distribution emitters shall be spaced a minimum of (distance-variable) apart along the distribution line.

13.3 The main distribution irrigation line to the tank must be buried to a minimum depth of 100mm below the finished ground level.

13.4 All drip/trickle effluent distribution lines and the main distribution line shall be of purple/lilac coloured with “Do Not Drink” printed on the line/or tagged on the line.

13.5 A distribution box (Indexing valve) shall be installed to rotate between all effluent distribution lines installed.

13.6 All effluent from the approved wastewater management system shall be managed wholly with the effluent application area/s of <INSERT MERGE TYPE) square metres as indicated in the attached plan or diagram.

13.7 Within or adjacent to the effluent application area there shall be displayed two (2) warning signs advising that reclaimed effluent is being used for irrigation. The sign shall be on a GREEN background with WHITE lettering at least 20mm high. The warning signs shall state “RECLAIMED EFFLEUNT< DO NOT DRINK, AVOID CONTACT”.

14. Buffer Zones

All Wastewater management Systems, Effluent Application Areas (EAA) and Effluent Distribution Systems (EDS) shall be:

14.1 The minimum buffer distances from the perimeter of all effluent application areas shall be maintained:

a) 100 metres to permanent surface water (eg. rivers, streams, creeks, lakes etc);

b) 250 metres to a domestic groundwater well;

c) 40 metres to other water sources (eg. Farm dams, intermittent waterways and drainage channels, etc).

Septic Tank & Collection Well Systems, Effluent Application Area (EAA) & Effluent Distribution System (EDS - Soil Absorption/Trans-Evaporation Systems) shall be:

14.2 The minimum buffer distances from the perimeter of effluent application area/s with effluent distribution systems (**Absorption Trench/ Trans-evaporation Bed System)** shall be:

a) 12 metres from any dwelling (Any dwelling and/or granny flat).

b) 12 metres if area is up gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

c) 6 metres if area is down gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

d) 3 metres to paths and walkways

e) 12 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

f) 6 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

Aerated Wastewater Treatment Systems, Effluent Application Area (EAA) & Effluent Distribution System (EDS)- Semi-fixed Surface Spray (Lilac Capped Turf-valve) or Fixed Surface Spray).

14.3 The minimum buffer distances from the perimeter of effluent application area/s with effluent distribution systems (Semi-fixed surface spray or fixed surface spray) shall be:

a) 15 metres from any dwelling (Any dwelling and/or granny flat)

b) 6 metres if area is up gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

c) 3 metres if area is down gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

d) 3 metres to paths and walkways.

e) 12 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

f) 6 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

g) 40 metres (for Fixed Surface Spray Distribution Systems only) shall be provided between the proposed effluent application area and any commercial market garden and orchard. Approval at Councils discretion.

Advisory Note:
Panting of buffer with hedge trees maintained to a height of 1.5 metres or grass will potentially reduce risk of effluent spray drift migrating onto areas other than the effluent application area. A buffer zone planted with grass and maintained to a length of 150mm will aid in effluent absorption and the prevention of overgrown and excessive vegetation.

Aerated Wastewater Treatment Systems, Effluent Application Area (EAA) & Effluent Distribution System - Surface Drip/Trickle or Sub-surface Distribution System).

14.4 The minimum buffer distances from the perimeter of effluent application area with Surface Drip/Trickle System or Sub-surface System shall be:

a) 6 metres if area is up gradient from any dwelling (Any dwelling and/or granny flat), swimming pools, spa bath/pool, recreational areas or other type of outbuilding (garden sheds, workshops), property boundaries and driveways.

b) 3 metres if area is down gradient from dwelling (any dwelling and/or granny flat), swimming pools, spa bath/pool, recreational areas or other type of outbuilding (garden sheds, workshops), property boundaries and driveways.

c) 6 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

d) 3 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils decreation.

e) 20 metres (for sub-surface effluent distribution systems only) if effluent application area is up gradient of any commercial market garden production area (commercial enterprise) and orchard. Approval at Councils discretion.

f) 10 metres (for sub-surface effluent distribution systems only) if effluent application area is down gradient of commercial market garden production area (commercial enterprise) and orchard. Approval at Councils discretion.

Advisory Note:

Panting of buffer with hedge trees maintained to a height of 1.5 metres or grass will potentially reduce risk of effluent spray drift migrating onto areas other than the effluent application area. A buffer zone planted with grass and maintained to a length of 150mm will aid in effluent absorption and the prevention of overgrown and excessive vegetation.

Glossary of Conditions for Operation of Waste Water Management Systems

All Wastewater Management Systems

1. All household wastewater is to be treated in the approved system.

2. No water supply or any source of water supply used for drinking or domestic purposes or for livestock purposes shall be polluted or rendered unwholesome by the disposal of effluent through the effluent application area.

3. Liquid trade wastes or mechanical oil/petroleum base products are not to be discharged into the approved Wastewater Management System, effluent application area or effluent distribution system.

4. At no time shall pool wastewater/backwash enter or discharge into the approved Wastewater Management System, effluent application area or effluent distribution system. In such circumstances backwash is to be disposed of separately into a suitably sized rubble drainage pit or alternatively a cartridge filtration system used.

5. Cooking fats, oils, lards, similar base products and food waste shall not be disposed into the Wastewater Management System, effluent application area or effluent distribution system.

6. Cleaning agents, antibiotics, detergents, disinfectants, bleaches, alkalies, acids, pesticides, and herbicides shall be used sparingly as these substances act to reduce performance of the Wastewater Management System, effluent application area or effluent distribution system.

7. The approved system shall be adequately protected from possible vehicle and livestock damage. Such work(s) shall be carried out to Councils satisfaction.

   The approved system shall not be used as a storage or stockpiling area for any such items as vehicles (i.e. trucks, cars etc) materials (i.e. debris of any nature, pallets, boxes and crates).

8. The effluent application area shall not be used for passive or active recreational purposes that involve skin contact with the effluent (treated or untreated) discharge.

   Effluent shall be disposed of on to a non-trafficable effluent application area/s.

9. The effluent application area shall be well grassed at all times and be regularly mowed, and maintained to a maximum length of 150 mm to aid in the efficiency of the effluent application area and prevention of overgrown vegetation.

10. Ensure that the effluent application area is maintained free of any depressions.

    All grass clippings from the effluent application area are to be removed when mowing and maintaining the area to aid in the efficiency of maximum nutrient removal and increased surface contact for solar and wind exposure.

11. No paths, barbecues, entertaining or play areas, pergolas, concrete surfaces, garages or other structures shall be constructed over any portion of or any buffer zone of the approved system.

12. Fruit, vegetables and any other matter grown for human consumption shall not be sprayed or applied with any effluent (treated or untreated) from any wastewater management system.

13. The effluent application area and the effluent distribution system shall be regularly monitored and maintained free of blockages, to allow the effluent to be evenly distributed within the required effluent application area/s and to avoid surface ponding.

14. Grazing or livestock animals are not permitted to enter the effluent application area due to the potential for these animals to cause damage, impede the efficiency of such areas or cause destruction of effluent distribution equipment.

    Advisory Note:
    In certain situations, where adequate controls (such as temporary fences), are in place, separate written approval may be obtained from Council to permit temporary stock access to a portion of the effluent application area not currently under irrigation. Such approval will only apply to effluent application areas serviced by mobile (and not fixed) distribution lines.

15. Hose and/or fittings of types, which are capable of being connected to reticulated water supply, shall not be used to convey or distribute effluent to the effluent application area.

    Soaker hoses, garden hoses of any type and colour, rotating, elevated or swinging garden sprinklers, standpipes and standard water hose fittings shall not be used at any time to convey or distribute effluent to the effluent application area.

16. Should there be more than one (1) effluent application area, a valve system shall be used to ensure that all effluent application areas are available at all times.

17. Ease of access shall be provided to the approved system its components to allow servicing, maintenance and authorised officers to observe the performance and operation of the system.

18. The following buffer distances from the perimeter of all effluent application areas shall be maintained:

    a. 100 metres to permanent surface water (eg. rivers, streams, creeks, lakes etc);

    b. 250 metres to a domestic groundwater well;

    c. 40 metres to other water sources (eg. Farm dams, intermittent waterways and drainage channels, etc).

Aerated Wastewater Management Systems and Surface/Subsurface Distribution Systems

1. Within or adjacent to the effluent application area there shall be displayed two (2) warning signs advising that reclaimed effluent is being used for application. The sign shall be on a GREEN background with WHITE lettering at least 20mm high. The warning signs shall state “RECLAIMED EFFLEUNT< DO NOT DRINK, AVOID CONTACT”.

2. Located visually on the Aerated Wastewater Treatment Tanks there shall be displayed one (1) warning sign advising that reclaimed effluent is being used for application. The sign shall be on a GREEN background with WHITE lettering at least 20mm high. The warning signs shall state “RECLAIMED EFFLEUNT, DO NOT DRINK, AVOID CONTACT”.

3. The owner/licensee shall enter into a service contract with a Council authorised Service Company for the regular servicing and mechanical maintenance of the Aerated Wastewater Treatment System at quarterly (3 monthly) intervals.

4. The owner/licensee shall and/or the service company shall provide a copy of the service record report for the Aerated Wastewater Treatment System shall be submitted to Council within 14 days of the each service.

5. Treated/reclaimed effluent distribution within the effluent application area shall be monitored on a regular basis to ensure that even distribution of the treated/reclaimed effluent is achieved across all sprinklers/drippers or emitters.

6. Reinforced heavy duty hose/s of a type which is not compatible with, or capable of being cross connected with, a reticulated potable water supply may be used to discharge effluent within the designated related effluent application area.

7. The effluent application area and its relevant effluent distribution system must be installed and maintained in such a way that it will not be readily subject to damage.

8. All irrigation pipework and fittings shall comply with AS 2698 *Plastic pipes and fittings for irrigation and rural applications.*

9. The minimum buffer distances from the perimeter of effluent application area/s with effluent distribution systems (**Movable Surface Spray Irrigation, Semi-fixed (lilac capped Turf-valve) Surface Spray Irrigation or Fixed Surface Spray Irrigation Methods)** shall be:

    a) 15 metres from any dwelling (Any dwelling and/or granny flat)

    b) 6 metres if area is up gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding (garden sheds, workshops), property boundaries and driveways.

    c) 3 metres if area is down gradient of swimming pools, spa bath/pool, recreational areas or other type outbuilding (garden sheds, workshops), property boundaries and driveways.

    d) 3 metres to paths and walkways.

    e) 12 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

    f) 6 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

g) 40 metres (for Fixed Surface Distribution Systems only) shall be provided between the proposed effluent application area and any commercial market garden and orchard. Approval at Councils discretion.

Advisory Note:
Panting of buffer with hedge trees maintained to a height of 1.5 metres or grass will potentially reduce risk of effluent spray drift migrating onto areas other than the effluent application area. A buffer zone planted with grass and maintained to a length of 150mm will aid in effluent absorption and the prevention of overgrown and excessive vegetation.

10. The minimum horizontal buffer distances from the perimeter of effluent application area with **Wisconsin Mound Irrigation Method** shall be:

    a) 12 metres from any dwelling (Main dwelling and/or granny flat).

    b) 12 metres if area is up gradient of swimming pools, spa bath / pool or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

    c) 6 metres if down gradient of swimming pools, spa bath / pool or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

    d) 12 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

    e) 6 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils decreation

    Advisory Note:
    Planting of buffer with hedge trees maintained to a height of 1.5 metres and/or grass maintained to a height of 150mm will potentially reduce risk of effluent drift migrating onto areas other than the effluent application area. A buffer zone planted with hedge trees and grass will aid in effluent absorption and the prevention of overgrown and excessive vegetation.

11. The minimum horizontal buffer distances from the perimeter of effluent application area with **Surface Drip/Trickle Irrigation or Sub-surface Irrigation Method** shall be:

    a) 6 metres if area is up gradient from any dwelling (Any dwelling and/or granny flat), swimming pools, spa bath/pool, recreational areas or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

    b) 3 metres if area is down gradient from dwelling (any dwelling and/or granny flat), swimming pools, spa bath/pool, recreational areas or other type of outbuilding, (garden sheds, workshops), property boundaries and driveways.

    c) 6 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

d) 3 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

e) 20 metres, (for sub-surface effluent distribution systems only), if effluent application area is up gradient of commercial market garden production area (commercial enterprise). Approval at Councils discretion.

f) 10 metres, (for sub-surface effluent distribution systems only), if effluent application area is down gradient of commercial market garden production area (commercial enterprise). Approval at Councils discretion.

Advisory Note:
Planting of buffer with hedge trees maintained to a height of 1.5 metres and/or grass maintained to a height of 150mm will potentially reduce risk of effluent drift migrating onto areas other than the effluent application area. A buffer zone planted with hedge trees and grass will aid in effluent absorption and the prevention of overgrown and excessive vegetation.

TANKER PUMP-OUT SYSTEM

1. The collection well shall be emptied at least every two (2) weeks, or more frequently if required, and the contents removed by a licensed liquid waste removal contractor.

2. Any exposed PVC (Class 12) pump-out line / effluent suction pipe shall be adequately protected against impact damage.

3. The pump-out line from the collection well shall terminate at the property boundary closest to the road and is to be fitted with a 50mm or 65mm Kamlock fitting and approved dust cover or plug. The necessary fitting, dust cover, plug and adaptor may be purchased from the sanitary contractor/licensed liquid waste removal contractor.

4. The owner/licensee shall maintain, throughout the term of this approval, service contract arrangements with a suitably licensed waste removal contractor for the regular fortnightly waste removal service.

   Documentary evidence verifying service contract arrangements shall be submitted by the owner/licensee to Council, at Councils discretion by the owner/licensee (or otherwise retained for verification purposes).

   Documentary evidence in the form of receipts or invoice statements from the licensed liquid waste removal company shall be retained by the system owner/licensee to verify regular fortnightly pump out of the system.

5. A graduated dipstick of copper material not less than 13mm in diameter shall be provided to the collection well. The highest graduation must indicate when the collection well is full.

6. The lids of tanks are to be free of any soil or vegetation from the top of the septic tank and collection well (entire Tanker Pump-out system). The concrete join between the lid and the tank shall remain exposed (minimum 100mm height clearance) to ensure surface water cannot enter the tank.

7. The lids, access opening cover shall be accessible and rendered watertight.

8. The inspection holes on the tanks are to be clear and easily accessible.

9. The septic tank and collection well (entire Tanker Pump-out system) must be pumped out immediately by a suitably licensed waste removal contractor, if there is evidence and or potential that the system is approaching a level where surcharge into the environment is likely.

10. The primary chambers of the septic tank shall be pumped out / desludged by a suitably licensed waste removal contractor at a regular frequency (i.e. every 3 to 5 years), or when scum and sludge occupy 2/3 of the volume of the septic tank and / or as directed by Council.

    Advisory Note:
    the chambers shall be pumped out / desludged equally, to combat adjacent chambers collapsing due to hydrostatic pressures.

11. The effluent from the Tanker Pump-out system shall not be used for irrigation or discharged onto any land or into any watercourse or drainage system.

SEPTIC TANK/COLLECTION WELL AND EFFLUENT APPLICATION AREAS

1. The minimum buffer distances from the perimeter of effluent application area/s with effluent distribution systems (**Absorption Trench/ Trans-evaporation Bed System)** shall be:

    a) 12 metres from any dwelling (Any dwelling and/or granny flat).

    b) 12 metres if area is up gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding (garden sheds, workshops), property boundaries and driveways.

    c) 6 metres if area is down gradient of swimming pools, spa bath/pool, recreational areas or other type of outbuilding (garden sheds, workshops), property boundaries and driveways.

    d) 3 metres to paths and walkways

    e) 12 metres if effluent application area is up gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils discretion.

    f) 6 metres if effluent application area is down gradient from a residential vegetable garden or fruit trees (area less than 500 sqm). Approval at Councils decreation.

    Advisory Note:
    Planting of buffer with hedge trees maintained to a height of 1.5 metres and/or grass maintained to a height of 150mm will potentially reduce risk of effluent drift migrating onto areas other than the effluent application area. A buffer zone planted with hedge trees and grass will aid in effluent absorption and the prevention of overgrown and excessive vegetation.

PART H: Appendices

Appendix 1 - Site Constraints For Wastewater Management Systems & Private Recycled Water Schemes

The following tables 1-3 have been adopted from the Health and Protection Guidelines 1998.

Table 1: Site Constraints

Soil Feature	Relevant System	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Depth to Bedrock	Effluent Distribution System (Surface/Subsurface 100mm)	>1.0m	0.5-1.0m	<0.5m	Excessive runoff and waterlogging
	Effluent Distribution System – Absorption/Evapotranspiration System (Sub-soil system)	>1.5m	1.0-1.5m	<1.0m	Groundwater pollution and resurfacing/ seepage hazard
Depth to Watertable	Effluent Distribution System (Surface/Subsurface 100mm)	>1.0m	0.5-1.0m	<0.5m	Groundwater pollution and resurfacing hazard
	Effluent Distribution System – Absorption/Evapotranspiration System (Sub-soil system)	>1.5m	1.0-1.5m	<1.0m	Groundwater pollution and resurfacing hazard
Soil Permeability Category (See Table 7)	Effluent Distribution System (Surface/Subsurface 100mm)	2b, 3 & 4	2a, 5	1, 6	Excessive runoff
	Effluent Distribution System – Absorption/Evapotranspiration System (Sub-soil system)	3 & 4	Nil	1,2,5 &6	Excessive runoff, Waterlogging, Percolation
Coarse Fragments (%)	All effluent distribution Systems	0-20%	20-40%	>40%	Restrict plant growth, Affect sub-soil installation
Bulk Density Sandy Loam	All effluent distribution Systems	<1.8 g/cm^3		>1.8 g/cm^3	Restricts plant growth, indicator of permeability
Bulk Density Loam/Clay	All effluent distribution Systems	<1.6 g/cm^3		>1.6 g/cm^3	Restricts plant growth, Indicator of permeability

Soil Feature	Relevant System	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Bulk Density Clay	All effluent distribution Systems	<1.4 g/cm^3		>1.4 g/cm^3	Restricts plant growth, Indicator of permeability
pH	All effluent distribution Systems	>6.0	4.5-6.0	<4.5l	Reduces plant growth
Electrical Conductivity (dS/m)	All effluent distribution Systems	<4dS/m	4-8dS/m	>8dS/m	Excessive salt restricts plant growth
Sodicity Exchangeable sodium (percentage)	Effluent Distribution System (Surface/Subsurface 100mm)	0-5	5-10	>10	Potential for structural degradation
Cation Exchange Capacity	Effluent Distribution System (Surface/Subsurface 100mm)	>15	5-15	<5	Unable to hold plant nutrients
Phosphorous Sorption (kg/ha)	Effluent Distribution System (Surface/Subsurface 100mm)	>6000	2000-6000	<2000	Unable to immobilise any excess phosphorous
Modified Emersion Aggregate Test	Effluent Distribution System (Surface/Subsurface 100mm)	Class 1	Class 2	Class 3,4	Potential for structural degradation

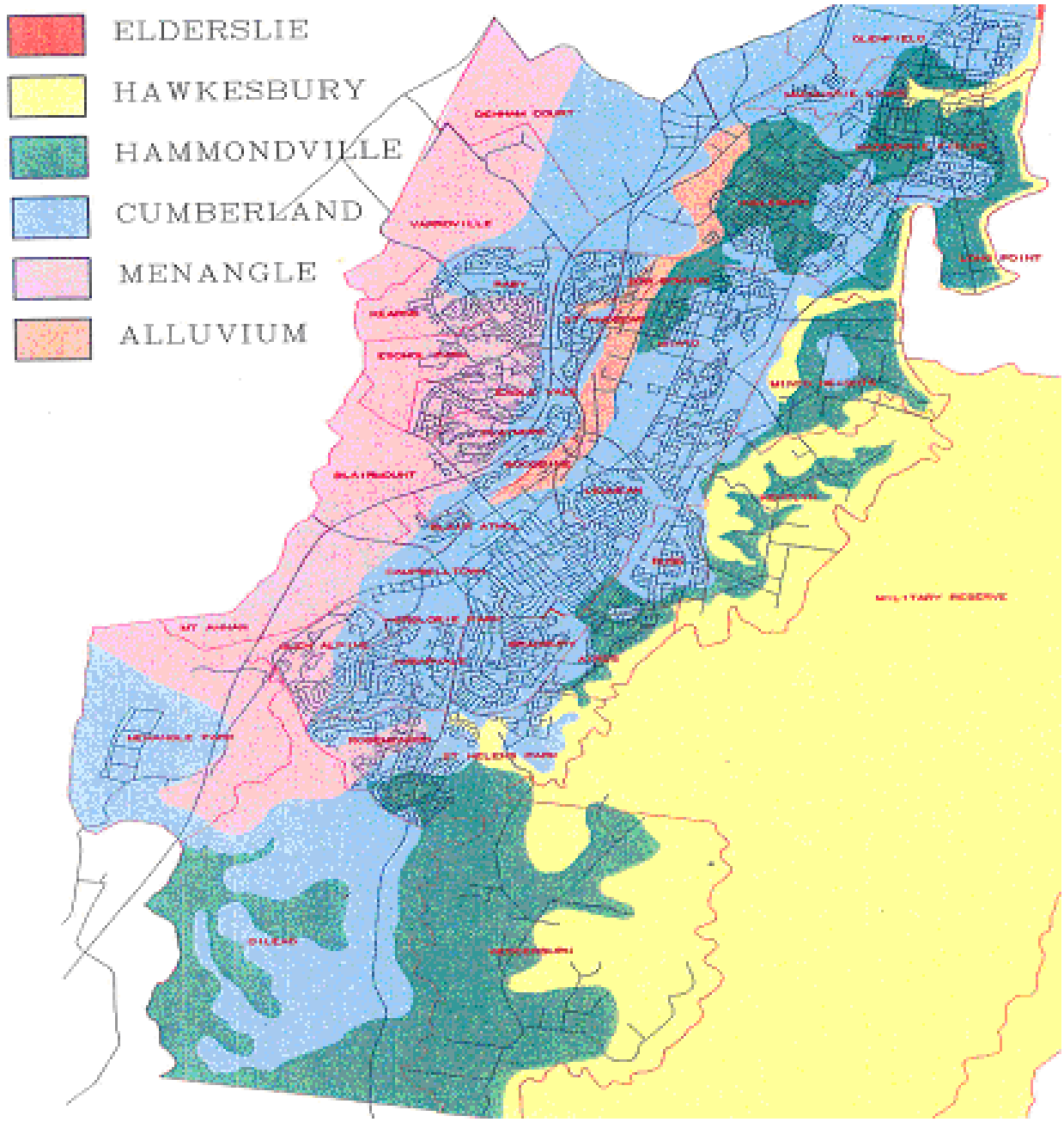
Table 2: Soil Classifications

Soil Permeability Category	Soil Structure	Soil Texture
1		Gravels and sand
2a	Weakly pedal	Sandy loam
2b	Massive	
3a	Highly/moderate pedal	Loams
3b	Weakly pedal or massive	
4a	Highly/moderate pedal	Clay loams
4b	Weakly pedal	
4c	Massive	
5a	Highly pedal	Light clays
5b	Moderately pedal	
5c	Massive	
6a	Highly pedal	Medium to heavy clays
6b	Moderately pedal	
6c	Massive	

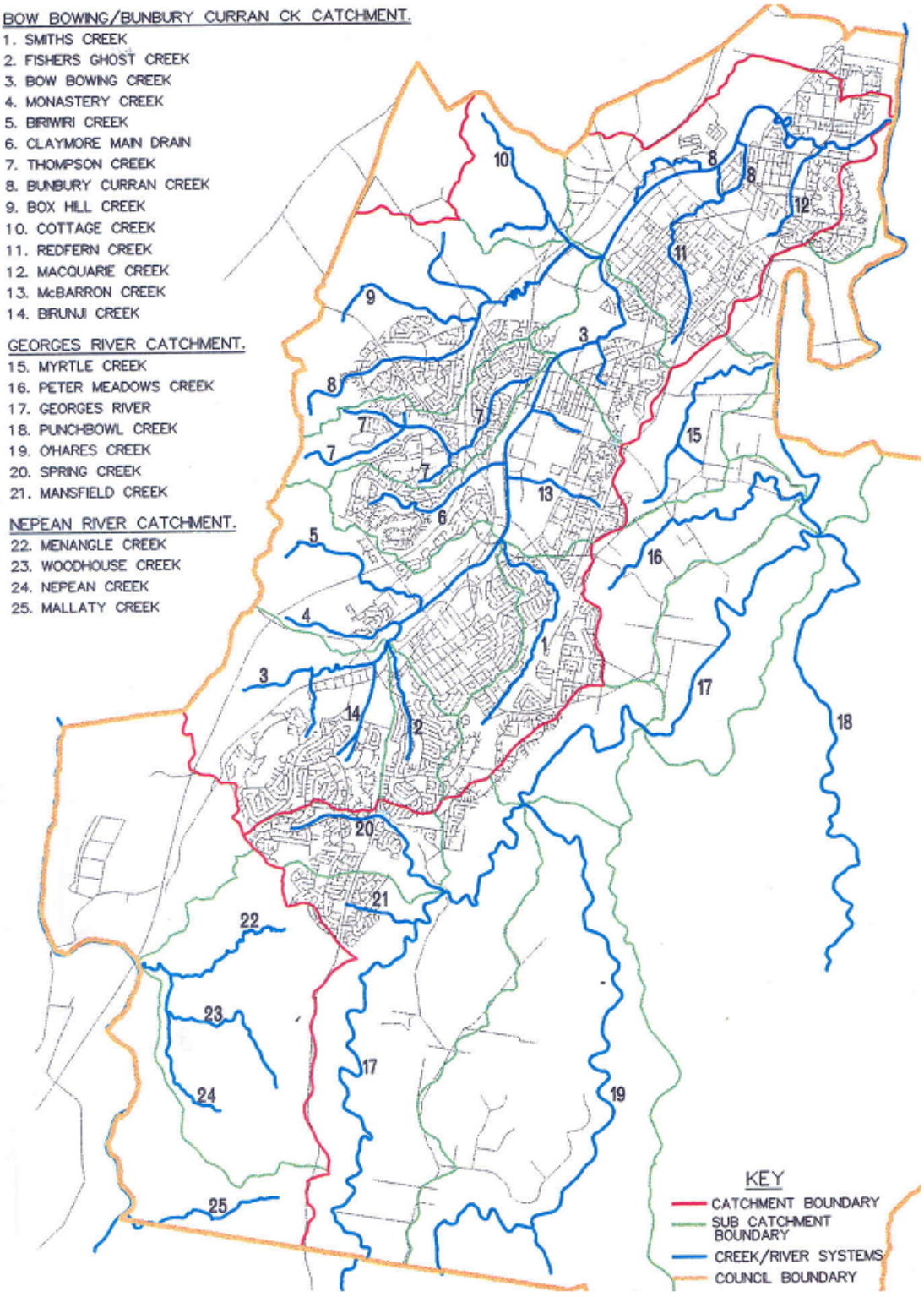
Table 3: Unified Soil Classification (USC)

Unified Soil Classification – Typical Names	USC	Suitability for Septic Tanks
Well graded gravels, gravel-sand mixtures, little or no fines	GW	Good
Poorly graded gravels, gravel-sand mixtures, little or no fines	GP	Excellent
Silty gravels, poorly graded gravel-sand-silt mixtures	GM	Average
Clayey gravels, poorly graded gravel-sand-clay mixtures	GC	Unsuitable
Well graded sands, gravely sands, little or no fines	SW	Good
Poorly graded sands, gravely sands, little or no fines	SP	Good
Silty sands, poorly graded sand-silt mixtures	SM	Poor
Clayey sands, poorly graded sand-clay mixtures	SC	Unsuitable
Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	ML	Average
Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays	CL	Unsuitable
Organic silts and organic silt-clays of low plasticity	OL	Poor
Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	MH	Average
Inorganic clays of high plasticity, fat clays, silty soils and elastic soils	CH	Unsuitable
Organic clays of medium to high plasticity	OH	Unsuitable
Peat or other highly organic soils	Pt	Average

Appendix 2 - Soil Types of the Campbelltown LGA



Appendix 3 - Fluvial Systems and Catchment Areas in the Campbelltown LGA



Appendix 4 - Domestic and Commercial Wastewater Management Systems and Typical Domestic Wastewater Flow Rates

Source	Typical Wastewater Flow rates (Litres/person/day)	
	Onsite Roof Water/ Rainwater tank / Dam Supply (non reticulated supply)	Reticulated Water Supply / Community or bore-water Supply (Potable Water)
Households with standard fixtures	140	180
Households with standard Water Reduction fixtures	115	145
Motels/Hotels • Guests, resident staff • Non resident staff • Reception rooms • Bar trade (per customer) • Restaurant (per diner)	 140 30 20 20 20	 180 40 30 25 30
Community Halls • Banqueting • Meetings	 20 10	 30 15
Resturants (per diner) • Dinner • Lunch	 20 15	 30 25
Tea Rooms (per diner) • Without rest room facilities • With rest room facilities	 10 15	 15 25
Schools • Students and staff	 30	 40
Rural Factories	30	50
Shopping Centres	30	50
Camping Grounds • Fully Serviced • Recreation areas	 100 50	 130 65

Appendix 5 - Calculations and Balances

There is a selection of formulae and variables that can be used in wastewater management calculations. The below calculations are examples to give residents an idea of hydraulic and nutrient loads generated from domestic wastewater and effluent. **Consultants submitting reports should use these relevant standards for their calculations.**

References used for formulas and variables are from the following documents:

- *Environment & Health protection Guidelines - On-site Sewage Management for Single Households 1998 (silver booklet)**
- AS/NZS 1547:2000
- Other figures are taken from the Centre for Environmental Training Preparing and Evaluating Site and Soil Assessment Reports for Wastewater Management Systems Nov 2003.

The following variables will be used in the calculators and balances that appear below:

- AS/NZS 1547:2000
  (a) 300L per bedroom (Appendix 4.3A)
  (b) 145L per person
  (c) 1.5 persons per bedroom

- Environment and Health Protection Guidelines Onsite Sewage Management for Single Households 1998
  (a) 25-50mg/L Total Nitrogen present in septic tank effluent
  (b) 10-15mg/L Phosphorous present in septic tank effluent

- Other References
  (a) 1L = 1mm per square metre
  (b) 5mm effluent per m2 disposed of from average daily household
  (c) Total Nitrogen = 75% Ammonium and 25% Organic Nitrogen
  (d) Grass consumes/uptakes 250kg/ha of Total Nitrogen per year
  (e) Grass consumes/uptakes 30kg/ha of Phosphorous per year
  (f) 1 Hectare = 100m x 100m
  (g) 1 Hectare = 10,000 m2

Example of a Hydraulic Load Balance – Wastewater Production

Using the per bedroom method - AS/NZS 1547:2000

Taking a four bedroom house with 300L per bedroom

4 X 300L = **1200L/day**

See **AS/NZS 1547:2000 APPENDIX 4.3A** for recommendations on capacities for septic tanks.

Nitrogen Balance - Calculations - Silver Booklet

$$A = \frac{C \times Q}{Lx}$$

Where:

A = land area (m^2)
C = concentration of Total Nitrogen (mg/L) = accepted as 35mg/L
Q = treated wastewater flow (L/d)
Lx = Critical loading rate of nutrient $mg/m^2/d$ = accepted as 25 unless specific value provided

For 1200L per/day wastewater flow:

$$A = \frac{35 \times 1200}{25}$$
$$= 1680\ m^2$$

Therefore using the Nitrogen balance calculator an effluent application area of $1680m^2$ is required.

Phosphorous Balance - Calculations

The major mechanism for phosphorous removal is soil adsorption, which is not renewable. Phosphorous calculations are based on a 50 year capacity of the soil to adsorb phosphorous.

Based on figures of 12mg/L of Total Phosphorous, a critical loading rate of 3 $mg/m^2/d$ and a phosphorous sorption capacity of 6000 kilograms per hectare (if other figures are available these can be substituted) the following can be determined:

Phosphorus adsorbed = Phosphorus sorption capacity x 1/3

P-adsorbed = 6000 x 1/3 = 2000kg/ha = **$0.2kg/m^2$**

Phosphorus uptake = critical loading rate x 365 days x 50 years

P-uptake = 3 x 365 x 50 = $54750mg/m^2$ = **$0.055kg/m^2$**

Therefore P generated = Total Phosphorous (mg/L) x Volume (L/d) x 50 years

= 12mg/L x 1200L x 365 days x 50 years = 262.8kg

Therefore irrigation area required:

= Pgenerated / (Padsorbed + Puptake)

= $262.8/(0.2 + 0.055) = 1030.0m^2$

Therefore using the phosphorus balance equation an effluent application area of $1030m^2$ is required, thereby making Total Nitrogen the limiting value. Consequently, $1680m^2$ will need to be found for the effluent application area.

Hydraulic Water Balance – Wastewater and Precipitation

Below are three examples of Water Balance Tables using the **Nominated Area Method** as prescribed in the Silver Booklet 1998.

In Table 1, the values of 1200 L/d and $1200m^2$ from the above calculations are used. The green highlighted section at the bottom of the table shows that all values are negative indicating there is no storage of wastewater required and the effluent application area of $1200m^2$ is adequate.

In Table 2, an inadequate land area of 300m^2 has been used to show what happens to the storage when the size of the effluent application area is inadequate. This means that 62.5m^3 of storage needs to be found to comply. This is the equivalent of 15 standard (4000 litre) septic tanks. This is extremely large and more irrigation land is required.

In Table 3 an effluent application area of 600 sqm is used. As outlined in Table 1, this amount of EAA is half the original required EAA amount, and double the effluent application area (shown in Table 2 indicating that 7.8m^3 or (7800 Litres) of storage is required. This is equivalent of 2 standards (4000 Litre) septic tanks

It is more realistic installing two septic tanks, however, it is more favourable if there was no additional storage in a septic tank. Therefore, these examples indicate the benefits of having sufficiently sized effluent application areas to comply with the standards.

All effluent application areas using reclaimed effluent as a source of water for non potable reuse shall install the below sign adjacent to the area approved by Council. It is a requirement of "Australian/New Zealand Standards 1547:2000.

Figure 1 – Aerated Wastewater Treatment System and or A Private Recycled Water Scheme Warning Sign

The reclaimed effluent warning sign is to advise any visitors/guests who may not be familiar with wastewater management systems of the approved effluent application area and that the liquid being discharged should not be consumed and contact should be avoided.

All effluent application areas and effluent distribution systems are to occur within the boundary of the premises. Discharge of effluent or effluent distribution on public land or onto neighbouring properties is illegal and is a punishable offence.

Table 1: Adequate Effluent Application Area

WATER BALANCE

NOMINATED AREA METHOD

(Nominate an irrigation area based on the nutrient balances)

Weather Station: (evap info) Badgerys Creek
Weather Station: (rainfall info) Campbelltown Swimming Centre

Design Wastewater Flow	(Q)	L/day	1200
Design Percolation Rate	(R)	mm/wk	20
Land Area	(L)	m2	1200

Parameter	**Symbol**	**Formula**	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Days in Month	(D)		days	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0	**365.0**
Precipitation	(P)		mm/month	73.4	73.1	83.4	48.1	29.3	61.6	21.6	23.1	36.8	57.6	65.6	55.8	**842.4**
Evaporation	(E)		mm/month	182.9	151.2	139.5	105.0	65.1	51.0	65.1	93.0	120.0	145.7	176.7	204.6	
Crop Factor	(C)			0.70	0.70	0.70	0.60	0.50	0.45	0.40	0.45	0.55	0.65	0.70	0.70	
Evaportranspiration	(ET)	(E x C)	mm/month	128.0	105.8	95.5	59.4	32.6	23.0	23.6	40.5	66.0	92.7	117.6	141.1	925.6
Inputs																
Precipitation	(P)	(QxD)/(L)	mm/month	73.4	73.1	83.4	48.1	29.3	61.6	21.6	23.1	36.8	57.6	65.6	55.8	**842.4**
Wastewater Application	(W)	(QxD)/(L)	mm/month	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0	**365.0**
Inputs		(P + W)	mm/month	104.4	101.1	114.4	78.1	60.3	91.6	52.6	54.1	66.8	88.6	95.6	86.8	**994.4**
Outputs																
Evaportranspiration	(ET)	(E x C x D)	mm/month	128.0	105.8	95.5	59.4	32.6	23.0	23.6	40.5	66.0	92.7	117.6	141.1	**925.6**
Percolation	(B)	(R / 7) x (D)	mm/month	88.6	80.0	88.6	85.7	88.6	85.7	88.6	88.6	85.7	88.6	85.7	88.6	**1042.9**
Outputs		(ET + B)	mm/month	216.6	185.8	184.1	145.1	121.1	108.7	112.1	129.0	151.7	181.3	203.3	229.6	**1968.5**
Storage	(S)	(P + W) - (ET + B)	mm/month	-112.2	-84.7	-69.7	-67.0	-60.8	-17.1	-59.5	-74.9	-84.9	-92.7	-107.7	-142.8	
Cumulative Storage	(M)		mm	0	0	0	0	0	0	0	0	0	0	0	0	
Storage	(V)	Largest M	mm	**0.0**												
		(V x L) / 1000	m3	**0.0**												

Table 2: 300 sqm of Effluent Application Area with 62.5 m3 (62 500 litres) of Storage Capacity

WATER BALANCE

NOMINATED AREA METHOD

(Nominate an irrigation area based on the nutrient balances)

Weather Station: (evap info) Badgerys Creek

Weather Station: (rainfall info) Campbelltown Swimming Centre

Design Wastewater Flow	(Q)	L/day	1200
Design Percolation Rate	(R)	mm/wk	20
Land Area	(L)	m2	300

Parameter	**Symbol**	**Formula**	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Days in Month	(D)		days	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0	**365.0**
Precipitation	(P)		mm/month	73.4	73.1	83.4	48.1	29.3	61.6	21.6	23.1	36.8	57.6	65.6	55.8	**842.4**
Evaporation	(E)		mm/month	182.9	151.2	139.5	105.0	65.1	51.0	65.1	93.0	120.0	145.7	176.7	204.6	
Crop Factor	(C)			0.70	0.70	0.70	0.60	0.50	0.45	0.40	0.45	0.55	0.65	0.70	0.70	
Evaportranspiration	(ET)	(E x C)	mm/month	128.0	105.8	95.5	59.4	32.6	23.0	23.6	40.5	66.0	92.7	117.6	141.1	925.6
Inputs																
Precipitation	(P)	(QxD)/(L)	mm/month	73.4	73.1	83.4	48.1	29.3	61.6	21.6	23.1	36.8	57.6	65.6	55.8	**842.4**
Wastewater Application	(W)	(QxD)/(L)	mm/month	124.0	112.0	124.0	120.0	124.0	120.0	124.0	124.0	120.0	124.0	120.0	124.0	**1460.0**
Inputs		(P + W)	mm/month	197.4	185.1	207.4	168.1	153.3	181.6	145.6	147.1	156.8	181.6	185.6	179.8	**2089.4**
Outputs																
Evaportranspiration	(ET)	(E x C x D)	mm/month	128.0	105.8	95.5	59.4	32.6	23.0	23.6	40.5	66.0	92.7	117.6	141.1	**925.6**
Percolation	(B)	(R / 7) x (D)	mm/month	88.6	80.0	88.6	85.7	88.6	85.7	88.6	88.6	85.7	88.6	85.7	88.6	**1042.9**
Outputs		(ET + B)	mm/month	216.6	185.8	184.1	145.1	121.1	108.7	112.1	129.0	151.7	181.3	203.3	229.6	**1968.5**
Storage	(S)	(P + W) - (ET + B)	mm/month	-19.2	-0.7	23.3	23.0	32.2	72.9	33.5	18.1	5.1	0.3	-17.7	-49.8	
Cumulative Storage	(M)		mm	0	0	23.3	46.3	78.5	151.4	184.9	203.0	208.1	208.4	190.7	140.9	
Storage	(V)	Largest M	mm	**208.4**												
		(V x L) / 1000	m3	**62.5**												

Table 3 600 sqm of Effluent Application Area with 7.8 m3 (7800 litres) of Storage Capacity

WATER BALANCE

NOMINATED AREA METHOD

(Nominate an irrigation area based on the nutrient balances)

Weather Station: (evap info) Badgerys Creek
Weather Station: (rainfall info) Campbelltown Swimming Centre

Design Wastewater Flow	(Q)	L/day	1200
Design Percolation Rate	(R)	mm/wk	20
Land Area	(L)	m2	600

Parameter	**Symbol**	**Formula**	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Days in Month	(D)		days	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0	**365.0**
Precipitation	(P)		mm/month	73.4	73.1	83.4	48.1	29.3	61.6	21.6	23.1	36.8	57.6	65.6	55.8	**842.4**
Evaporation	(E)		mm/month	182.9	151.2	139.5	105.0	65.1	51.0	65.1	93.0	120.0	145.7	176.7	204.6	
Crop Factor	(C)			0.70	0.70	0.70	0.60	0.50	0.45	0.40	0.45	0.55	0.65	0.70	0.70	
Evaportranspiration	(ET)	(E x C)	mm/month	128.0	105.8	95.5	59.4	32.6	23.0	23.6	40.5	66.0	92.7	117.6	141.1	925.6
Inputs																
Precipitation	(P)	(QxD)/(L)	mm/month	73.4	73.1	83.4	48.1	29.3	61.6	21.6	23.1	36.8	57.6	65.6	55.8	**842.4**
Wastewater Application	(W)	(QxD)/(L)	mm/month	62.0	56.0	62.0	60.0	62.0	60.0	62.0	62.0	60.0	62.0	60.0	62.0	**730.0**
Inputs		(P + W)	mm/month	135.4	129.1	145.4	108.1	91.3	121.6	83.6	85.1	96.8	119.6	125.6	117.8	**1359.4**
Outputs																
Evaportranspiration	(ET)	(E x C x D)	mm/month	128.0	105.8	95.5	59.4	32.6	23.0	23.6	40.5	66.0	92.7	117.6	141.1	**925.6**
Percolation	(B)	(R / 7) x (D)	mm/month	88.6	80.0	88.6	85.7	88.6	85.7	88.6	88.6	85.7	88.6	85.7	88.6	**1042.9**
Outputs		(ET + B)	mm/month	216.6	185.8	184.1	145.1	121.1	108.7	112.1	129.0	151.7	181.3	203.3	229.6	**1968.5**
Storage	(S)	(P + W) - (ET + B)	mm/month	-81.2	-56.7	-38.7	-37.0	-29.8	12.9	-28.5	-43.9	-54.9	-61.7	-77.7	-111.8	
Cumulative Storage	(M)		mm	0	0	0	0	0	12.9	0	0	0	0	0	0	
Storage	(V)	Largest M	mm	**12.9**												
		(V x L) / 1000	m3	**7.8**												

PART I - References

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