Rous Water
Regional Water Supply

Rous Water

On-site Wastewater Management

Guidelines

June 2008

On-site Wastewater Management Guideline Reference Table

This table provides a quick reference point for those who know what information they are seeking from these guidelines. To familiarise yourself with these guidelines it is recommended to read through the document. A Table of Contents for this document is provided on the proceeding pages.

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On-site WWMS Owner		Why have these Guidelines been revised?		1.0, 3.0, 4.0
Potential On-site WWMS Owner		Are these guidelines applicable to YOU??		1.0, 5.1, 6.1, 7.1
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			Rous Water	5.5, 7.5
			Ballina Shire & Lismore Council	5.5, 7.5
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Note: On-site WWMS = On-site Wastewater Management System

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1. Introduction

Rous Water is the regional water supply authority on the NSW North Coast, supplying water to the local authority areas of Lismore (excluding Nimbin), Ballina (excluding Wardell), Byron (excluding Mullumbimby) and Richmond Valley (excluding Casino). In providing these areas with water, Rous Water manages four water catchment zones, two of which consist of existing water supply storages (Rocky Creek Dam and Emigrant Creek Dam), one water supply scheme that is currently being constructed (Wilsons River Source) and the other being the proposed Dunoon Dam and associated catchment area.

A catchment area is land that is bounded by natural features such as hills or mountains, from which all run-off water flows to a low point. In the case of a natural catchment area, the low point could be a dam, a location on a river, an inland lake, or the mouth of a river where it enters the ocean. Catchment areas vary in size and make-up.

Catchments associated with water supply areas are the area from which surface water drains (via runoff) to a reservoir or water storage facility. The stored water is then treated before use for human consumption. Rous Water recognises that the water catchment area above a water supply dam forms the first barrier for the protection of the water supply and that the quality of water provided to customers from the water supply dam is dependant upon the quality of the water draining to the storages (supply dam) from the catchment areas.

The quality of the water in the water supply is therefore directly related to the management of the catchment area above the dam. Together with the relevant local government authorities, Rous Water manages and oversees the activities occurring in the water catchment areas that are associated with water supply areas.

One of the key issues of concern associated with water quality from water supply dams is the installation and operation of on-site wastewater systems (e.g. septic tanks) within the catchment. The most significant water quality hazard for drinking water is related to the potential for microbial pathogens. On-site wastewater systems are a key potential source of human infective organisms.

Management guidelines for on-site systems in the water supply catchment area will help to control the input of pathogens to the dams and therefore reduce the risk of pathogens being present in the water.

This document outlines Rous Water's *On-site Wastewater Management Guidelines* ('the guidelines') for the installation, operation and maintenance of on-site wastewater systems within water supply catchments. The local authorities who manage these catchments have existing strategies and procedures associated with the installation, operation and maintenance of on-site wastewater treatment systems within their local government area.

The purpose of these guidelines is to compliment the Council's existing strategies and procedures by providing additional guidance for managing on-site wastewater management systems located within a water supply area.

These guidelines therefore focus on identifying any requirements of Rous Water, for water supply catchment zones, over and above the existing requirements of the local council.

The dam locations and associated catchment areas are presented in Figure 1 and described in Table 1.

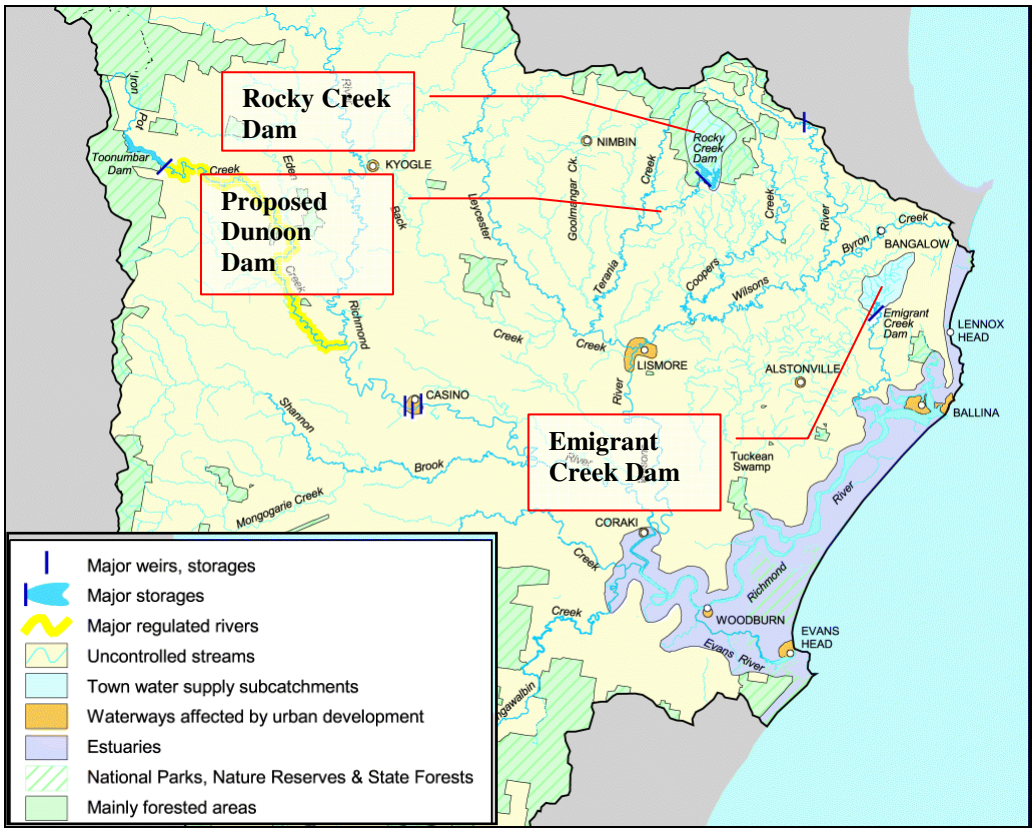

Figure 1 Richmond River Catchment including Rous Water Catchment Areas

Source (EPA-1999)

Note: The Wilsons River water catchment includes all of the catchment area of the Wilsons River and Coopers Creek upstream of Lismore.

Table 1 Rous Water Catchment Areas

Catchment Area	Area (km^2)	Land Use	Local Government Authority
Emigrant Creek	19.7	Mixed, consisting of cattle grazing, macadamia, stonefruit and coffee orchards, rural residential and urban land use.	Ballina Shire Council
Rocky Creek Dam	29	Native vegetation located within Whian Whian State Forest and Nightcap National Park	Lismore City Council
Proposed Dunoon Dam	19.4	Mixed landuse consisting of cattle grazing macadamia orchards, rural residential landuse	Lismore City Council
Wilsons River Source	550	Mixed agricultural landuses including grazing and horticulture, rural residential landuse but also towns, villages and major roads.	Ballina Shire Council, Byron Shire Council and Lismore City Council.

Land use in Rocky Creek Dam's catchment is within State Conservation Area and National Park, and therefore no on-site wastewater systems are present. One key element of Rous Water's risk management approach is to seek to have no development within the Rocky Creek Dam catchment and therefore there should be no need to manage on-site wastewater systems in this catchment.

Whilst the development of these guidelines has used the Emigrant Creek and Dunoon Dam catchments as case studies, it is also intended that the policy and guidelines will apply to the water catchment of the Wilsons River Source, which is now operational.

1.1 Definition of a Water Course

For the purpose of these guidelines a watercourse is as follows:

A watercourse comprises two types of systems, Perennial and Intermittent

> *1. Perennial watercourses are those watercourses that essentially flow all year-round and consist of baseflow during dry periods.*
>
> *2. Intermittent. watercourses are those watercourses that flow for only certain times of the year, when they receive water from surface runoff or from springs or ground water. During dry years they may be reduced to a series of separate pools or may even cease to flow entirely. However, these pools are still connected to the water table/ground water*

and/or:

Those water courses identified on the NSW Government Drainage Layer. This layer has been made available to Councils as the watercourse GIS layer consistent with Rous Water's watercourse GIS layer.

It should be noted that gully's or ephemeral streams are drainage lines that have channels which are above the water table at all times and therefore do not receive spring or groundwater flows (and are not classified as a watercourse). They carry water only during and immediately after rain. They may be dry for extended periods but subjected to flash flooding during high intensity storms.

2. Objectives

Effluent from on-site wastewater management systems can pose environmental, public health or agricultural resource risks if not managed appropriately. The information in these guidelines will provide the baseline for managing effluent from on-site wastewater treatment trains to help manage risks to drinking water quality. These guidelines are not intended to provide specific guidance on every individual treatment train available for on-site wastewater management. Rather, they provide an information base to be used as a foundation for addressing issues that might arise in the range of situations, circumstances and treatment trains in which on-site wastewater treatment occurs.

The objectives of these guidelines are:

- To protect drinking water quality in the water supply catchment areas of Rous Water.
- To reduce health risks to the community (including both residents of the water supply catchment areas and Rous Water customers).
- To provide advice to landholders, wishing to construct or modify on-site wastewater treatment facilities within these catchment areas, regarding what they need to address to meet the requirements of Rous Water.
- To provide information to the respective local council regarding the requirements of Rous Water.

Note that the local councils have further requirements for the use of on-site systems that need to be considered by anyone wishing to construct and or modify on-site wastewater treatment facilities.

3. Previous Practice

3.1 Rous Water

Rous Water's previous policy in relation to on-site wastewater systems within water catchment areas has been to oppose any development that creates or has the potential to create harmful increases in wastewater effluent loads in the water supply catchment areas within which Rous Water operates.

In the past Rous Water specified the following requirements for dwelling house developments in water supply catchment areas:

- Treatment to consist of aerated wastewater treatment systems or other approved systems designed to treat and disinfect all domestic wastewaters.
- Disposal of all treated wastewater from such facilities to be within the confines of the allotment to approved standards.
- Systems to incorporate a disinfection process capable of providing adequate treatment of pathogens and viruses.
- System design to ensure that there are no overland flows induced by malfunction or overloading conditions.

These principles are fundamental and still apply however these guidelines provide additional clarification of these requirements.

3.2 Councils

Ballina

Ballina Shire Council released a policy titled "Minimum Standards for Design of On-site Septic Wastewater Disposal Systems" in 1999. The policy outlines minimum acceptable standards and guidelines for the disposal of septic tank effluent in Ballina Shire. The policy recognises the importance of considering soil type, landform, depth to water table and bedrock and the proximity to watercourses and property boundaries when locating the Land Application Area (LAA).

In 2001 Ballina Shire Council released an "On–site Sewage Management Plan/Strategy" which now prohibits spray irrigation techniques in the shire and promotes subsurface drip irrigation as the standard method of applying Aerated Wastewater Treatment System (AWTS) effluent to Land Application Areas and specifies a minimum of 400m^2 as the application area.

In addition Ballina Shire Council has introduced an inspection, assessment and corrective action program for on-site systems. The On-site Sewage Management Plan/Strategy applies to the entire Shire not just systems located in water supply catchment zones.

Lismore

Lismore City Council released its draft on-site sewage and waste management strategy in 1999 and subsequently released a revised strategy in 2003. The strategy provides a model for calculating the Land Application Area based on the hydraulic, total nitrogen and total phosphorous loadings. The strategy also provides details for reducing the loadings from each of these three factors.

Lismore City Council also introduced a system of inspection, assessment and corrective action program for on-site systems. The Strategy applies to the entire Lismore Local Government area not just on-site systems within water supply catchment zones.

4. Rous Water Guidelines For On-site Wastewater Management Systems – An Overview

Rous Water's guidelines for on-site wastewater management systems have been revised because:

1. Recent research has shown that effluent from on-site wastewater systems poses a significant health risk to drinking water quality.
2. It has been found that the risk of pathogens in a nearby water course correlates not only to level of performance and treatment process but also to the distance an on-site wastewater management system is from a water course.
3. Performance improvements to existing on-site wastewater systems is required to minimise risks to the water supply.
4. Rous Water, Lismore City Council and Ballina Shire Council have agreed that consistent, unambiguous guidelines for on-site wastewater management systems in water supply catchments are required.

These comments are discussed in more detail below

4.1 Pathogen risk from on-site wastewater management systems

Nutrients and pathogens are the main pollutants of concern from on-site wastewater systems to the environment and human health respectively. The removal of pathogens will be highly dependant on the type of wastewater treatment process and the way in which it is operated.

Table 2 identifies the performance capabilities to remove pathogens for various on-site wastewater management systems. This information was obtained from a review carried out to determine the performance capabilities of various on-site wastewater system performances.

Table 2 Pathogen Removal Capabilities of On-site Wastewater Management Systems

Treatment Component of On-site Wastewater Management System	Comments	Pathogen removal capability
Primary / secondary treatment		
Septic tank	Relies on removal via soil in LAA. Maintenance is critical for proper functioning of LAA.	Low
Aerated wastewater treatment system	Often utilise chlorine for disinfection	Medium

Treatment Component of On-site Wastewater Management System	Comments	Pathogen removal capability
Sand filter (re-circulating, intermittent, or pulse dosed)		Medium - High
Constructed wetlands (reed beds)		Medium
Membrane bioreactor technology (i.e. waterboy)	Water passes through a membrane to remove contaminants	Medium
Waterless composting toilet	Eliminates “blackwater” from on-site wastewater management system. Still requires greywater management system for the property	High
Chlorination Disinfection	Poor against Cryptosporidium. Good for many other pathogens. Requires secondary treated effluent and regular maintenance	Low – High (1)
UV Disinfection	Requires secondary treated effluent and regular maintenance	Medium – High(1)
Greywater treatment devices (reed beds / sand beds)	Generally used in conjunction with composting toilet	High
Land Application		
Evapo-transpiration / absorption beds	Requires adequate sizing and depth to groundwater	High (2)
Mounds	Suitable for areas of high water table	High (2)
Sub-surface drip irrigation systems	Requires secondary treated effluent	High (1)
Surface spray irrigation systems	Requires secondary treatment, disinfection and ongoing maintenance. Very high risk if failing.	Low – Medium (1)

Note:

1. Pathogen removal rating assumes secondary treated effluent prior to this treatment is of appropriate quality for this treatment process.

2. Pathogen removal rating assumes design of land application method and land conditions are suitable.

Overtime, a number of guidelines and standards have been introduced to manage on-site wastewater management systems. Table 3 details these guidelines and standards and identifies the changes implemented over time to assist managing on-site

wastewater management facilities. It is thought the changes to these guidelines and standards have reduced the pathogen risk from the on-site wastewater systems. It is considered that systems installed with little or no reference to calculating Land Application Areas, or hydraulic loads are considered more likely to fail (e.g. systems installed prior to 1994 when AS1547 (1994) was released). In addition, systems are considered to pose less pathogen risk where appropriate design and secondary treatment are established. For newer systems the majority of system failures is associated with the lack of correct maintenance of these systems.

Table 3 Histories of Guidelines and Standards for Managing On-site Wastewater Management Systems

Time Frame of System Installation	Requirements	Estimated performance	Estimated Failure Rate
Prior to 1994	Australian Standard AS 1547:1973	AS 1547:1973 provided little guidance on sizing of absorption trenches and transpiration beds. Most systems therefore consisted of relatively small septic tanks (<2000L) and single 0.6m wide and <20m long trenches, which resulted in insufficient design capacity of LAA (i.e. likely to be too small) leading to above ground application, overflow and low detention and little to no primary treatment.	High - Failure occurs as a result of poor design criteria with approximately half of the systems inspected classified as over 15 years old and unsatisfactory The rate of failure is increased if operation and maintenance are inadequate – inspections indicate that up to half of these systems have not been pumped out.
1994 – 1999	Australian Standard AS 1547: 1994	AS 1547: 1994 recommended that capability assessments for LAA were undertaken and techniques for sizing absorption trenches based on soil permeability and hydraulic loading are provided. This has lead to the majority of systems, installed during this period, being primary treatment and providing adequately sized LAA .	Moderate failure of systems has occurred, some of which is likely to be due to inadequate system design criteria and diversion discharge, the majority of system failure is expected however, to be associated with operation techniques and lack of system maintenance (i.e. pump outs)
Since 1999	Lismore City Council Strategy in 1999 (revised 2003) In 2000 AS/NZ 1547:2000 was introduced In 2001 Ballina Shire Council introduced their Management Plan Strategy	Systems are required to be designed to Australian Standard (AS/NZ 1547: 2000) It is recommended that nutrient budgeting be considered which has lead to a reduction in hydraulic and nutrient loadings, secondary treatment is promoted as is source control, and LAA have been adequately sized and are generally larger than previous installations.	Low Failure, Failure is mainly as a result of poor operation and lack of maintenance

4.2 Risk of pathogens relative to the location of the on-site wastewater management system

Research completed for Rous Water (GHD, 2005) has shown that the likelihood of pathogens entering the water supply substantially reduces as the distance of the on-site wastewater system from a watercourse increases. *Cryptosporidium* modelling carried out for the catchments found that achieving a low likelihood of pathogens entering the water supply (that is a high log removal) is strongly correlated to the location of the on-site wastewater treatment system relative to watercourse rather than the performance of the on-site wastewater management system. Table 4 shows the risk of pathogens entering the watercourse from an on-site wastewater management system in relation to the system's distance from the watercourse.

Therefore to minimise the pathogen risk within the water supply, on-site systems that are located within or proposed within high risk locations (i.e. in close proximity to a water course) should operate with a high level of performance and require ongoing management and inspections to minimise the pathogen risk.

Table 4 The risk of pathogens entering a watercourse based on the location of the on-site wastewater management system relative to that specific watercourse.

Location of On-site Wastewater System Relative to the Water Course	Pathogen Risk Rating
WWMS within 25 metres of a water course	HIGH
WWMS within 50 metres of a water course and with little vegetation between WWTP and water course	HIGH
50 - 100 metres of vegetated (pasture) land between the WWMS and water course	HIGH
50 - 100 metres of vegetated (native vegetation) land between the WWMS and water course	MODERATE
WWMS has physical features which minimise likelihood of effluent entering a water course	MODERATE
WWMS located greater than 100 metres from a water course and the land between the WWMS and water course is vegetated with pasture	MODERATE
WWMS located greater than 100 metres from a water course and the land between the WWMS and water course is vegetated with native vegetation	LOW

Notes:

1. WWMS = Wastewater Management System
2. If any part of the system is within 25 m of a water course then there will be a need for an additional monitoring mechanism or alarm system. In addition an annual inspection/ maintenance regime will need to be implemented at all such

sites to ensure the system is functioning appropriately. An annual report will need to be submitted to the relevant local authority to certify that the system is operating appropriately. This certification will need to be provided by a NSW licensed plumber after they have undertaken the annual inspection. (This will be a condition of approval for any such system).

3. With regards to the distance of an on-site wastewater management system from a watercourse, the critical distance is that distance between the closest component of the on-site wastewater management system (either the treatment train or the disposal area) and the watercourse, i.e. whichever part of the system is the closest to the watercourse becomes the most disadvantaged part of the system. The buffer distance is that distance between the closest component of the system and the top of the bank of the nearest watercourse.

4.3 Performance improvements for existing on-site wastewater systems

Inspections undertaken to date in Ballina Shire Council and Lismore City Council indicate that around 50% of existing on-site systems are considered to be unsatisfactory (i.e. the failure rate is approximately 50%).

A system is classified as unsatisfactory if there is evidence of above ground discharge. System failure is generally a result of inappropriate system choice or sizing and / or poor maintenance.

4.4 Development of unambiguous guidelines for upgrading existing and new on-site wastewater systems

Landholders proposing to install or upgrade on-site wastewater management systems and the Councils of Ballina Shire and Lismore City are seeking greater clarification from Rous Water regarding the requirements for on-site wastewater management systems in the water supply catchment areas.

These requirements need to be clear enough to provide unambiguous guidance, and yet be flexible enough to be relevant to a range of likely conditions and development scenarios.

Rous Water, in conjunction with Ballina Shire Council and Lismore City Council, have determined that specific guidelines are required for on-site wastewater treatment system installation, operation and maintenance within water supply catchment zones. As a result any on-site wastewater management system located or proposed within a water catchment area will now be subject to the guidelines outlined in the subsequent chapters of this document.

4.5 Rous Water Guidelines

Recent findings from research associated with on-site wastewater management systems and the agreement between Rous Water and the Councils of Ballina Shire and Lismore City for guidelines has lead to the revision of Rous Water Guidelines for

on-site wastewater management systems located within Rous Water's water supply catchment zones.

These guidelines have been developed to achieve the following:

1. Ensure new on-site wastewater management systems are appropriately designed for operation within a water supply catchment zone.
2. Ensure upgrade works to existing on-site systems are adequate for future operation within a water supply zone.

These guidelines are designed to increase the performance standards to be met for any new on-site system or for existing on-site systems undergoing a major upgrade that are located within Rous Water's water supply catchment zones.

These guidelines are applicable to:

- New on-site wastewater management systems being installed within Rous Water's water supply catchment area.
- Existing on-site wastewater management systems located within Rous Water's water supply catchment areas that have failed and require major upgrade works.

The following three sections within this document will provide guidance on applying for a new on-site system or to upgrade and existing on-site system, operation and maintenance of these systems and the roles and requirements of the Council and Rous Water. These three sections are summarised below:

Section 5: A general overview of the procedures and obligations for the installation, operation and maintenance of an on-site wastewater management systems within Rous Water's water supply areas. This section needs to be read prior to reference to either Section 6 or 7.

Section 6: Identifies specific procedures and obligations for upgrading existing on-site wastewater management systems within the water supply area. This section needs to be read in conjunction with Section 5.

Section 7: Identifies specific procedures and obligations for new on-site wastewater management systems within the water supply area. This section needs to be read in conjunction with Section 5.

5. Rous Water Guidelines for On-site Wastewater Management Systems in Water Supply Catchment Areas – General Procedures

5.1 Introduction

This section provides a general overview of the procedures and obligations for owners, Council and Rous Water over the lifecycle of an on-site wastewater management system.

This section addresses the following procedures for on-site wastewater management systems located within Rous Water's water catchment areas:

- Designing an appropriate management system for a specific location.
- Installing new or upgrading existing on-site systems.
- Inspections of on-site systems
- Responsibilities

5.2 Designing an appropriate on-site wastewater management system

The key considerations for assessing the suitability of a proposed on-site wastewater management system in a water supply catchment zone are:

1. Does the location pose a high or low pathogen risk to the watercourses?
2. What disposal method is proposed?
3. What treatment is now required?

Design of the management system considers the level of treatment i.e. primary or secondary treatment, the capacity of that treatment train to treat flows from the source and site conditions (e.g. sizing of land application area).

5.2.1 Treatment Trains

A treatment train consists of a series of wastewater management processes applied to treat wastewater. Typically the treatment train consists of wastewater sources (e.g. the toilet, bathroom, kitchen) followed by the collection point which can also comprise of the primary treatment (e.g. septic tank, greywater tank, AWTS), and then possibly followed by secondary treatment (e.g. sand filters, reed beds). A Land Application Area (LAA) (e.g. subsurface irrigation) is the final step where a land application technique disposes flows after either the primary or secondary treatment.

To protect the water supply Rous Water's preference - given the additional sensitivity of receiving environments in a water supply catchment area, particularly where identified buffer distances are not met - is to have a treatment train that includes some form of secondary treatment. In order to qualify as "secondary treated", effluent must

contain no more than 20 mg/L Biochemical Oxygen Demand (BOD) and 30 mg/L Total Suspended Solids. Hence, Rous Water would prefer to see secondary treatment for all new dwellings and therefore the developer/owner must demonstrate that the system can be operated and maintained in a manner that results in a minimal impact on the water supply.

Rous Water is however, aware that a number of existing or proposed systems may not be posing a high risk to the quality of water within the water supply due to their current operation and/or distance from watercourses.

For this reason if existing systems without secondary treatment are adequately maintained and are shown to pose minimal risk if they continue to be maintained in an appropriate manner (as determined by routine inspections) these systems can continue to operate without a secondary treatment process incorporated into the treatment train.

Guidelines identifying appropriate treatment trains are contained in Appendix A.

5.2.2 Location

To demonstrate that a system can be operated and maintained with a minimal impact on the water supply (i.e. no off site migration of effluent, no migration of effluent into a water course), the following factors should be considered:

- In most instances where the LAA is to be located 100 meters or more from the nearest watercourse the likelihood of contamination of the water supply is significantly reduced.
- The vegetative state of the area between a LAA and a watercourse will also influence the likely impact to the water supply with native or heavily vegetated areas providing a greater barrier to the potential for surface migration of effluent.

The following may be investigated to determine a suitable site for the land application area:

- Type of management system, type of treatment and land application system;
- Distance to watercourse;
- Vegetation types between site and water course
- Size of allotment;
- Soil type;
- Slope;
- Density of development in the location; and
- Population

Models can be used to predict sustainable land areas and wet weather storage requirements for a specific effluent irrigation scheme. They can also be used to identify the key risks of the scheme and therefore the need for additional controls such as buffer zones, low impact irrigation systems, leaching requirements, runon and runoff

controls. If design relies on models, the models must be based on carefully collected and comprehensive baseline data on site features, including some or all of:

- Effluent flow rate and quality
- Climate
- Treatment plant type and proposed management
- Landform, soil properties
- The proposed irrigation system

5.2.3 Designing a suitable on-site management system

The installation of any new system or upgrade to an existing system will be subject to a review to ensure appropriate regulatory requirements are met, and that the system of choice provides appropriate treatment for the source wastewater and for the location of the management system.

Based on the treatment train and location criteria discussed above, Rous Water have formulated a table to indicate the types of treatment trains that are suitable for different site locations. This process is based on the idea that where a good location is provided (i.e. 100m or more from a watercourse) only a certain level of treatment may be required in the treatment process. By way of contrast where the location is poor (e.g. within 25m of a water course) a high level of treatment will be required to ensure maximum protection of the water supply.

Table A1 to A6 in Appendix A outline the indicative treatment required for different treatment train locations in relation to water courses.

Judgement will also be used to consider specific site factors which will allow Council staff to consider any justification provided by an applicant, providing some level of flexibility subject to a merit-based assessment. This level of flexibility is not afforded to rezoning and subdivision applications as buffer distances are treated as absolute minimums.

5.3 Application Process

An application for any new system or upgrade to an existing system requires a review by Council to ensure appropriate regulatory requirements are met, and that the treatment train of choice is in fact appropriate for the wastewater and for the location of the system.

The relevant council will need to be contacted either by phone or by visiting council offices to obtain the relevant documentation. In addition, the guidelines will also be available on the relevant Councils' website and the Rous Water website. The documentation required for the installation of a new system or upgrading an existing system and then subsequent operation of an on-site wastewater treatment system in a water supply catchment zone may include the following:

- Application Form – Application for Approval to Install a Waste Treatment Device or Upgrade an Existing Waste Treatment Device and

- Approval to Operate an On-Site Wastewater Management System;
- Manufacturers specifications of the tank(s);
- A site report – Site Assessment Report (undertaken as required in the relevant council's on-site waste water management strategy). This will usually need to be completed by the plumber, system installer or civil engineering firm as approved by the relevant Council;
- A Geo-technical Report (if applicable or requested by Council);
- Floor plans of any dwelling or building that will be connected to the waste treatment device;
- Site Plan for any On-Site Disposal detailing; proximity to water courses, buffer distances (m) from dwelling, boundaries, paths, vegetation, swimming pools, dams, drains and any other sensitive landform. Locations of the primary and reserve disposal areas (where possible photo's should be included);
- Plan of any storm water diversion drains and down-slope bunding;
- Design plans of the disposal area, calculations for the disposal area (both hydraulic loading and nutrient balance) and details of the maintenance agreement with the service provider where appropriate;
- When an aerated water treatment system (AWTS) is to be used, the applicants must provide details of maintenance agreement with the service provider.

If proposed treatment trains (in conjunction with the location) are rated as a Medium, Medium–high or High suitability (based on the tables in Appendix A), then Rous Water may not be directly involved with the approval process. If however, proposed treatment trains (in conjunction with the location) are rated a Low–medium or Low suitability, such applications may be forwarded to Rous Water who may become directly involved in the application process.

Table 5 provides an indication of which type of application would typically need to be referred to Rous Water or otherwise.

Table 5 Referral arrangements for on-site wastewater systems in water catchment areas

Suitability	Does the application need to be referred to Rous Water?
Low	No. Council to refuse the application.
Low–medium	Yes. Applications in this category could potentially be consistent with the requirements of Rous Water and Council, but further consideration of the application and site specific factors is required by Rous Water.
Medium	No. Provided Council is satisfied that the application comprehensively addresses the requirements of Rous Water and Council, there is no need to refer the application to Rous Water.

Medium–high	No. Provided Council is satisfied that the application comprehensively addresses the requirements of Rous Water and Council, there is no need to refer the application to Rous Water.
High	No. Provided Council is satisfied that the application comprehensively addresses the requirements of Rous Water and Council, there is no need to refer the application to Rous Water.

Note: 1. 'Council' refers to the relevant local council. 2. This table relates primarily to dwelling-construction (including dual occupancy). More intensive development (such as packing shed and associated facilities) may require more advanced assessment, and may also require additional treatment processes.

5.4 Inspections

Inspections of the on-site wastewater management systems located within water supply catchment zones will be undertaken. Appendix B identifies the range of criteria that may be assessed during a site inspection.

Based on a desktop review of the on-site wastewater management systems a risk ranking may be applied to the on-site wastewater management system.

High risk systems may be subject to inspections on a more frequent basis than those systems with a low risk rating. Councils will provide reports based on available information to Rous Water regarding the status of on-site wastewater management systems within water supply areas.

Each system that is installed, or called upon for an upgrade, must have an operation and maintenance plan. This will be system specific but is likely to include items such as:

- Maintenance of pumps and other mechanical devices
- Cleaning of screens / filters
- Desludging
- Checking any chemicals
- Checking levels.

The inspector may ask to see evidence of the plan, and that it is being followed.

The relevant local council will keep a register of all systems in the water catchments zones. Relevant information may include:

- Details of owner and occupants
- Number of occupants
- System type / size
- Disposal type / size
- Distance and geography to the nearest water course

- Date system was Installed
- Date of Last Inspection
- Action required

5.5 Responsibilities

Proponents should be aware of the range of environmental offences relating to air and water pollution and conduct their operation and maintenance procedures accordingly. It is an offence for the occupier of premises to fail to operate equipment in a proper and efficient manner, and it is an offence for the owner/ occupier to fail to maintain equipment in an efficient condition.

A license will not protect an occupier from prosecution for these failures.

If on-site wastewater management systems are posing a potential risk to the water supply the owner/ occupier will be required to resolve the problem within a specified timeframe via Notice/ Order from the relevant Council. Where the problem is not resolved in a timely manner fines will be considered, followed by legal action. Rous Water will support both Lismore City and Ballina Shire Councils in these situations.

Specific guidelines outlining how the information described in this section should be applied to existing on-site systems requiring major upgrades due to failure or for proposed new systems are outlined in Sections 6 and 7 of this document.

6. Rous Water Guidelines for Operating Existing On-site Wastewater Management Systems

6.1 Introduction

These guidelines apply to existing (systems with a current licence to operate) on-site wastewater management systems operating within water supply catchment zones that require major upgrade works due to failure of the system.

Under Section 68 of the *Local Government Act 1993*, all on-site wastewater systems must have an "Approval to Operate". It is the owner's responsibility to ensure they have an Approval to Operate. Approvals to Operate are obtained from the local council. Approvals to Operate can be withdrawn if the treatment train is not operated and maintained in a manner that manages risks to the water supply. The adequacy of a system in relation to continued Approval to Operate is assessed through the following process and in the flowchart provided in Appendix C.

6.2 Operation and Maintenance

An Approval to Operate does not mean the owner / occupier is released from the requirement to manage the treatment train. Inappropriate operation and / or maintenance is considered a breach of the licence to operate and can result in fines and prosecutions as outlined in the relevant council strategy.

The treatment train will be operated as specified by the manufacturer and in a manner that ensures that the risks to the water supply are managed. In some instances routine maintenance records (i.e. a Maintenance Log) need to be kept and may be requested by the relevant council to demonstrate that the system has been operated and maintained in an appropriate manner.

6.3 Inspection

As discussed in Section 5 the frequency of inspections may be based on the risk rating for the on-site system according to Rous Water's guidelines and the relevant council's on-site wastewater management strategy.

Existing systems are subject to inspection on a routine basis to determine if the system is being operated and maintained in an appropriate manner.

In some instances the inspection may result in minor issues being identified with an existing system (i.e. a small crack in a pipe, additional reed harvesting etc). In such instances Councils inspector will determine the action required and may request that evidence be forwarded to council upon completion but a re-inspection or major upgrade to the system are unlikely to be required if the risk to the water supply (and public/environmental health) is low.

If the inspection concludes the existing treatment train or component of a treatment train is failing and / or has been identified as posing a high risk to the water supply (i.e.

surfacing of effluent) the owner/ operator will be required to upgrade the treatment train or failing component of the treatment train.

The adequacy of a system in relation to continued Approval to Operate is assessed through the flowchart provided in Appendix C.

6.4 Significant Upgrades

When an upgrade is required the proposed design will be subject to Rous Water's guidelines for New On-Site Wastewater Management Systems in Water Supply Catchment Zones.

Scenarios other than inspection results that may require the existing on-site wastewater systems to be upgraded are:

- Where renovations have been proposed for the dwelling, which is serviced by the on-site management system, notification should be submitted to the relevant council outlining the extent of renovations and likely impacts on the performance of the treatment train (e.g. addition of a bedroom may result in increased load to the treatment train). If it is felt the renovations may potentially increase the risk of performance failure the treatment train will require upgrading.
- If a dwelling is sold it is the responsibility of the purchaser to obtain an Approval to Operate for the on-site wastewater management system from the relevant council. If the new owner plans alterations to the dwelling that may impact the existing performance of the treatment train (e.g. results in potential additional load on the treatment train) an upgrade may be required.

Note: A significant upgrade relates to situations that cannot be addressed through maintenance or repair work. This may relate to the replacement / upgrade of the treatment device and / or the associated disposal area.

7. Rous Water Guidelines for New On-Site Wastewater Management Systems in Water Supply Catchment Areas

7.1 Introduction

These guidelines apply to:

- New on-site wastewater management systems proposed for development, construction and operation within a water supply catchment zone
- Upgrading existing on-site systems within water supply catchment zones.

Under Section 68 of the *Local Government Act 1993*, all on-site wastewater systems must have an "Approval to Operate" It is the owner's responsibility to ensure they have an Approval to Operate. Approvals to Operate are obtained from the local council by lodging an application.

An Approval to Operate can be obtained by following the process outlined below:

- Select a treatment train
- Select a Land Application Area
- Submit Application

7.2 Selection of a treatment system

The installation of a treatment system must be undertaken as per the design specifications agreed through the application to install an on-site system lodged with the relevant council. The proponent of a new system or the upgrade to an existing system must determine the type of treatment system that will be suitable for the site and proposed usage. The treatment train must be designed to minimise the pathogen risk to the water supply and must be designed with consideration for the relevant local council's strategy. This document along with the relevant council strategy provides guidance for selecting a system suitable to site characteristics.

Refer to Section 5 and Appendix A for guidelines on selecting an appropriate treatment train.

7.3 Calculation of LAA

In addition to selecting a treatment train the Land Application Area (LAA) should also be determined. The LAA must be designed to ensure that there is no surfacing of effluent. The LAA size should be determined using the relevant local council's strategy as a guide.

Also refer to Section 5 for guidelines on selecting a suitable LAA.

7.4 Submitting Application

Once the proponent has determined the treatment train and LAA they need to submit an application. Applications should be submitted as outlined in the relevant council's strategy and should consider those issues listed under section 5 and Appendix B of this document.

7.5 Council and Rous Water Responsibility

A desktop assessment of the application will initially be undertaken by the relevant council for the proposed treatment train and location. A site inspection will then be undertaken prior to Approval to Operate to ensure that the system has been installed to design specifications.

Once an Approval to Operate is given, routine inspections will be undertaken to ensure that the on-site wastewater management system is being operated and maintained in an appropriate manner and that the system does not pose a high risk to the environment. Inspections for systems located within water supply catchment zones will be undertaken with consideration for the criteria in the checklist in Appendix B.

Once Approval to Operate has been granted the on-site system will be subject to Rous Water's Guidelines outlined in Section 5.

Appendix A

Indicative Treatment Systems in Relation to Water Courses

As outlined in the guidelines the key criteria to minimise pathogen risks is associated with the installation and management of an appropriate treatment train and the distance that treatment train is from a watercourse. The tables below detail the suitability of treatment trains within a range of distances from a watercourse and provides the likely suitability for approval based on the expected pathogen risk.

The tables within this appendix identifying the pathogen risk a particular on-site management system imparts onto the watercourses.

Table	Location of on-site wastewater management system relative to a water course	Extent of vegetation between the on-site wastewater management system and a water course
A1	100 meters or more	Heavily vegetated with native vegetation
A2	100 meters or more	Vegetated with pasture
A3	Between 50 to 100 meters	Heavily vegetated with native vegetation
A4	Between 50 to 100 meters	Vegetated with pasture
A5	Less than 50 meters	N/A
A6	Less than 25 meters	N/A

Note: Membrane filtration processes can remove particles, bacteria, other microorganisms, particulate matter, natural organic matter and salt (desalination), with removal determined by the membrane's pore size. As the pore size decreases smaller pollutants can be removed and pressure requirements increase. The smaller pore size requires greater pressure and greater energy requirements for effective treatment. The pressure requirements, pore size and typical pollutant removal are summarised in the table below.

Membrane filtration key features summary

Filtration	Pore size	Operating pressure	Typical target pollutant
Microfiltration	0.03 to 10 microns	100-400 kPa	Sand, silt, clays, *Giardia lambia, Cryptosporidium*
Ultrafiltration	0.002 to 0.1 microns	200-700 kPa	As above plus some viruses (not an absolute barrier) Some humic substances
Nanofiltration	About 0.001 microns	600-1000 kPa	Virtually all cysts, bacteria, viruses and humic materials
Reverse osmosis	About 4 to 8 Å	300-6000 (or 13,000kPa – 13.8 bar) kPa	Nearly all inorganic contaminants Radium, natural organic substances, pesticides, cysts, bacteria and viruses Salts (desalination)

Table A1 Located 100m or more from a watercourse. Heavily Vegetated with Native Vegetation

Pathogen risk for system located 100m or more from a water course (thick native Vegetation)	Treatment trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
Low	Septic tank with evapotranspiration (ETA)/absorption beds land application area	Low to Medium	Medium	
Low	Septic tank with sand filter and ETA /absorption beds or sub- surface drip irrigation land application area	Medium	Medium	
Low	Septic tank with re-circulating sand filter and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium - high	High	
Low	Septic tank with constructed wetland (reed bed) and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Low	Membrane bioreactor technology (micro filtration) with ETA / absorption bed or sub-surface drip irrigation land application area (some reuse i.e. for toilet may be permissible)	Medium	Medium	As the pore size decreases smaller pollutants can be removed and pressure/ energy requirements increase.
Low	Composting toilet and greywater treatment device (i.e. reed beds/ sand beds) ETA / absorption bed.	High	High	
Low	Aerated waste water treatment system with	Medium	Medium	Chlorination does not

Pathogen risk for system located 100m or more from a water course (thick native Vegetation)	Treatment trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	chlorination disinfection and subsurface irrigation			remove Cryptosporidium successfully
Low	Aerated waste water treatment system with sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Low	Aerated waste water treatment system with recirculating sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium - High	High	
Low	Biological filter system (based on worm farm style system) and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium - High	Secondary treatment can be provided with accredited UV component.

Table A2 Located 100m or more from a watercourse. Vegetated with Pasture

Pathogen risk for system located 100m or more from a water course (minimal vegetation)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
Medium	Septic tank with evapotranspiration (ETA) /absorption beds land application area	Low to Medium	Medium	
Medium	Septic tank with sand filter and ETA/ absorption beds or sub-	Medium	Medium	

Pathogen risk for system located 100m or more from a water course (minimal vegetation)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	surface drip irrigation land application area			
Medium	Septic tank with re-circulating sand filter and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium - high	Medium	
Medium	Septic tank with constructed wetland (reed bed) and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Medium	Membrane bioreactor technology (micro filtration) with ETA/ absorption bed or sub-surface drip irrigation land application area (some reuse i.e. for toilet may be permissible)	Medium	Medium	As the pore size decreases smaller pollutants can be removed and pressure/ energy requirements increase.
Medium	Composting toilet and greywater treatment device (i.e. reed beds/ sand beds) and ETA/ absorption bed	High	High	
Medium	Aerated waste water treatment system with chlorination disinfection and subsurface irrigation	Medium	Medium	Chlorination does not remove Cryptosporidium successfully
Medium	Aerated waste water treatment system with sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Medium	Aerated waste water	Medium - High	Medium	

Pathogen risk for system located 100m or more from a water course (minimal vegetation)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	treatment system with recirculating sand mound and ETA / absorption bed or sub-surface drip irrigation land application area			
Medium	Biological filter system (based on worm farm style system) and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	Secondary treatment can be provided with accredited UV component.

Table A3 Located between 50 and 100m from a watercourse. Heavily vegetated with native vegetation

Pathogen risk for system located 50 - 100m from a water course (heavily vegetated)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
Medium	Septic tank with evapotranspiration (ETA) /absorption beds land application area	Low to Medium	Low to medium	
Medium	Septic tank with sand filter and ETA/ absorption beds or sub-surface drip irrigation land application area	Medium	Medium	
Medium	Septic tank with re-circulating sand filter and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium - high	Medium	
Medium	Septic tank with constructed wetland (reed bed) and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Medium	Membrane bioreactor technology (micro filtration) with ETA/ absorption bed or sub-surface drip irrigation land application area (some reuse i.e. for toilet may be permissible)	Medium	Medium	As the pore size decreases smaller pollutants can be removed and pressure/ energy requirements increase.
Medium	Composting toilet and greywater treatment device (i.e. reed beds/ sand beds) and ETA/ absorption bed	High	Medium - high	
Medium	Aerated waste water treatment system with	Medium	Medium	Chlorination does not remove

Pathogen risk for system located 50 - 100m from a water course (heavily vegetated)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	chlorination disinfection and subsurface irrigation			Cryptosporidium successfully
Medium	Aerated waste water treatment system with sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Medium	Aerated waste water treatment system with recirculating sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium - High	Medium	
Medium	Biological filter system (based on worm farm style system) and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	Secondary treatment can be provided with accredited UV component.

Table A4 Located between 50 and 100m from a watercourse vegetated with pasture

Pathogen risk for system located 50 - 100m from a water course (little vegetation)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
Medium - High	Septic tank with evapotranspiration (ETA) /absorption beds land application area	Low to Medium	Low	
Medium - High	Septic tank with sand filter and ETA/ absorption beds or sub-surface drip irrigation land application area	Medium	Low	
Medium - High	Septic tank with re-circulating sand filter and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium - high	Medium	
Medium - High	Septic tank with constructed wetland (reed bed) and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Medium - High	Membrane bioreactor technology (micro filtration) with ETA/ absorption bed or sub-surface drip irrigation land application area (some reuse i.e. for toilet may be permissible)	Medium	Medium	As the pore size decreases smaller pollutants can be removed and pressure/ energy requirements increase.
Medium - High	Composting toilet and greywater treatment device (i.e. reed beds/ sand beds) and ETA/ absorption bed	High	Medium - High	
Medium - High	Aerated waste water treatment system with chlorination disinfection	Medium	Medium	Chlorination does not remove Cryptosporidium

Pathogen risk for system located 50 - 100m from a water course (little vegetation)	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	and subsurface irrigation			successfully
Medium - High	Aerated waste water treatment system with sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	
Medium - High	Aerated waste water treatment system with recirculating sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium - High	Medium	
Medium - High	Biological filter system (based on worm farm style system) and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Medium	Secondary treatment can be provided with accredited UV component.

Table A5 Located within 50 m of a watercourse

Pathogen risk for system located within 50m of a water course	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
High	Septic tank with evapotranspiration (ETA)/absorption beds land application area	Low to Medium	Low	
High	Septic tank with sand filter and ETA/ absorption beds or sub-surface drip irrigation land application area	Medium	Low	
High	Septic tank with re-circulating sand filter and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium - high	Medium	
High	Septic tank with constructed wetland (reed bed) and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium	Low	
High	Membrane bioreactor technology (micro filtration) with ETA/ absorption bed or sub-surface drip irrigation land application area (some reuse i.e. for toilet may be permissible)	Medium	Low	As the pore size decreases smaller pollutants can be removed and pressure/ energy requirements increase.
High	Composting toilet and greywater treatment device (i.e. reed beds/ sand beds) and ETA/ absorption bed	High	Medium	
High	Aerated waste water treatment system with chlorination disinfection	Medium	Low	Chlorination does not remove Cryptosporidium

Pathogen risk for system located within 50m of a water course	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	and subsurface irrigation			successfully
High	Aerated waste water treatment system with sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Low	
High	Aerated waste water treatment system with recirculating sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium - High	Medium	
High	Biological filter system (based on worm farm style system) and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Low - Medium	Secondary treatment can be provided with accredited UV component.

Table A6 Located within 25m of a watercourse

Pathogen risk for system located within 25m of a water course	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
High	Septic tank with evapotranspiration (ETA)/absorption beds land application area	Low to Medium	Low	
High	Septic tank with sand filter and ETA/ absorption beds or sub-surface drip irrigation land application area	Medium	Low	
High	Septic tank with re-circulating sand filter and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium - high	Low - Medium	
High	Septic tank with constructed wetland (reed bed) and ETA/ absorption bed or sub-surface drip irrigation land application area	Medium	Low	
High	Membrane bioreactor technology (micro filtration) with ETA/ absorption bed or sub-surface drip irrigation land application area (some reuse i.e. for toilet may be permissible)	Medium	Low	As the pore size decreases smaller pollutants can be removed and pressure/ energy requirements increase.
High	Composting toilet and greywater treatment device (i.e. reed beds/ sand beds) and ETA/ absorption bed	High	Medium	
High	Aerated waste water treatment system with chlorination disinfection	Medium	Low	Chlorination does not remove Cryptosporidium

Pathogen risk for system located within 25m of a water course	Treatment Trains (assuming that systems have been designed and installed to meet required capacity, hydraulic load etc)	Pathogen Removal capacity of treatment (assuming they can be operated and maintained appropriately) Comments	Suitability of system/ likelihood of approval (combined pathogen risk for location and treatment train)	Comments
	and subsurface irrigation			successfully
High	Aerated waste water treatment system with sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Low	
High	Aerated waste water treatment system with recirculating sand mound and ETA / absorption bed or sub-surface drip irrigation land application area	Medium - High	Low - Medium	
High	Biological filter system (based on worm farm style system) and ETA / absorption bed or sub-surface drip irrigation land application area	Medium	Low	Secondary treatment can be provided with accredited UV component.

Notes:

1. If any part of the system is within 25 m of a water course then there will be a need for an additional monitoring mechanism or alarm system. In addition an annual inspection/ maintenance regime will need to be implemented at all such sites to ensure the system is functioning appropriately. An annual report will need to be submitted to the relevant local authority to certify that the system is operating appropriately. This certification will need to be provided by a NSW licensed plumber after they have undertaken the annual inspection. (This will be a condition of approval for any such system).

2. Adding filtration or further treatment of a similar level will improve risk level.

Appendix B

Checklist for Inspection

Checklist for Inspection

Question 1.

Effluent characteristics	Comments	Ratings
Source of effluent		
Method of treatment and disinfection		
Rating of treatment (based on Table 3.)		
Degree of exposure to humans		
Effluent quality and quantity		
Effluent strength and identification of the most limiting constituent which resulted in the strength classification		

Question 2.

Description of site	Comments	Ratings
Locality map, indicating catchment, Eastings, Northings, AMG Zone and scale		
Current land use		
Vegetation Type		
Proximity of site to dwellings and roads, water courses, other property		
Boundaries, urban areas, areas of natural timber and protected environmental areas		
Location of existing groundwater bores.		

Question 3.

Description of climate	Comments	Ratings
precipitation analysis (average monthly distribution)		
• storm intensities		
evapotranspiration (average monthly distribution)		
• prevailing wind (if applicable)		
• description of water balance (daily or monthly) used to estimate maximum hydraulic load		

Question 4.

Topography/landform	Comments	Ratings
Ground slope and relief		
Description of adjacent land		
Erosion potential		
Drainage features		
Seasonal wet areas and springs		
Surface rockiness		
Flood potential.		
Ground slope and relief		

Question 5.

Soil characteristics	Comments	Ratings
Type, structure		
Profile features		
Texture & colour,		
Electrical conductivity		
Cation exchange capacity		
Exchangeable cations		
Hydraulic conductivity		
Nutrient levels		
Organic matter		
Phosphorus sorption capacity		
Salinity levels		
pH		
Infiltration and percolation characteristics		

Question 6.

Groundwater	Comments	Ratings
Depth to groundwater		
Location of existing wells on the subject site and adjoining sites		
Current use and ambient groundwater chemistry		
An analysis of the hydrogeological conditions under the site		
Vulnerability of groundwater systems to pollution.		

Question 7.

Surface water	Comments	Ratings
Proximity		
Quality and current use		
Flow characteristics		
Quality of aquatic ecosystems.		

Question 8.

Cropping system	Comments	Ratings
Crops/vegetation grown		
Details of planting and harvesting cycles		
Details of cropping or grazing management and practices.		

Question 9.

Animal system	Comments	Ratings
Animal species and types to be fed/grazed		
Farm design and facilities for animal enterprise		
Plan of production and health practices		
Exposure of pets, birds and native animals.		

Question 10.

Irrigation area and wet weather storage required	Comments	Ratings
Details and results of nutrient, organic, salt and water budgets		
Determine of land area and wet weather storage		

Question 11

Effluent transport	Comments	Ratings
Detailed plans of effluent transport facilities		

Wet weather storage facilities		
Detailed plans of effluent storage facilities (including balance ponds)		

Question 12

Irrigation system	**Comments**	**Ratings**
Type of irrigation system: spray, trickle, flood or furrow –for spray systems		
Pressure at which effluent is discharged		
Plan of irrigation system		
Schematic diagram of the system controls, including pipes, pumps, valves,		
Timers, alarms and runoff controls		
Proposed monitoring program		
Analysis of risks to environment from scheme		
Details of components to be monitored		
Details of tests to be undertaken		
Details of analysis reporting mechanisms.		

Appendix C

Process

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