EnviroFit

Environmental Solutions

WASTEWATER ASSESSMENT REPORT

Lot 31 Nepean Gorge Road, Mulgoa

Prepared by: EnviroFit Pty Ltd
Client: Mr Peter Sayer
Date: 23rd September 2017
Report No. ENVF17-1090

EnviroFit Pty Ltd
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1. Executive Summary

Wastewater Load	
Main dwelling and pool house	820L/day (based on tank water and PCC Policy)
Caretakers Residences	480L/day (based on tank water and PCC Policy)
Tank Selection	
2 x Accredited AWTS (secondary treatment) System Accredited septic for pool house to drain to AWTS	
Disposal Areas	
Main Dwelling and Pool House	684 sqm surface irrigation
Caretakers Cottage	401 sqm surface irrigation
Site Limitations	

No 88b restrictions apply to this property

One moderate limitation was identified as part of the site and soil assessment. This was:

- Heavy Clay Soils (category 5 and 6 soils)

Site Plan

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1. Introduction

EnviroFit Pty Ltd has been commissioned by Warwick Stimson from Stimson and Baker Planning on behalf of the property owners to conduct a site and soil assessment and to prepare a wastewater report for the proposed development of two dwellings (main residence and caretakers cottage).

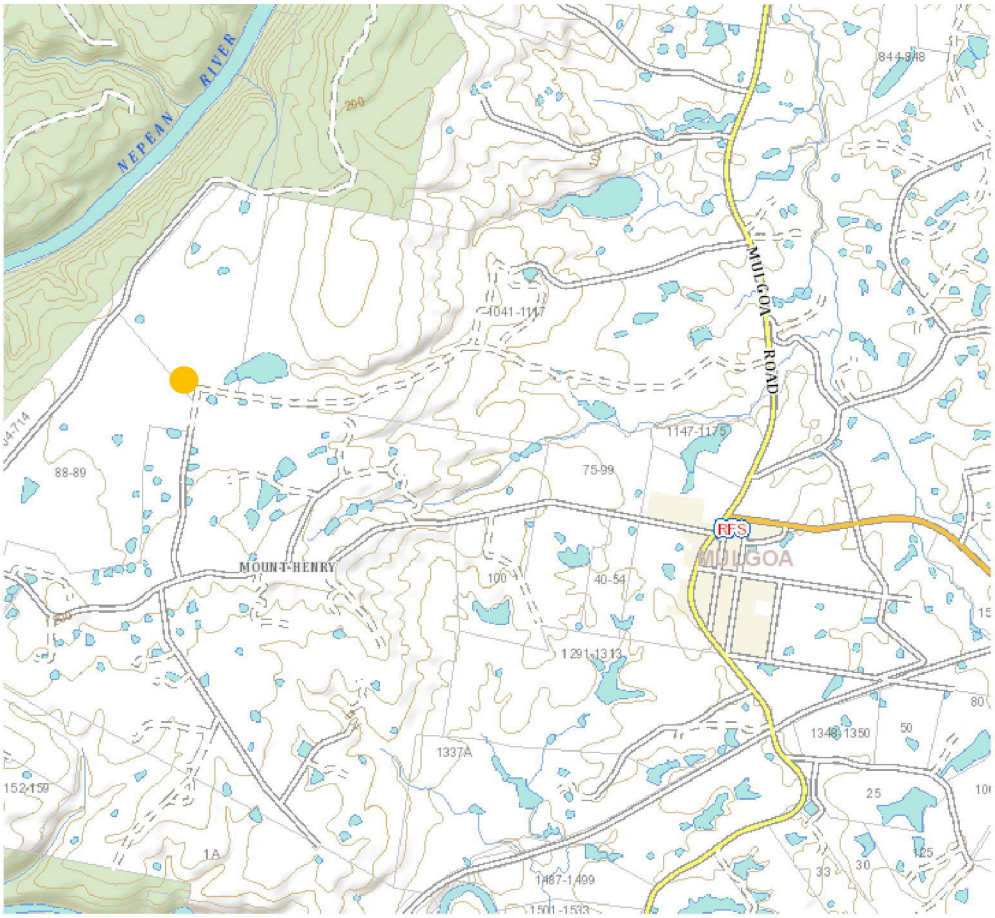
Site Information

Address: Lot 31 Nepean Gorge Drive, Mulgoa

Local Government Area: Penrith City Council

Water Supply: Tank water

Proposed Development: Two dwellings (main residence and caretakers cottage).



2. Site Assessment

A site inspection encompassing an assessment of the sites physical features as well as intrusive soil sampling was conducted on 18th September 2017. The following information is based on the results of this inspection as well as a desktop review of the site.

Flood Potential and Overland Flow	Low Limitation

It is best to locate all the components of on-site systems above the 1 in 100 year probability flood contour, but the 1 in 20 year probability contour may be used as a limit for land application areas.

Electrical components, vents and inspection openings of wastewater treatment devices should be sited above the 1 in 100 year probability flood contour.

Site Specific Comments

The site is not subjected to mainstream flooding or overland flow

Sun Exposure	Low Limitation

Sun and wind exposure on land application areas should be maximised to enhance evaporation. Factors affecting exposure include the geographical aspect of the area, and vegetation and buildings near the proposed application area. Evaporation may be reduced by up to two-thirds in some locations by a poor aspect or overshadowing and sheltering by topography, buildings or vegetation.

Site Specific Comments

The site presents with good sun exposure in the disposal area.

Slope	Low Limitation

Excessive slope might pose problems for installing systems and create difficulties in evenly distributing the treated wastewater to land, resulting in run-off from surface land application areas. The recommended maximum slope will vary depending on the type of land application system used and the site and soil characteristics.

Site Specific Comments

The slope of the land in the area that the dwellings and effluent disposal area (EDA) are located is no more than 5%.

Run on and Upslope Seepage	Low Limitation

Run-on of precipitation on to the land application area from up-gradient areas should be avoided. Run-on should be diverted around any land application area by using earthworks or a drainage system approved by the local council.

Upslope seepage can be at least partly controlled by installing groundwater cut-off trenches, provided the lowest level of the trench is above the level at which effluent can enter the land application area.

Site Specific Comments

The site is not subjected to run on or upslope seepage.

Surface, Shallow and Bed Rock	Low Limitation

The presence of rock outcrops usually indicates highly variable bedrock depths, and can be associated with preferential pathways (short-circuits) for effluent to flow along rock fissures and surface elsewhere.

The presence of rocks can limit evaporation and interfere with drainage. Rocks can also interfere with trench and pipe installations. Cobbles and larger stones can collapse into installations, causing problems with even effluent distribution

Site Specific Comments

No bedrock or rocky outcrops experienced on the site.

Fill Material	Low Limitation

Fill can be described as soil resulting from human activities that have led to modification, truncation or burial of the original soil or the creation of new soil parent material by a variety of mechanisms. Fill often has highly variable properties, such as permeability. Fill can be prone to subsidence, and could contain material that might not be suitable for plant growth or for constructing land application systems. Fill can be removed, but if this is not possible a detailed assessment of the fill might be needed. Fill less than 0.3 metres deep could be suitable, depending on the nature of the material and the suitability of the underlying soil.

Site Specific Comments

There was no evidence of fill located where the dwellings and EDA are located

Erosion Potential	Low Limitation

On-site systems should not be put on land that shows evidence of erosion, or that has potential for mass movement or slope failure.

Site Specific Comments

The proposed effluent disposal presents with a very low potential for erosion.

Surface water, dams and drainage channels	Low Limitation

Surface water can be considered a river, lake, stream, or wetland that may be permanently or intermittently flowing. Surface water also includes water in the coastal marine area and water in man-made drains, channels, and dams unless these are to specifically divert surface water away from the land application area.

Note: Different buffer distances may apply depending on the type of surface water.

The discharge of nutrients (N, P) from an on-site system at levels higher than the soil and vegetation can assimilate, would in the longer term result in excess nutrients reaching the adjacent watercourses

either in surface run-off or, indirectly, in the groundwater. Nitrogen and phosphorus are particularly significant in their ability to cause eutrophication of receiving water bodies.

The discharge of high levels of bacteria from on-site systems also poses a health risk to humans and animals.

Site Specific Comments

There is no identified waterways or drainage easements within 40 metres of the proposed OSSM system and effluent disposal area

Landform	Low Limitation

The landform in terms of convex, concave side slopes, foot slopes, hill crests and plains can have an impact on the lands drainage patterns. Consideration needs to be given to the landform particularly when considering surface irrigation.

Landforms that present moderate to major limitations (such as drainage plans and concave side slopes) need to be carefully considered as part of the any site and soil assessment.

Site Specific Comments

The landform is a slight convex side slope and poses no limitation.

Groundwater	Low Limitation

Groundwater is the water contained within rocks and sediments below the ground's surface in the saturated zone. Groundwater occurs everywhere below the ground but the ability to get the water out of the ground and the salinity of the water can vary widely depending on the geology and the amount of recharge a groundwater system receives.

Poorly designed and operated on-site sewage management systems can pose a risk to groundwater. This is due to potential of contamination via nutrients, pathogens and viruses

Attention needs to be given to groundwater protection, particularly if the groundwater is used or may be used for potable or irrigation water supplies.

Minimum depths from the treated wastewater infiltrative surface to the minimum periodic watertable and/or gravel layer in a floodplain adjoining a river or stream are recommended to maintain aerobic conditions in the soil, prevent surface ponding and prevent contamination of groundwater. These minimum depths will vary, depending on the type of application system proposed and the site and soil characteristics of the site

Site Specific Comments

NSW Office of Water shows that there is no groundwater bore located within 250 metres from the proposed OSSM system.

Vegetation	Low Limitation

Areas that consist of native vegetation are to be avoided. The effluent disposal area is to be situated in an existing cleared area or an Asset Protection Zone (APZ) to the extent possible, whilst observing the appropriate buffer distances. Where this is not possible the impact on native vegetation is required to be considered.

Site Specific Comments

There was native vegetation within the proposed disposal area however this is due to be cleared via the development application for the dwellings.

Available Land for effluent disposal	Low Limitation

Small lots can create situations where there is reduced space or land that can be used for the disposal of effluent. During the planning stages of a subdivision consideration should be given to the land required for the management of effluent for each lot.

In terms of single lots which have minimal space for effluent management detailed site and soil assessment needs to consider all available options to ensure that effluent can be managed without impact the environment or public health.

Site Specific Comments

There is sufficient land available on the property for the disposal of effluent

Buffer Distances			Low Limitation
Feature	Criteria	Assessment Outcome	Comments
Property Boundaries	3-6 metres dependant on slope	✓	
Waterways (creeks, dams)	40-100 metres	✓	
Drainage depression	40m	✓	
Flooding and overland flow	Council Specific	✓	
Groundwater Wells	250 metres from proposed system	✓	
Dwellings/Buildings	15 metres	✓	
Swimming Pools	6 metres	✓	
Driveways	3-6 metres	✓	

3. Soil Assessment

During the site inspection on the 18th September 2017 soil sampling was carried out on site. These were taken in the same location as the proposed effluent disposal area. An analysis of the site soil properties was conducted in accordance with Appendix E of AS/NZS 1547:2012.

The results are presented in the following table.

Bore Hole A				
Depth to bedrock	>1m			
Depth to high soil watertable	Not experienced. No mottling or free water			
Soil Landscape	Blacktown – Shallow to moderately deep (>100 cm) hard setting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines.			
Soil layer	**Depth (mm)**	**Colour**	**Structure**	**Texture**
Layer 1	0-100	Brown	Moderate	**Loam**
Layer 2	100-400	Red/Brown	Moderate	**Medium Clay**
Layer 3	400-600	Red/Brown	Moderate	**Medium Clay**
Layer 4	600-1000	Red/Brown	Moderate	**Medium Clay**

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4. Disposal Area Calculations and Justification

Several disposal area designs and types were considered for this site. The disposal option proposed as part of the wastewater report is for surface irrigation from two AWTS. The design of the disposal area has been completed in accordance with Australian Standard 1547:2012 and Council's Policy.

System One – Main Dwelling and Pool

Wastewater Load		
Wastewater load	5 Bedroom secondary dwelling (including study) *In accordance with Penrith City Council's OSSM Policy* *Plus 100 litres for use of the pool house*	**820 litres/day**

Irrigation Disposal Area Sizing	
Design Irrigation Rate	The proposed effluent disposal area consists of a medium clay soil. Under Table M1 of AS1547:2012 the appropriate design irrigation rate for category 6 soils receiving secondary treated effluent is 2mm/day.
Hydraulic Calculations	**Wastewater Load = 820 L/d** **DIR = 2mm/day** Area Required = Wastewater Load/DIR **AR = 410 sq. metres.**
Nitrogen Calculations	**25 mg/L Nutrient loading** *(Based on NSW Environment and Health Protection Guidelines for OSSM for single households)* **33mg/L Nutrient uptake** *(Based on Appendix 1 of the Sydney Catchment Authority Guidelines)* Area Required = TN Loading X Wastewater Load/Nitrogen uptake AR = 25 x 820/33 **AR = 621 Sq. metres**
Phosphorus Calculations	**12 mg/L Nutrient loading** (*Based on NSW Environment and Health Protection Guidelines for OSSM for single households)* **3mg/L Nutrient uptake** (*Based on Appendix 1 of the Sydney Catchment Authority Guidelines)* **Phosphorus Sorption Capacity** Weighted Sorption Calculations based on Sydney Catchment Authority 'Designing and Installing On-site Sewage Management Systems' Guidelines.

	P sorption = 6295 kg/ha (weighted average based on 4 horizons) Area Required = Pgenerated (kg)/ (Pabsorbed + Puptake) AR = 273.75Kg / (0.198+0.05475) **AR = 684 sq. metres.**
Designated effluent disposal area	**584 sq. metre irrigation area**

System Two – Caretakers Cottage

Wastewater Load		
Wastewater load	3 Bedroom secondary dwelling *In accordance with Penrith City Council's OSSM Policy*	**480 litres/day**

Irrigation Disposal Area Sizing	
Design Irrigation Rate	The proposed effluent disposal area consists of a medium clay soil. Under Table M1 of AS1547:2012 the appropriate design irrigation rate for category 6 soils receiving secondary treated effluent is 2mm/day.
Hydraulic Calculations	**Wastewater Load = 480 L/d** **DIR = 2mm/day** Area Required = Wastewater Load/DIR **AR = 240 sq. metres.**
Nitrogen Calculations	**25 mg/L Nutrient loading** *(Based on NSW Environment and Health Protection Guidelines for OSSM for single households)* **33mg/L Nutrient uptake** *(Based on Appendix 1 of the Sydney Catchment Authority Guidelines)* Area Required = TN Loading X Wastewater Load/Nitrogen uptake AR = 25 x 480/33 **AR = 364 Sq. metres**
Phosphorus Calculations	**12 mg/L Nutrient loading** (*Based on NSW Environment and Health Protection Guidelines for OSSM for single households)* **3mg/L Nutrient uptake** (*Based on Appendix 1 of the Sydney Catchment Authority Guidelines)* **Phosphorus Sorption Capacity**

	Weighted Sorption Calculations based on Sydney Catchment Authority 'Designing and Installing On-site Sewage Management Systems' Guidelines. P sorption = 6295 kg/ha (weighted average based on 4 horizons) Area Required = Pgenerated (kg)/ (Pabsorbed + Puptake) AR = 273.75Kg / (0.198+0.05475) **AR = 401 sq. metres.**
Designated effluent disposal area	**401 sq. metre irrigation area**

5.1 Proposed disposal area

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5.2 Water Balance and Climate Assessment

Main Residence and Pool House

Property	Lot 31 Nepean Gorge Drive
Wastewater Load (L/D)	840
DIR (mm/day)	2
Design Disposal Area Size (sq. metres)	684
BOM Site (percipitation)	Badgery's Creek
BOM Site (Evapotranspiration)	Badgery's Creek

WET WEATHER STORAGE CALCULATIONS														
Percolation Rate	mm/week	14												
Parameter		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Days in month	days	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	582.3
Evaporation	mm/month	182.9	151.2	139.5	105	65.1	51	65.1	93	120	145.7	171	204.6	1436.9
Crop Factor		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
INPUTS														
Parameter		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	546.6
Effluent irrigation	mm/month	38.07	34.39	38.07	36.84	38.07	36.84	38.07	38.07	36.84	38.07	36.84	38.07	448.25
Inputs	mm/month	113.47	97.19	109.47	75.24	69.37	66.94	57.87	65.47	70.64	81.87	98.44	88.87	994.84561
OUTPUTS														
Parameter		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Evapotranspiration	mm/month	182.90	151.20	139.50	105.00	65.10	51.00	65.10	93.00	120.00	145.70	171.00	204.60	1494.10
Percolation	mm/month	62.00	56.00	62.00	60.00	62.00	60.00	62.00	62.00	60.00	62.00	60.00	62.00	730.00
Outputs	mm/month	244.90	207.20	201.50	165.00	127.10	111.00	127.10	155.00	180.00	207.70	231.00	266.60	2224.10
Storage	mm/month	-131.43	-110.01	-92.03	-89.76	-57.73	-44.06	-69.23	-89.53	-109.36	-125.83	-132.56	-177.73	
Cumulative storage	mm													0.00
STORAGE	mm	0.00												
	m3	0.00												

Caretakers Cottage

Property	Lot 31 Nepean Gorge Drive													
Wastewater Load (L/D)	480													
DIR (mm/day)	2													
Design Disposal Area Size (sq. metres)	401													
BOM Site (percipitation)	Badgery's Creek													
BOM Site (Evapotranspiration)	Badgery's Creek													
WET WEATHER STORAGE CALCULATIONS														
Percolation Rate	mm/week	14												
Parameter		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Days in month	days	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	582.3
Evaporation	mm/month	182.9	151.2	139.5	105	65.1	51	65.1	93	120	145.7	171	204.6	1436.9
Crop Factor		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
INPUTS														
Parameter		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	546.6
Effluent irrigation	mm/month	37.11	33.52	37.11	35.91	37.11	35.91	37.11	37.11	35.91	37.11	35.91	37.11	436.91
Inputs	mm/month	112.51	96.32	108.51	74.31	68.41	66.01	56.91	64.51	69.71	80.91	97.51	87.91	983.50773
OUTPUTS														
Parameter		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**TOTAL**
Evapotranspiration	mm/month	182.90	151.20	139.50	105.00	65.10	51.00	65.10	93.00	120.00	145.70	171.00	204.60	1494.10
Percolation	mm/month	62.00	56.00	62.00	60.00	62.00	60.00	62.00	62.00	60.00	62.00	60.00	62.00	730.00
Outputs	mm/month	244.90	207.20	201.50	165.00	127.10	111.00	127.10	155.00	180.00	207.70	231.00	266.60	2224.10
Storage	mm/month	-132.39	-110.88	-92.99	-90.69	-58.69	-44.99	-70.19	-90.49	-110.29	-126.79	-133.49	-178.69	
Cumulative storage	mm													0.00
STORAGE	mm	0.00												
	m3	0.00												

5.3 Options Considered

As stated previously as part of this assessment two options were considered for the effluent disposal area. These included:

Option One	Preferred

Two surface irrigation areas. One being 684 sq. metres and the other being 401 sq. metres.

Option Two	Unsuitable

As part of the assessment for this new development, passive options such as evapotranspiration beds were considered. However due to the category 5 and 6 soils experienced on site, it was deemed that these types of systems would be unsuitable for long term sustainable management of wastewater.

5.4 Site Plan

Area of the lot subject to the assessment

5.5 Effluent Management Site Plan

Site Plan: Proposed Irrigation Area (1:1000)

	Surface irrigation disposal area
	Proposed buildings
	Proposed location of AWTS for main dwelling and pool house
	Proposed location of AWTS for care takers cottage
	Proposed location of septic tank for pool house
	Proposed driveways
	Bore hole

6. Recommendations

In consideration to the site and soil assessment undertaken for the proposed development, the following recommendations are provided:

- Installation of 2 NSW Accredited secondary treatment systems (AWTS).
- The AWTS will need to be powered by the main 'off grid' power supply or its own solar panel and battery system. This will need to be determined by the owner once the type of system has been selected.
- A backup power supply should also be considered.
- Install an accredited septic tank with a minimum of 2000L to service the pool house. This is to be connected to the main residence AWTS via gravity or pump. This tank may require to be weighted/anchored due to the limited use.
- Establish a 684 sq. metre surface irrigation area for the main residence and pool house in accordance with Section 4 of this Report.
- Establish a 401 sq. metres reserve area for the care takers cottage in accordance with section 4 of this report.
- Although unlikely, if the effluent disposal area is subject to overland flow, the irrigation area is to be converted to sub-surface irrigation.
- Distribution line between the AWTS tank and disposal area is to be buried to a depth of 300mm, unless they go beneath driveways and traffic areas, in which case they are to be buried to a depth of 600mm.
- Stormwater is to be diverted away from the disposal area using methods approved by Council.
- The semi fixed surface irrigation set up is to achieve at minimum the following and any conditions of approval provided by Council:
    - All movable irrigation lines and sprinklers are not to have the ability to be moved outside the EDA
    - The distribution line is to be buried
    - spray irrigation shall only use low pressure, low volume spray heads which are not capable of producing aerosols. The spray shall have a maximum plume height 400mm and a plume radius of not more than 2 metres

- The owner and occupiers are to manage sodium inputs into the system.
- The dwellings are to employ water conservation measures. This may include the use of water saving devices within the kitchen, bathroom and laundry of the dwelling.
- The two AWTS are to be serviced in accordance with their NSW Accreditation.

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References

Penrith City Council's, On-Site Sewage Management and Greywater Reuse Policy

Department of Local Government 1998, On-site Sewage Management for Single Households

Standards Australia 2012, Australian/New Zealand Standard 1547:2012, On-site domestic wastewater management.

Sydney Catchment Authority 'Designing and Installing On-site Sewage Management Systems' Guidelines.

Appendix A – Irrigation Guide

This irrigation diagram is provided as a conceptual plan for surface irrigation. The client may choose to install another type of surface irrigation however, it must meet the following:

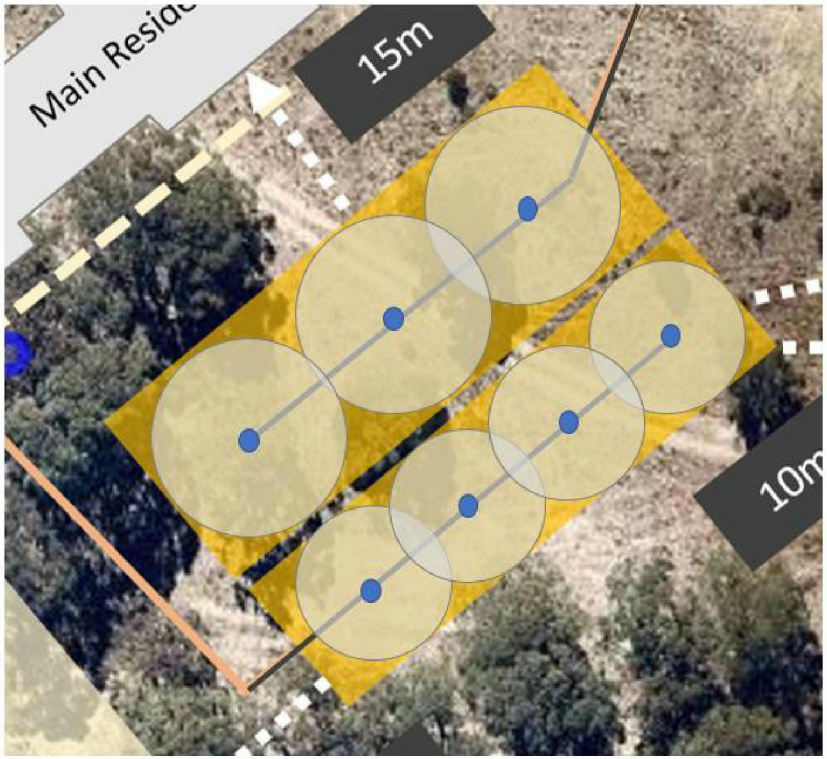
- All movable irrigation lines and sprinklers are not to have the ability to be moved outside the EDA.
- The distribution line is to be buried
- Spray irrigation shall only use low pressure, low volume spray heads which are not capable of producing aerosols. The spray shall have a maximum plume height 400mm and a plume radius of not more than 2 metres.

Standpipes

EDA

Semi fixed irrigation zone from standpipe

Buried distribution line



Appendix B – Operation Guide

ON-SITE SEWAGE MANAGEMENT SYSTEMS

If you live in or rent a house that is not connected to the main sewer then chances are that your yard contains an on-site sewage management system. If this is the case then you have a special responsibility to ensure that it is working as well as it can.

The aim of this pamphlet is to introduce you to some of the most popular types of on-site sewage management systems and provide some general information to help you maintain your system effectively. You should find out what type of system you have and how it works.

More information can be obtained from the pamphlets:

Your Septic System
Your Aerated Wastewater Treatment System
Your Composting Toilet
Your Land Application Area

You can get a copy of these pamphlets from your local council or the address marked on the back of this pamphlet.

It is important to keep in mind that maintenance needs to be performed properly and regularly. Poorly maintained on-site sewage management systems can significantly affect you and your family's health as well as the local environment.

What is an on-site sewage management system?

A domestic on-site sewage management system is made up of various components which - if properly designed, installed and maintained - allow the treatment and utilisation of wastewater from a house, completely within the boundary of the property.

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, and washing machines), or a combination of both.

Partial on-site systems - eg. pump out and common effluent systems (CES) - also exist. These usually involve the preliminary on-site treatment of wastewater in a septic tank, followed by collection and transport of the treated wastewater to an off-site management facility. Pump out systems use road tankers to transport the effluent, and CES use a network of small diameter pipes.

How does an on-site sewage management system work?

For complete on-site systems there are two main processes:

1. treatment of wastewater to a certain standard
2. its application to a dedicated area of land.

The type of application permitted depends on the quality of treatment, although you should try to avoid contact with all treated and untreated wastewater, and thoroughly wash affected areas if contact does occur.

Treatment and application can be carried out using various methods:

Septic Tank
Septic tanks treat both greywater and blackwater, but they provide only limited treatment through the settling of solids and the flotation of fats and greases. Bacteria in the tank break down the solids over a period of time. Wastewater that has been treated in a septic tank can only be applied to land through a covered soil absorption system, as the effluent is still too contaminated for above ground or near surface irrigation.

AWTS
Aerated wastewater treatment systems (AWTS) treat all household wastewater and have several treatment compartments. The first is like a septic tank, but in the second compartment air is mixed with the wastewater to assist bacteria to break down solids. A third compartment allows settling of more solids and a final chlorination contact chamber allows disinfection. Some AWTS are constructed with all the compartments inside a single tank. The effluent produced may be surface or sub-surface irrigated in a dedicated area.

Composting Toilets
Composting toilets collect and treat toilet waste only. Water from the shower, sinks and the washing machine needs to be treated separately (for example in a septic tank or AWTS as above). The compost produced by a composting toilet has special requirements but is usually buried on-site.

These are just some of the treatment and application methods available, and there are many other types such as sand filter beds, wetlands, and amended earth mounds. Your local council or the NSW Department of Health have more information on these systems if you need it.

Regulations and recommendations

The NSW Department of Health determines the design and structural requirements for treatment systems for single households. Local councils are primarily responsible for approving the installation of smaller domestic septic tank systems, composting toilets and AWTSs in their area, and are also responsible for approving land application areas. The NSW Environment Protection Authority approves larger systems.

The design and installation of on-site sewage management systems, including plumbing and drainage, should only be carried out by suitably qualified or experienced people. Care is needed to ensure correct sizing of the treatment system and application area.

Heavy fines may be imposed under the Clean Waters Act if wastewater is not managed properly.

Keeping your on-site sewage management system operating well

What you put down your drains and toilets has a lot to do with how well your system performs. Maintenance of your sewage management system also needs to be done well and on-time. The following is a guide to the types of things you should and should not do with your system.

DO

- ✓ Learn how your sewage management system works and its operational and maintenance requirements.
- ✓ Learn the location and layout of your sewage management system.
- ✓ Have your AWTS (if installed) inspected and serviced four times per year by an approved contractor. Other systems should be inspected at least once every year. Assessment should be applicable to the system design.
- ✓ Keep a record of desludgings, inspections, and other maintenance.
- ✓ Have your septic tank or AWTS desludged every three years to prevent sludge build up, which may 'clog' the pipes.
- ✓ Conserve water. Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.
- ✓ Discuss with your local council the adequacy of your existing sewage management system if you are considering house extensions for increased occupancy.

DON'T

- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with effluent.
- ✗ Don't extract untreated groundwater for cooking and drinking.
- ✗ Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your system via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby waterway.

Your sewage management system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

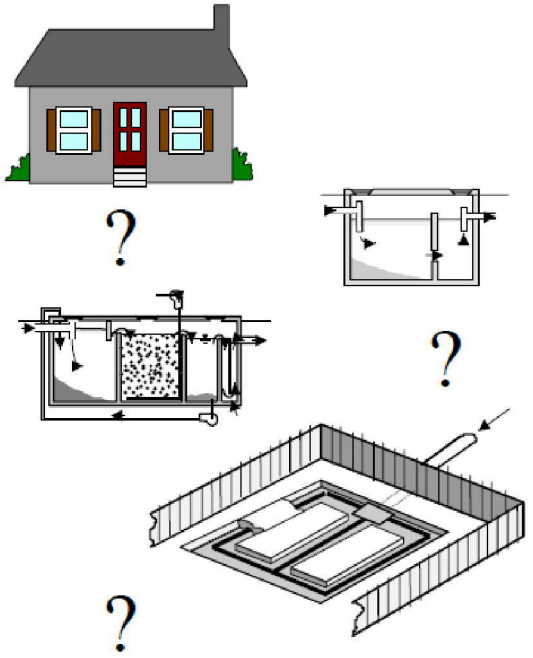
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained sewage management systems are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your management system you can do your part in helping to protect the environment and the health of you and your community.

For more information please contact:

Managing Wastewater In Your Backyard



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SEPTIC SYSTEMS

In unsewered areas, the proper treatment and reuse of household wastewater on-site is critical in ensuring minimal impact to public health and the environment. Septic systems have been developed as a way of achieving this.

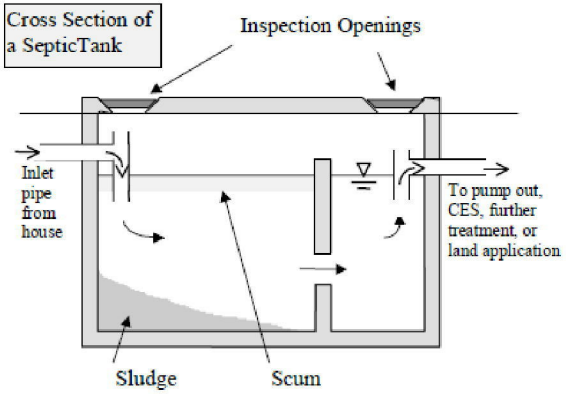
What is a septic system?

A septic system consists of a septic tank combined with a soil absorption system and/or transpiration beds or pump out connections. The system enables people living in unsewered areas to treat and disperse their sewage.

A septic tank is a structurally sound watertight tank used for the treatment of sewage and liquid wastes from a single household or multiple dwellings.

How does a septic system work?

All the wastewater from a household enters the tank. Most of the solids settle to the bottom and are retained in the tank forming a sludge layer, whilst fats and greases collect at the top in a scum layer.

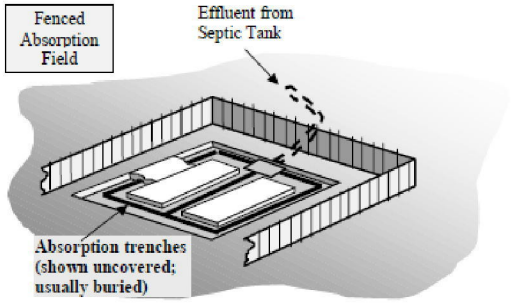


Bacteria in the septic tank break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the tank and must be pumped out periodically.

There are three ways to handle septic tank effluent:

On-site application. The effluent flows from the septic tank to transpiration and/or absorption trenches. Here the effluent is mainly absorbed into the soil and partly evaporated by the sun and used by vegetation.

Such application systems have the potential to contaminate groundwater and are not recommended in sensitive locations or in higher density developments. Further treatment followed by subsurface irrigation should be considered.



Pump out. The effluent flows from the septic tank into a collection well or holding tank. At regular periods, a tanker pumps out the holding tank and transports the effluent to an off-site management facility.

Common effluent system (CES). The treated wastewater is transported to an off-site management facility through a network of small diameter pipes.

Regulations and recommendations

An on-site septic system requires approval from the local council before it is put in place. The regulations that apply to single household systems differ from those for multiple dwellings. The Environment Protection Authority (EPA) is responsible for approving septic tanks used to treat wastes generated by multiple dwellings like caravan parks and commercial and industrial premises. The NSW Department of Health determines the design and structural requirements for septic tanks and collection wells.

Local councils have the authority to approve systems certified by the NSW Department of Health for individual properties and ensure the systems do not have adverse impacts on health and the environment. Local councils are responsible for ensuring that the approved system is installed according to specifications and any special conditions, and is maintained and serviced correctly. You should consult your local council on the regulations that apply to you.

Care of the septic tank is only a part of the maintenance of your septic system. Management of the treated wastewater from your septic system is your responsibility and is discussed in the pamphlet "Your Land Application Area". Heavy fines may be imposed if the effluent is managed improperly.

Maintaining your septic system

The effectiveness of the system will, in part, depend on how it is operated and maintained. The following is a guide on how to achieve the most from your system.

DO

- ✓ Have your septic tank desludged every three years to prevent sludge build up, which may 'clog' the pipes and absorption trenches.
- ✓ Have your septic tank serviced annually by contractors to check scum and sludge levels, and the presence of blockages in the outlet and inlet pipes.
- ✓ Have your grease trap (if installed) cleaned out at least every two months.
- ✓ Keep a record of pumping, inspections, and other maintenance.
- ✓ Learn the location and layout of your septic system and land application area.
- ✓ Check household products for suitability for use with a septic tank.
- ✓ Use biodegradable liquid detergents, such as concentrates with low phosphorous.
- ✓ Ensure your tank is mosquito-proofed.
- ✓ Conserve water.

DON'T

- ✗ Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your septic tank via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't use more than the recommended amounts of detergents.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby river, creek or dam.

Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.

Your septic system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

Warning signs

You can look out for a few warning signs that signal to you that there are troubles with your septic tank. Ensure that these problems are attended to immediately to protect your health and the environment.

Look out for the following warning signs:

- Water that drains too slowly.
- Drain pipes that gurgle or make noises when air bubbles are forced back through the system.
- Sewage smells, this indicates a serious problem.
- Water backing up into your sink which may indicate that your septic system is already failing.
- Wastewater surfacing over the land application area.

Trouble shooting guide

If there are odours check the following areas:

- Greasetrap (if installed), is it full or blocked?
- Absorption field, is it wet or soggy?
- Has there been recent heavy rain?

Odour problems from a vent on the septic system can be a result of slow or inadequate breakdown of solids. Call a technician to service the system.

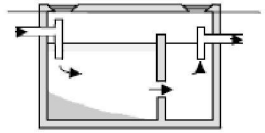
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

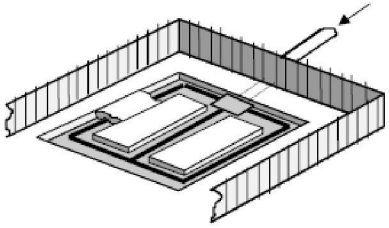
Poorly maintained septic tanks are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your septic system you can do your part in helping to protect the environment and the health of you and your family.

If you would like more information please contact:

Your Septic System





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