Design Guidelines for On-site Sewage Management for Single Households

APPENDIX G

Looking After Your On-Site Sewage System

OSMS Management Plan for

_____

_____

_____

_____

On-Site System Management Plan

This section is designed to be used as a basis for On-site Sewage Management System (OSMS) designers to provide a management plan for the homeowner's permanent use. It is intended that the OSMS designer will fill in the appropriate sections, remove any irrelevant components, and add any relevant comments to make the management plan as comprehensive and useful as possible to the future homeowners. It will be a requirement of consent that a management plan is provided with each design successfully submitted, and a further condition of the Approval to Operate that s copy of the Management Plan is stored in an appropriate location within the home

The following information is to be provided at the front of each management plan.

Street address	
Lot, Deposited Plan	
Council reference no's (if known)	
Author and date of OSMS design document submitted to Council	
DA or s68 Approval No. and date(s) approved.	
Date installed	
Service provider and contract details	

G1. Details of Your 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 within the boundaries of the property. Homeowners should acquaint themselves with what sewage management system is installed at your property and how it works. If in doubt, consult your service provider or Byron Council.

Your OSMS has been designed to cater for ___ people and ___L/day of effluent, based on the understanding that the following water-saving devices are installed. If you are aware that more people are regularly using the system, or if you wish to install extra water-consuming devices (e.g. additional bathroom or installation of a spa), please consult Council to ensure that your system is capable of managing the wastewater loads.

The OSMS installed at your property comprise the following elements ***(designers to add or delete information to make description relevant and accurate);***

System Component	**Number**	**Details** (e.g. manufacturer, size, relevant details)
Water-saving devices		
Treatment System		
Composting toilet		
Septic/sullage tank		
Outlet filter		
Aerated wastewater treatment system		
Sand-filter		
Reed bed		

Holding tanks		
Pumps		
Filters		
Alarms (light / siren)		
Other		
Land Application System		
Absorption trenches		
Mound system		
Evapotranspiration beds		
Sub-surface irrigation		
Surface irrigation		
Other		

A detailed plan and technical details of the various components should be appended to this report.

G2. Advice for Home-Owners

G2.1 Background Information

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, kitchens and washing machines), or a combination of both. Greywater (sullage) can have a high percentage of the same pollutants as blackwater, but composting toilets are strongly encouraged due to the overall reduction in water used and nutrients which need to be taken up.

Additional information to be added by system designer as appropriate

G2.2 How does my OSMS work?

The components listed above collectively treat and disperse the household wastes within your property (refer attached plan). The following section provides a brief overview on how the components work together to achieve this.

An OSMS generally consists of three main parts: the wastewater source, treatment components, and a land application area for the final reuse or disposal of the treated effluent. These components are represented graphically in Figure G1.

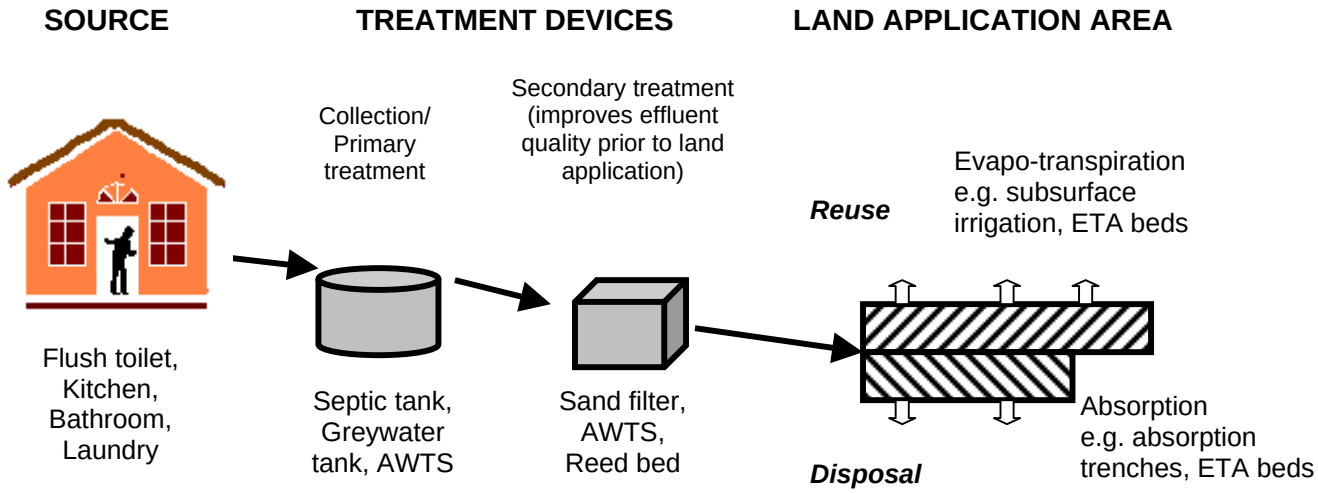


Figure G1: Major Components of On-Site Sewage Management Systems (OSMSs)

G2.3 Source Reduction of Wastewaters and Nutrients

G2.3.1 Recommendations for saving and managing water

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. On-site systems generally work best when the wastewater load is minimised and "shock-loads" (e.g. sudden, heavy loads such as when large numbers of people use the system for a short or uneven periods) are avoided.

- Spread heavy water use activities such as laundry over the week.
- Replace single flush toilets with dual flush.
- Install low-flow shower roses.
- Replace internal taps with low-flow designs.
- Purchase a front-loading washing machine.
- Install a waterless composting toilet.
- Do not install spa baths unless this has been specifically accounted for in the OSMS design. If a spa bath has been installed, use sparingly and release the water slowly.

Additional information to be added by system designer as appropriate

G2.4 What can my OSMS cope with?

G2.4.1 Detergents

The use of detergents low in phosphorus and sodium is recommended for use in households with on-site systems. Detergents high in sodium can lead to soil degradation in the land application area, leading to a reduction in permeability, a consequent risk of surcharging sewage and the need for early replacement of the application area.

Note: Concentrated and liquid detergents often contain much less phosphorus and sodium than equivalent powder detergent products. Potassium based liquid soaps (eg Castile soap) are also recommended.

G2.4.2 Food and Cooking Oils

It is anticipated that some food and cooking oils will be washed into wastewater treatment devices, and all systems discussed in Appendix A of the Design Guidelines are capable of handling a limited amount of these. However, most systems (other than very large septic tanks) are likely to become overloaded if large volumes of food and/or cooking oils enter them. For this reason, the following broad guidelines should be followed to protect your OSMS;

- Food and cooking oils should be kept to a reasonable minimum by keeping food-strainers in kitchen sinks at all times and by tipping larger volumes of oils or fats into garden.
- "Insinkerators" or similar types of in-sink macerators should not be installed unless these have been specifically addressed and accounted for in the OSMS designs.
- Where large volumes of oil or grease are likely to be flushed down sink, a grease-trap should be installed and regularly maintained.

Additional information to be added by system designer as appropriate

G2.5 What should I avoid?

Almost all sewage treatment systems use microorganisms to treat and break down the sewage components. Regardless of the system type, it is therefore vitally important that the health of the micro-organisms that perform the treatment be protected. Any materials or fluids which are toxic to animals (e.g. bleaches, disinfectants, whiteners, nappy soakers and spot removers, fuels etc.) can be presumed to be toxic to microorganisms. Many medicines, e.g. antibiotics, contraception pills, can also have harmful effects on the microorganisms in the treatment system or the broader environment and should not be flushed into the household wastewater system.

Besides not placing poisons in your system, the following should be avoided;

- Don't let children or pets play on land application areas.
- Don't water root vegetables with effluent, and clean thoroughly any fruit or vegetables which could have contacted the effluent.
- Don't extract untreated groundwater for cooking and drinking.
- Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- Chemicals in cleaning agents, disinfectants, shampoos and bleaches etc. can be detrimental to treatment systems – minimise or avoid their use. Vinegar, lemon juice, vegetable oil based soaps and hydrogen peroxide could be considered as alternatives.
- Do not empty paint, petrol, pesticides, medications or chemicals down sinks.
- Disposable nappies, sanitary napkins, paper towels, plastics etc block treatment systems. Dispose of these separately.

Additional information should be added by system designer as appropriate

G2.6 Problem solving

All on-site systems need to be regularly maintained in order to function well. If particular problems are found, such as:

- gurgling or unusual toilets;
- slow-draining wastewaters;
- unusual odours;
- unusually noisy pumps or other components;
- surcharging effluent from any treatment or land application systems; or
- poor vegetation growth in irrigated areas;

these symptoms should be investigated by your service provider as soon as possible.

Many systems include a light and/or sound alarms to alert the homeowner of any overload problems. If one of these alarms goes off, the householder **must** contact the relevant service provider immediately.

Additional information should be added by system designer as appropriate

G3. Maintenance and Care For Your System

G3.1 Treatment Systems

G3.1.1 Septic/Sullage Tanks

A septic (blackwater and greywater) or sullage (greywater only) tank operates as a "stilling pond" and anaerobic digester. When the wastewaters enter the tank they are allowed time to settle out solids, which fall downwards to join the sludge on the base of the tank, and oils and greases which rise up to form part of the crust at the top of the water column. For this to happen, it is vitally important that sufficient liquid volume is maintained in the tank by pumping it out regularly and that the microorganisms in the tank are not killed off through inappropriate inputs.

Operation & Maintenance

- The householder should check the depth of the crust and the sludge regularly, at least once or twice per year (refer attached sheet for instructions).
- The sludge which builds up in the tank must be pumped out when it occupies more than a third of the tank's volume, usually every 3 to 5 years.
- Do not flush tampons, condoms or other indigestible inorganic material into a septic tank. Avoid introducing bleach and chemicals harmful to the anaerobic microorganisms.
- If crust above the fluids becomes thinner than 2-3 cm or thicker than 10-15 cm, investigate causes (e.g. thin crust could be due to high throughflow of effluent or toxic materials in influent).
- Do not smoke near the septic tank when undertaking maintenance work due to possible risks from build up of flammable gases such as methane in confined spaces.

G3.1.2 Effluent Filters

An effluent filter is a coarse screen filter that sits in the outlet of a primary treatment tank. Effluent filters need to be maintained regularly to ensure that they function effectively. An effluent filter which is not regularly cleaned will clog and potentially cause the tank to back-up and overflow, or otherwise might be responsible for high levels of solids being carried over to the next treatment component.

Effluent filters should be cleaned by the householder every few months, and cleaned and serviced by a service provider at least once per year (check manufacturer's recommendations). Care should be taken when cleaning an effluent filter to avoid contact with the effluent, and to clean hands and any affected clothes afterwards.

G3.1.3 Aerated Wastewater Treatment Systems (AWTS's)

In accordance with NSW Health accreditation requirements, most AWTS's require *quarterly* maintenance and servicing by a *qualified service contractor* (usually the firm that supplied the unit). A copy of a maintenance report based on the examples shown in Appendices E and F must be completed by the service-provider and sent to Council within 14 days of the service.

An owner-funded contract should exist between the Council-authorised service provider and the owner of the AWTS.

G3.1.4 Sand Filters

Sand filters work by dosing an enclosed sand column with effluent. As the effluent moves past the sand grains, it is treated through contact with the micro-organism which coat the sand grains.

Operation & Maintenance

- Service provider to check and service pumps and other mechanical parts every twelve months
- Home owner and service provider to check for slime or algae build up in intermittent (single pass) sand filters, and remove if necessary, every three months.

- For most heavily used systems or those working under adverse circumstances, sand may need to be replaced every decade or so (check manufacturer's recommendations).

G3.1.5 Reed-beds / Constructed Wetlands

Reed beds comprise tubs filled with gravel, into which reeds (or in some cases shrubs) are planted. Effluent is biologically treated as it moves slowly through the root zone of the reeds.

Providing reed beds are properly designed and constructed, they require minimal maintenance. Harvesting of reeds, while not absolutely necessary, does promote fresh green growth and thus enhance a reed bed's aesthetic appeal whilst at the same time increasing nutrient removal. This job is easily performed using a sharp knife, sickle or whipper-snipper. January (after the spring/summer growth flush) and May (prior to dormancy) are probably the optimum harvest times from the perspective of both nutrient removal and aesthetics. The reeds are cut back to approximately 20cm in height. The cut material should be removed from the bed and can be used as mulch elsewhere.

During macrophyte establishment, weeding of the bed may be necessary. Weeds can be pulled out very easily from the wet gravel. Strategic flooding may also be periodically used to drown out terrestrial weeds.

Because substrate blockage is the primary failure mode of reed beds, steps should be taken to minimize carryover of solids from the primary treatment device. The septic tank should have an effective outlet filter fitted. This filter should be cleaned regularly, sludge and scum levels checked and, when necessary, tank pumpout conducted. Where blockage has already occurred, lowering of the water level can sometimes lead to recovery.

Reed bed Operation & Maintenance

- The person nominated in the Approval to Operate is to check fluid levels are correct and that inlets/outlets are clear of root blockages every three months. Weeds should be removed regularly.
- A service contractor should perform a system check every twelve months.
- The reeds should be harvested at least once per year (contractor or owner).

G3.1.6 Composting Toilets

Composting toilets work by encouraging solid human wastes (faeces) to compost in a chamber beneath the toilet "pedestal". The subtropical climate of Byron Shire is suitable for compost toilets all year round. The process is biological and involves micro-organisms digesting the faecal heap and gradually composting the material to humus. The time taken to reduce the material to humus is variable, and the operator of a compost toilet must recognise that the compost heap is a living thing and needs to be cultivated and protected. There are texts available for those wishing to use a compost toilet and these should be read and understood so that the compost process is encouraged by the household activities.

Dry composting toilets require a carbon-rich bulking agent such as wood shavings, shredded leaves, shredded paper, or preferably a mixture of these, which needs to be applied after each use of the toilet. This bulking agent also covers the faecal material and aids in reducing any odours from the compost. The toilets must be vented and some have mechanical ventilation to ensure good air flow around the compost heap. After a period of time faecal and bulking material is decomposed into a friable humus-like compost material, which is removed from a door at the base of the toilet.

Operation & Maintenance

- After each visit add some carbonaceous bulking agent (e.g. mixture of paper, straw, woodchips).
- Poke/flatten the compost pile to reduce height if a large "cone" of material forms.

- Ensure that urine is able to drain from the compost, it will quickly turn “septic” if the compost is kept too wet.
- Manually clean the pedestal regularly.
- Do not use bleach cleansers or dispose of poisonous cleaning agents into the toilet.
- Remove compost when it builds up or appears full.
- Bury compost for three months before use.
- Use compost only on trees etc, and not on vegetable gardens.
- Use gloves or wash hands thoroughly after each handling, do not allow small children to have access

G3.1.7 Pump Wells

Pump wells are in-ground sealed chambers which enable collection of effluent for intermittent pumping to the land application system or next treatment process.

If installed, pump wells must be checked by the service provider as part of the annual maintenance check. This annual maintenance should include servicing of pumps and electrical components, and a check that the float switches are correctly set and operating. The home-owner is also encouraged to regularly check that the high-level alarm switch is operating and that there are no significant sludge build-ups or other problems.

Additional information should be added by system designer as appropriate to the above sections.

G3.2 Land Application (Dispersal) Systems

Common to all land application systems are the following maintenance principles to protect land application areas:

- A suitable service provider, using the maintenance checklist provided as Appendix F as a guide, must service all land application systems at least once per year.
- Most AWTS (depending on their NSW Health accrediation) must be maintained quarterly by a suitably qualified and experienced, independent service provider, and all pumped irrigation systems must be flushed at least once every three
- Maintain stormwater diversion devices (e.g. swales, drains) to ensure that stormwater does not “run on” to land application area.
- Do not drive over land application areas, except with ride-on mowers.
- Keep stock, e.g. cattle and horses, away from land application areas.
- The corners of each land application area should be clearly demarcated and casual access by children, vehicles and livestock should be restricted. This may be achieved by means of low fencing or preferably with low vegetative borders that don’t greatly shade out the area.
- Keep grass short and trim the vegetation when necessary to let sunlight in, promote plant uptake and remove nutrients from the land application area.

G3.2.1 Absorption Trenches

Besides the above generic maintenance advice, absorption trenches should be regularly checked to ensure that they are not surcharging.

G3.2.2 Mounds

Raised effluent application systems, such as Wisconsin Mounds, are sometimes used where natural soils are extremely permeable and/or underlying groundwaters are seasonally close to the ground surface.

Besides the generic advice above, the edges of mounds should be regularly checked to make sure that effluent is not “breaking out” of the mound edges rather than through the base. Where the mound is fitted with observation ports, the levels of effluent within the mound should be regularly checked to ensure that it is not building up and that the effluent is being evenly distributed within the mound.

G3.2.3 Evapotranspiration/Absorption (ETA) Beds

Evapotranspiration/absorption (ETA) beds are essentially shallow trenches, which encourage much better uptake of wastewaters and nutrients by plants grown into the bed.

ETA beds should be regularly harvested and plants replaced if required at regular intervals, e.g. by mowing or pruning to encourage young growth.

G3.2.4 Sub-surface Drip Irrigation Systems

Sub-surface drip irrigation (SDI) is a form of pressurised effluent dispersal in which the irrigation lines are buried 100 mm below the ground surface and effluent is emitted through spaced emitters.

SSI systems need to be flushed and maintained at no more than three-monthly intervals, using the checklist provided in Appendix F as a guide. Annual servicing must include flushing of lines to remove solids that may block emitters.

G3.2.5 Surface Irrigation Systems

Surface irrigation systems are generally discouraged in domestic situations due to the ease of contact between effluent and humans (or pets who may contact humans).

Besides the generic maintenance principles outlined above, particular attention must be paid to ensuring that people, especially children, are not able to contact the effluent. Unless prior agreements have been specifically made with Council (refer to attached Council Approval), effluent must be suitably disinfected before above-ground irrigation occurs.

G3.2.6 Surface-Irrigation-Under-Mulch Systems

Surface-irrigation-under-mulch systems are a type of hybrid between the two irrigation systems described above. These systems are generally only appropriate in agricultural or remote locations when they are installed under dense tree plantings, including orchards.

Besides the generic maintenance instructions described above, it is important that the mulch covering the irrigation lines is regularly renewed to reduce the risk of plastic pipes moving or breaking down under the effect of ultra-violet deterioration. Particular attention must also be paid to ensuring that people, especially children, are not able to contact the effluent.

G4. Your “Approval to Operate” your OSMS

Council ‘approval to operate’ a system of sewage management is required under Section 68(F10) of the Local Government Act 1993 and clause 45 of the Local Government (Approvals) Regulation 1999.

Landowners or occupiers must now nominate a designated person to apply to operate the sewage management system associated with the residence or activity on the land owned or occupied by them.

An ‘approval to operate’ requires the operator to take all reasonable steps to prevent:

- transmission of disease and spread of foul odours;
- pollution of water and degradation of land;
- any discharge to a watercourse; and

- any discharge to land other than the approved effluent application area that may occur as a result of on-site sewage management activities.

Council 'approval to operate' a system of sewage management is personal and does not run with the land. It is the activity of sewage management, not the facilities, which is the subject of the approval.

The approval process establishes a relationship between Council and the owner to improve awareness of environmental and health risks and also the maintenance and operating requirements for their system.

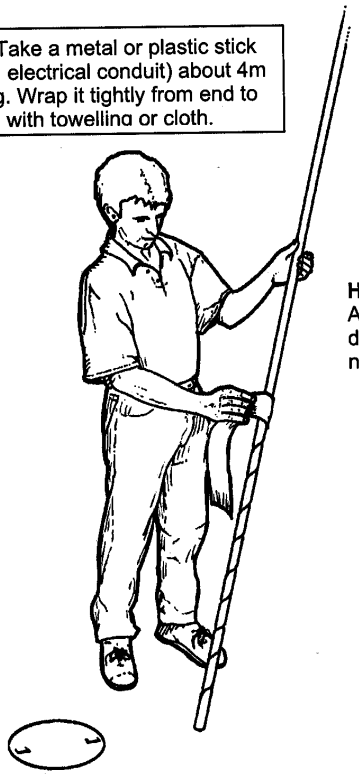
Over 3,000 on-site systems were registered in 2001-2002, and when affected properties have changed ownership the new owners have been requested to reapply for an updated Approval to Operate. Anyone who owns a dwelling which is not connected to a reticulated (town) sewerage system is required to apply immediately for an Approval to Operate that system. For more information about approvals contact Byron Shire Council.

G4.1 ATO application fees

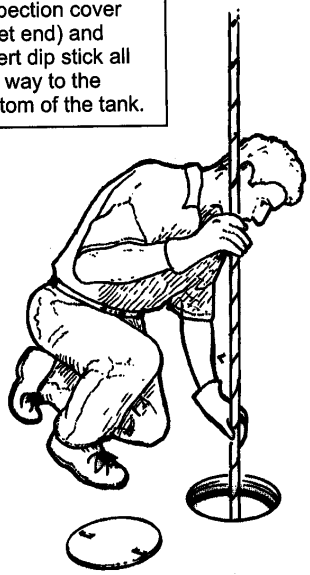
Application fees for approvals to operate are spent on the cost of processing applications, development and implementation of Council's on-site sewage management strategy, provision of advice and assistance to owners of existing systems and enforcement of legislative provisions.

(1) How to check the sludge and scum depth of your tank

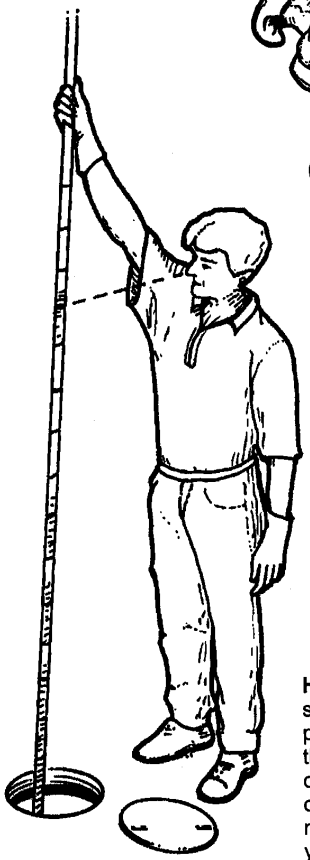
1) Take a metal or plastic stick (eg. electrical conduit) about 4m long. Wrap it tightly from end to end with towelling or cloth.



2) Wearing rubber gloves, remove the inspection cover (inlet end) and insert dip stick all the way to the bottom of the tank.



Health & Fire Hazard
Always wear gloves, don't smoke and keep naked flames away.



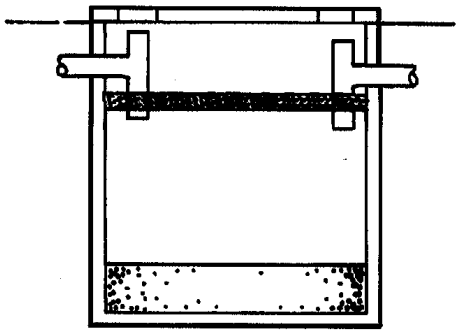
3) Withdraw it completely, observe the size and position of the scum mark (bottom) and the sludge mark (top).

4) Compare the marks on the dip stick with the diagnostic illustrations on the next page.

Health caution: Put the cloth strip in a waste bag and burn or place in the garbage. Wash down the stick and place in sunlight out of reach for a few days. Dispose of the gloves (or soak them in a mild bleach solution) and wash your hands and arms thoroughly.

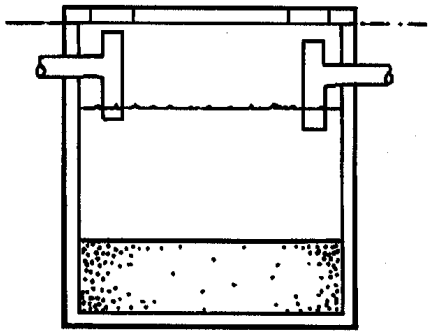
Tank diagnosis

Healthy tank



Sick tank

Bacteria have died.
Needs pumping out, filling with clean water and addition of lime.



Sick tank

Needs pumping out and trench may be blocked or waterlogged or failed