Understanding and taking care of your On-site Wastewater Management System (OWMS) for Domestic Wastewaters

water NEW ZEALAND
The New Zealand Water & Wastes Association Wai ora Aotearoa

Acknowledgements

This document has been prepared on behalf of Water New Zealand by Andrew Dakers of ecoEng Limited. We wish to thank the following members who have contributed to the document's revision: Fiona Ambury, Alan Ambury, Malcolm Linton, as well as Noel Roberts from Water New Zealand.

ISBN: 978-0-473-41797-0

Published by: Water New Zealand | PO Box 1316, Wellington 6140 | P: +64 4 472 8925 | E: enquiries@waternz.org.nz | W: www.waternz.org.nz

November 2017

The safe management of the wastewater discharging from your dwelling is your responsibility. Because of its complex and somewhat unpredictable contaminant composition (compared to say clean water), it is one of the most difficult and risky materials to handle, convey and process. It is aggressive on mechanical components, and pipe systems can be very prone to blockages. Therefore, for any wastewater management service to be effective and sustainable, you do need to ensure that it is competently and regularly serviced.

1 IN A NUTSHELL

Property owners should fully inform themselves about the on-site wastewater management system on their property and its operation and maintenance. They should have available a copy of the operation, maintenance, and monitoring guidelines and the loading certificate for the system.

The property owner should ensure that maintenance carried out on the system is certified by the contractor. The maintenance should be in accordance with the schedules in the operation, maintenance, and monitoring guidelines prepared for the system by the designer and with the regulatory authority requirements.

The property owners should keep records of the maintenance carried out for the past 10 years. Property owners should also ensure that details and requirements for operation, maintenance, and monitoring (including plans, design reports, loading certificate, equipment brochures, and so on) are retained on the property and are readily accessible to the occupier.

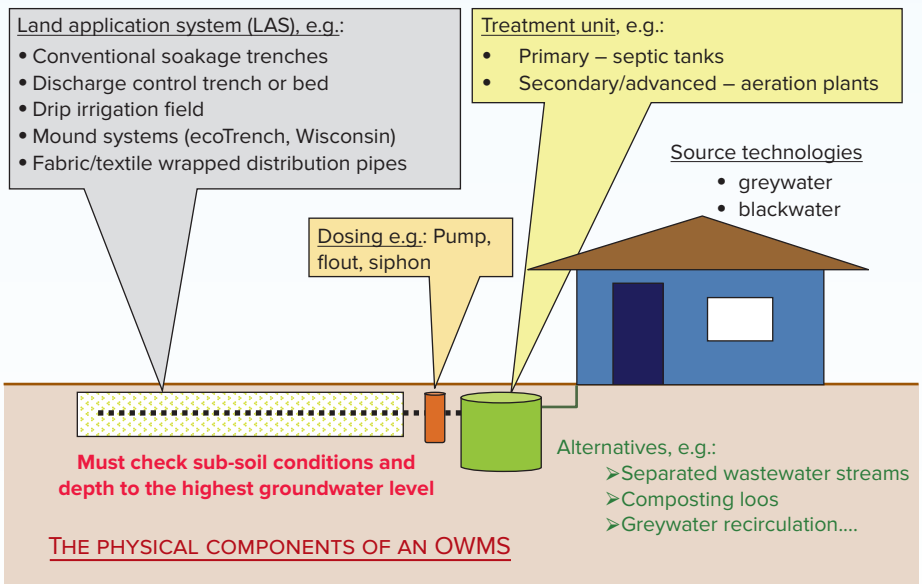
Absentee property owners should ensure that occupiers are similarly informed.

AS/NZS1547:2012. Section 3.8

This brochure has been written to firstly assist owners of an on-site wastewater management service to better understand the physical design of their system and, secondly, to understand the need and the procedures for operation and maintenance of the system. It is assumed owners will require their system to provide sanitation that is safe, low risk and convenient.

2 COMPONENTS OF AN OWMS?

An OWMS comprises a number key physical components and involves several different people as service providers (practitioners). The physical components are the wastewater source technologies (e.g. showers, baths, toilets, sinks, washing machine), the treatment unit, the dosing device and the land application system (LAS). The key practitioners normally include site assessors and designers, the technology providers, the installers, the regulators and their advisors, and the servicing technicians. Achieving sustainable and effective on-site wastewater management requires high quality technologies and competent and responsible practitioners.



3 STANDARDS, RULES AND REGULATIONS

On-site wastewater management services are required to meet best practice engineering standards and council rules to mitigate the risks to humans, stock and the environment.

3.1 LOCAL RULES AND REGULATION

Regional councils administer rules under the RMA while territorial councils administer rules under the Building Act. Both will refer to the Health Act.

Standard	Title	Purpose of the Standard
AS/NZS 1547:2012	*On-site domestic wastewater management*	*…to provide the requirements for treatment units and their land application systems to achieve sustainable and effective on-site domestic wastewater management, to protect public health and the environment.*
AS/NZS 1546.1:2008	*On-site domestic wastewater treatment units Part 1: Septic tanks*	*…to specify performance requirements and performance criteria for septic tanks, to specify technical means of compliance and to provide test specifications that will enable septic tanks to be manufactured to comply with the performance requirements and performance criteria.*
AS/NZS 1546.2:2008	*On-site domestic wastewater treatment units. Part 2: Waterless composting toilets*	*…specifies the performance requirements and performance criteria that a waterless composting toilet shall achieve.*
AS/NZS 1546.3:2008	*On-site domestic wastewater treatment units Part 3: Aerated wastewater treatment systems*	*…specifies the function, performance requirements, design requirements, operation and maintenance requirements, and installation requirements for aerated wastewater treatment systems.*

Your installed OWMS will have, or should have, been approved by a territorial authority. If it was not approved as a Permitted Activity then is likely a Resource Consent was granted by your local regional council. Check the requirements (conditions) of these documents in terms of your responsibilities as owner and operator.

3.2 STANDARDS

There are several standards that apply to New Zealand conditions. These have been listed and briefly described in the table above. While it is considered best practice for system and component designers, technology suppliers, installers and servicing technicians to adhere to these standards, the legal requirements to do so are only valid if referred to as a requirement under the Building Code or local body rules and regulations. Note that it is not uncommon for local body rules to require conformity to sections only of a Standard, rather than all requirements in a particular Standard.

3.3 REQUESTING EVIDENCE OF CONFORMITY

As owner of an OWMS, you have the right to request, from your provider, clear independent evidence that your system complies with the above standards, rules and regulations. Be sure to request the details. For example, a supplier may state that their technology conforms to a particular standard, but it may only be in relation to specific clauses within that standard.

ON-SITE EFFLUENT TREATMENT NATIONAL TESTING PROGRAMME (OSET NTP)

(Refer section 5.2)

This programme is a joint venture between Water New Zealand, Rotorua Lakes Council and Bay of Plenty Regional Council. The programme tests the effectiveness of On-site Wastewater Management Systems.

4 THE NATURE OF DOMESTIC WASTEWATER

Domestic wastewater is a messy, unpleasant, hazardous and complex medium. The bulk of it is water, but it also includes faecal matter, urine, infectious organisms (pathogens), fats, oils, greases, hair, lint, dirt, soap suds, cleaning agents, residual pharmaceuticals, a range of organic matter, and a whole variety of material people shouldn't flush down the drain and toilet bowl. Therefore, a system designed to treat and safely manage this very complex material is assigned a very challenging task.

Health and Safety

- All domestic wastewater is a health risk, even after it has been treated by a septic tank, or a more sophisticated treatment plant.
- All precautions must be taken to avoid skin contact, inhalation and ingestion of both treated and untreated wastewater.
- Wear gloves and protective clothing when working on your wastewater system.
- Never enter a wastewater tank – toxic gases in the tank can kill in minutes.
- Never smoke around or near wastewater tank openings due to the risk of explosive and flammable gas leaks.
- Keep your appliances, tools and electrical lights away from the septic tank and water, or wet ground, near the system. These may generate sparks which could ignite gases, and may also result in electrocution.
- Keep your tank manholes locked or heavy enough to prevent children from opening them.
- Any surface ponding on or around the treatment plant, pipe work and land application fields is to be regarded as hazardous.

We commonly define two categories of domestic wastewater:

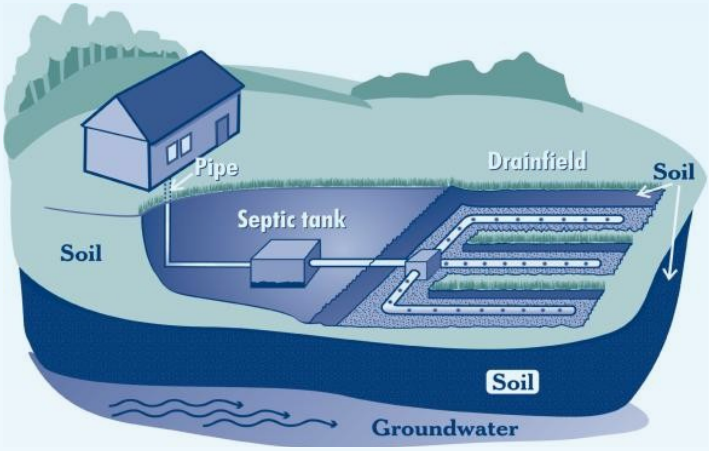
- **Blackwater** refers to wastewater from flush toilets and urinals
- **Greywater** refers to wastewater from sinks (including kitchen sinks), tubs, baths, showers and laundry.

Domestic wastewater does NOT (or should not) include stormwater; that is water runoff from roofs, paved and non-paved outdoor surfaces.

5 WHAT TYPE OF SYSTEM IS INSTALLED ON YOUR PROPERTY?

You are likely to have one of four types of systems on your property:

- an old, unknown septic tank system about which you have no or very little information
- an older style septic tank and soakage trench or soak hole system
- a new modern single or multi-chamber septic tank and land application system (such as dosed trenches, a sand bed or a mound)
- a new secondary or advanced treatment unit (such as an aerobic treatment plant, sand filter, or packed bed reactor) plus drip irrigation land application system.

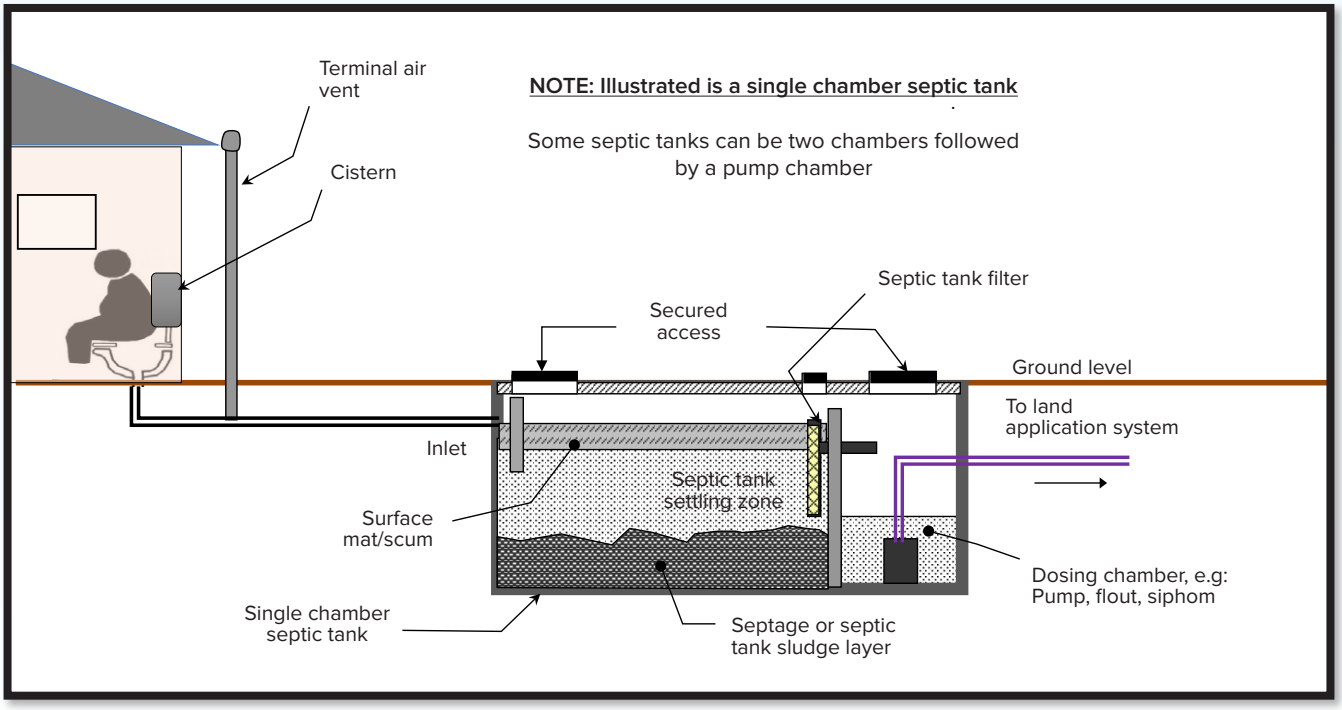


Older style septic tank and soakage trench system

Modern septic tank, sand filter and drip irrigation field

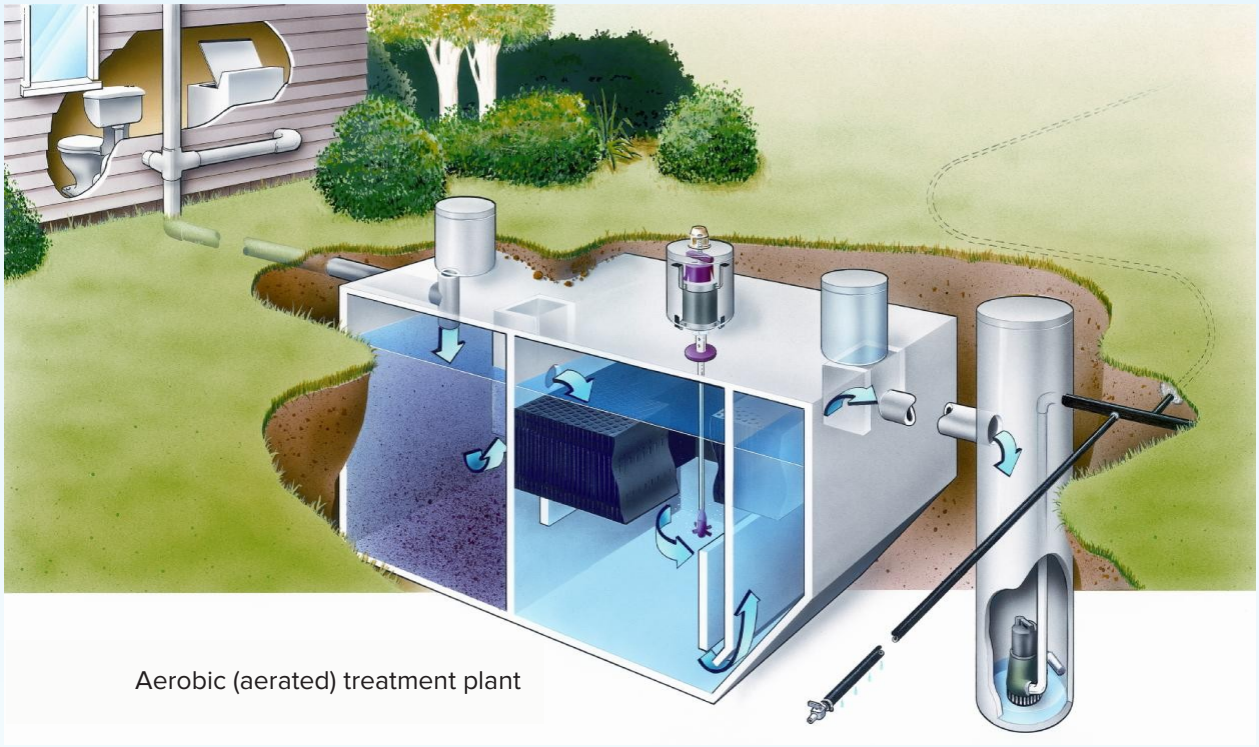
5.1 THE SEPTIC TANK

The septic tank is the simplest and most basic wastewater treatment unit. The level of "treatment" achieved by septic tanks (whether single or multiple chamber), described as primary treatment, is minimal. It removes most fats/greases and larger gross solids through floatation, settling and crude filtering, but most other risk contaminants (pathogens and nutrients) remain in the discharge from the septic tank (effluent). Land application systems (LAS) receiving this primary effluent must be designed to cope with this low quality effluent. Higher quality effluent is produced by the higher technology secondary and advanced treatment package plants.



5.2 SECONDARY AND ADVANCED TREATMENT PLANTS

Secondary and advanced treatment plants employ more complex treatment processing and technologies. There are many different types of secondary treatment processes and designs and more than 60 different brands available on the New Zealand market. A secondary treatment package plant commonly involves several chambers, some with aerators, contact media, balanced activated biomass recirculation and physical filtering. Because the effluent from a secondary treatment unit is higher quality (than from a septic tank) this enables us to pump it through irrigation drip lines without blocking the emitters. However, as discussed in more detail later, irrigation drip lines, as with all wastewater distribution pipe systems, require regular flushing.



Aerobic (aerated) treatment plant

There are other ways of achieving secondary effluent quality, such as sand and sphagnum peat beds, and biofilm filtering chamber trenches, vermiculture beds and constructed wetlands, all requiring specialised and qualified design. In some situations, an even higher level of treatment, known as advanced treatment, may be required, especially when it is necessary to disinfect the treated effluent using UV lamps.

There is an independent testing facility based in Rotorua that has been set up to independently certify commercial secondary and advanced treatment plants. This facility is known as the On-site Effluent Treatment (OSET) National Testing Programme (NTP). Set up by Water New Zealand, this facility undertakes performance testing of ex-factory on-site wastewater treatment units.

OSET NTP does not certify the OWMS. It provides certification of the treatment plant only. OSET NTP certifying services have recently been reviewed and will be more closely aligned to the recently released certification standard, AS1546.3:2017. This will provide a more comprehensive certification to include not only effluent quality performance and energy consumption at the manufacturer rated daily flow, but also evaluate the treatment system's resilience under stress loading, component durability and structural integrity, and support documentation for the treatment unit, such as manuals for installers, homeowners and servicing technicians.

All commercial treatment units tested at OSET NTP since 2007 can be viewed at www.waternz.org.nz/OSETresults and a copy of the one page Performance Certificate can be downloaded. If your treatment unit has OSET certification, you may wish to request a copy of the full report from the manufacturer.

5.3 DOSING SYSTEMS AND DISTRIBUTERS

Older OWMS with septic tanks did not dose load to the land application system (LAS). Instead, the effluent from the septic would simply overflow into the LAS when there was a wastewater input to the septic tank. This was called “trickle loading”. Today trickle loading is discouraged for most soakage fields, as it can result in soakage failure due to gradual buildup of anaerobic biofilm within the soakage field (sometimes referred to as “progressive failure”). However, it is to be noted that there is a proprietary system currently available on the New Zealand market called Advanced Enviro-Septic (AES) system that is designed for trickle loading.

The common dose loading systems include:

- pump dosing; pump selection and chamber design are site specific
- gravity dosing
    - flouts
    - siphons.

Submersible wastewater sump pump

Flout

Siphon

With trickle loaded or dose loaded systems it is sometimes necessary to distribute the effluent from the treatment plant to different sectors of the land application system. A common technique for distributing trickle loaded or dosed septic tank effluent is a distribution box, as illustrated below. An alternative to the distribution box, that can only be used for a pump dosed field, is the sequencing valve (also referred to as an indexing valve). Sequencing valves require pressure to operate and automatically switch the flow to a different outlet port, in sequence, each time the pump activates.

Distrubtion box

Sequencing valve

5.4 LAND APPLICATION SYSTEMS (LAS)

Common practice in the early days was to treat the household wastewater in a septic tank with the effluent then trickle loading to a soak hole (also called boulder pit). Many of these older systems remain. However, in poorly draining soils, soak pits commonly became blocked and failed, while in free draining soils (gravels and sandy soils) ground water was at high risk of being contaminated. **Therefore, in most regions throughout New Zealand, soak holes and boulder pits are now no longer permitted.**

There are a range of different types of land application systems commonly installed. These include soakage trenches, sand beds, mounded systems (ETA/ETS beds, ecoTrench, Wisconsin mounds), low pressure effluent distribution irrigation, (LPED irrigation) fields (for septic tank effluent), and pressure compensating drip irrigation (PCDI) fields (for secondary effluent). For older systems, with no record of design detail, it is often very difficult to know the details of the installed LAS, which is probably well hidden under established vegetation.

The type and specifications of the most appropriate LAS for a particular site will depend on the site specific conditions such as, for example, available land area and slopes, access, soil types and seasonal soil saturation risks, surface and subsurface drainage characteristics, depth to groundwater, risks to drinking water supplies (surface and subsurface), any site contamination issues, required setbacks from boundaries, development densities, flooding risks, proximity to protected and sensitive ecosystems, cultural, community and heritage sites.

6 IDENTIFYING YOUR SYSTEM'S DETAILS

Some of the earlier systems had separate grease traps for the kitchen wastewater. Others had separate management systems for each of the grey and blackwater streams.

You may be able to find an air vent or "mushroom" somewhere on your property. Your wastewater treatment tank is likely to be close to this. A give-away sign for land application systems can be notably vigorous and contrasting green grass and vegetative growth.

If design details are not available in your own home file, then this information may be available at one or more of the following sources:

- the company that installed the system and/or provided the technologies
- check for details on your property file at your local district or city council office and regional council.

Whatever system is installed on your property, it is important that you understand the capabilities of the system. These are best identified and summarised in a loading certificate (refer to note 1). The loading certificate will enable you to understand the limitations or constraints of your system so that the right sort and frequency of maintenance can be carried out. If there is not an existing loading certificate or other documentation, it may be advisable to engage an experienced and suitably qualified technician to inspect your system and provide you with the necessary documentation (refer to Section 8.3, and appendix A).

Note 1: Loading Certificate

This should set out the following information:

a) system type (obtained from the as-built details provided by the designer/installer)
b) system capacity (number of persons and daily flow volume)
c) summary of design criteria
d) the location of and use of the 'reserve area'
e) use of water efficient fittings, fixtures and appliances
f) allowable variation from design flows (peak loading events)
g) consequences of changes in loading (due to varying wastewater characteristics)
h) consequences of overloading the system
i) consequences of underloading the system
j) consequences of lack of operation, maintenance and monitoring attention; and
k) any other relevant considerations related to use of the system.

Ref: AS/NZS 1547:2012, Section 7.4.2.

7 SYSTEM FAILURE - THE NEED FOR SERVICING

A failed or failing wastewater system is not only a serious health risk to occupants of the property and members of the public using the site, but also possibly neighbours. Furthermore, failure can cause nuisance odours and ponding and limitation to, or loss of, the amenity service.

There are those property owners who regard the wastewater service as a necessary but nuisance expense that, once installed, can be forgotten about and not require regular servicing. They may also be careless and irresponsible about what they allow to be flushed or drained into the OWMS. They can become quite annoyed when it fails and costs a lot of money to fix.

There are few, if any, OWMS that don't require regular servicing, even the simple septic tanks systems.

Our advice is that property owners not only accept that a reliable and enduring system needs to be designed for the specific conditions, but the owner should understand what should and shouldn't be flushed into the wastewater system. They should also take care of the land application system and ensure the complete system (treatment unit and land application system) is regularly serviced by a competent and qualified servicing technician. It is likely to be cheaper overall to pay for regular servicing than allow it to fail and face a major cost to fix or replace the failed system.

Failed soakage field

Drip lines must be requlary flushed to prevent biofilm build-up and blockage

Excessive filter clogging due to poor treatment plant performance

Note 2: A living system

All on-site wastewater management systems (the treatment tanks and the receiving soils) are living systems that rely on micro and macro-organisms to break down and stabilise the contaminants contained in the wastewaters from your dwelling. These organisms include very large numbers (millions) of bacteria, actinomycetes, protozoa, nematodes, mites, fungi, worms and many other wastewater and soil organisms. It is critical that the wastewater does not contain persistent quantities of substances that are toxic to these organisms. If it does, the OWMS will fail.

Refer to advice on what should and shouldn't be flushed into the OWMS.

7.1 SIGNS THAT YOUR ON-SITE WASTE WATER SYSTEM IS FAILING

Your system may be failing if, for example:

- a foul, rotten-egg smell is noticed around your septic tank or land application area
- your tank overflows, perhaps through the vent
- the land around your treatment tanks and land application system is ponding, soggy and odorous
- the filter(s) are blocking up too frequently
- your drains and toilets are running slowly or overflow
- there is a gurgling noise when the bath plug is pulled
- there is overflowing at the gully trap or tank mushroom
- power consumption is high
- an alarm is activated.

There are many factors that can cause failure of your system. Some common examples are listed below.

- The soils in the soak pit or soakage trench have become completely blocked.
- There is a filter in the system that is partly or completely blocked and needs to be cleaned.
- Toxic products have been flushed into the treatment plant (refer to Note 2).
- Your primary chamber contains too much sludge and scum – have your tank pumped out; often referred to as desludging.
- The system is not being serviced either competently or regularly enough.
- The system is not being flushed in accordance with recommendations (see Note 3).
- The treatment plant is not fit for purpose. For example:
    - its treatment capacity is too small for the load
    - the treatment plant components are not durable or appropriate for wastewater
    - it is the wrong type of treatment plant for the type of land application system installed
    - the components (pump, filter, aerator, chamber design/ capacity) are substandard.
- Components, such as the distribution box, sequencing valves, vacuum/air valves, have become blocked or mechanically failed.
- The original land application system design was substandard. For example:
    - soil drainage capability was not competently assessed
    - the land application system design is not appropriate for the type of soils at this site
    - land area for soakage is too small for the volume of treated wastewater being dispersed each day
    - pre-existing surface and subsurface drainage patterns were not adequately assessed and soils become over-saturated, particularly after substantive rainfall events
    - excavations or earthworks, after site and soil assessment was completed, have modified soil and drainage characteristics, invalidating the design of the land application system
    - the wrong dosing device has been installed
    - the distribution manifold on the land application system has not been competently designed to achieve even distribution
    - flush ports have not been installed to allow regular flushing to prevent progressive blockage of the distribution manifold (refer to Note 3).

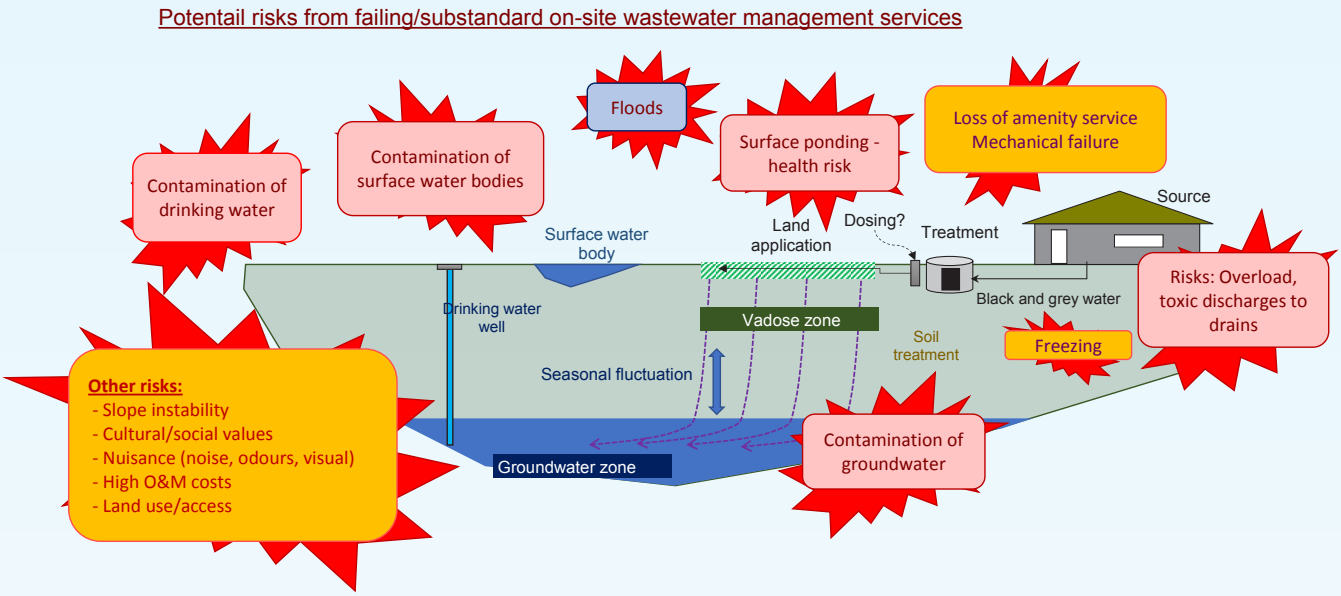
Backup to gully trap from clogged tank

Note 3. System flushing

Bacterial slimes (biofilm) will grow in pipes where treated wastewater is sitting stagnant. If these biofilm deposits are not flushed out, this can cause blockages over time. The rate of growth will depend on the degree of treatment received, temperature and stagnation period. However, even if it is very well treated, biofilm growth can occur within a few hours of stagnation. Therefore, it is always good practice to install flushing ports in all distribution systems and pipe-work at appropriate locations. For most systems servicing should require flushing at least every 6 months.

8 POSSIBLE RISKS OF FAILED OR FAILING ON-SITE WASTEWATER SERVICE

The following figure illustrates what risks may occur if the on-site wastewater system is poorly designed, badly installed, uses substandard technologies or is not regularly serviced as recommended by the supplier. The risks may impact on residents, neighbours and stock; consequences can be severe and potentially costly.



9 WHAT DO I DO IF MY WASTEWATER SYSTEM IS FAULTY OR FAILING?

The answer to this question is obvious. It is the same as you would do if your washing machine or your car needed fixing. You would typically call in a qualified technician and pay for it to be fixed, unless you considered yourself sufficiently qualified to fix it yourself.

10 OPERATING YOUR ON-SITE WASTEWATER MANAGEMENT SERVICE

It is the responsibility of the property owner to:

- understand the basics of your on-site wastewater management system (refer to Sections 5 and 6)
- ensure all dwelling occupiers understand what can and can't be flushed into the system (refer to Section 10.1)
- ensure at least one responsible dwelling occupier has an understanding of the basics of caring for and operating the OWMS (refer to Section 10.2)
- ensure regular servicing of the OWMS by a suitably qualified servicing technician (refer to Section 10.2.2)
- maintain and file a detailed record of failure and servicing activities carried out (refer to Section 10.3 and Appendix B).

10.1 WHAT CAN BE AND WHAT SHOULDN'T BE FLUSHED INTO THE WASTEWATERS SYSTEM

As Note 2 explains, the on-site wastewater service is a living system. There are some products that may be used in the household that are toxic to the system. Care must be taken by occupants of the dwelling to ensure large quantities of toxic substances do not enter the drainage system.

Do not overload the system.

- The system has been designed for a maximum daily wastewater volume. Ensure that this is not exceeded.
- Avoid overloading the system with high short duration loads by spacing out water use as evenly as possible.
  For example:
  - do not do all the washing on one day, and
  - do not run the washing machine and dishwasher at the same time.

Reduce solids input to the treatment unit by:

- scraping all dishes to remove fats, grease, and so on before washing
- keeping all possible solids out of the system
- shake all the dirt and sand off your clothes before washing them
- not using a food waste disposal unit (insinkerator)
- not putting sanitary napkins and other hygiene products into the system.

What can go down the drain:

- all that has been first eaten by you
- biodegradable soaps and low phosphorus detergents
- septic-safe disinfectants, bleaches and toilet cleaners in small dilute amounts
- washing machine and dishwasher wastewater
- shower and bath wastewater
- toilet wastewater
- milk and drinks.

Minimise discharging the following substances:

- some **cold wash laundry agents** are aggressively alkaline and can cause septic tank and treatment unit failure
- bleaches, whiteners, nappy soakers, stain removers, disinfectants
- sanitary pads, tampons, disposable nappies, condoms and excessive quantities of paper
- excessive fats, cooking oils and greases
- antiseptics liquids.

Do not discharge the following into the wastewater system:

- **DON'T USE flushable wipes. They can block the system**
- portable cassette toilet waste (use approved dump stations)
- excessive volumes of bleaches and chlorine products
- alkaline detergents such as caustic soda
- acids, pesticides, herbicides, chemicals
- paints, solvents, varnishes and paint thinners
- antibiotics and medicines
- drugs and pharmaceuticals
- motor oil
- toys, clothing, plastic bags and other non-biodegradable products
- storm/roof water
- pool or spa waste.

To support the living ecology in the treatment tank and in the land application area:

- use biodegradable soaps
- use a low-phosphorus detergent
- use a low-sodium detergent in dispersive soil areas
- use detergents in the recommended quantities.

10.2 THE BASICS OF CARING FOR THE OWMS

As described earlier in this document, there are several different types of treatment plants and land application systems that have been installed on properties throughout New Zealand. They will all have their own site-specific operating and servicing requirements. Once you understand the type of system that has been installed on your property, your primary responsibility is to gain full knowledge of what the operating and servicing requirements are and to then ensure that the occupiers of the property have this information and are encouraged to action these.

Ideally the designer and/or provider should have supplied you with:

- a design report showing the details of the complete system (treatment, dosing and land application systems)
- two Operation and Maintenance (O&M) Manuals, one manual for the system owner and the other for the trained servicing technician
- recommendations on suitably qualified local servicing technicians. See Note 4.

If this information and detail is not available, it would be advisable to retrospectively engage a suitably qualified on-site wastewater engineer or technician who will be able to provide the required details. Refer to Appendix A for system description and specification template.

Checking scum and sludge levels in a septic tank

Healthy worm activity in septic tank scum layer

Note 4. Selecting suitably qualified servicing technicians

The OWMS involves complex technologies and systems. It is important that the person you engage to service your system is competent. Some suppliers of the technologies will recommend technicians who have been trained to service their specific technologies. Ensure that the technician is competent in servicing your whole system, including the land application system, and not just part of it, e.g. the treatment plant.

Some local government bodies have a list of “approved” installers and servicing technicians that can be made available to the public.

Otherwise ask around your local area for recommendations.

10.2.1 OWNER/OCCUPIER – PRACTICAL RESPONSIBILITIES

There are basic operational matters the owner or delegated occupier should take responsibility for. These include:

- informing all dwelling occupiers what can and what should not be flushed into the system
- regularly check installed alarms
- noting and actioning any obvious blockages in drains
- noting and actioning any abnormal sewage odours
- ensuring earthmoving activities are prohibited in areas where the treatment plant, land application systems and reserve areas are located
- ensuring vehicles, stock and unauthorised people do not have access to areas where the treatment plant and land application systems are located (unless stock access is approved and built into the design and management of the system)
- if there is a designated reserve area, ensuring this area is retained as available at all times
- checking the treatment plant and noting and actioning:
    - leakages and ponding
    - damaged tanks, lids, covers, vents, alarms and other fittings
    - flooded chamber(s), including dosing chamber
    - pump (if fitted) running for excessive time period and high power costs
- checking the land application system and noting and actioning:
    - wastewater leakages and surface ponding
    - damaged fittings such as vents, Toby boxes, flush ports
    - obvious patchiness in distribution patterns (abnormal excess vegetative growth)
- where cut and carry or management of vegetative cover is required for the land application system, ensuring this is carried out in accordance with recommendations
- ensuring signage and warning notices remain effective.

10.2.2 SERVICING TECHNICIAN RESPONSIBILITIES

For the more technical servicing and maintenance requirements it is recommended that a suitably qualified servicing technician is engaged to carry out the detailed servicing schedule as recommended by the system designer and technology supplier(s).

The basic and general operation and servicing requirements may include, for example, the following.

- All wastewater tanks will need to be checked for settled sludge (and possibly surface mat formation). This is particularly so for primary tanks, but also all other tanks, including the dosing chamber. Operators should advise when desludging and cleaning is required.
- The following, if part of your system, will need to be regularly checked, cleaned and, where necessary, fixed or replaced:
    - filters
    - mechanical components such as pumps, flouts, siphons, aerators
    - electrics and control panels
    - alarm systems
    - distribution boxes, sequencing valves, flush valves
    - plumbing and fittings (for leakage).
- The land application system is to be thoroughly checked for surface ponding and leakage points. If found, immediate diagnosis and remedial action is required.
- Distribution manifolds for sand beds and trenches, soakage trenches and beds and mounded systems are to be flushed in accordance with the designer's recommendations.

10.3 DOCUMENTATION AND SERVICING RECORDS

Maintain and retain a dedicated file of documentation relating to the on-site wastewater service. This file should include the following:

i. original system design details with design producer statements
ii. regional council consent to discharge and supporting documentation (if not a permitted activity)
iii. land use consents (if required)
iv. building consent details and documents with as-built plans, Code of Compliance and produce statements
v. loading certificate. Refer to Appendix A
vi. operation and maintenance manuals for occupier
vii. system/component problems or failure events record. Refer to Section 7 and Appendix B
viii. servicing record. Refer to Appendix B.

11 USING TREATED WASTEWATER IN THE GARDEN

Wastewater, even after treatment, contains nutrients (such as nitrogen, phosphorus and many other plant friendly micro-nutrients) that will benefit and enhance their growth. Recovering wastewater nutrients in this way can be a beneficial "green" practice. If the plants uptake these nutrients and are taken off-site (sometimes referred to as "cut-and-carry"), such practice can be designed into the system to mitigate the risk of unwanted nutrient contamination of groundwater. Furthermore, these plants can uptake the applied soil water in the wastewater by a process known as evapotranspiration. Evapotranspiration is the transfer of water to the surrounding atmosphere because of both plant transpiration (which is water moving from soil pores into plant roots, through the plant and out the stomata on the plant's leaves) and evaporation (which is the drying effect of any exposed water on the soil surface, leaves and stems). The evapotranspiration rate can vary from say 10 mm/day (same as 10 L/m^2.day) on a hot, windy summers day to near zero mm/day on a still, cold winters day.

If it is desired to use wastewater for either or both nutrient management and water uptake by evapotranspiration for productive purposes or risk mitigation, then the following matters need to be carefully taken into consideration by your system designer.

- Some plant root systems may damage or block the buried land application pipe distribution system.
- If the wastewater has been chlorinated, this may damage plant growth.
- If the water uptake by plants is to be built into the design and risk mitigation measures, full year water balance modelling by a competent person is required to identify times of the year when surface ponding may be a significant risk. This water balance must take into consideration variations in evapotranspiration rates and rainfall as well as any corresponding variations in wastewater loads.
- Reclaimed (and disinfected) wastewater may be suitable for subsurface irrigation of gardens, including fruit trees and shrubs, but not root crops or spray irrigation of crops that are eaten raw or unprocessed.
- If it is desired that treated wastewater is to be used for productive purposes, appropriate and competent advice must be sought and considerable care should be taken, particularly if the plants are to be used as a human or stock food source.
- It is critical that unauthorised human access is restricted in areas where shallow land application systems (and particularly garden sub-irrigation) are used.

12 APPENDIX A. SYSTEM RECORD

Table A1. Site details and contacts.

Address:			
NZ Grid Reference:			
Legal description			
Regional Council		**Consent No.:**	
District/City Council		**Building Permit No.**	
System Designer and contact details			
Technology supplier and contact details			
Installers and contact details			
Servicing agent and contact details			
Date of commissioning			

12.1 GPS DATA

Treatment plant		Land application system	

12.2 SITE MAP

Loading Certificate: Treatment plant

Description of treatment process/technologies				
Working capacities of compartments				
Temperature and humidity operation range				
Description of dosing system				
Model details:	Normal treatment capacity (L/day)	3 –day peak treatment capacity (L/day)[1]	Emergency storage volume (L)	Dose volume (L)
Service life of treatment process	Treatment process warranty	Serviceable life of tank(s)	Warranty for tank(s)	Electro/mechanical component(s) warranty
Effluent quality (normal loading, domestic influent)	BOD_5/TSS[2]	TN: % reduction or mg/L	TP: % reduction	F. Coliform Log reduction

1. This is the maximum continuous daily flow for 3 days, assuming at least 1 month normal flow follows between such peaks, without significantly compromising the overall plant treatment performance.
2. The **secondary effluent** quality requirements for biochemical oxygen demand (BOD_5) and total suspended solids (TSS) defined by AS/NZS 1547:2012 as follows:
   When sampled and tested for biochemical oxygen demand (BOD_5) 90% of samples shall have a BOD_5 of less than or equal to 20 g/m^3 with no sample greater than 30 g/m^3.
   When sampled and tested for total suspended solids (TSS) 90% of samples shall have a TSS of less than or equal to 30 g/m^3 with no sample greater than 45 g/m^3.
   Ref: AS/NZS1547:2012 M2.1

Loading Certificate: Land application system

Type and description of land application system (LAS)	
LAS system capacity	
Variations in flows and consequences of variable loading	
Location of land application system and reserve area	

13 APPENDIX B. OPERATING REPORTS

13.1 REPORTING PROBLEMS AND FAILURE

When failures or problems occur, a detailed record is to be kept.

This report should include:

- date of failure/problem
- description of failure/problem
- action taken and costs
- recommendations.

13.2 MAINTENANCE REPORTING

Note 5. A maintenance certificate shall include (from AS/NZS 1547:2012)

a) certification by a qualified and experienced person that the on-site system is operating and performing effectively
b) a note of any specific operation and maintenance attention which is due
c) identification of any operation and maintenance problems, their likely cause and recommended remedial action
d) any evidence of system capacity being exceeded or likely to be exceeded (for example, by extra residents, or by holiday period occupiers)
e) results of effluent quality testing where advanced or disinfection treatment is being used
f) note of actions taken and results achieved following recommendations for remedial work after the previous routine inspection
g) a recommendation on when next desludge/pump out should be undertaken and
h) any other relevant matters.

The servicing technician is responsible for maintaining a detailed servicing report to be filed securely. A copy is to be provided to the owner of the OWMS. The servicing technician will have his or her own report format. Details that should be included in the report should include:

- date of servicing
- name and contact details of servicing technician who performed the field work
- brief description of the servicing completed
- cost of servicing
- advise to occupiers/owner (if appropriate)
- recommendations for additional/future work required (if appropriate).

WHERE CAN I GET MORE INFORMATION?

This document is available online.
https://www.waternz.org.nz/OWMScompleteguide

Information on helping you choose an OWMS is available from the link below.
https://www.waternz.org.nz/OWMSchoosing

"Outstanding - probably the best OWMS guide you'll read this year" - Alan Ambury, OWMS User

water NEW ZEALAND
The New Zealand Water & Wastes Association Waiora Aotearoa

Ranchhod Tower | Level 12, 39 The Terrace
PO Box 1316 | Wellington 6140 | www.waternz.org.nz
enquiries@waternz.org.nz | Tel: +64 4 472 8925

A consistent approach across the 3 waters sector

ISBN: 978-0-473-41797-0
Water New Zealand – November 2017