Wastewater reuse

This fact sheet provides information on wastewater re-use for both urban and rural households.

On-site wastewater re-use provides numerous opportunities to reduce water use within the home. At present, potable (drinkable) water is used for practically everything in the house and garden.

Wastewater re-use opportunities vary according to where you live. Urban households typically have a connection to a centralised, or reticulated, sewage system, whereas rural households manage their wastewater on-site.

We are literally flushing our drinking water down the toilet!

Consequently, the regulations concerning the treatment and re-use of wastewater vary according to your location. Check with your local council or state health authority for advice on the regulations in your area. In some States it is illegal to re-use wastewater in urban areas.

ADVANTAGES AND DISADVANTAGES

Advantages

Wastewater can be used to flush toilets, water gardens and even to wash clothes. By using wastewater as a resource rather than a waste product you can:

> Reduce water bills.

> Use less water resources.

> Cut down the amount of pollution going into our waterways.

> Help save money on new infrastructure for water provision and wastewater treatment.

Wastewater re-use decreases effluent volumes, reducing the stress on existing centralised wastewater disposal systems, which will work better and last longer.

Disadvantages

The disadvantages of reusing your wastewater also need to be considered. Currently, one of the main disadvantages for most households is the financial cost of installing and maintaining a re-use system. The cost will vary according to:

> The extent of existing centralized wastewater treatment services where you live.

> The price of water in your area (urban) or scarcity of water (rural).

> Whether you are replacing an existing system or starting from scratch.

> The length of time you intend to live in your current house.

> The type of system you install – annual operating and maintenance costs vary between systems.

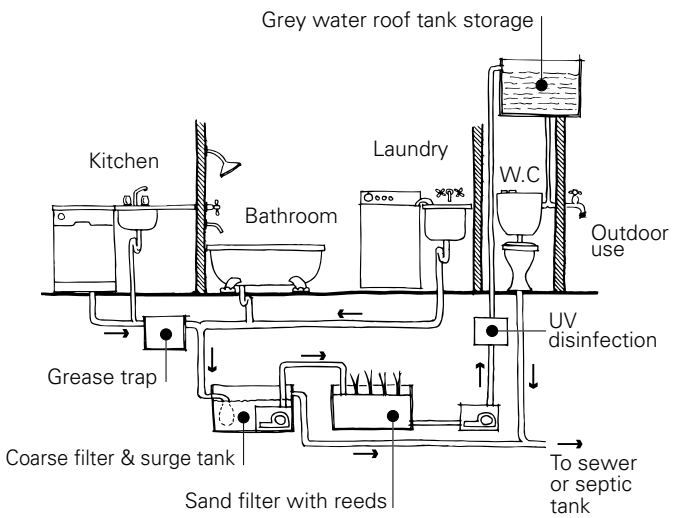
If your house is frequently unoccupied for a fortnight or more, for example a holiday home, then you need to carefully select a re-use system to cope with intermittent use. Most systems that include biological treatment do not function properly if used intermittently.

TYPES OF WASTEWATER

There are two types of wastewater created in a home, each of which can be treated and used in various ways.

Blackwater is water that has been mixed with waste from the toilet. Blackwater requires biological or chemical treatment and disinfection before re-use. Black water should only be re-used outdoors.

Greywater is wastewater from non-toilet plumbing fixtures such as showers, basins and taps. Depending on its use, greywater can require less treatment than blackwater and generally contains fewer pathogens. Treated greywater can be re-used indoors for toilet flushing and clothes washing, both of which are significant consumers of water. Greywater can also be used for garden watering.



Grey water collection, treatment and re-use for toilet flushing and outdoors

CALCULATING WASTEWATER VOLUME

The table below indicates the amount of wastewater you can expect from your home after applying simple water use efficiency measures. [See: Reducing Water Demand]

BLACKWATER	LITRES/PERSON/DAY
Toilet	22
GREYWATER	**LITRES/PERSON/DAY**
Shower	56
Hand Basin	6
Kitchen tap	12
Dishwasher	5
Laundry tap	7
Washing Machine	27
Total - Greywater	113
Total - Overall	135

RE-USE WATER QUALITY

The quality of your re-use water depends on your treatment system, the water's 'first use' and which chemicals are used in the home.

To reduce your treatment requirements:

Minimise use of cleaning chemicals such as coloured toilet dyes. Use natural cleaning products where possible;

Do not dispose of household chemicals down the sink or toilet. Contact your local council or water authority for information on collection services; and

Use a sink strainer in the kitchen to help prevent food scraps and other solid material from entering your wastewater.

Use a lint filter on the outlet from your washing machine. A piece of nylon stocking is generally sufficient. Replace as necessary.

WASTEWATER RE-USE IN URBAN AREAS

It is sensible to consider wastewater re-use if you live in an urban, sewered area and any of the following apply to you:

> Efficiency measures for indoor and outdoor water use have already been undertaken. [See: Reducing Water Demand; Outdoor Water Use]

> Water supplies in your area are often limited, eg during droughts.

> You have a large garden which you water regularly.

Remember to check with your local council or water authority before you re-use wastewater, as it may be illegal in your area.

WASTEWATER RE-USE IN RURAL AREAS

Households in rural areas typically have greater scope for reusing wastewater for the following reasons:

> There is no centralized treatment service, therefore investment in a wastewater treatment system is a necessity.

> Installing a re-use system in a new house, or adapting an existing treatment system to allow re-use, may not incur significant additional expenditure.

> Water supply may be restricted, thus placing a premium on using water resources in the most efficient manner. [See: Reducing Water Demand; Rainwater]

> The regulations for reusing wastewater in rural areas are not as stringent as urban areas - there is more scope for innovation.

> The septic tank and absorption trench system is currently the most prevalent on-site wastewater treatment system in rural Australia. This system does not actively treat wastewater to remove pathogens, and therefore the treated wastewater needs to be disposed underground, rather than re-used.

REUSING WASTEWATER INDOORS

Greywater can be re-used indoors for toilet flushing and clothes washing. Toilets and clothes washers are two of the biggest users of water in an average household. [See: Reducing Water Demand]

Reusing wastewater for toilet flushing will save approximately 65 litres of potable water in an average household every day.

Reusing wastewater in your clothes washer will save approximately 90 litres of potable water in an average household every day.

In order to re-use greywater indoors for toilet flushing and clothes washing you will need to firstly:

> Separate greywater and blackwater waste streams.

> Install a greywater treatment and disinfection system that provides a suitable level of treatment and meets local regulations.

Greywater can be directly diverted from the shower or bathroom sink drains for re-use in the toilet only. However, it should not be stored for more than a couple of hours before re-use or disposal to sewer.

Precautions

Greywater must be treated and disinfected before storage and general re-use because:

> It can contain significant numbers of pathogens which spread disease.

> It cannot be stored for longer than a few hours untreated as it begins to turn septic and smell.

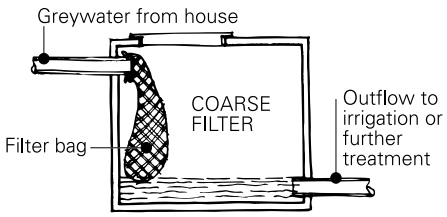
When reusing greywater for clothes washing discoloration of clothing from dissolved organic material may be an issue. This can be avoided by installing an activated carbon filter.

Re-use of blackwater inside the home is not advisable, even after treatment and disinfection.

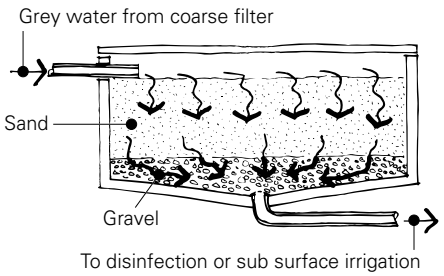
Treatment systems for indoor re-use

Domestic greywater systems require an accreditation certificate to be sold commercially in most states. Check with your local council or state health department. Owner built systems generally require only Council approval.

There are many different types of greywater treatment systems, a few examples are given below. Refer to the reference list at the end of this sheet for further information and contact your local council for a list of suppliers in your area.



Greywater needs to be filtered before being treated in order to remove large waste particles. A coarse filter for greywater can be quite simple. See the diagram above for an example for owner operators. It comprises a waterproof box and a filter bag or stocking attached with rubber bands. The stocking or bag must be checked regularly and replaced when full.



Once coarse filtered, greywater can be treated using a sand filter. The basic structure is a waterproof box filled with coarse sand laid over a gravel bed. Greywater flows in at the top and out the bottom. A number of commercial sand filters are available.

Reed beds and sand filters treat the wastewater through filtration and some biological nutrient uptake. Wastewater needs to be pre-treated to allow removal of large particles, otherwise clogging will occur, and the lifetime of the system will be reduced.

Smaller sized aerated wastewater treatment systems are also suitable for treating greywater for general re-use.

Disinfection

Disinfection is required for general re-use of greywater. All disinfection require regular maintenance.

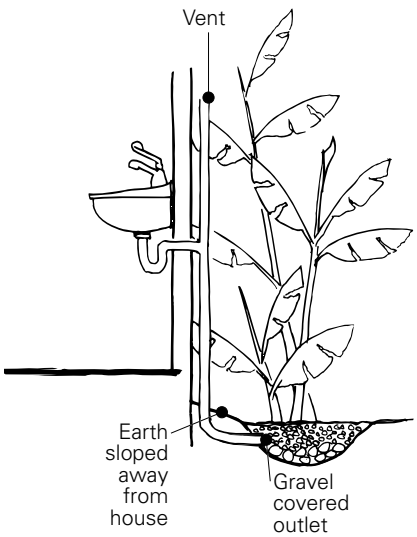
Chlorine is most commonly used for disinfection, for example Aerated Wastewater Treatment Systems (AWTS) require chlorine pellets. However, chlorine disinfection has been found to have adverse environmental impacts. Alternatives should be used where possible.

Some councils and state health authorities allow Ultra-Violet (UV) or Ozone disinfection in place of chlorination. Any enquiries should be directed to these organisations. Small scale ozone systems have only recently become available on the market.

REUSING WASTEWATER OUTDOORS

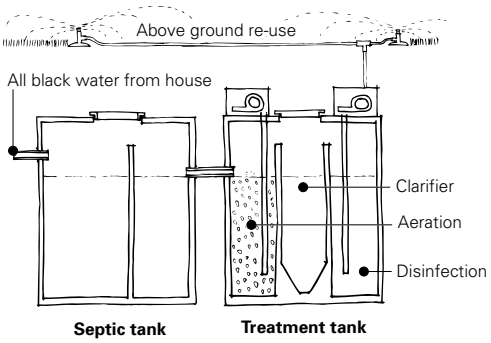
Reusing wastewater outdoors can reduce your household's potable water use by 30 to 50 percent. [See: Outdoor Water Use]

Treated wastewater can be re-used to water gardens either by subsurface or above ground irrigation. Only treated and disinfected wastewater should be used for above ground irrigation due to potential presence of pathogens.



Simple grey water sub-surface re-use

The only place where blackwater can be safely re-used is outdoors. However, in some States blackwater cannot be re-used for above ground irrigation even if treated and disinfected: check with your local council or state health department.



Precautions

Avoid watering fruits and vegetables with re-use water if they will be eaten raw. There is a chance that pathogenic organisms may be present in wastewater even after treatment.

The level of re-use of wastewater in the garden needs to be balanced with the amount of water, solids and nutrients that the plants and soil in your garden can absorb. If excess wastewater is applied:

> Excess nutrients may run-off or leach through the soil to enter waterways, contributing to algal blooms and other water quality problems.

> Soils and plants may become water logged and inhibit plant growth.

> Soils can become physically clogged with organic and suspended material or damaged by salts in the wastewater.

In order to avoid these problems:

> Plan your garden carefully. [See: Outdoor Water Use]

> Use Phosphate-free liquid or environmentally-friendly detergents.

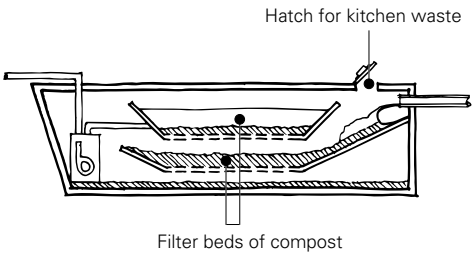
> Prefilter to remove solids.

> Adjust the amount of wastewater re-used to the conditions in the garden. Do not irrigate if the soil is already saturated, see 'Wet weather storage'.

Treatment systems for outdoor re-use

There are many different types of treatment systems suitable for outdoor re-use, a few examples are given below. Refer to the reference list at the end of this sheet for further information and contact your local council for a list of suppliers in your area.

The most common wastewater treatment and re-use system currently in Australia is the Aerated Wastewater Treatment System (AWTS). There are many commercially available models in all states.



Wet composting system

Wet composting systems treat all household wastewater and also allow the composting of other household organic wastes (kitchen and green waste). Compost must be removed periodically and disposed of carefully underground. The effluent from wet composting systems typically requires further treatment and/or disinfection if it is to be re-used above ground.

Wet weather storage

If you are reusing your wastewater in the garden, you will need to have a method of either disposing or storing the wastewater you do not require during periods of high rainfall.

If storage is not an option and you live in an urban area, excess wastewater can be directed to a sewer. In rural areas sub-surface disposal to a trench in the garden is recommended, provided there is enough space.

Storage is recommended as it maximises the usefulness of wastewater.

Wastewater should be treated and disinfected before storage. Storage requirements depend on:

> Climate.

> Household demand for re-use water.

> Presence/size of disposal area.

> Maximum daily wastewater output.

ADDITIONAL KEY REFERENCES

The Composting Toilet System Book – A Practical Guide to Choosing, Planning and Maintaining Composting Toilet Systems, a Water Saving, Pollution-Preventing Alternative (1999) by David Del Porto and Carol Steinfield. Published by The Center for Ecological Pollution Prevention (CEPP), P.O Box 1330, Concord, Massachusetts 01742-1330.

Ecological Sanitation (1998) by Steve Esrey et al. Edited by Uno Windblad. Published by the Department of Natural Resources and the Environment, Sida, S-105 25 Stockholm, Sweden.

Create an Oasis with Greywater: your complete guide to managing greywater in the landscape Art Ludwig

NSW Health, *Greywater reuse in sewered single domestic premises 2000*: www.health.nsw.gov.au/public-health/ehb/general/greywater~policy.pdf

Environment & Health Protection Guidelines On-site Sewage Management for Single Households at http://www.dlg.nsw.gov.au/onsite.htm

Standards Australia AS/NZS 1547:2000

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