Greywater reuse systems for New Zealand houses

Greywater reuse systems offer a number of benefits to households. They take wastewater from baths, showers and hand basins (and, in some cases, from laundries) and reuse it for irrigation or, with appropriate treatment, toilet flushing.

WHETHER OR NOT greywater reuse systems can be installed relies largely on the rules and regulations of the local authority. There are no national guidelines.

Benefits

For households with on-site sewage treatment systems, reusing greywater has the big advantage of reducing the volume of liquid waste requiring treatment. This takes pressure off the sewage treatment system, letting it give better performance.

For all houses, greywater can provide a significant volume of water for garden irrigation, reducing the demand on water from other sources, including town supply where there may be a charge. BRANZ monitored water use in 51 Auckland houses and found that, in summer, 17% of water used by a household was for irrigation and other outdoor purposes. A further 18–19% of a household's total water use is in toilet flushing.

Finally, where households have no town supply and rely completely on rainwater, reusing greywater means they can save their tank water for potable water needs.

Exactly what is greywater?

AS/NZS 1547:2012 *On-site domestic wastewater management* defines greywater as "the domestic wastes from a bath, shower, basin, laundry and kitchen, but excluding toilet and urinal wastes which are described as black water".

In practice, kitchen wastewater is generally excluded from new greywater installations because it carries fat and grease that can block pipes and contamination such as *Campylobacter* bacteria from preparing raw meat for cooking.

Some people prefer not to reuse wastewater from clothes washing machines or laundry tubs. It can contain enzymes, detergents, bleaches, softeners, whiteners and other chemicals, and there is also a greater likelihood of faecal matter in the wastewater. An alternative is to change to using different detergents.

A number of proprietary greywater reuse systems are available in New Zealand, and their manufacturers typically recommend what can and what should not be used in their systems.

A very detailed BRANZ survey in New Zealand in 2014 found that most (>70%) respondents thought that using greywater for irrigation and toilet flushing was acceptable.

Surveys have found a greater understanding of rainwater harvesting systems than greywater reuse systems. Environmental benefits were the most frequently quoted reason in favour of greywater reuse systems.

System design

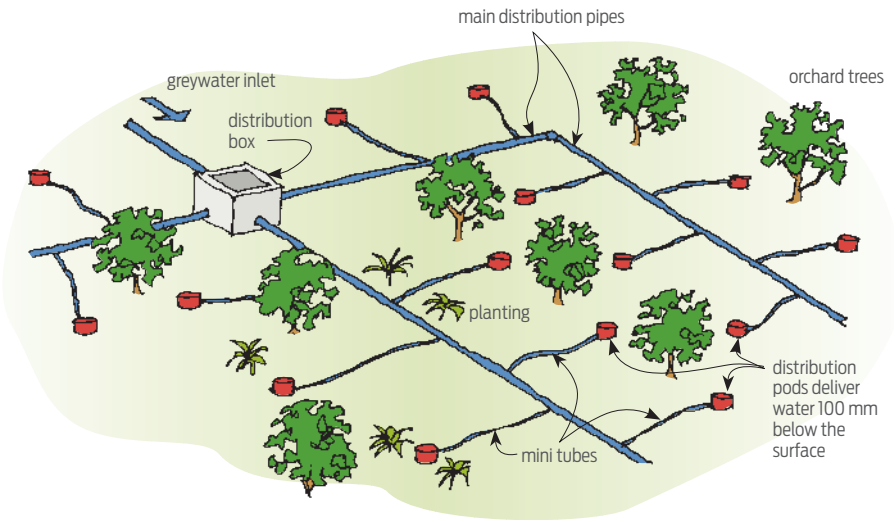
The use of proprietary systems is recommended because of the potential health and regulatory issues. A greywater reuse system will not normally be designed from scratch. The comments here assume that a selection is being made between different proprietary systems.

There are two types of system – one with a tank to hold the greywater and another without.

A tank allows water to be stored until it is required for use but comes with the risk of bacterial build-up in the water. To prevent this, the stored water will need to be treated by the addition of chlorine, through ultrafiltration or by using biological treatment to reduce the risks to health.

In addition, a tank should:

- be vented
- have a trapped overflow that discharges directly into the sewer or to an on-site discharge



Subsurface irrigation with greywater.

- be sealed
- be vermin proof.

Systems that do not store water have a lower risk, simply requiring the water to be filtered before being pumped to an in-ground irrigation system.

Both types of system should have a bypass valve. Greywater can then be sent directly into the sewer or on-site blackwater treatment system if there is something in it that house occupants do not want to go into the garden. This is standard on most units available. Water with faecal matter from bathing very small children should be diverted, for example. Some proprietary systems also have a sensor that diverts greywater if there is already enough water in the garden.

There should also be provision for overflow to be discharged to a sewer or on-site blackwater treatment system. Untreated greywater should not be stored for more than 24 hours.

When used for irrigation, a greywater distribution system should include a distribution box and branched drain network, often with a pump (which may require mains water top-up). This allows water to be diverted to different parts of the dispersal area to allow areas to rest. Greywater should be distributed under the soil and never through a sprinkler or used on vegetables and salad plants.

Where greywater is used for toilet flushing, it should be filtered and treated to remove odours and bacteria. Coarse filters trap lint, hair and so on. Membrane filters can hold back bacteria and viruses. The water is likely to be cloudy. Where there is also a rainwater harvesting system installed, rainwater is a preferred option for toilet flushing because it is cleaner.

A study into these systems conducted for the Ministry of Health found systems with automatic disinfection were more effective than those requiring action from the householder, such as adding chlorine every day.

Legal requirements

The plumbing work in greywater reuse systems will require a building consent. The work must be done by a registered plumber. Any on-site wastewater treatment system (including greywater reuse) must meet performance requirements in the Building Code. The sanitary plumbing connected to an on-site wastewater treatment system within the house must comply with the requirements of Building Code clause G13 *Foul water*. If the system is designed to AS/NZS 1547:2012, the Code requirements will be met.

Where greywater is used to flush toilets and mains water is also available for standby use, the system must prevent the risk of backflow (greywater contaminating mains water).

Lilac piping is adopted through AS/NZS 3500 *Plumbing and drainage* series to indicate non-potable water supply.

Depending on how the water will be disposed of, a resource consent may also be required. If your greywater ends up on neighbouring properties or runs into nearby waterways, you will be liable.

There is no national legislation or specific national guidelines around greywater reuse. Rules are set by local authorities. Their attitudes and requirements vary enormously around New Zealand. In some cases (such as Auckland), getting permission to reuse greywater for irrigation is not easy, although using it for toilet flushing is easier. (The regulations covering this area in Auckland are being reconsidered at the moment.) Some local bodies are more encouraging. New houses in Kāpiti Coast District Council's jurisdiction must either install a large rainwater collection tank or a smaller tank and a greywater system.

Maintenance

Regular maintenance is required to keep these systems operating properly. Cleaning or replacing filters are the main tasks (although some filters are at least partly self-cleaning). A New Zealand research study found that fewer than half of the greywater systems assessed worked properly and were maintained according to the manufacturer's instructions.

More information

Fact sheet 5 *Benefits of rainwater and greywater systems in New Zealand houses*

Fact sheet 6 *What is holding back rainwater and greywater systems in New Zealand?*

Bint, L. (2017). *Performance of commercial rainwater and greywater systems.* BRANZ Study Report SR383. Judgeford, New Zealand: BRANZ Ltd.

Bint, L. & Jaques, R. (2017). *Drivers and barriers to rainwater and greywater uptake in New Zealand.* BRANZ Study Report SR382. Judgeford, New Zealand: BRANZ Ltd.

Garnett, A. & Bint, L. (2017). *Calculating potential network savings through employing rainwater and greywater systems.* BRANZ Study Report SR384. Judgeford, New Zealand: BRANZ Ltd.

www.level.org.nz: This BRANZ website has information about greywater recycling at www.level.org.nz/water/wastewater/on-site-wastewater-treatment/greywater-recycling/

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