

Greywater buyers' guide

The reuse of domestic wastewater is one way that households can help reduce their water use and bills. As a relatively new technology, there is still some confusion as to how to go about it. Ralf Pfleiderer provides a basic checklist for choosing a system

As we enter into yet another hot summer, many Australians are looking at ways to reduce the amount of water they use around the house and garden. More households are collecting their own rainwater or undertaking water-efficiency retrofits. Another option that has grown in popularity over the last few years is the installation of greywater systems to recycle wastewater from the home for use in the garden.

Greywater is the domestic wastewater produced in your bathroom, laundry and kitchen, such as water from the shower, washing machine and kitchen sink. Toilet wastewater is classified as blackwater and must be connected to a sewer or a treatment system. For more information on blackwater systems refer to the composting toilet buyers' guide in *ReNew 81*.

Greywater systems need to be well set up and maintained to ensure that they do not have any negative effects on the environment or human health. All greywater systems require some behavioural changes and a maintenance regime, therefore careful consideration is needed before installing a system. Make sure you discuss the project with your family, people who have greywater systems and a friendly green plumber.

There are a number of regulations that govern the installation of greywater systems. Check out the greywater regulations article on page 19 to make sure that you comply with your state regulations and have the appropriate permits and approvals.

System types

There are three broad categories of greywater systems. From least to most complex these classifications are: diversion only, diversion and filtration, and diversion with treatment. All states and territories have different regulations for the three types of systems.

Diversion-only systems

Diversion-only systems are simple and generally require little maintenance, but are potentially the most hazardous. They involve intercepting or 'diverting' the water along a pipe pathway and directing it into the garden, generally by gravity. The first version of this type of system was a rubber funnel in-



serted into the inspection hole on the elbows of exposed water pipes. Better diverters are now widely available. These have a switch mechanism to allow greywater through to the sewer again when the garden does not need any more water. They should also automatically divert greywater to the sewer in the case of a blockage.

The big advantage with these systems is that they do not need approval in some states (check with your state and local authority and they are cheap and easy to install. However they do require monitoring to ensure that untreated wastewater is not going into other people's backyards.

The drawback of diversion-only systems is that even when people compliment them with filter sieves, larger particles can still get through and over time, this can clog up your irrigation system.

Some diversion-only systems will have a simple storage tank to allow for extended irrigation through smaller diameter piping, without causing water to back up in the sink or bath. In some states, the regulation is that untreated greywater should not be stored for more than 24 hours. Check with your local authority.

Diversion and filtration systems

Diversion and filtration systems will have a filter mechanism located outside the house. These filters strain out the hair and other little bits that go down the drain. The filter will obviously need to be cleaned regularly. The frequency will depend on the number and type of greywater attachments connected to the system. It is mandatory in most states for diversion and filter systems to include a sewer overflow outlet for when the filter is too full to deal with the water flow.

Diversion and filtration systems may require approval in some states, are more costly and require cleaning. They do, however, allow for better irrigation options than diversion-only systems, as they will clog your irrigation system less easily.

Diversion and treatment systems

Diversion and treatment systems are more complex and vary from highly mechanised systems, such as aerated wastewater treatment systems (AWTS), to sand filters. Check to see if your chosen system requires approval by local councils or water authorities. The advantage of installing a treatment system is that the water will have a far lower nutrient and solids content, as well as having a reduced pathogen load. Treated greywater can be used safely in more direct irrigation systems, such as dripper lines, and possibly inside the house for toilet flushing and laundry washing.

Treatment systems can be expensive to install and often require a lot more room than filter systems. They will also



The Greywater Saver is a diversion and filtration greywater system.

require varying degrees of ongoing maintenance and may even have running costs associated with the use of pumps, blowers et cetera.

Irrigation: getting the water on to your garden

There many irrigation and disposal options for greywater and your choice will depend on the greywater system that you choose and the type of area that you want to irrigate. Irrigation systems must be carefully designed to take into account the slope of your site, soil structure and the type of plants or lawn that you want to irrigate. Methods range from subsurface irrigation via trenches or drip irrigation lines to applying the greywater directly on the surface. Subsurface irrigation is recommended as it will minimise health risk.

Two of the most common sub-surface irrigation options are absorption trenches and dripper systems. Broadly speaking, absorption trenches use slotted flexible pipes which are laid around the garden in filled trenches. Trenches can vary in width from 10cm to the width of a backhoe bucket, and need to slope away from the house along a 1

to 2% gradient.

The length or run of the trench will be determined by the amount of water produced, and your soil type. Wider and deeper trenches will deal with a larger volume of water and take longer to clog. However, the smaller volume generated by typical greywater sources will mean that most of the irrigation will happen at the start of a wide trench and not be carried further down the line.

Choosing a pipe and trench size is a fine balance between ensuring equal irrigation along the length of the trench (or trenches) and not having them overflow or clog too quickly. The trenches can be filled with any stable coarse material such as gravel or recycled hardwood mulch chips.

Absorption trenches are easy to install and maintain (if they don't clog). They are ideal for getting rid of a large volume of water in a small area. They also serve to treat the greywater further as the bio-film that grows on the gravel or mulch will utilise nutrients and kill pathogens in the water.

Alternatively, dripper lines can be laid in the garden. Dripper systems require well filtered greywater as the perfora-



Laying of agricultural pipes in gravel filled trenches is one way to irrigate your garden with greywater.

tions or 'leaks' in the hoses are very small and clog easily. The advantage of dripper systems is that larger areas can be irrigated with a smaller volume of water. Dripper lines are ideal for lawns, larger garden beds and the irrigation of large areas of individual plants such as in orchards and wood lots.

Closed loop systems

System installation checklist

Before installing a greywater system the following factors need to be carefully considered and discussed: location and size of property, soil type, members of the household, appliances, cleaning products, where your greywater is coming from and how you are going to use it.

All of these factors will influence which of the three greywater systems you choose to install.

Property location

Non-sewered property owners are at both an advantage and disadvantage when it comes to greywater. The main disadvantage is that it can be difficult

to obtain council or water authority permission to treat your greywater separately from your blackwater. On the other hand, it encourages you to install an advanced all-wastewater treatment system. This system produces what is known as tertiary-treated water, which can include disinfection, and gives you the option of reusing all your wastewater. It is also generally cheaper to have one advanced treatment system installed rather than two simple ones.

However, a system that treats blackwater separately from greywater is more robust than a system that treats all your wastewater together.

Residents in sewerred areas have all their grey and blackwater directed to one central treatment plant. To reuse your greywater in this situation you need to be able to access the plumbing.

Size of lot

The advantage in non-sewered areas is usually space. The majority of non-sewered blocks are big enough to allow you to dispose of all your wastewater easily. For example, you can use it on lawns, fruit trees or planted-out absorption trenches.

On smaller blocks of land you will need to be more careful that you don't over-saturate your soil. After heavy rains, your soil will not be able to absorb the greywater and it will make its way to your neighbour's block. You do not want this to happen as all greywater must remain within the boundary of your property. You may want to consider a greywater system that can be turned off during a good rain spell. In other words, a system that is flexible.

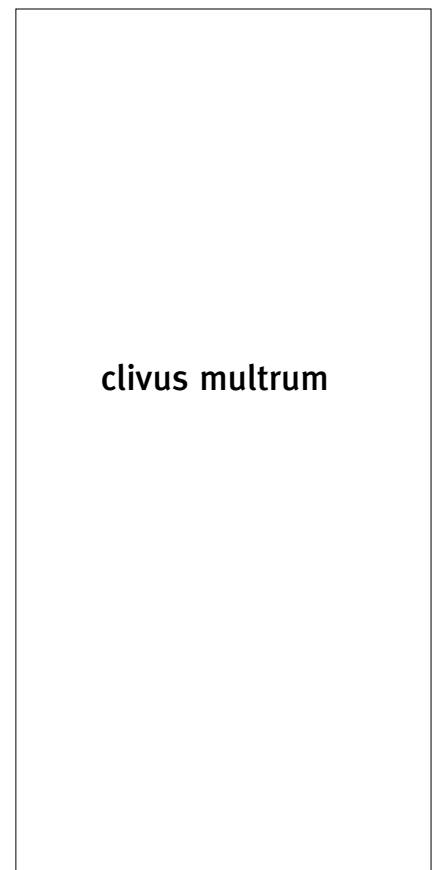
Soil type

While lot size is important, how much water your garden will absorb is also dependent on soil type. A large block with poor soil may not use as much as

a small block with good soil. A soil professional should be contacted to do an assessment in the areas that you are considering using the greywater.

Australia is a very old continent which has little topsoil, and many soil types are sandy or have heavy clay subsoil. In sandy soils, water can rapidly leach into the groundwater table. If the water contains contaminants, these can infect the groundwater. Clay soils have a low permeability and are easily saturated. Salts from cleaning detergents can also make clay soil structures dispersive. Healthy, well-draining loam topsoils are best suited to deal with greywater. This soil will be dark brown to black in colour. It is crumbly when dry, will hold some moisture when wet, but will not remain saturated for long periods. It is ideal to have a topsoil layer thicker than 200mm.

A block dominated by heavy clay soils



clivus multrum

will need a larger dispersal area for any given volume of water. In sandy areas, you will need to water carefully and consistently, exactly to your plants' uptake, or you may need to consider placing a liner under your irrigation area.

Household type

The behaviour and make-up household occupants will affect greywater source patterns. To list a few stereotypes: teenagers tend to love having long showers, babies give the laundry and bath a bigger workout, and older folks are more conservative with their water usage. As families grow and change you may need to reassess your greywater regime.

Shared households and renters who wish to reuse greywater will need to think carefully about the longevity of their stay at the house, and hence how complicated and/or permanent the system should be. Will the next tenants want to use a greywater system? Is your system easy to maintain or does it require the tenants to make considerable behavioural changes? The simpler the better.

Greywater source and quality

The Environment Protection Authority (EPA) Victoria estimates that the bathroom produces 55% of total waste-

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water, the laundry 35% and the kitchen 10%.

The bath and/or shower are a good, regular water source that will generally have low nutrient levels, pathogens, solid organic matter and salt content. The chemical content is generally minimal and fats, grease and oils are not a significant issue.

Hand basins will have high chemical loads from hand washing, toothpaste and the occasional hair dye/rinse. It may be best to incorporate this in with the blackwater.

The laundry is a good source of greywater too, but produces less frequently. Thirsty ornamental or vegetable gardens are best matched to regular dosing from the shower. Fruit trees may be better suited to big doses from the laundry.

Laundry greywater generally has acceptably low levels of pathogens, unless you are washing soiled nappies or incontinence pads. It has low solid organic matter, fats, oils, grease and nutrients. However, the salt and chemical

load is generally quite high, especially in more water-efficient machines.

Kitchen water is 'dark' greywater that is considered to have high nutrient, solid organic matter, fats, oil, grease and chemical loads. The pathogen and salt content in kitchen water is often low due to the use of dishwashing liquids with disinfectants, but these same disinfectants will make the greywater unusable, unless you have a good treatment system. Reusing untreated greywater from the kitchen on your garden is not recommended.

Cleaning products

All greywater will contain chemicals from soaps, shampoos and detergents. It is easier to reduce the amount of these used, or to use greywater-friendly products than to remove these chemicals from the water through treatment.

Cleaning products should be used as sparingly as possible. Laundry greywater can be highly saline, have a high pH (alkaline/caustic) or contain aggressive chemicals. The chemical and antibac-

organic bio

electrosense

terial content of some surface cleaners, hand washing and laundry soaps make them problematic for reuse. Personal soaps, shampoos and conditioners are generally milder and more diluted, making them more acceptable for reuse if used in moderation. Ingredients to avoid when recycling your greywater are disinfectants, fats, surfactants, salt, bleach, phosphorus, nitrogen and preservatives.

A general rule of thumb is that liquid detergents will contain less salt, which is used as a filler in many powders. You can crudely test the pH with an aquarium pH kit or litmus paper.

Appliances

Dishwashers use heated water so you will have to investigate the temperature of the disposed water and its causticity. Hot, caustic water will quickly kill plants and soil critters. Dishwashers are best treated as blackwater.

In the laundry, top-loading washing machines tend to use more water per wash than front or tumble washers. For energy efficiency and safer wastewater, use cold wash cycles. Some machines don't like water backing up around their discharge pipes. Make sure the plumbing to your greywater system can deal with the flow produced by your machine, otherwise you may have a lot of dripping clothes to hang, even after the spin cycle.

Where can you use greywater?

Ornamental plants that are nutrient and water hungry are well suited to greywater dosing. Care should be taken with prized plants, as regular and continuous watering with untreated greywater that contains sodium salts and other chemicals may damage sensitive plants.

Indigenous plants will have adapted to the soil type in your area. Australian

Suppliers' details

Aerocycle Water Treatment P/L Lot 11 York Rd Riverstone NSW 2765 ph: (02) 9838 1677 / 1800 007 878

Aqua Clarus P/L PO Box 1172 Beenleigh QLD 4207 ph: 1300 368 158 info@aquaclarus.com www.aquaclarus.com

Biolytix PO Box 591 Maleny QLD 4552 ph: 1300 881 472 info@biolytix.com www.biolytix.com

Envbiochem Solutions Australia P/L PO Box 2060 Taylors Lakes VIC 3038 ph: (03) 9356 9040 isosa@envbiochem.com.au www.envbiochem.com.au

Environment Equipment P/L 41 Jarrah Drive, Braeside VIC 3195 ph: (03) 9587 2447 enquiry@rotaloo.com www.rotaloo.com

Everwater Australia P/L 2/17 Simms Rd Greensborough VIC 3088 ph: (03) 9432 0222

Greywater Rainwater Automated Solutions P/L 65 Grange Rd Cheltenham VIC 3192

Nylex Water Solutions 20 Purton Rd Pakenham VIC 3810 ph: 1300 138 265 info@nylexwater.com.au

New Water Corp. P/L 2 Melba Ave Lilydale VIC 3140 ph: 1300 552 695 www.rainreviva.com.au

Perpetual Water P/L PO Box 6112 Phillip ACT 2606 ph: (02) 6162 0650 sales@perpetualwater.com.au www.perpetualwater.com.au

Sampford & Staff 421 Smith St Fitzroy VIC 3065 ph: (03) 9418 5845 smaunders@sampford.com.au www.pontos-online.de

Septech Industries Australia P/L 14 Burgfess Rd Bayswater Nth VIC 3153 ph: (03) 9729 8655 ken@septech.com.au www.septech.com.au

Suncoast Waste Water Management 6-40 Olsens Rd Ilkley QLD 4554 ph: 1800 450 767 info@ozzikleen.com www.ozzikleen.com

Water Recycle Group GPO Box 2609 Canberra ACT 2601 ph: 1800 333 812 sale@waterrecycle.com.au www.waterrecycle.com.au

Wattworks P/L PO Box 569 North Balwyn VIC 3104 ph: (03) 9859 8688 wattorks@ozemail.com.au www.wattworks.com.au

plants have evolved to deal with dry and wet periods, but are sensitive to excess phosphorus, a nutrient deficient in Australian soils. Indigenous plants should be watered intermittently to allow the area to process any excess nutrient before it receives more. Salt build-up can also kill plants.

Lawns should be saturated and then left to dry to encourage deep root growth.

Vegetable gardens are a little trickier to irrigate with untreated greywater. Although the plants can utilise the nutrients present in greywater, pathogens are also likely to be present. **Never irrigate vegetables with greywater that you are going to eat raw.**

Conclusion

The greywater choices available to you are many and will vary with each household. This is part of the reason why the market for greywater systems has taken some time to develop and regulators are still reluctant to accept them. With time, more greywater reuse on individual and subdivision levels will occur to ameliorate our water shortages.

Another deterrent to the wide uptake of greywater systems is the cost. If you are thinking of using greywater to save money, you're going down the wrong path. If you're doing it for your own peace of mind, to recover resources and reduce your impact on the environment, you're on the ball. ✧