THE WATER CONSERVATION ALLIANCE
OF SOUTHERN ARIZONA PRESENTS:

Graywater Guidelines

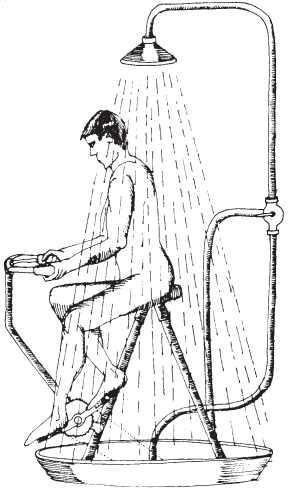
WRITTEN BY VAL L. LITTLE

WATER
C·A·S·A

INTRODUCTION

You might have a family member or friend who is old enough to remember using a hand pump to draw water or who may have had to haul water from a distant supply. Ask them how many times water was used before pouring it on a tree near the house or onto the kitchen garden out the back door. Using precious water just once would have been considered wasteful and just not done in those days.

Nowadays we take our water supply very much for granted. We turn on the tap and there it is in fresh hot or cold abundance. We let it run while we brush our teeth, look at ourselves in the mirror, talk to a family member or just daydream. It is all so easy and so inexpensive that we rarely give water much thought.



Velocipede Recycling Shower

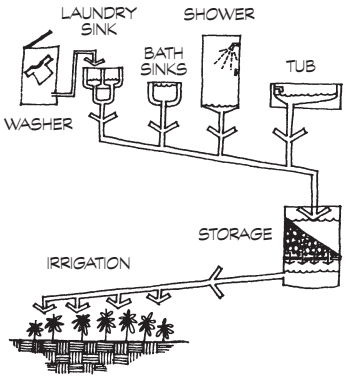
In recent years, with growing populations and limited amounts of fresh water available, water conservation, or the efficient use of water, has assumed greater importance in our lives. People are looking for ways to use less water or to use water more than once. This leads some people to wonder about just how or if they should reuse graywater in their gardens.

The Water Conservation Alliance of Southern Arizona (Water CASA) hopes the information on the following pages will help you decide whether use of your graywater for landscape irrigation is right for you. We also hope it will assist you in determining whether it is possible or feasible for you to make economical use of your graywater.

Water CASA has worked diligently over the past few years to clarify the extent of graywater use and the health implications of it in Southern Arizona with research and advocacy. The results of these efforts are a set of rules for residential graywater use that are simple and straightforward. The new rules, implemented by the Arizona Department of Environmental Quality in January of 2001, are contained in this publication on page 21.

What is Graywater?

Graywater is wastewater from your laundry, bathtubs, showers, and bath sinks (lavatories). Water from your clothes washing and bathing is, for the most part, an excellent source of water to irrigate your residential landscapes and compost piles.



Graywater System Schematic

What Graywater is Not . . .

For the purpose of regulation in Arizona, water from kitchen sinks and dishwashers is not considered graywater. The reason for this is the potential for increased health risks associated with the organic matter commonly associated with food preparation and cooking.

Water from your toilet, which is considered blackwater, is not suitable for any reuse in or around your home.

Graywater is not to be confused with reclaimed water which is water from a municipal sewer system that has been treated and then delivered to high-volume water users such as golf courses, parks and playgrounds via a separate distribution system.

Can I Use My Graywater?

In 2001, the Arizona Department of Environmental Quality (ADEQ) issued new regulations for the use of residential graywater. These new rules make it possible and feasible for the general public to use their graywater for landscape irrigation. The full text of the new straightforward, common sense rules can be found on page 21 of this booklet.

The new rules state you may legally use graywater from your clothes washers, bathtubs, showers, and bath sinks (remember, kitchen sink water is not allowed to be reused) without applying for a graywater permit, **if your answer is yes to all of the following statements:**

Yes . . .

- ❍ All my graywater originates from my own residence and is used within my property boundary for household gardening, composting, lawn watering, or landscape irrigation.
- ❍ My household generates less than 400 gallons of graywater per

day (20-35 gallons per day X number of residents = the approximate amount of graywater your family creates in a day.)

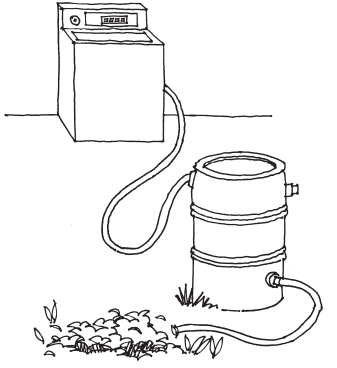
❍ I avoid direct contact with my graywater and do not allow others to contact it directly. This means my children won't be making mudpies with this water and my pets won't play in it either.

❍ My graywater irrigation is only by flood or drip. I do not spray irrigate with my graywater.

❍ My graywater is not used on the surface for irrigation of food plants, except for citrus and nut trees.

❍ I don't allow my graywater to contain hazardous chemicals derived from activities such as cleaning of car parts, washing of greasy or oily rags, or disposal of waste solutions from home photo labs or home occupational activities.

❍ I apply my graywater to my landscape in such a way that it minimizes standing water on the surface.



❍ My graywater system is constructed so that in the case of a blockage, plugging or backup of the system, all my graywater can be directed into the sewage collection system or on-site wastewater treatment and disposal system, as applicable. (The graywater system may include a means of filtration to reduce the opportunity for plugging and to extend the system lifetime.)

❍ If I have a graywater storage tank, it is covered to restrict access and to eliminate habitat for mosquitoes or other vectors.

❍ My graywater system is sited outside of any flood way.

❍ My graywater never comes within five feet (5') of the top of the seasonally high groundwater table.

❍ If I use any pressure piping in my graywater system that might be susceptible to cross connection with a potable water system, the piping is clearly marked.

❍ My graywater does not contain water from a washing machine that is used to wash diapers or similarly soiled or infectious garments unless that graywater is disinfected before irrigation.

Why Should You Use Your Graywater? Because You Will . . .

- Use less of our valuable potable or fresh water.
- Save money on your water bill.
- Also, save money on your sewer bill. (Did you know that your sewer bill is calculated from your water use during the three winter months when outdoor use is lowest?) If you do any irrigating during December, January, and February, which many of us do to augment our less than dependable winter rains, you cut down on the volume of potable water you use, thus reducing your sewer fees, if you irrigate with graywater.
- Have the satisfaction of taking responsibility for efficient use of a valuable, finite resource.
- Be "drought proofing" your landscape by using your graywater, since more than half of the water you use indoors can be reused as irrigation water during shortages, when outdoor watering may be restricted.
- Have a constant source of water for irrigation and your compost pile, except when you are away from home.
- Possibly be adding nutrients from your graywater beneficial to your plants and to your soil.

Do Not Use Your Graywater If . . .

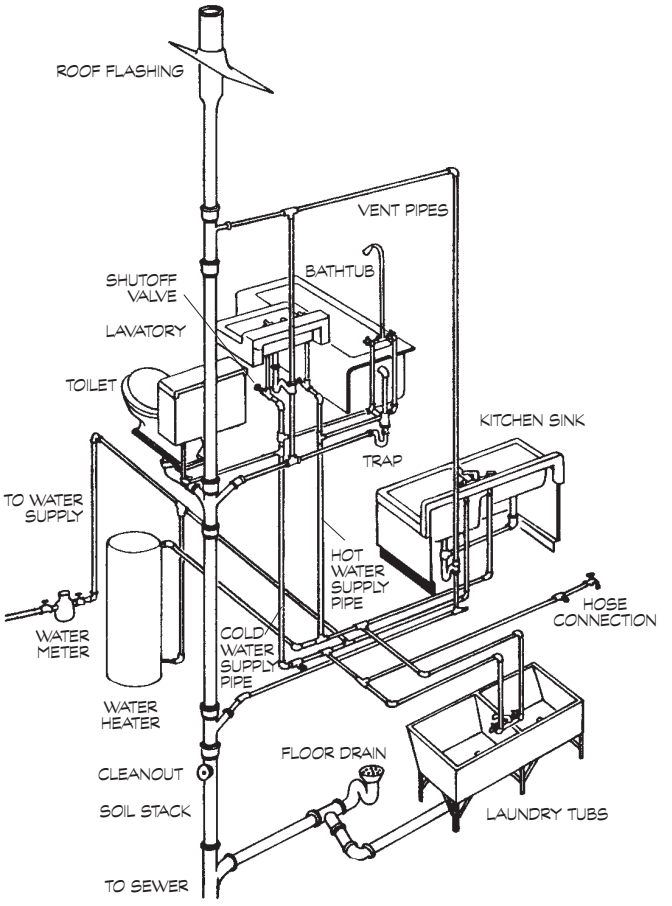
- You don't have sufficient space or have no plants to irrigate.
- It is not possible to access your drain pipes, making graywater use uneconomical.
- Your soil is unsuitable; it won't allow appropriate drainage and percolation of your graywater.
- Your graywater would be discharged against your house foundation, as it could cause damage to your home. Try to keep irrigation four feet from the house.
- You have a water softening system. The salts used to soften your water make it unsuitable for use on plants.
- You have a family member with an infectious health condition, or if you wash diapers and don't treat your graywater.

If You Want to Use Your Graywater, What Should You Do First?

If you wish to install a graywater system at your EXISTING residence, carefully consider all of the following. If you are planning a NEW residence, consider all the following, as well as the considerations for new dual plumbed residences found on page 17.

1. Read and make sure you understand the do's and don'ts of the new Residential Graywater Reuse Rules found on page 21 of this booklet. Were you able to answer yes to all the questions posed on pages 2 and 3?
2. Determine if it is feasible for you to access your laundry water. Is your laundry located outside? In the garage? On an outside wall? The answers to these and other similar questions will help you decide.
3. Decide whether or not it is feasible to make use of your bathroom tubs and shower or sinks.

   Where are your bathrooms? Are they located In the interior of the house? Are they against outside walls? The answer to these questions will be critical in determining your ability to access your graywater.

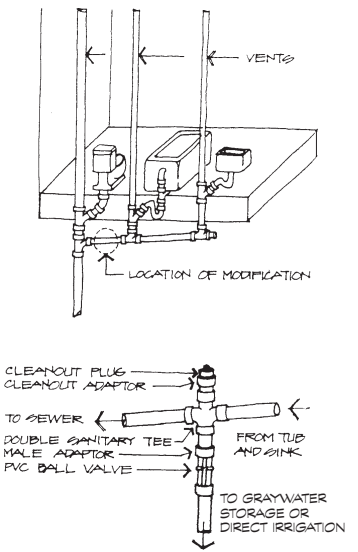


Residential Plumbing Schematic

4. Consider what plants you are going to irrigate with your graywater. Do you have special exotic plants or do you have native or desert adapted vegetation around your house?

   Where are the area(s) to be irrigated relative to the sources of your graywater? If you have laundry facilities and bathrooms in the back of your house and your garden or most of your landscaping is in the front yard, that may make your property poorly suited for graywater reuse.

5. Tapping into any part of your plumbing system has potential for creating problems, so we ask that you become thoroughly familiar with your entire plumbing system before you do anything beyond considering a graywater system. If you are unsure of the intricacies of your plumbing system, particularly the drain-waste-vent portion, consult with a professional.



Plumbing Modifications (typical)

6. Analyze your site. Determine how much graywater your household will generate from the sources you are able to access readily. Figure your irrigation needs for existing plants in your yard or for landscaping you plan to install. Again, ask yourself where your need for graywater irrigation is relative to your graywater sources.

Plumbing Considerations

- Try to direct all irrigation water four feet (4') from your building foundation.
- Get professional advice, assistance, or have the work done by a professional if you are unsure of your expertise.
- Be sure to get your free plumbing permit and inspection.
- Use flexible or rigid pipe for pressurized graywater lines that is color-coded either purple or gray: clearly differentiate them from your galvanized, copper or plastic drinking water supply lines.
- Put clear, bold signage on your storage tanks saying this is graywater not suitable for drinking.

Be sure to ask your local building officials about the possibility of a free plumbing permit, followed by a free inspection upon completion of your system. This will ensure that the system is installed safely so that it will not create potential health or structural hazards and that the installation complies with the State of Arizona Department of Environmental Quality Rules. The municipalities and counties within Southern Arizona, are committed to provide you with the best professional guidance toward an efficient and effective graywater system.

City of Tucson:	(520) 791-5550 www.ci.tucson.az.us
Cochise County:	(520) 432-9450 www.co.cochise.az.us/P&Z/index.htm
Pima County:	(520) 740-6520 www.dsd.co.pima.az.us
Santa Cruz County:	(520) 375-7800 www.santacruzcounty.az.org/
Town of Marana:	(520) 297-2920 www.marana.com
Town of Oro Valley:	(520) 229-4800 www.ci.oro-valley.az.us/home.asp?point
Town of Sahuarita:	(520) 648-1972 www.ci.sahuarita.az.us

What is a Graywater System?

A graywater system can be so simple it can hardly be called a "system": think carrying a bucket of shower water outside to water a special plant. It can also be so complex as to be completely impractical for the homeowner. Between these two extremes are many varieties of systems for irrigating with household graywater.

"In a residential context, any system which uses a pump, filter, or costs more than you spend on water in a year is suspect. Disinfection is extremely suspect".

Create an Oasis with Graywater

The goal is to find the level of system that makes maximum use of your graywater while minimizing your costs for the purchase, installation and maintenance of your system.

All graywater systems need a water source and a way to get the water from the source to the point of use. All other system components are optional and are where the major costs lie.

With graywater systems, there is no "one size fits all." Many companies have tried to design and market such systems and they invariably fail. Be forewarned that to install a system on an existing home is more costly and more complicated than to develop a system for a new home. You may well discover that you can't fea-

sibly access all your graywater. Without easy access to your washing machine water, you may not be able to capture and use any of your graywater.

All that being said, it is well worth looking at how simply and easily you can make use of at least some of your graywater.

Graywater System Components

See sample systems on pages 11-16 for a variety of combinations of the following components. There are many more systems than can be shown in this booklet, but the samples should help your thinking about what type of system would work for your particular residence.

Potential Water Sources

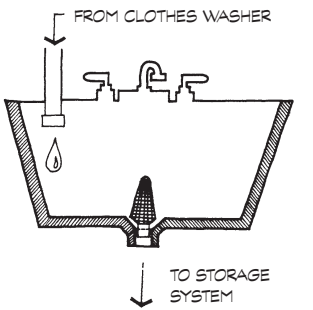
- Washing machines
- Bathtubs
- Showers
- Bath sinks (lavatory)
- Any combination of the above

Distribution: This is how you get the graywater to the plants. It might be a simple hose from your washing machine or an extensive drip irrigation system. You determine what this component will be by what and where you will irrigate with your graywater. You need also to consider your sources of graywater and type of storage or surge tank you will plan to utilize.

Conveyance: The conveyance portion of your system will consist of the pipes and valves needed to move the graywater from the source(s). *You may want to have your plumber check ANSI/NSF Standard 40 to see what requirements there may be and to check the Plumbing Code as well.*

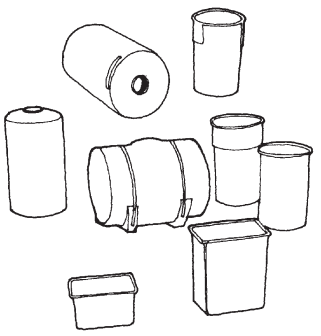
Surge Tank: This vessel can range from a simple plastic trash barrel to a large, heavy-duty container which may be above ground or buried underground. The capacity can vary from less than fifty gallons to several hundred gallons, or even several thousand gallons .

This tank typically slows the water from the source(s) and allows it to mix and is applied directly to the irrigation targets. It should be labeled as containing non-potable or graywater, unfit for drinking.



Surge Tank

For reasons of health and safety, this type of tank should only have an open top if it does not capture and store the graywater but merely allows it to surge into and then directly exit for irrigation.



Potential Graywater Storage Tanks

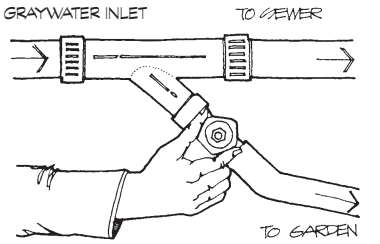
Storage Tank: Like the surge tank, this vessel can vary widely in size and expense. A storage tank holds the graywater until you are ready to use it, and has an on-and-off valve for dispensing the water as needed. It should also have a valve allowing for appropriate overflow of graywater.

For reasons of health and safety, this type of tank should never have an open top: think mosquitos and curious children.

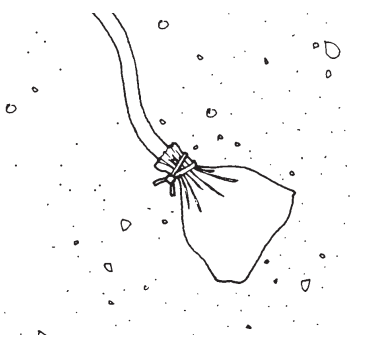
This tank should be labeled as containing non-potable or graywater, unfit for drinking.

Valves: A three-way or butterfly valve is a required component of any graywater system. This allows the graywater to be diverted to the sewer or septic system rather than be dispensed for irrigation.

In addition, and depending upon your system design, a backflow valve may be required to ensure safety.



Filter: A filter is an important option for any graywater system. It is generally a good idea to catch those particles of lint, hair, etc. that you don't want out on the ground in your landscape. The simplest way to filter your graywater is to use a piece of panty hose, or a sock that has lost its mate, on the end of your drainage hose. The advantage of this type of filter is that it can be easily discarded.



Nylon Stocking as Filter for Irrigation Hose

There are many other types of filters, such as screening at the point of storage, a screen in the storage tank itself, or a screen filter beyond the storage unit. Sand filtration can also be considered for more complex systems. The need for back flushing may also be an

important consideration. Take a look at the variety of filters on pages 14 and 15.

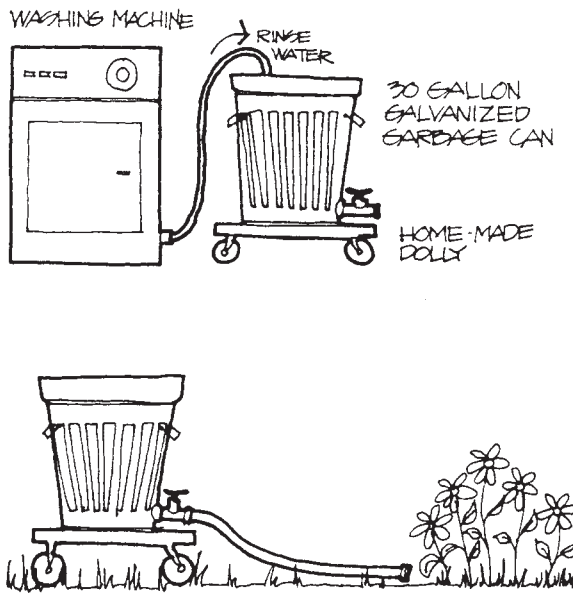
Pump: Graywater will have to be pumped at some point in the system if you cannot gravity feed your graywater to your landscape. Perhaps your graywater sources or storage tanks are not able to be located above the garden, or perhaps your garden is located above the level of the house.

The type and size of sump pump or submersible pump appropriate for your system is site- and system-specific. Check with a knowledgeable person to determine what is appropriate for you.

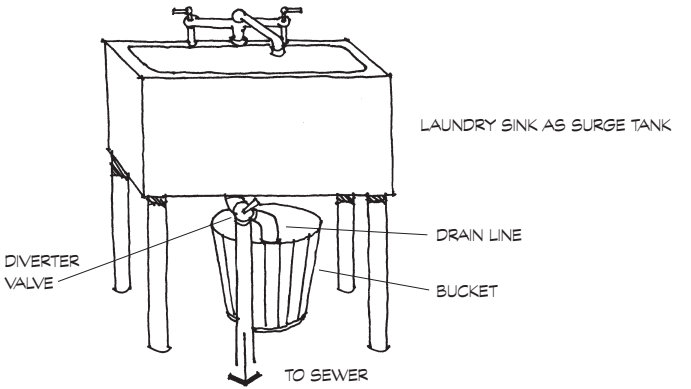
Treatment: Make every attempt to design, install and maintain your graywater system so that it does not require the water to be treated. An occasional odor problem or murkiness in the storage tank may necessitate the use of a small amount of a swimming pool chlorine tab or a small dose of bleach or peroxide.

The following graphics are provided to convey the wide variety of systems that can be designed for retrofitting a home and to help you design and install your own system.

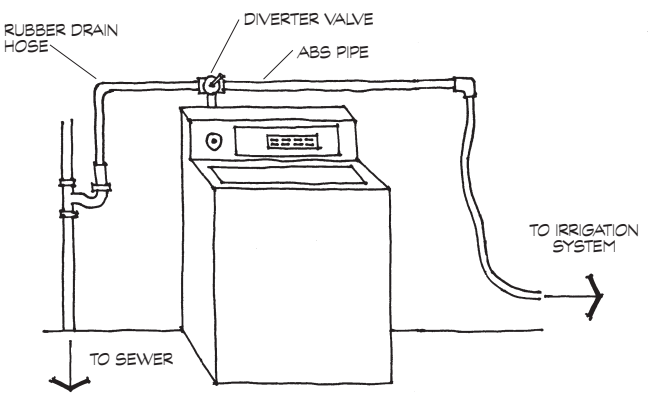
Gravity System



Gravity System with Portable Tank

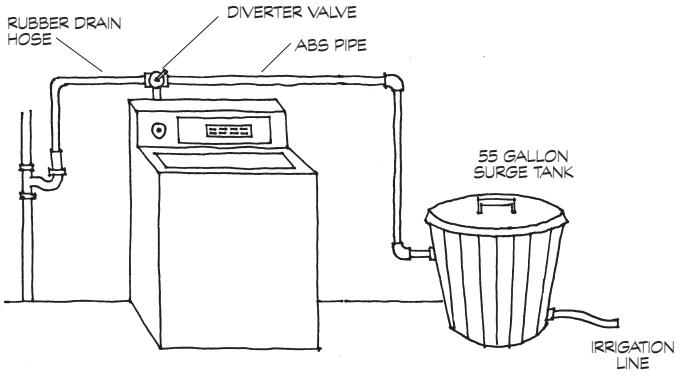


Bucket Graywater System

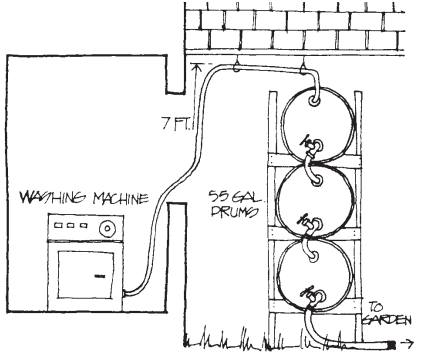


Hose Attachment Graywater System

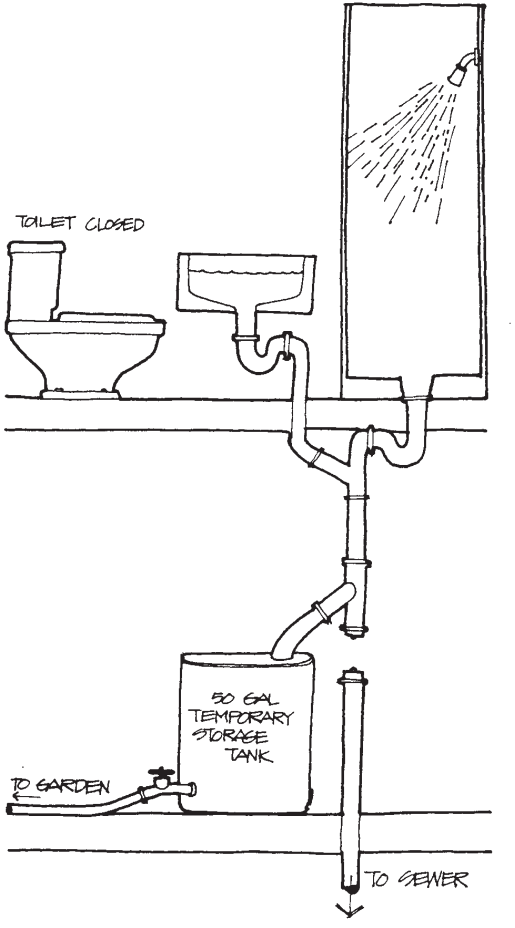
Gravity System - continued



Surge Tank Graywater System

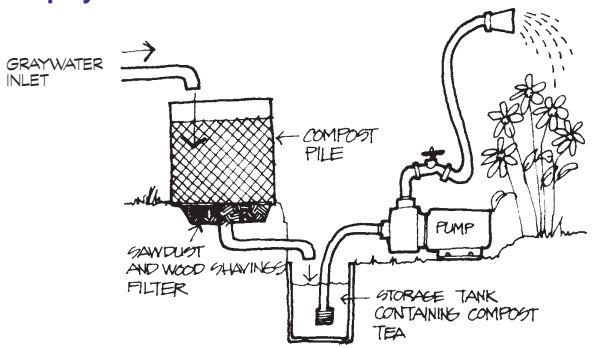


Stacked Storage Graywater System

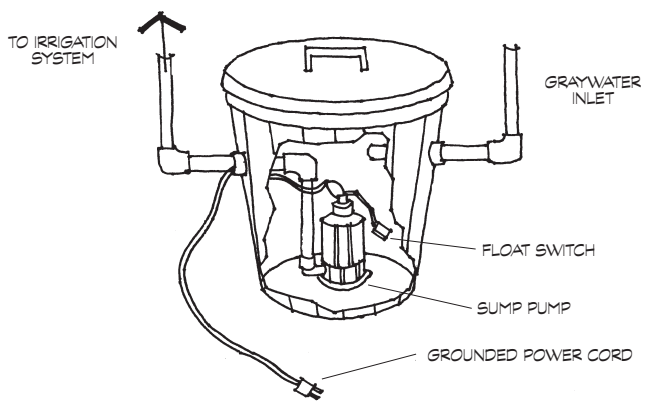


Graywater Collection from Second Story

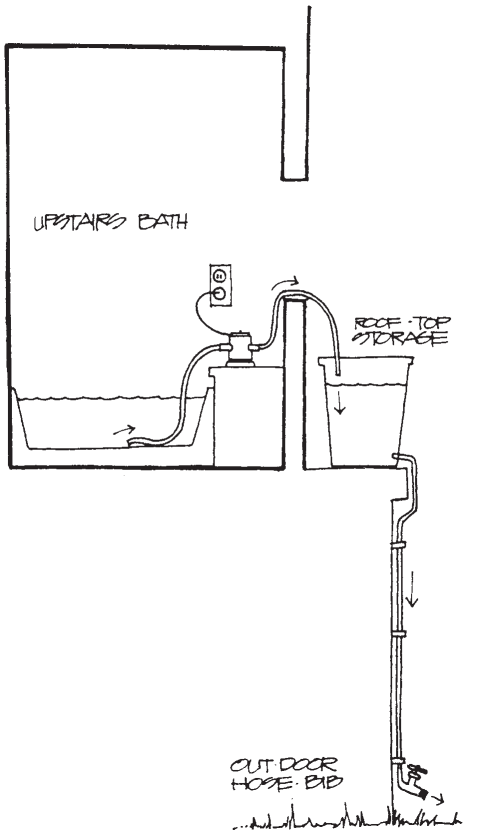
Pump System



Graywater for Composting and Irrigation Pump System

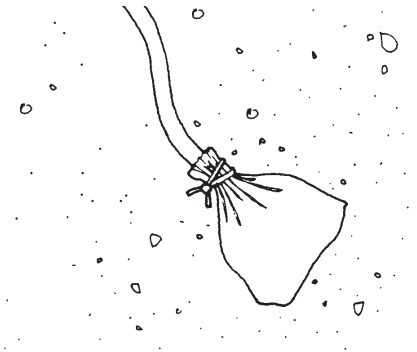


Graywater System with Distribution Pump

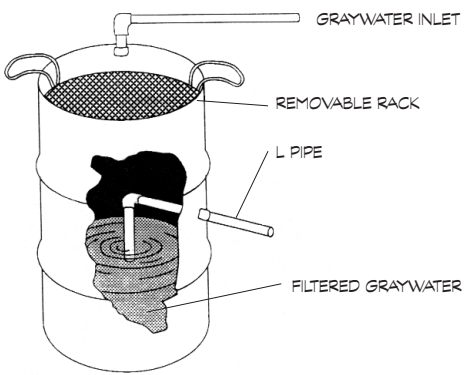


Graywater Collection from Second Story with Pump

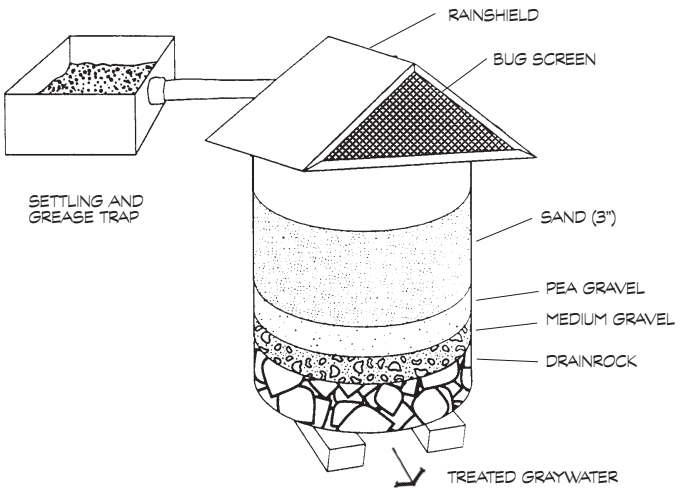
Filters



Simple Net, Stocking or Sock Filter for Irrigation Hose

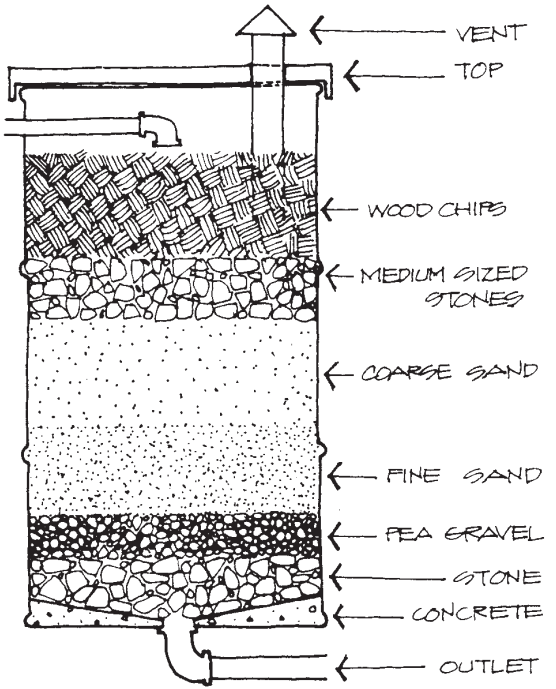


Rack Filter

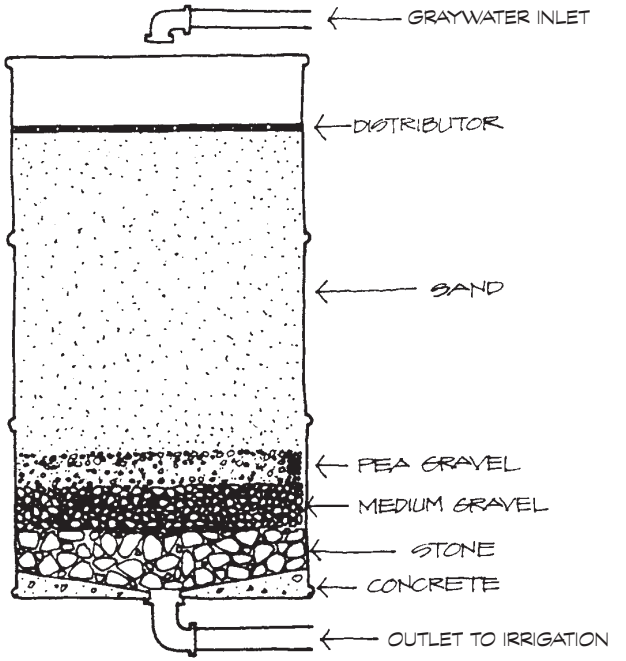


Sand Filter System

Distributor and Mixed Media Filters



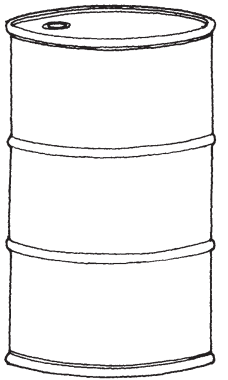
Mixed Media Filter



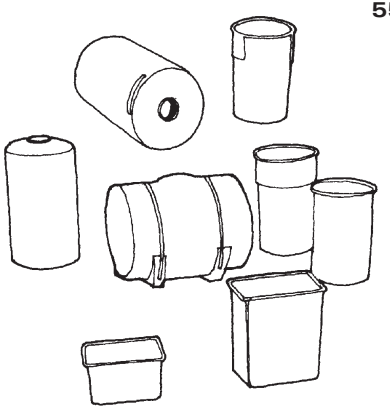
TO MAKE A DISTRIBUTOR, CUT THE TOP OF THE DRUM SO THAT IT FITS DOWN INSIDE THE DRUM. DRILL 1/2 INCH HOLES IN IT SPACED 1 INCH APART. COAT THE TOP WITH EPOXY TO PROTECT IT FROM CORROSION.

Mixed Media Filter with Distributor

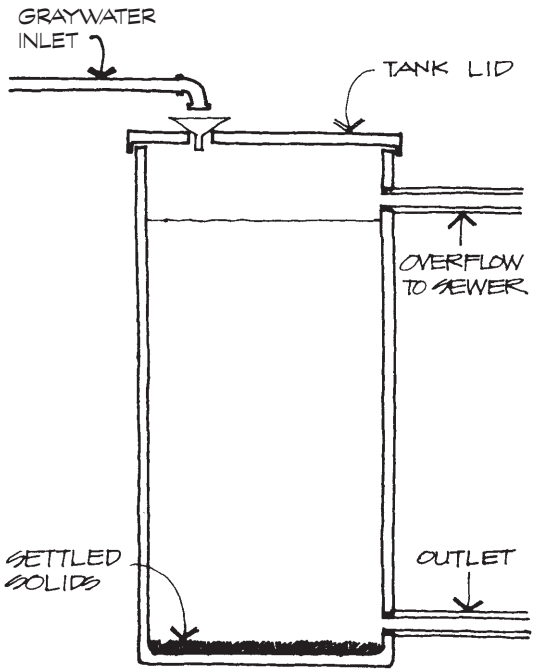
Storage Tanks



55 gallon drum



Standard Polyethylene Tanks



Graywater Storage (typical)

How Much Will Your Retrofit System Cost?

Washing machine hookup parts	$25 - $75
Shower/bath hookup parts	$45 - $95
Storage (50 - 500 gallons)	$15 - $500
(If you purchase a heavy-duty tank of greater than 50-gallon capacity, figure about a dollar a gallon for the cost of the tank.)	
Storage parts	$50 - 150
Pump (optional)	$90 - $200
Total*	**$135 - $1250**

** The irrigation system is not considered in the graywater system costs.*

Costs to assemble and install your system will vary greatly depending upon whether you do your own work or have it done professionally. You could spend $2,000 for a deluxe system, but it would not be cost effective to do so.

Additional Considerations For New Construction

To dual plumb for graywater use in any new residential construction is the simplest, most economical way to make use of your graywater.

- Read and make sure you understand the do's and don'ts of the new Residential Graywater Reuse Rules found on page 21 of this booklet. Were you able to answer yes to all the questions posed on pages 2 and 3?
- Incorporate into your design easy, but controlled, access to all sources of your graywater. (Also consider the distance from your hot water heater to where that hot water will be used. Running the faucets to get hot water creates graywater but is wasteful none-the-less.)
- Be sure your plumbing plan conforms to the Plumbing Code that is adopted and enforced by your local Building Department and to the Arizona Residential Graywater Rules cited at the end of this booklet
- If you design pressure piping into your graywater system, it may be subject to cross connection with a potable water system. Clearly mark that the piping does not carry potable water.

How Much Will a Graywater System Cost in New Construction?

Piping for the dual system may add as little as $100 - $150 to the cost of the building project and be a strong selling point.

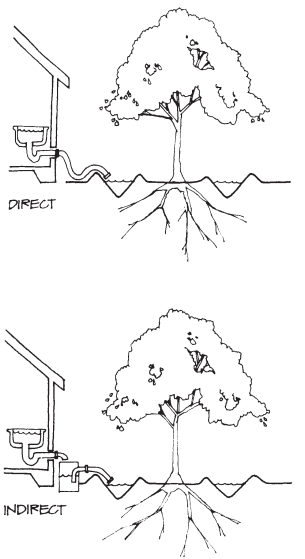
Storage (50 - 500 gallons)	$15 - $500
(If you purchase a heavy-duty tank of greater than 50-gallon capacity, figure about a dollar a gallon for the cost of the tank.)	
Storage parts	$50 - 150
Pump (optional)	$90 - $200
Total*	**$65 - $650**

** The irrigation system is not considered in the graywater system costs.*

How to Use Your Graywater

Most homes produce between 20 and 35 gallons of graywater per person per day, which is about enough to water four mature fruit trees or a dozen shrubs. Given the size of your household, use these estimates to decide how you will use the amount of graywater your residence will supply.

- Consider the age and hardiness of your plants in deciding how much or how often to provide them with graywater. All plants will benefit from an occasional flushing of rainwater or tap water.
- Do not overwater your soil with graywater, or overload any sensitive plants or plant material you have recently planted.
- Deep, less frequent irrigations encourage deep, strong root systems that can tolerate longer periods of drought.
- To minimize evaporative water loss, be sure to irrigate early in the morning, preferably between 3:00 a.m. and 8:00 a.m. To do this, you will need a storage tank.
- Wait until the soil in the root zone is half dried out before you re-irrigate. To do this, you will need a storage tank or multiple areas on which you can use your graywater.



Furrow and Basin Irrigation with Graywater

- Be sure you are reaching the entire depth and width of your plants' root zones. Use of a soil probe, such as a long screwdriver or a piece of re-bar will tell you how far you have moistened your soil.
- Prevent runoff. Apply water no faster than your soil can absorb it. You will need a hose bib or flow valve on your storage tank to control the rate of application.
- Use berms or basins to hold the water where you want it; allowing it to soak in for optimum use by your plants.
- Pay attention to what your plants are telling you. Wilted or curled leaves or leaf drop can be signs of lack of water. Brittle leaves, wilted shoot tips, or soft plant tissue can mean over watering.

Detergents and Soaps

If you plan to use washing machine water to irrigate, you need to be aware that detergents and other laundry products use a variety of chemicals to aid in cleaning. Some of these ingredients can be harmful to your plants. Consider the following product characteristics when planning your overall graywater system and how you will use the graywater you generate.

Alkalinity/Acidity - refers to the relative pH of soil. In our area, lowering the pH of the soil to make it less alkaline is generally desirable and beneficial to your plants.

Boron - considered a plant micro nutrient, required in only very, very small amounts. Most soils provide adequate amounts of this chemical. Concentrations only slightly higher than those considered beneficial can cause injury or death to plants.

Nitrogen - a very necessary nutrient for plant growth. It is extremely beneficial as a supplement to your landscape plants.

Phosphorous - a necessary plant nutrient, which is very beneficial to your landscape plants.

Potassium - a plant nutrient which is, in general, beneficial, though not as necessary in our soils as in more acidic soils

Sodium - can act as a plant poison by reducing the plant's ability to take up water from the soil. It can build up in the soil gradually increasing its toxicity, which is the last thing we need more of in our desert soils.

Chlorine - undesirable for plants in large amounts, though found in small amounts in many municipal water supplies. Bleaches and detergents carry larger amounts of chlorine, but it is generally

expended in the washing process. Minimizing its contact with your garden is an important goal.

Appropriate Plant Materials For Graywater

In general, native plants, desert-adapted plants and tough drought-tolerant plants will do best with graywater irrigation.

- Consider trees such as mesquite, palo verde, cypress, olive, and juniper.
- Also, shrubs such as oleander, rosemary, and hopseed bush.
- Bermuda grass loves graywater - if you must have some grass.
- Graywater is typically alkaline so avoid using graywater on acid-loving plants such as azaleas, begonias, gardenias, hibiscus, camellias, and ferns.

Special Irrigation Considerations

- Disperse graywater around the yard and garden to avoid buildup of harmful ingredients
- Do not apply to potted plants or young seedlings unless you alternate with fresh water or dilute the graywater.
- Do not use graywater extensively on acid-loving plants as graywater is typically high in salts.
- If graywater is to be used for irrigation of plants with edible parts, a subsurface irrigation must be used. The only exceptions are citrus and nut trees.
- Avoid using graywater on crops to be eaten raw such as lettuce.
- On root crops, use both graywater and fresh water to avoid any pollutant buildup.
- Use graywater on crops like tomatoes where the edible parts are not in contact with the graywater.
- Fruit trees and ornamental trees are grateful recipients of graywater.

Arizona Department of Environmental Quality Residential Graywater Reuse Rules (effective January 2001)

Title 18. Environmental Quality

Chapter 9. Department of Environmental Quality Water Pollution Control

Article 7. Direct Reuse of Reclaimed Water

R18-9-701. Definitions

Unless provided otherwise, the definitions provided in A.R.S. § 49-201, A.A.C. R18-9-101, A.A.C. R18-9-601, A.A.C. R18-11-301, and the following terms apply to this Article:

4. "Gray water" means wastewater collected separately from a sewage flow that originates from a clothes washer, bathtub, shower, and sink, but does not include wastewater from a kitchen sink, dishwasher, or toilet.
6. "Irrigation" means the beneficial use of water or reclaimed water, or both, for growing crops, turf, or silviculture, or for landscaping.

R18-9-711. Type 1 Reclaimed Water General Permit for Gray Water

A. A Type 1 Reclaimed Water General Permit allows private residential direct reuse of gray water for a flow of less than 400 gallons per day if all the following conditions are met:
   1. Human contact with gray water and soil irrigated by gray water is avoided;
   2. Gray water originating from the residence is used and contained within the property boundary for household gardening, composting, lawn watering, or landscape irrigation;
   3. Surface application of gray water is not used for irrigation of food plants, except for citrus and nut trees;
   4. The gray water does not contain hazardous chemicals derived from activities such as cleaning car parts, washing greasy or oily rags, or disposing of waste solutions from home photo labs or similar hobbyist or home occupational activities;
   5. The application of gray water is managed to minimize standing water on the surface;
   6. The gray water system is constructed so that if blockage, plugging, or backup of the system occurs, gray water can be directed into the sewage collection system or on-site wastewater treatment and disposal system, as applicable. The gray water system may include a means of filtration to reduce plugging and extend system lifetime;
   7. Any gray water storage tank is covered to restrict access and to eliminate habitat for mosquitoes or other vectors;
   8. The gray water system is sited outside of a floodway;
   9. The gray water system is operated to maintain a minimum vertical separation distance of at least 5 feet from the point of gray water application to the top of the seasonally high groundwater table;
   10. For residences using an on-site wastewater treatment facility for black water treatment and disposal, the use of a gray water system does not change the design, capacity, or reserve area requirements for the on-site wastewater treatment facility at the residence, and ensures that the facility can handle the combined black water and gray water flow if the gray water system fails or is not fully used;
   11. Any pressure piping used in a gray water system that may be

susceptible to cross connection with a potable water system clearly indicates that the piping does not carry potable water;

12. Gray water applied by surface irrigation does not contain water used to wash diapers or similarly soiled or infectious garments unless the gray water is disinfected before irrigation; and
13. Surface irrigation by gray water is only by flood or drip irrigation.

B. Prohibitions. The following are prohibited:
   1. Gray water use for purposes other than irrigation, and
   2. Spray irrigation.

C. Towns, cities, or counties may further limit the use of gray water described in this Section by rule or ordinance.

R18-9-719. Type 3 Reclaimed Water General Permit for Gray Water

A. A Type 3 Reclaimed Water General Permit allows a gray water irrigation system if:
   1. The general permit described in R18-9-711 does not apply,
   2. The flow is not more than 3000 gallons per day, and
   3. The gray water system satisfies the notification, design, and installation requirements specified in subsection (C).

B. A person shall file a Notice of Intent to Operate a Gray Water Irrigation System with the Department at least 90 days before the date the proposed activity will start. The Notice of Intent to Operate shall include:
   1. The name, address and telephone number of the applicant;
   2. The social security number of the applicant, if the applicant is an individual;
   3. A legal description of the direct reuse site, including latitude and longitude coordinates;
   4. The design plans for the gray water irrigation system;
   5. A signature on the Notice of Intent to Operate certifying that the applicant agrees to comply with the requirements of this Article and the terms of this Reclaimed Water General Permit; and
   6. The applicable permit fee specified under 18 A.A.C. 14.

C. The following technical requirements apply to the design and installation of a gray water irrigation system allowed under this Reclaimed Water General Permit:
   1. Design of the gray water irrigation system shall meet the on-site wastewater treatment facility requirements under R18-9-A312(C), (D)(1), (D)(2), (E)(1), (G), and R18-9-E302(C)(1), except the septic tank specified in R18-9-E302(C)(1) is not required if pretreatment of gray water is not necessary for the intended application;
   2. Design of the dispersal trenches for the gray water irrigation system shall meet the on-site wastewater treatment facility requirements for shallow trenches specified in R18-9-E302(C)(2);
   3. The depth of the gray water dispersal trenches shall be appropriate for the intended irrigation use but not more than 5 feet below the finished grade of the native soil; and
   4. The void space volume of the aggregate fill in the gray water dispersal trench below the bottom of the distribution pipe shall have enough capacity to contain two days of gray water at the design flow.

D. The Department may review design plans and details and accept a gray water irrigation system that differs from the requirements specified in subsection (C) if the system provides equivalent performance and protection of human health and water quality.

Create an Oasis With Graywater, by Art Ludwig
A complete guide to choosing, building and using graywater systems. If you buy one book about graywater, this should be it. Though it is written for a California audience, reflecting California graywater law, it is packed with good information and is a must for the graywater enthusiast. It is available from Oasis Designs at: http://www.oasisdesign.net/

Branched Drain Graywater System, by Art Ludwig
Reliable, sanitary, low maintenance distribution of household graywater to downhill plants without filtration or pumping. A supplement to "Create an Oasis with Graywater."

The Builder's Graywater Guide, by Art Ludwig
Installation of graywater systems in new construction and remodeling. A supplement to the book "Create an Oasis with Graywater."

Basic Plumbing Techniques, Ortho Books.

Better Homes and Gardens Handyman Book.

Uniform Plumbing Code, Appendix G, Graywater Systems.

Residential Graywater Reuse Study, June 2000, Water Conservation Alliance of Southern Arizona. Available at http://www.watercasa.org.

Note:

All figures in this booklet are taken from the following publications:

Better Homes and Gardens Handyman's Book, 1970. Out of print.

Domestic Graywater: a Review of Alternatives, University of Arizona, Office of Arid Lands Study, 1992.

Graywater Use in the Landscape, Robert Kourik, 1988. Out of print.

How to Use Graywater, Santa Barbara County, 1990.

Residential Water Reuse, Murray Milne, U.C. Davis, 1979. Out of print.

Notes:

WATER CONSERVATION ALLIANCE of SOUTHERN ARIZONA

Community Water Co. of Green Valley, Flowing Wells Irrigation District,
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www.watercasa.org

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