

distribute all graywater produced daily without surfacing. To determine the amount of irrigation area you will need, first calculate the expected graywater volume using the formula prescribed in the building standards. Start by calculating the typical number of occupants for your home as follows:

- First Bedroom 2 occupants
- Each additional bedroom 1 occupant

Then estimate the daily graywater flows for each occupant:

- Showers, bathtubs and wash basins (total) 25 Gal./Day/Occupant
- Clothes washer 15 Gal./Day/Occupant

Finally, multiply the number of occupants by the estimated graywater flow.

Number of Bedrooms	Graywater flow (gal./day)
1	80
2	120
3	160
4	200

For a given graywater flow rate, the Gray Water Standards sets minimum required irrigation area for six different soil types. In some cases, the local jurisdiction may require a percolation test to determine the required area.

Cost Considerations

On average, up to 40 gallons per person of graywater is available to be recycled on a daily basis. Although this is a lot of water, the cost of potable water today is still relatively inexpensive. It will generally take many years to recoup the initial cost of a graywater system.

With the adoption of stricter plumbing code requirements, toilets now operate at 1.6 gallons per flush or less, faucet aerators reduce water flow to 1.5 gallons per minute or less, and quality, high-performance water-conserving shower heads are available. As a result, the amount of graywater available to “harvest” has been greatly reduced.

¹ Prescribed flows per the California Graywater Standards, assuming graywater collection from showers, bathtubs, wash basins, and clothes washer.

Operation and Maintenance

Graywater reuse requires extensive, ongoing education. In multi-family housing, this would require constant training for existing and new tenants. Most people have never experienced graywater harvesting, and would need an introduction to the benefits and requirements.

The Graywater Guide, published by the California Department of Water Resources, advocates four rules to follow when using graywater:

1. Don't drink or play in graywater.
2. Don't mix potable (drinking) water with graywater.
3. Don't allow anything that may be eaten to come into contact with graywater.
4. Don't allow graywater to pond on the surface or run off the property.

The same source recommends selecting garden-friendly soaps. “Most hand and dish soaps and shampoos will not damage plants at low residential concentrations. Laundry detergents, on the other hand, need to be selected carefully. Sodium and boron are chemicals that can have a negative effect on landscapes. Powdered detergents and soaps include ‘filler’ ingredients (not essential to clothes cleaning) which are usually some compound of sodium. Liquid soaps contain few fillers, thus less sodium. A few soaps are now being formulated for use with graywater systems.”

In general, you should avoid bleaches or softeners; detergents that advertise whitening, softening and enzymatic powers; and detergents with ingredients that include bleach, boron, borax, chlorine, peroxygen, sodium perborate, petroleum distillate, alkylbenzene, or sodium tryptochlorite.

Graywater should not be stored for more than 24 hours without chlorination because bacteria growth will turn it “black” and produce odors.

Household members should understand how and when to use the three-way valve to divert graywater to the municipal wastewater treatment system. Graywater should be diverted from the property’s irrigation system when (1) the graywater volume exceeds the system capacity or the landscape irrigation needs or (2) when the graywater is contaminated with human fecal matter or toxics deemed detrimental to the landscape.

Examples of contamination events that call for graywater to be sent to the sewer include:

- Washing clothes laden with pesticides, vehicle lubricants, or other toxic chemicals
- Washing clothes with bleaches or softeners
- Washing diapers
- Unclogging a drain with chemically-based products
- Clean porcelain with products designed to clean without scrubbing

It is important to check your system on a regular basis, every week or so, to see that graywater is not surfacing, that the plants and soils are healthy, and that the equipment is working properly.

For more information

- California Graywater Standards, Title 24, Part 5, California Administrative Code, Graywater Systems For Single Family Dwellings
http://www.owue.water.ca.gov/docs/Revised_Graywater_Standards.pdf
- Graywater Guide
http://www.owue.water.ca.gov/docs/graywater_guide_book.pdf
- Oasis Designs
<http://www.oasisdesign.net/greywater/index.htm>
- The Irrigation Association, irrigation information
<http://www.irrigation.org>
- For more information about the Coalition, visit our website at www.greenaffordablehousing.org or call Bruce Mast at 510-271-4785.

Disclaimer

Development of this fact sheet was funded by California ratepayers under the auspices of the California Public Utilities Commission (Commission). It does not necessarily represent the view of the Commission, its employees, or the State of California. The Green Affordable Housing Coalition, the Commission, the State of California, its employees, contractors, and subcontractors make no warranty, express or implied, and assume no legal liability for the information in this report, nor does any party represent that the use of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the Commission, nor has the Commission passed upon the accuracy of adequacy of the information in this report. Contents are provided for general education and informational purposes only. The actual suitability and applicability of this information for a given use depends upon a host of project-specific considerations. The Green Affordable Housing Coalition strongly encourages the reader to consult with a construction professional and/or product supplier before applying any of this information to a specific use or purpose.

Figure 1 adapted from *Title 24, Part 5, California Administrative Code, Appendix G, Graywater Systems*, Building Standards Commission.