

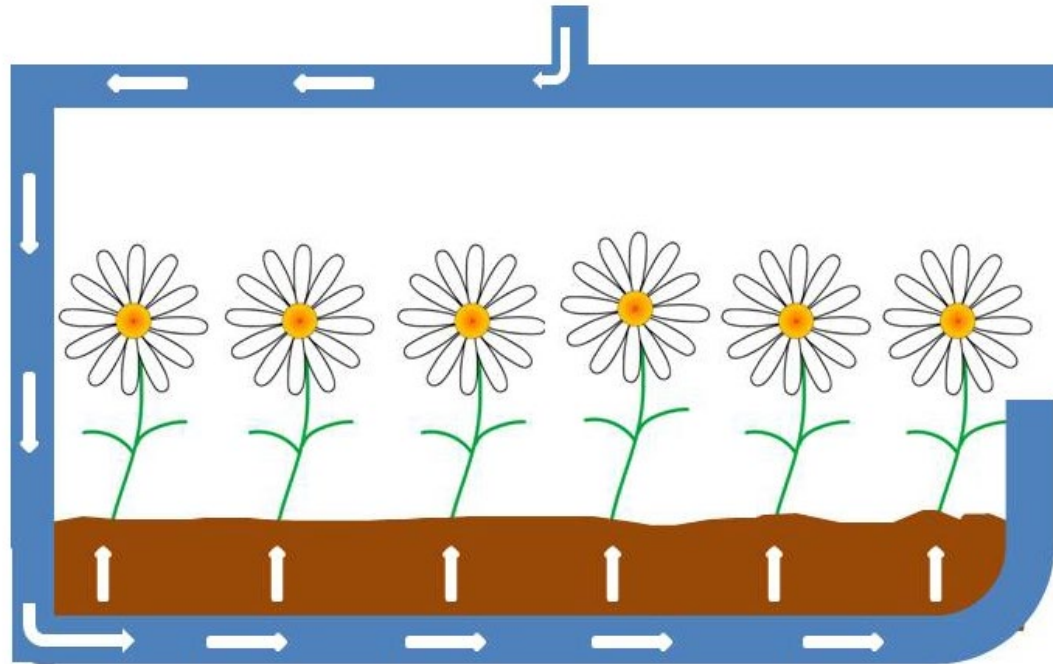
Greywater Systems

Josh Stokes

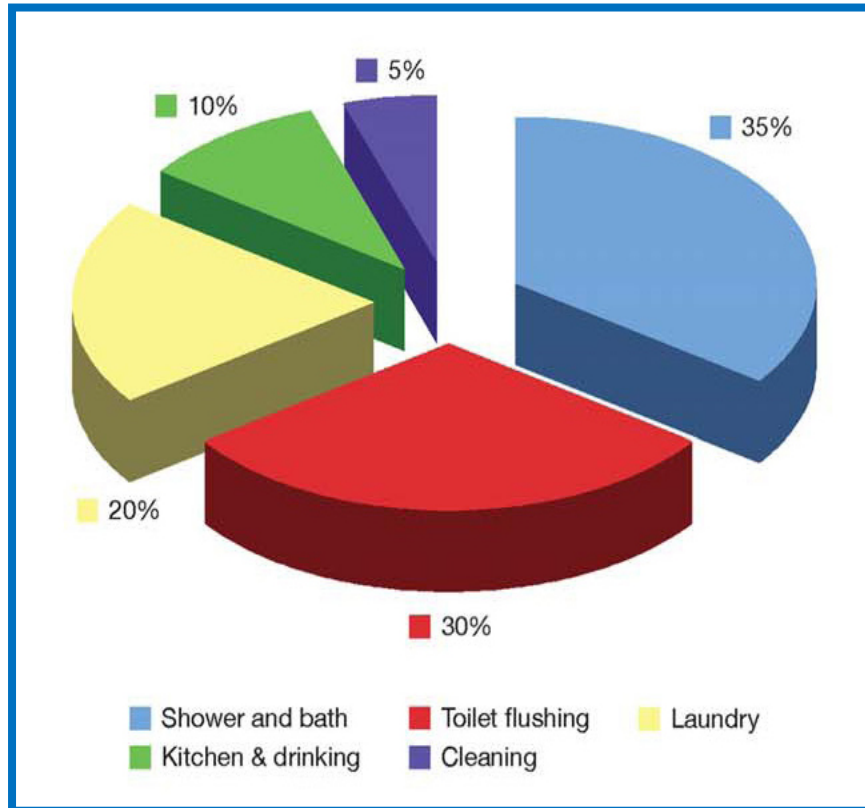
Water Conservation Specialist

City of Napa

LAUNDRY TO LANDSCAPE



How do we use our water?



Estimated Average US Household Water Usage

Shower/Bath 35%

Toilet Flushing 30%

Laundry 20%

Kitchen/Drinking 10%

Cleaning 5%

why greywater?



our municipal water has a carbon footprint!

19% of all electricity used in CA is related to water.

re-using water already used (& paid for) reduces the embodied energy per use

What is Greywater?

Greywater comes from:

- Showers and baths
- Washing machines
- Bathroom sinks



Greywater is NOT...

Water from:

- Toilets
- Kitchen sink
- Dishwasher
- Washing certain items (like dirty diapers)



Cautions

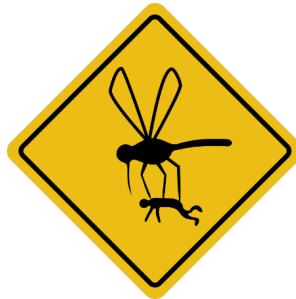
Greywater could contain pathogens

(Washing clothing with blood, etc.)

Greywater may have chemicals in it

(Oil soaked clothing, etc.)

Ponding (standing water) can breed mosquitoes





Some benefits of using Greywater:

- Saves potable water (drinking, cleaning, bathing etc.)
- Conserves energy
- Reduces demand on septic systems and wastewater treatment plants
- Encourages plant friendly product choices
- Facilitates home-grown food production

What is your Greywater production?

1. Upgrading machine in the near future?
2. Number of laundry loads per day
3. Number of gallons of water per load?
 - Efficient models \approx 15 gallons/load
 - Inefficient models \approx 40 gallons/load

Formula:

(Number of loads) x (Gallons per load) = Graywater produced

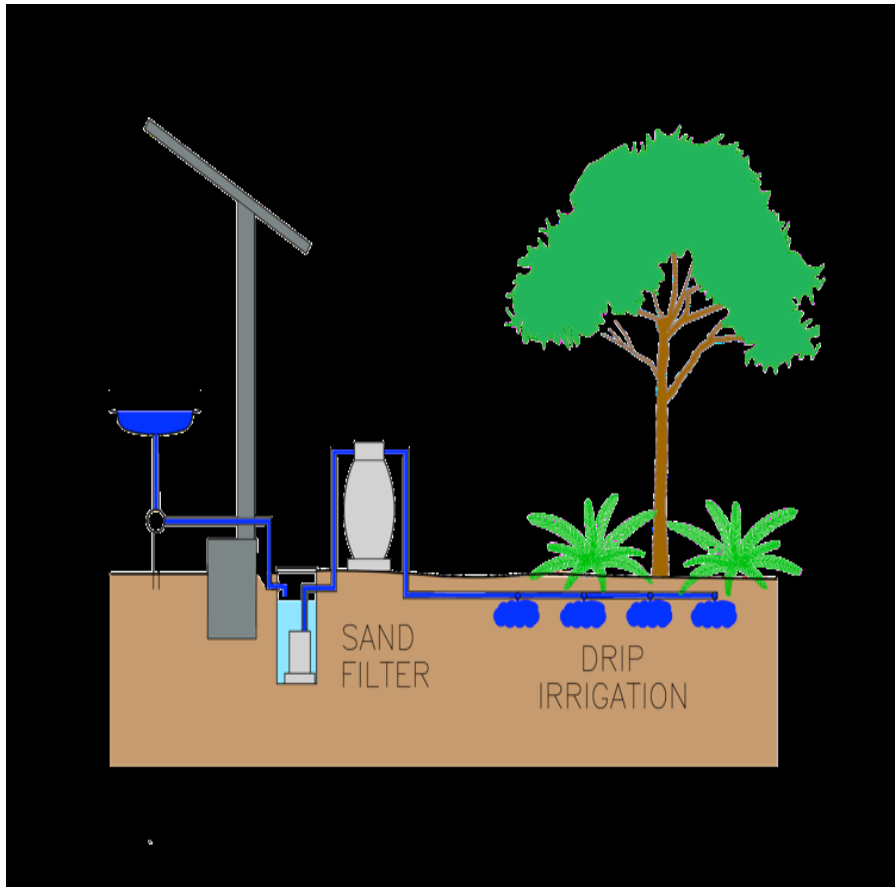
**Reuse greywater for 16-40%
reduction in total water use.**



► House using greywater for irrigation with simple laundry-to-landscape and gravity-fed systems

© Steve Sanford from The Water-Wise Home

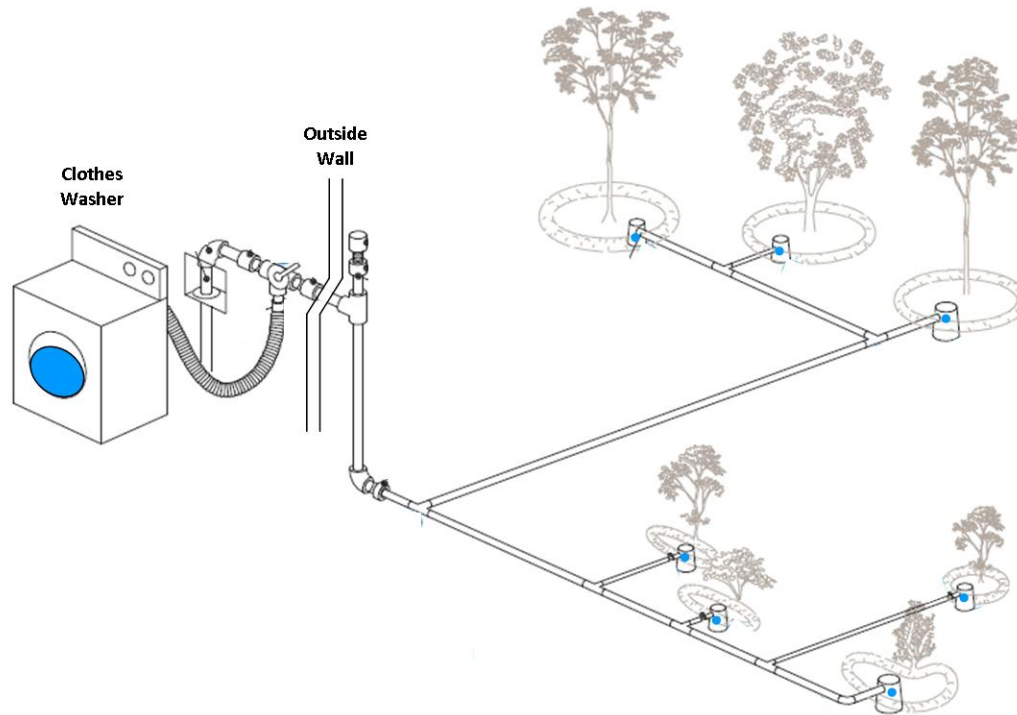
pumped and filtered system to drip:
automatically cleaned filters and multiple
irrigation zones.



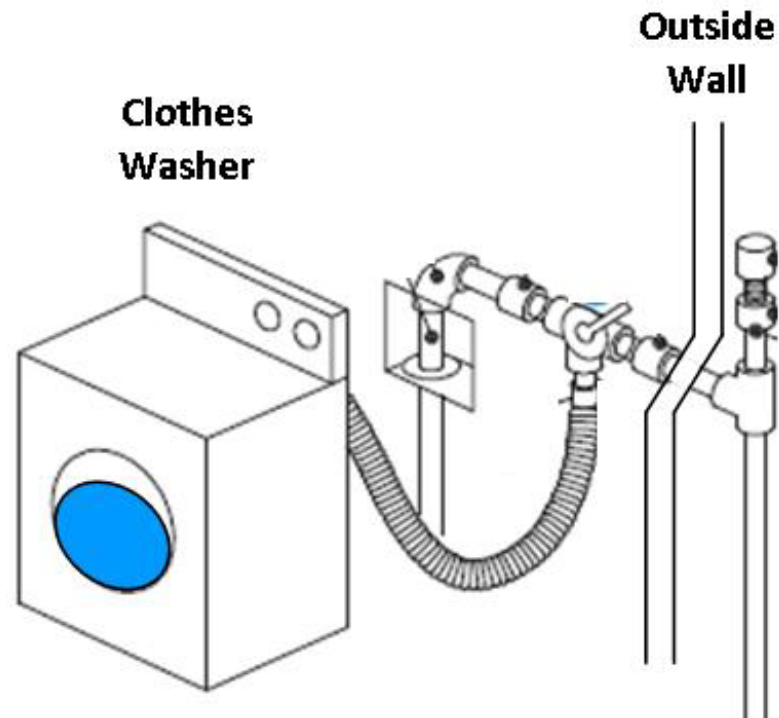
- A sump basin collects greywater from the house
- A pump pushes water through a filter which removes particles.
- Filter is automatically flushed (this requires special “backflow prevention” and permits are much more complicated)
- Filtered greywater is distributed through drip irrigation tubing to plants.
- Cost: \$10,000 - \$20,000

A Laundry to Landscape System

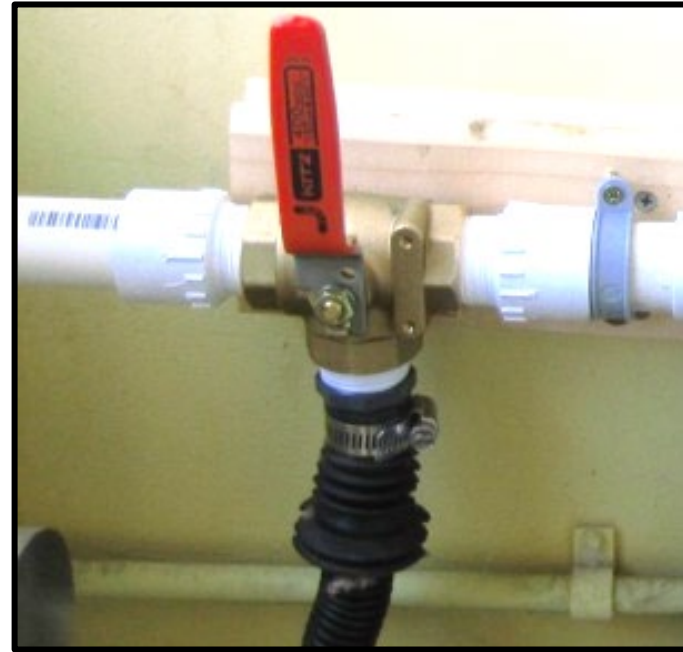
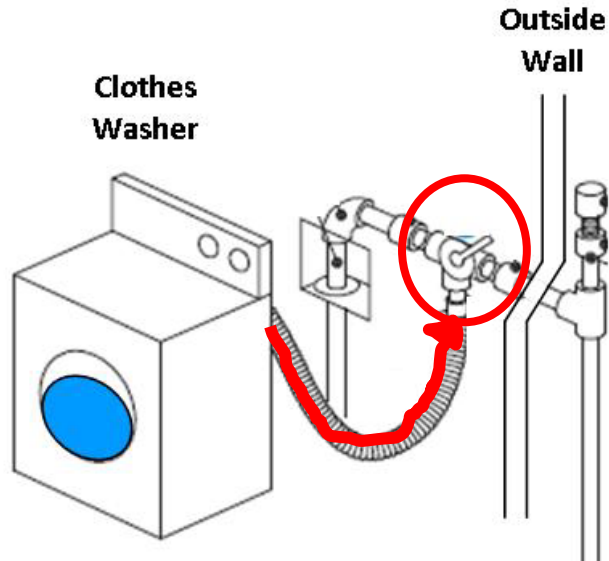
A Greywater system that requires no permit (some guidelines)



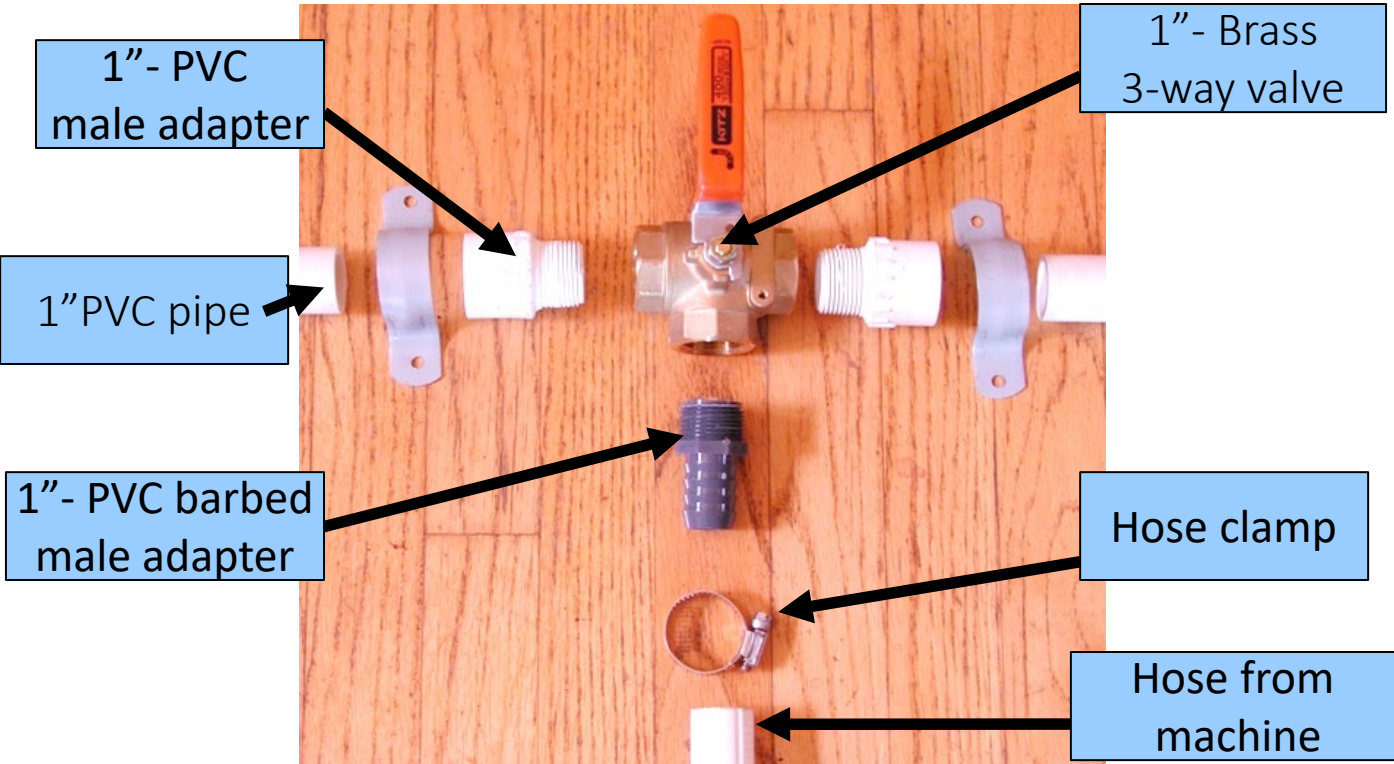
Inside Portion of System



From Washer Hose to a 3-Way Valve



Connecting the Washer Hose to the 3-Way Valve



Tips for connecting washer hose

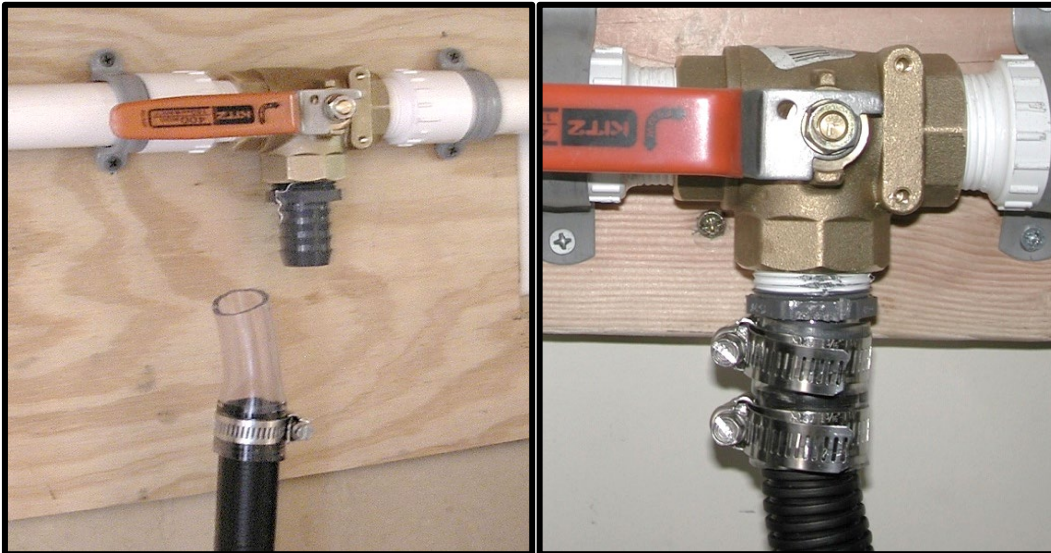
- Select the right size barbed adaptor to fit the machine discharge hose ($\frac{3}{4}$ " or 1")
- If it's difficult to slip hose over barb, heat hose with hair dryer or hot water
- Secure with hose clamp



More tips

If unable to securely fasten washer hose to barb

- Use vinyl tubing to connect them
- Secure both ends with hose clamps



Photos by:
Graywater Action

More 3-Way Valve Info



- Washer hose always connects to middle port.
- Ensure water-tight connections

Valve must be:

- Accessible
- Above washing machine



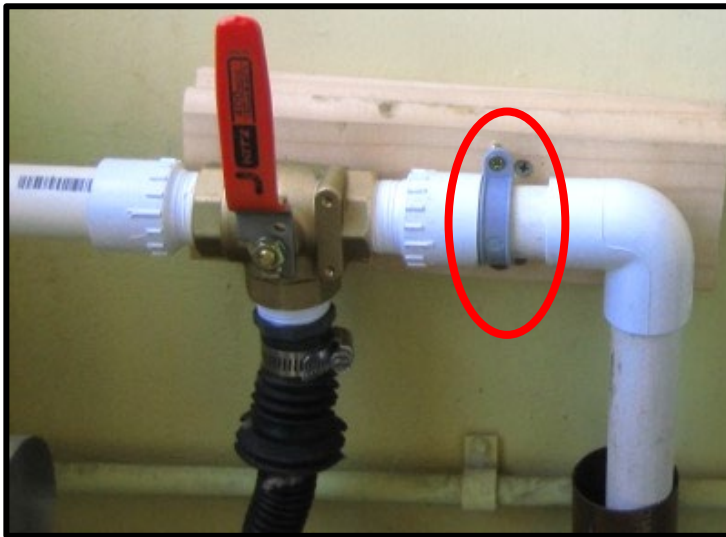
Photos by: Graywater Action

Other Examples



Strap the valve assembly

- Use 2-hole straps
- Add wood blocking if needed
- Strap so valve is secure

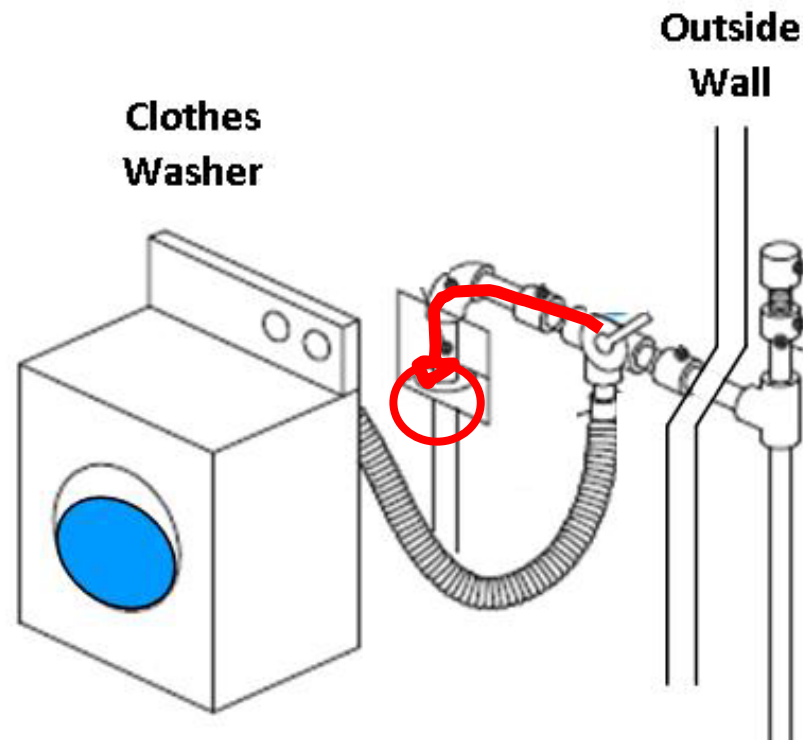


NOT recommended valve placement



Photo by: Graywater Action

3-way valve to sewer standpipe

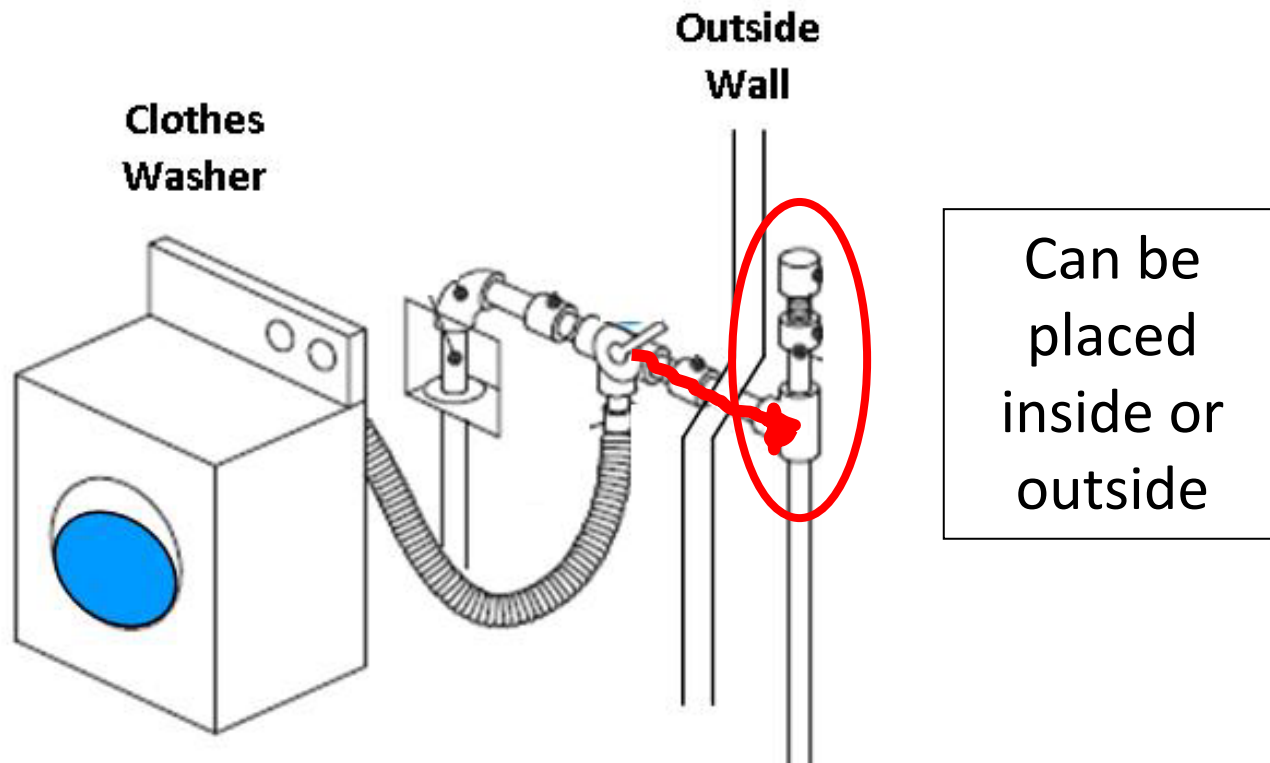


3-way valve to sewer standpipe



Keep a loose fit at the sewer connection

3-way valve to Anti-Siphon part



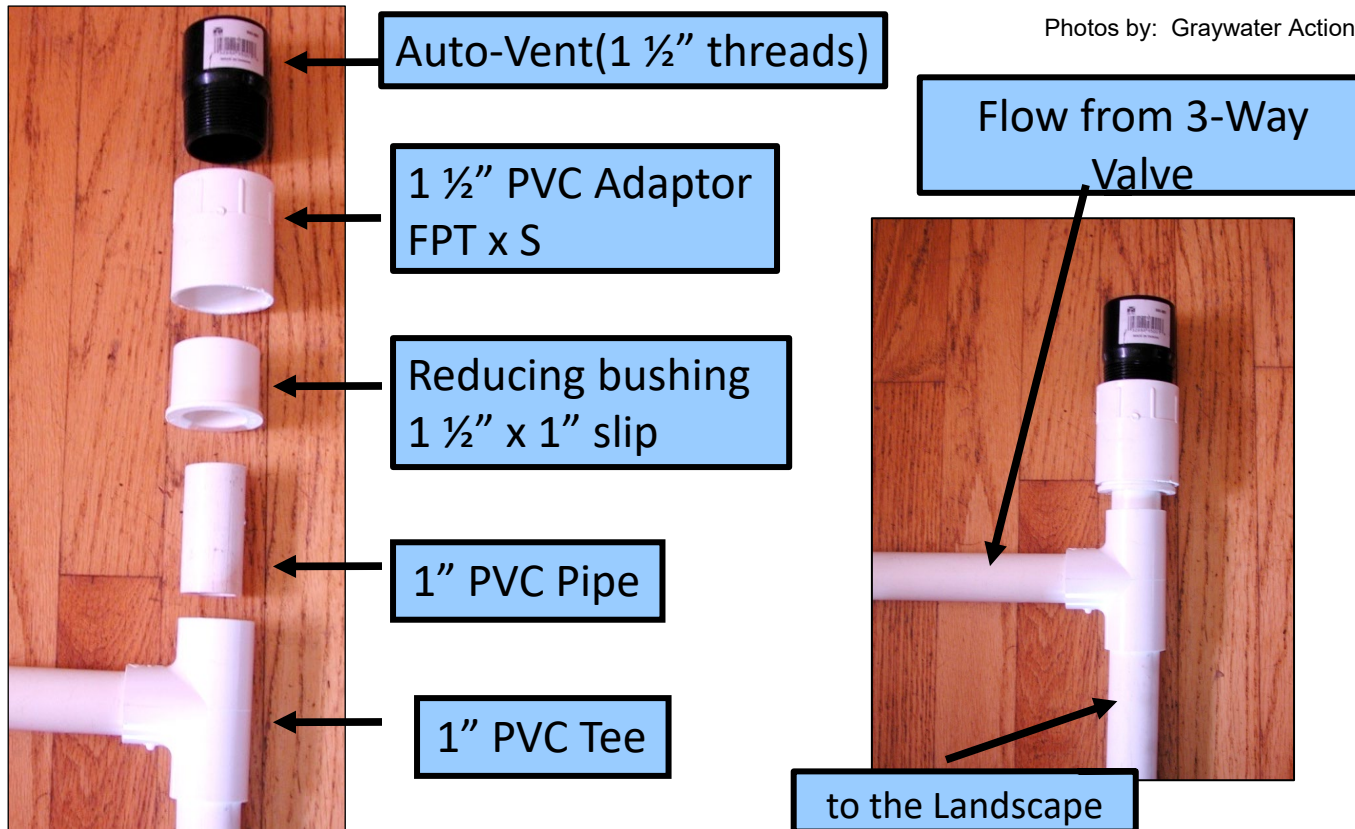
Anti-siphon Component



- To prevent a siphon from forming and draining the machine when it tries to refill.
- Also referred to as: Autovent, AAV, In-line vent, etc.

Assembling the Anti-siphon part

Photos by: Graywater Action



Anti-Siphon requirements

- Must be visible and accessible in case of leaks.
- Must be the highest point of the system.
- Must be placed on the landscape side of the 3-way valve.



Photo by: Graywater Action

Code Requirements

- 1" 3-way valve
- Label pipes with direction of water flow and:
 “Caution: Non-potable water, do not drink”
- Include operating manual
- No pump or potable water connected



What type of cleansers?

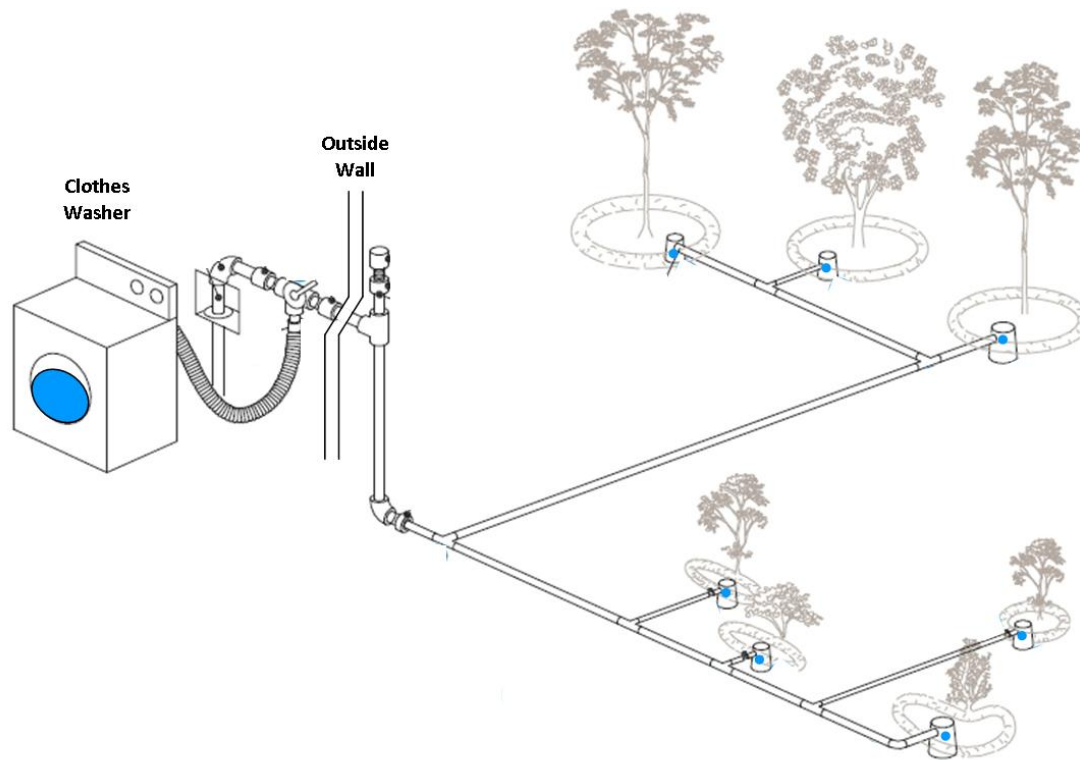
Plant-friendly products (salt, boron & chlorine free):

- Liquid laundry detergents
- Hydrogen Peroxide Bleach

Ingredients to avoid:

- Salt/sodium compounds – Common in powdered detergents, fabric & water softeners
- Boron/borates - Common in detergents and fabric softeners
- Chlorine bleach

Full system overview

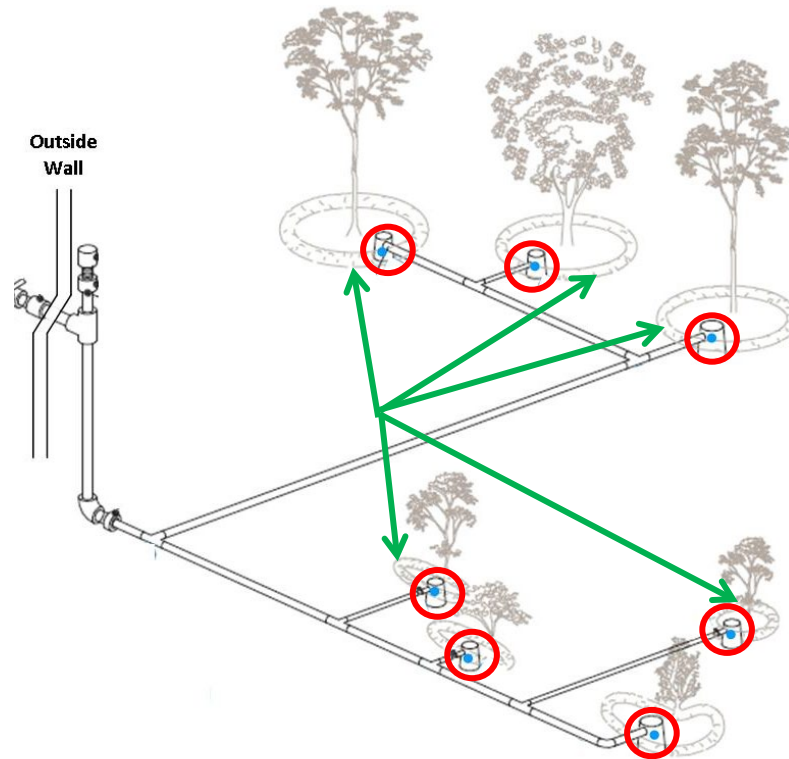


Hardscape considerations



Under, around,
cut or remove

Distribution Points / Irrigation Basins



Some definitions

- ***Irrigation (Mulch) Basin***: Trench filled with mulch designed to hold daily Greywater production.
- ***Mulch Shield*** - A subsurface discharge area that protects pipes from dirt and plant roots.



Keep a downward slope

- Irrigate on higher side of plant.
- Leave a 1" open end somewhere in system!



More distribution point mulch shields

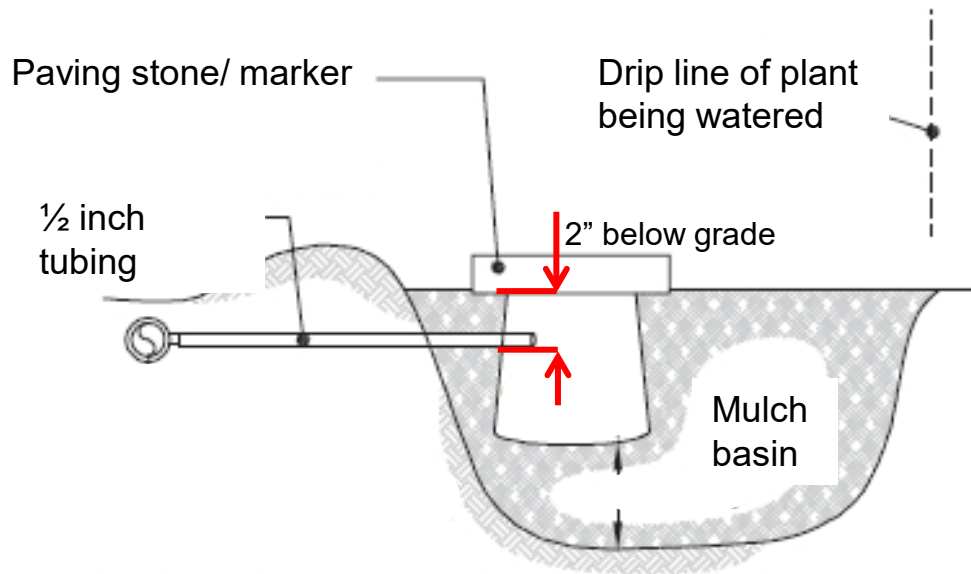


Inverted 1 gallon plant container

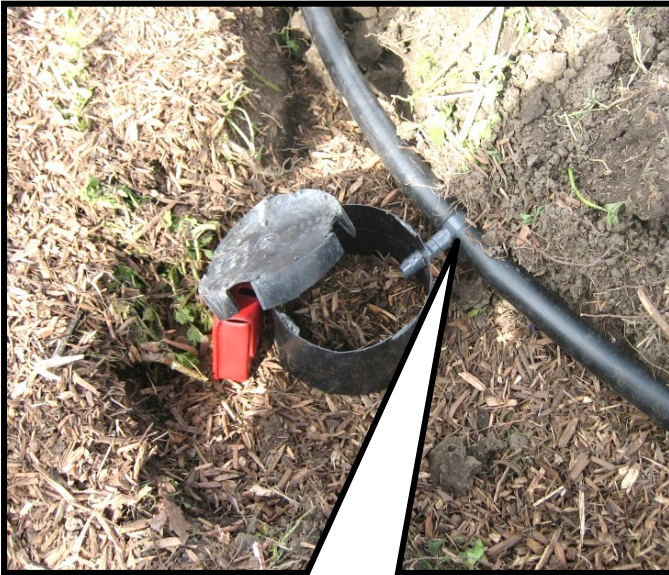


Small valve box

Inside the distribution point shield



Adjust flow to balance system



Adjust angle of tees



Ball valves can help balance flows but.....

Irrigation Basins

- No Greywater should enter the storm drain!
- For clay soil, trench 1 sq ft (shovel deep) per 1 gallon of Greywater produced daily.
- Dig at the drip line (where branches end).
- Needs to be large enough to contain all the Greywater released in a day.

Size will vary based on amount of Greywater produced, number of distribution points, and soil type.



Irrigation Basin Size?

Example:

- 4 loads of laundry (on Sat) at 15 gallons per load = 60 gallons (in one day)
- 1 gallon needs 1 sq ft basin
- 60 gallons of Greywater in one day = 60 sq ft of basin needed to contain it

From PVC pipe to HDPE

High-density polyethylene (HDPE)



This transition point will be used to flush system annually

Annual flushing of system

Disconnect HDPE from PVC.



Use a female hose adapter to connect garden hose and flush out system annually.



positioning the transition union:
on vertical pipe gives best access--
won't get buried in soil!



Plant Selection

Good choices

Trees

Shrubs & Bushes

Vines

Perennials

Large Annuals

... and not so good

Lawns

Root vegetables (not allowed)

Established plants or plants
that were never irrigated

Small or potted plants

Raised beds

Edibles in the ground?

- Tomatoes - OK
- Chard - OK
- Potatoes – **No!**
- Onions – **No!**
- Strawberries – **No!**
- Artichokes - OK



Fruit trees?



Setback Requirements

All discharge points (not the pipe) need to comply with setback requirements

- 1.5' from property line
- 2' from buildings
- 100' from waterways and wells
- 5' from septic tank
- 4' from leach field
- 3' above groundwater table

Sum it all up

Bury tubing

Check for leaks inside

Paint exposed pipe

Seal holes

Post advisory and directional signs

Post maintenance manual

Get Greywater friendly soap

Complying with the Code?

System Check List

- Have you installed the 3-Way Valve?
 - Is it visible and accessible?
 - Is it labeled appropriately?
- Have you posted a Maintenance Manual?
- Is the anti-siphon installed?
 - Is it on the landscape side of the system?
 - Is it the highest point of the system?
 - Is it visible & accessible in case of leaks?
- Is the Greywater discharging 2" below the surface?

Complying with the Code?

System Check List (continued)

- Will all Greywater be contained on site?
- All discharge points (not the pipe) comply with setback requirements
 - 1.5' from property line
 - 2' from buildings
 - 100' from waterways and wells
 - 5' from septic tank
 - 4' from leach field
 - 3' above groundwater table

QUESTIONS ?