



# Greywater Webinar Series 2015

Oct 14<sup>th</sup>- Greywater 101  
Presentation by Laura Allen



Oct 28<sup>th</sup>- Plumbing 101 for Greywater Installers

Nov. 18<sup>th</sup>- Design Your Own L2L System

Dec. 12<sup>th</sup>- Gravity-Flow, Branched Drain Systems and Greywater Irrigation in Arid Climates

Dec 16<sup>th</sup>- Southern CA Fruit Trees 101- How to Irrigate Your Home Orchard with Greywater

# Greywater 101



**Presentation by Laura Allen**  
from Greywater Action

# Outline of Presentation

- Introduction
- General greywater considerations
- Common types of greywater systems
- Design considerations
- Resources

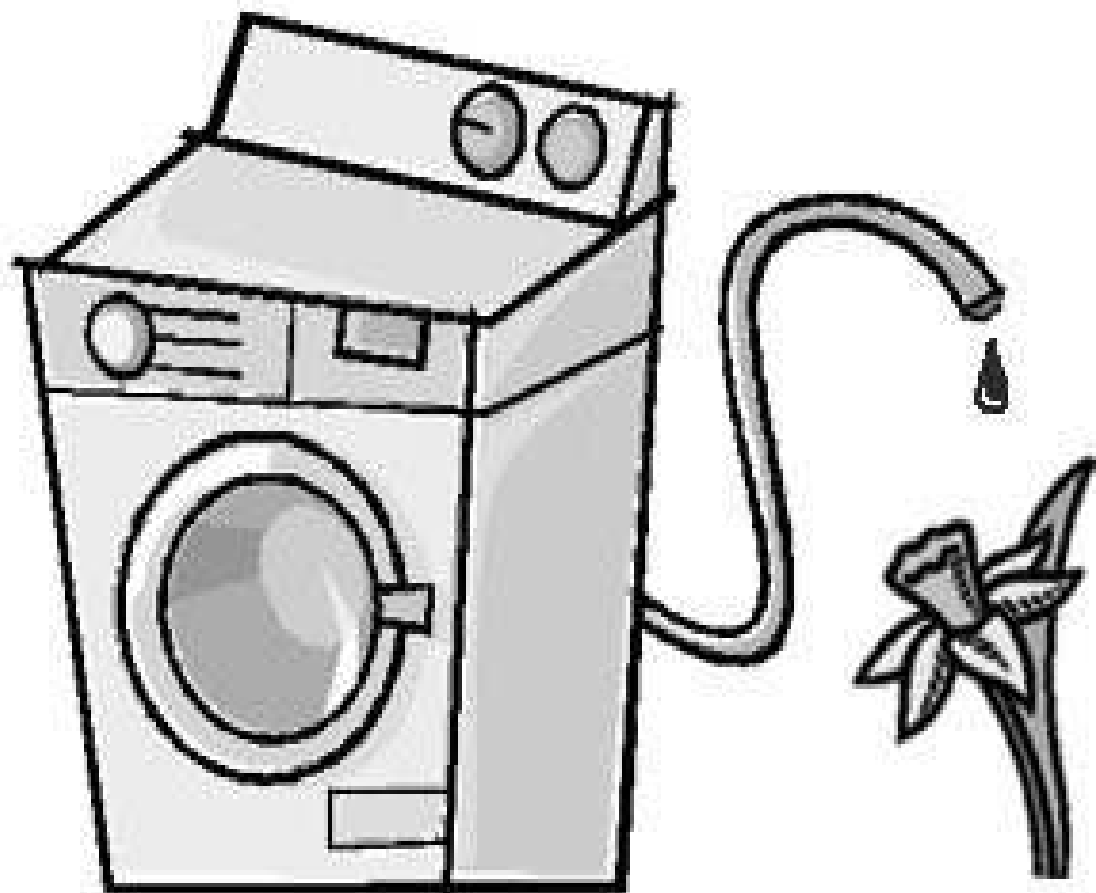








**HOW MUCH  
WATER  
DO YOU USE  
EACH DAY?**



About **50%** of residential  
water is used for irrigation

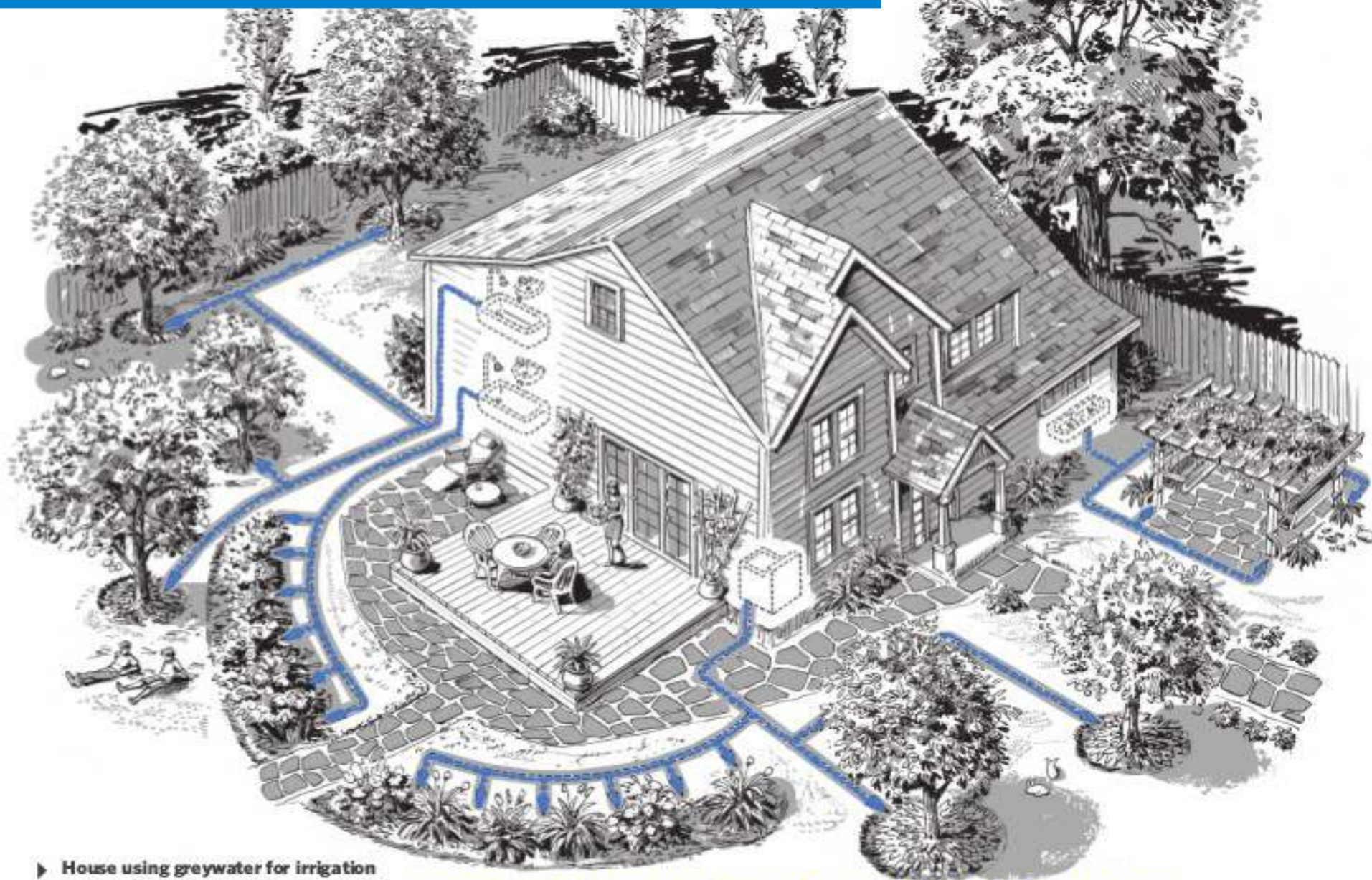


I don't need clean  
drinking water!



# Greywater Reuse

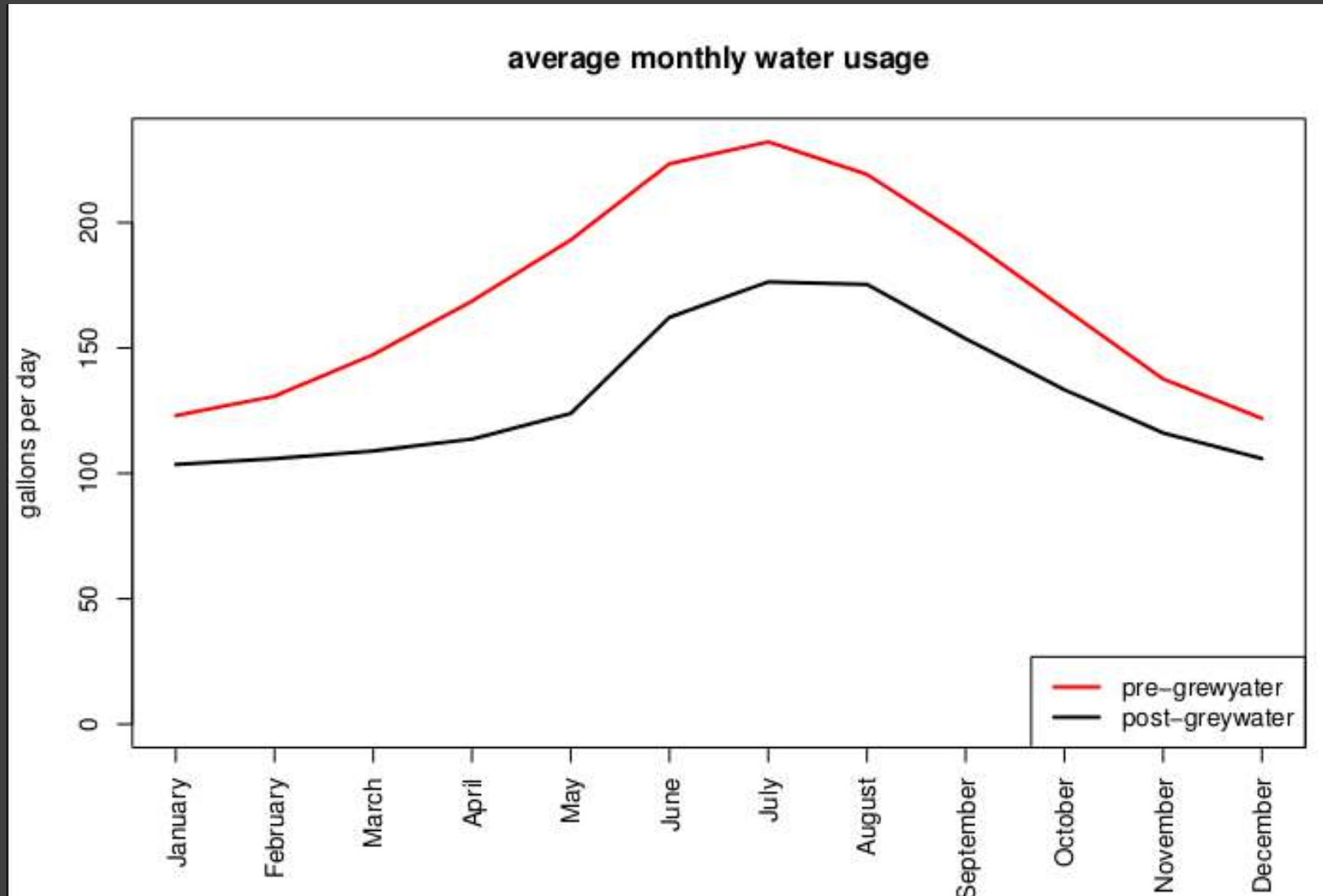
16-40% reduction in water use



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

© Steve Sanford from The Water-Wise Home

# Avg. household savings of 15,000/year (GWA Study)





Californian's produce around  
**1 billion gallons of greywater**  
every day





# Greywater is water from:

## #1 Washing machines

- Top loading machine:  
30-50 gallons/load
- Front loading machine:  
12-25 gallons/load
- Top efficient:  
15-25 gallons/load



# Greywater is water from:

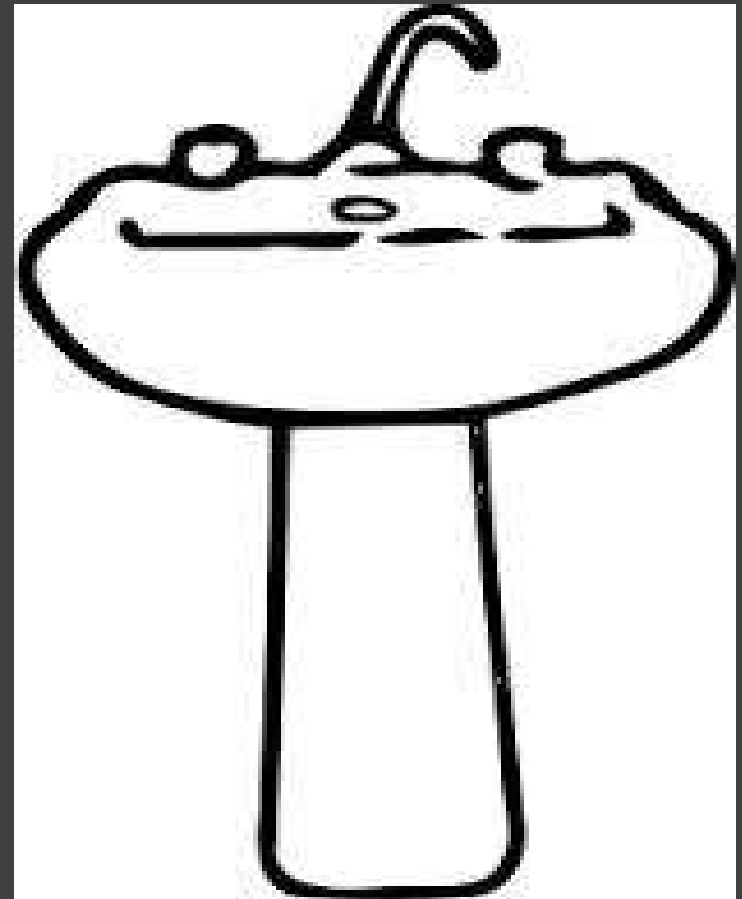
## #2 Showers and baths



# Greywater is water from:

## #3 Sinks

(Kitchen sink water is not currently considered greywater in California and is difficult to legally reuse)





Greywater is **never** from toilets!



# A brief history of the legality of greywater:

## Before 2009:

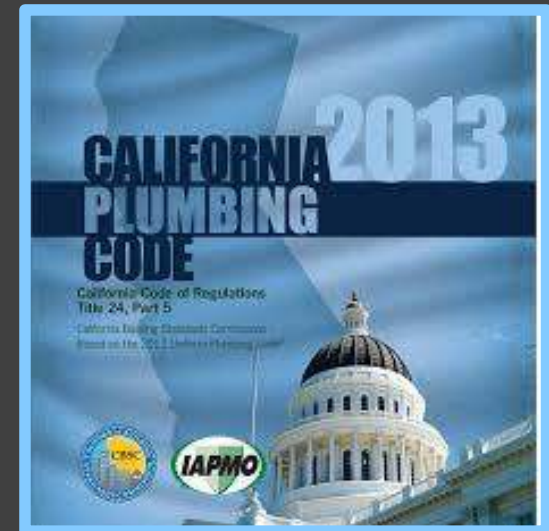
- It was not possible to install a legal system, there were 1.6 million illegal systems in California.

## After 2009:

- It is possible to install several types of systems legally, some don't require a permit.

# Is greywater legal? **Yes!**

Greywater is regulated by **Chapter 16** of the California Plumbing Code.





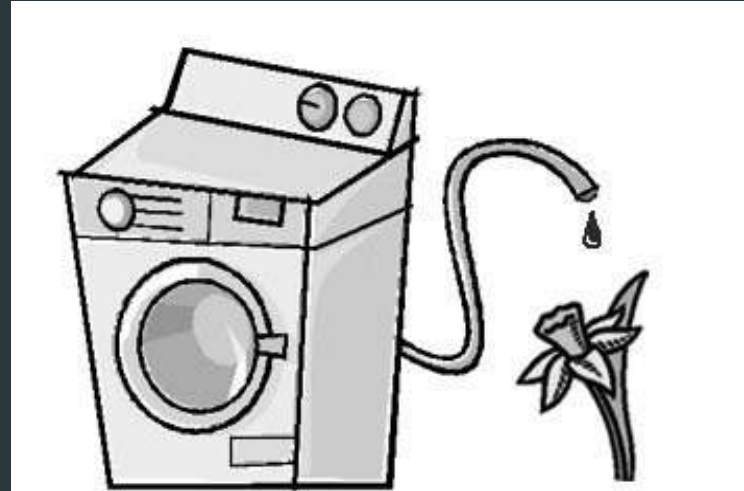
# Benefits of Greywater

- Save water
- Save time
- Save energy
- Fosters a connection to our landscapes
- What else?



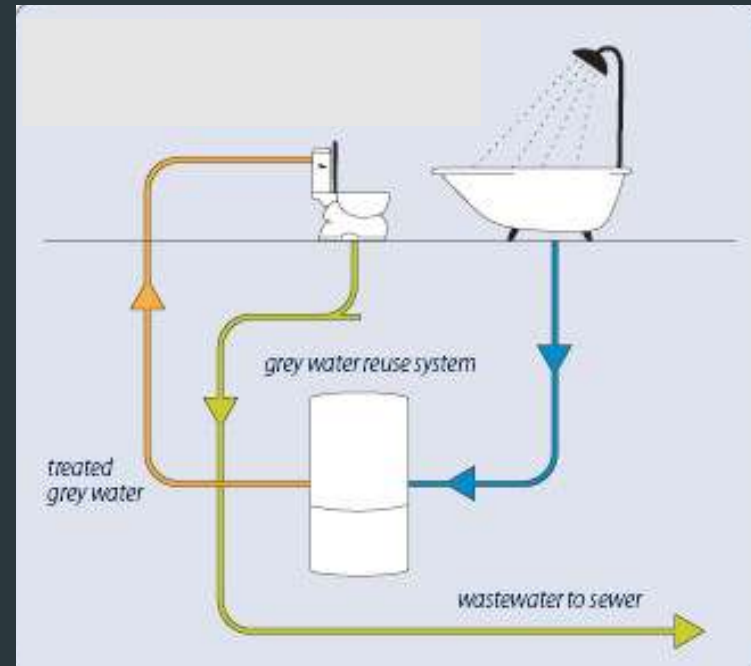
# How can you use greywater?

## #1 For outdoor irrigation



## #2 To flush toilets

These systems require filtration, disinfection, and frequent maintenance. They are difficult to obtain permits for.



# Use Plant Friendly Products

These products don't contain SALT, BORON, or CHLORINE.

For example: ECOS, Biopac, Trader Joes, Oasis, Vaska, Aubrey Organics, hydrogen peroxide bleach.

Don't use sodium based water softened water.





# Greywater is NOT Potable

## It's important that:

- Greywater doesn't pool up.
- People don't have direct contact with the water.
- Greywater doesn't run off or enter a storm drain, creek, river, etc..
- Greywater is not used to irrigate root crops.



# “Mulch”

Wood chips filter and absorb greywater before it soaks into the soil.



# “Mulch Basin”

A shallow basin filled with mulch (wood chips).

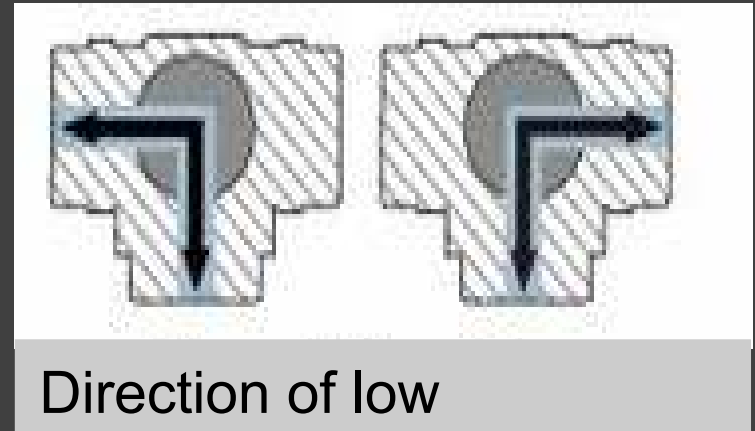
The basin spreads greywater out, provides surge capacity, and prevents pooling or runoff .



This man is filling the basin with wood chips.

# “Diverter Valve”

The valves allows us to control the flow of greywater (either to the landscape, or to the sewer/septic)





# A Bucket



- Collect cold water as shower heats up
- Dishpan in sink to collect wash water
- Use for irrigation
- Use to “bucket” flush toilet (pour into toilet bowl)

# Greywater Systems can be Simple or High-Tech

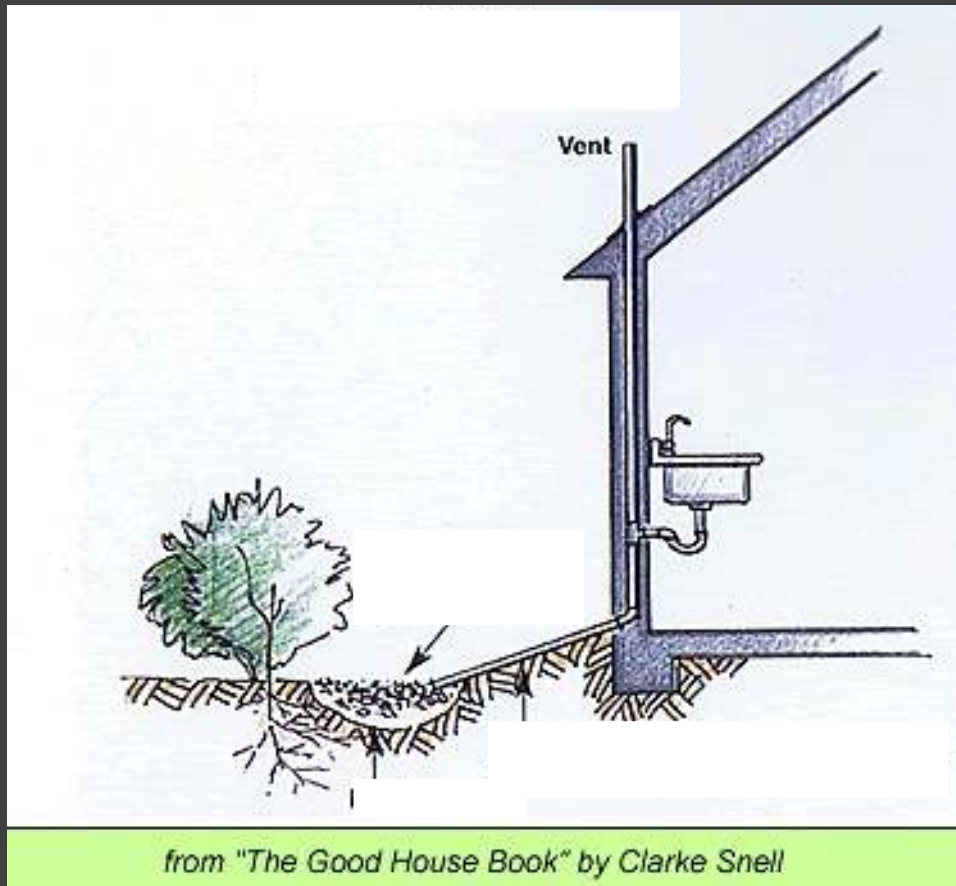


Image Water Sprout

# Simple Systems Irrigate Larger Plants

- Trees
- Bushes
- Vines
- Larger annuals and perennials





...but not lawns or small plants



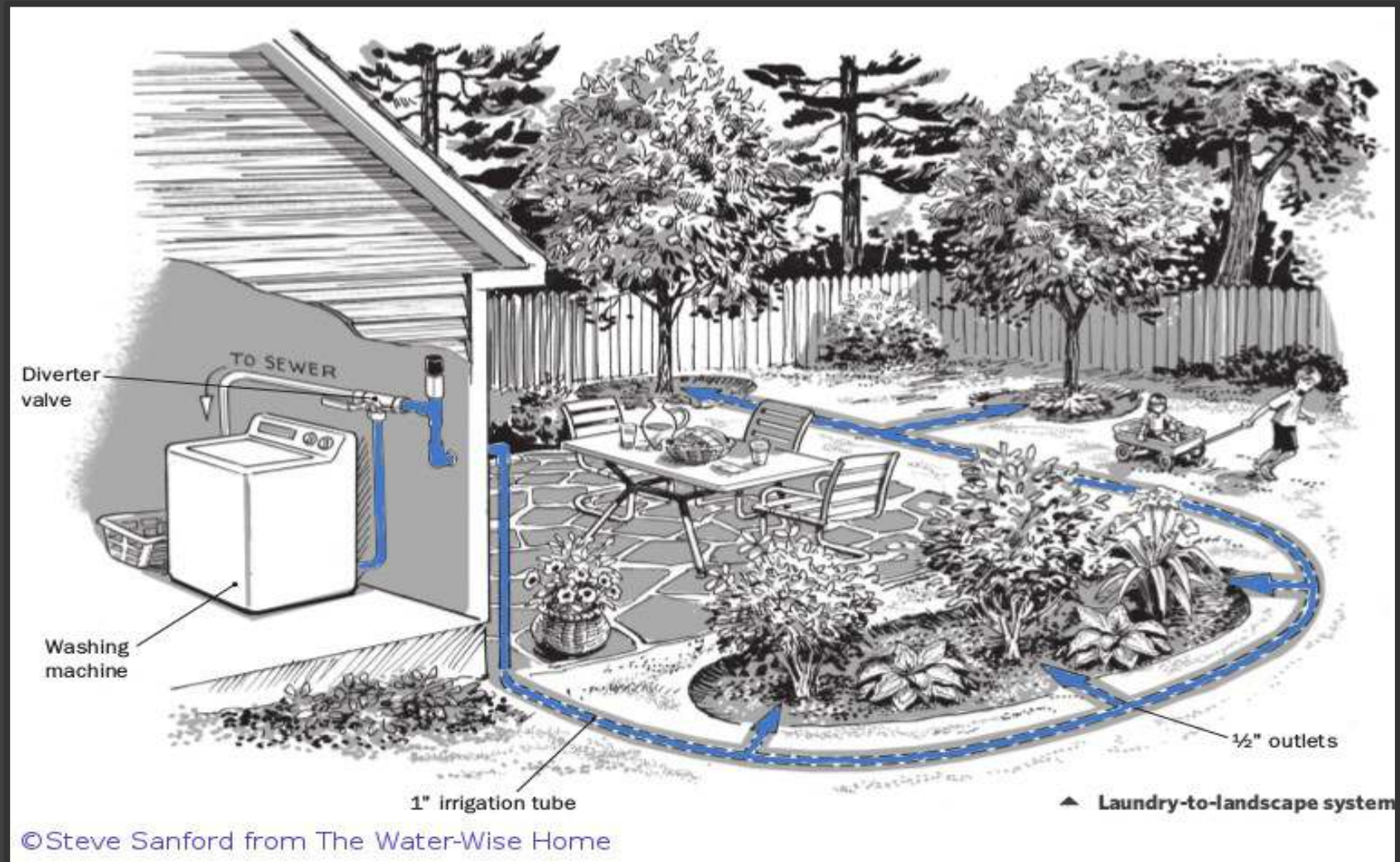
Irrigating these types of plants requires a **more complex** type of system.



# Simple System: Laundry-to-Landscape (L2L)

A **washing machine system** that doesn't alter the plumbing and doesn't require a permit (if basic guidelines are followed).

# Simple System: Laundry-to-Landscape (L2L)



Costs: \$150-\$250 parts, \$700-\$2,500 professional installation 30

# Laundry-to-Landscape System



Sewer  
connection

Greywater goes  
to landscape

Diverter  
valve











Image: Leigh Jerrard



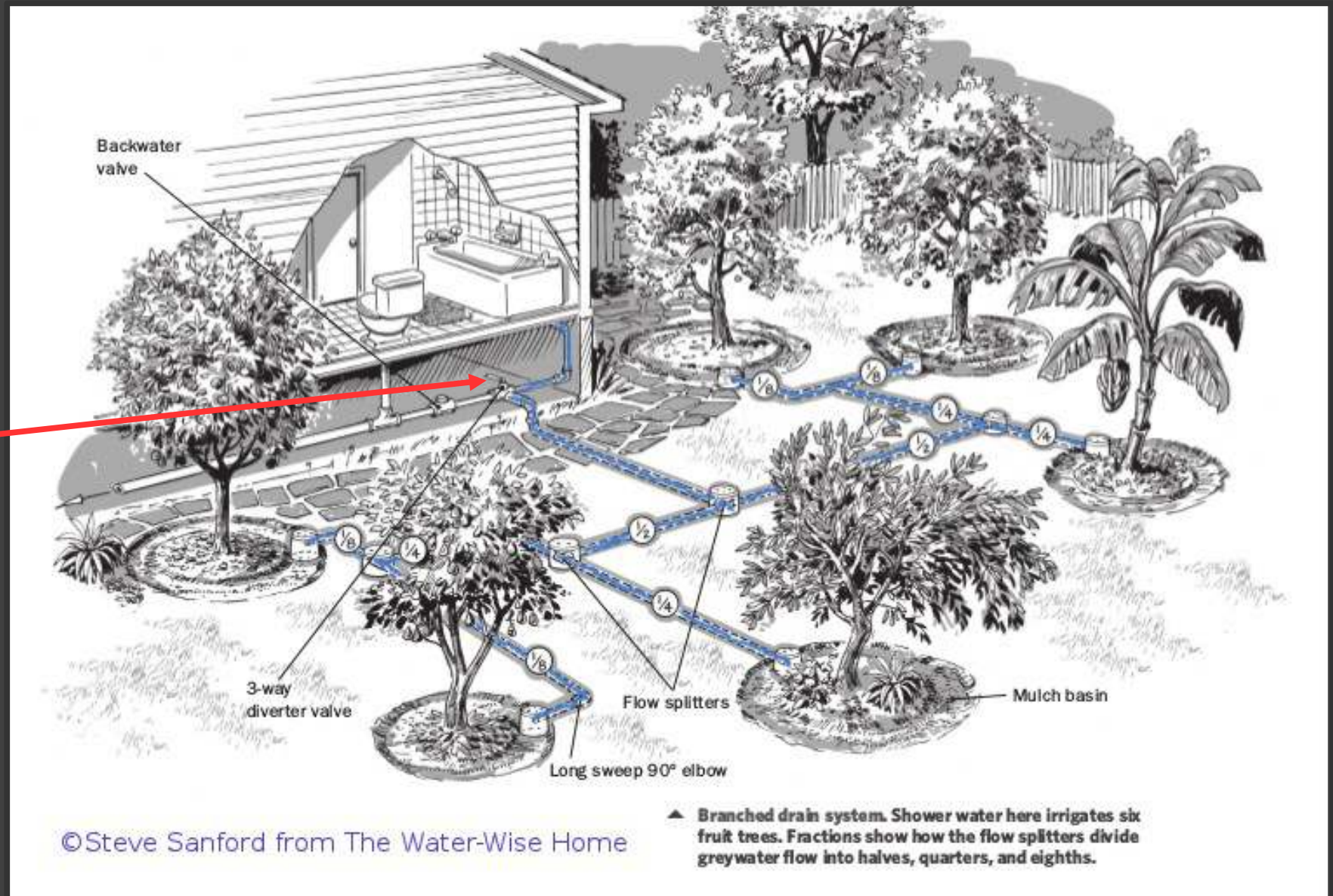
Image: Greg Bullock

# Branched Drain: A Gravity System

- To install this system you must be able to access the drainage plumbing
- It requires a permit
- The landscape must be lower than the greywater pipes



# Branched Drain: A Gravity System



**Costs:** \$250-\$500 parts, \$800-\$4,000 professional installation (permit fees cost more)

# A Diverter Valve Controls GW Flow



To Landscape

To Sewer



A motor (called an actuator) can be added, enabling the valve to be controlled by a switch inside the house.



# Branched Drain System

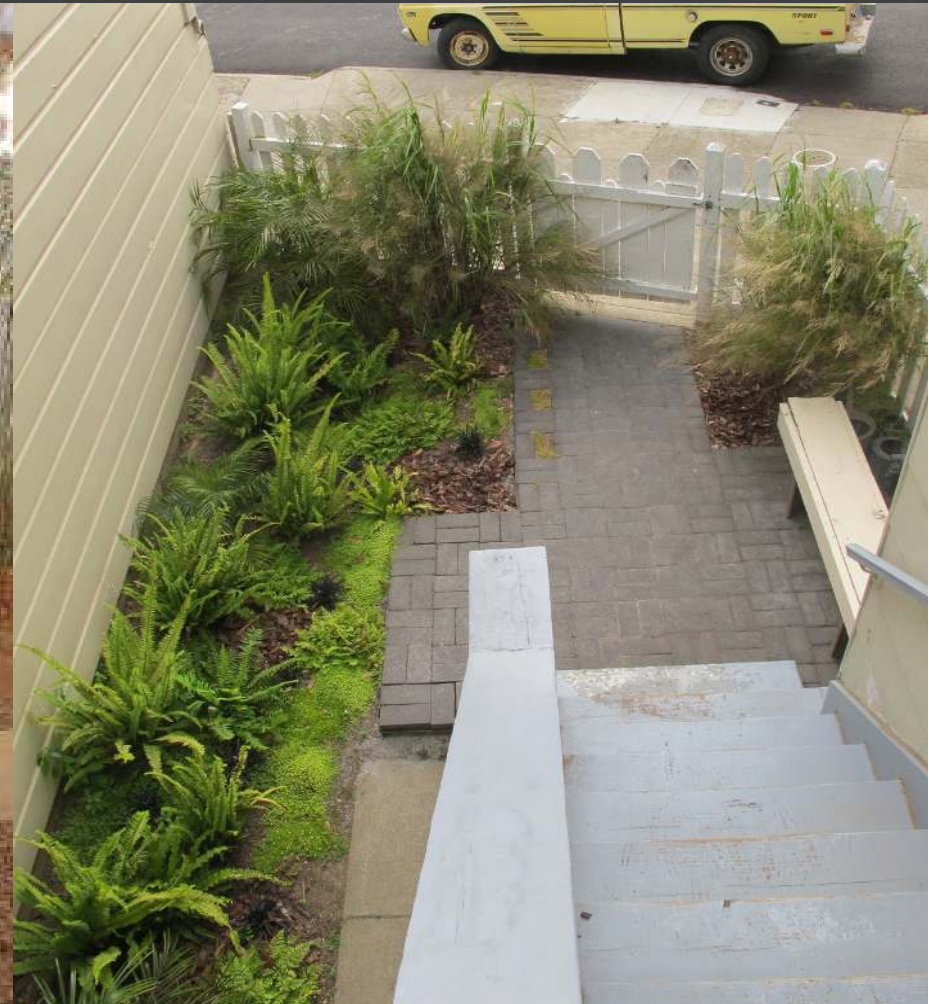


Setbacks from buildings and property lines



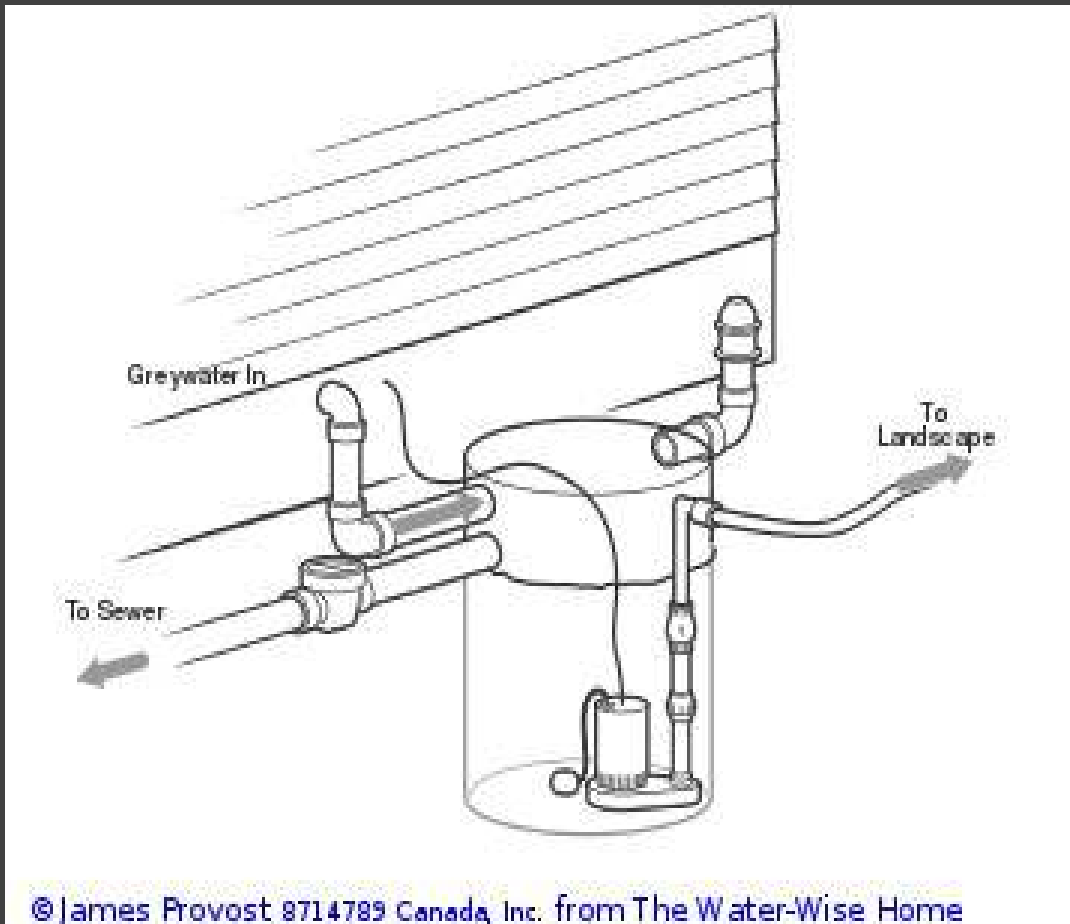
Greywater outlet is under a solid shield and flows into a mulch basin. Size of basin depends on soil type and amount of water.

# Completed System and 1 Year Later



Images: Josh Lowe

# Pumped System



- A diverter valve directs GW to a tank
- Unfiltered GW is pumped out to the landscape with 1" tubing and 1/2" outlets
- System requires an outlet and uses electricity
- Requires a rigorous permitting process





Photo: Leigh Jerrard



# Pump and Filter System for Drip Irrigation



(Filters must be cleaned manually and require frequent maintenance)

Image: Leigh Jerrard



Example of drip irrigation

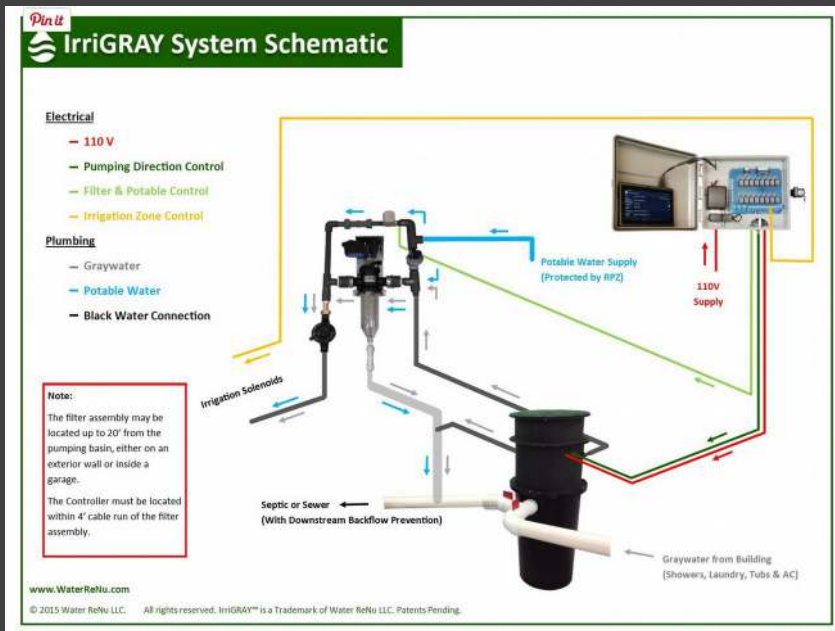
**Note:** Filtered GW requires special drip tubing and is not compatible with most standard drip systems.



# High-End Residential



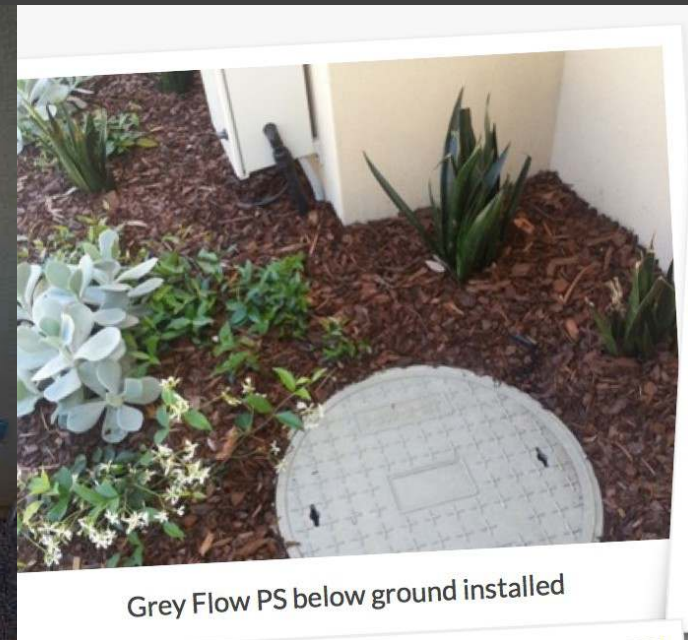
# Whole House Systems



WaterReNu “IrriGRAY”



Nexus E-Water



Grey Flow PS below ground installed

Grey-Flow PS



# Commercial Scale Greywater System

## NRDC Headquarters- ReWater System





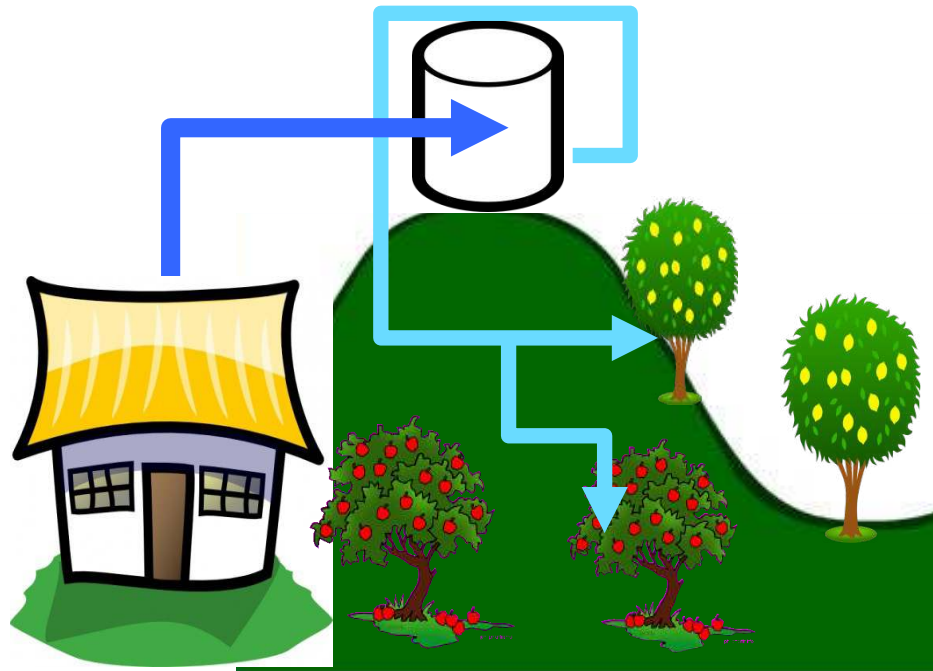
# Pre- Legal Kitchen Sinks (CA)





# Common Errors

*"I'm going to pump my greywater to the top of my property and store it a large tank, then gravity flow it down the hill to irrigate through drip irrigation system".*



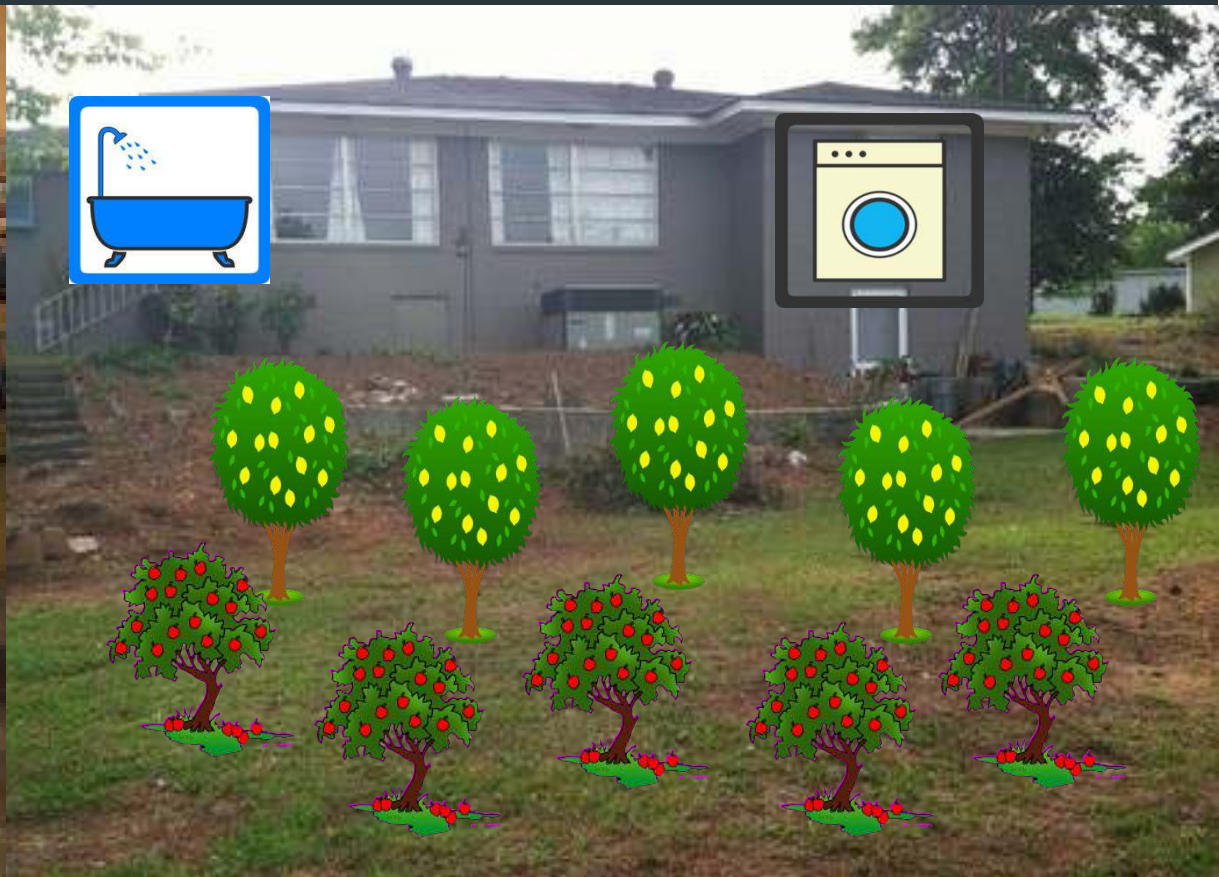
#1 Storage tank

#2 Overuse of pumps

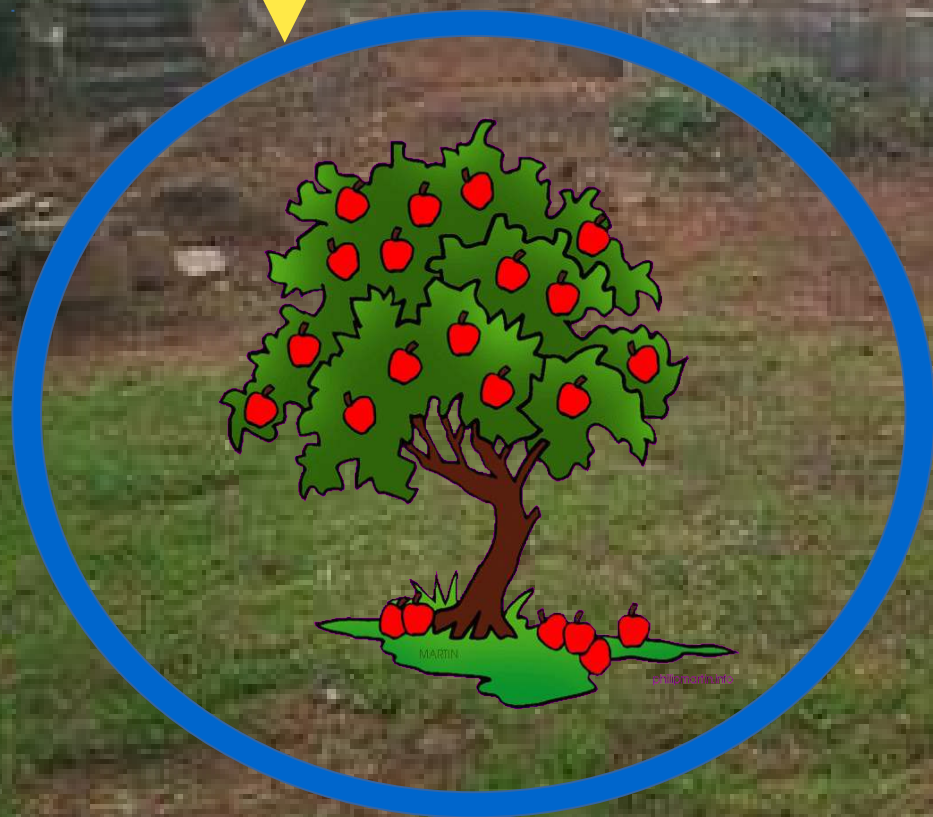
#3 Misuse of filters

# What **system** would you recommend here?

“My yard slopes downhill. All the plumbing is accessible in my 3 foot high crawl space. I want to irrigate 10 fruit trees.”







# Design Considerations

- **WHAT** sources of greywater can you access?
- **HOW** much greywater does your home produce?
- **WHAT** plants will you irrigate?
  - Match the amount of GW with their weekly irrigation needs.  
Remember to “hydro-zone”! (Keep plants with similar water needs together.)
- **CHOOSE** a system to meet your needs.

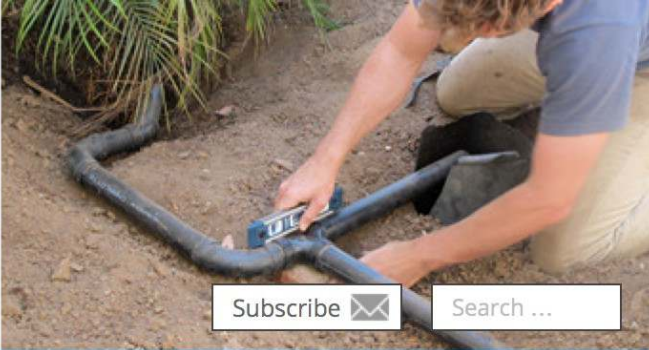






► House using greywater for irrigation with simple laundry-to-landscape and gravity-fed systems

© Steve Sanford from The Water-Wise Home



# For more information visit: greywateraction.org



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ABOUT

**UPCOMING EVENTS**

(Los Angeles) Create a Water-Wise Home & Fest  
September 25 @ 5:00

Cancelled (Ventura) Design your own laundry-to-landscape greywater system  
September 26 @ 10:00 am - 12:00 pm

(Berkeley) Greywater Action: Get Started with Greywater Systems

GREYWATER FAQ

SYSTEM EXAMPLES

RESOURCES

CODES AND POLICY

**HIRE AN INSTALLER**

Directory lists people and companies who've attended Greywater Action's 5 day training for installers and existing water businesses in your area, please visit [this](#) for advice.

**Find an installer to Hire here**

Greywater Action Association requires a minimum of 2 years of experience in the installation of greywater systems in their local area as well as to ease permitting barriers.

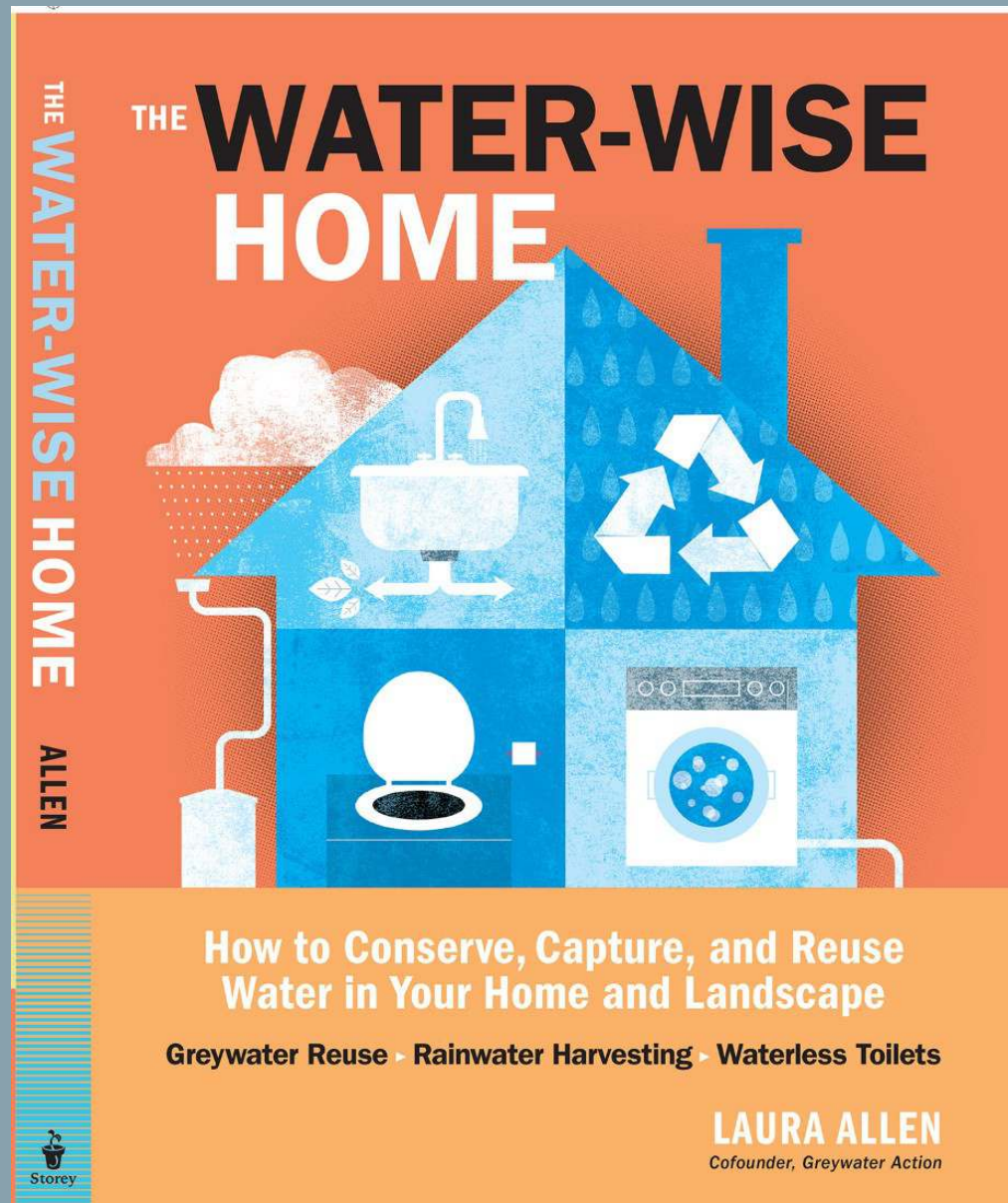
**Level 2 Installers:** These people have completed Greywater Action's 5 day "Greywater System Design and Installation" course, and have installed at least two systems on their own, submitting photos and documentation of the systems to Greywater Action.

**Level 1 Installers:** These people have completed Greywater Action's 5 day "Greywater System Design and Installation" course. They have completed a certification examination with a score of 80% or higher, and also successfully installed a greywater system in a small group.

# Free downloadable manual from [sfwater.org](http://sfwater.org)

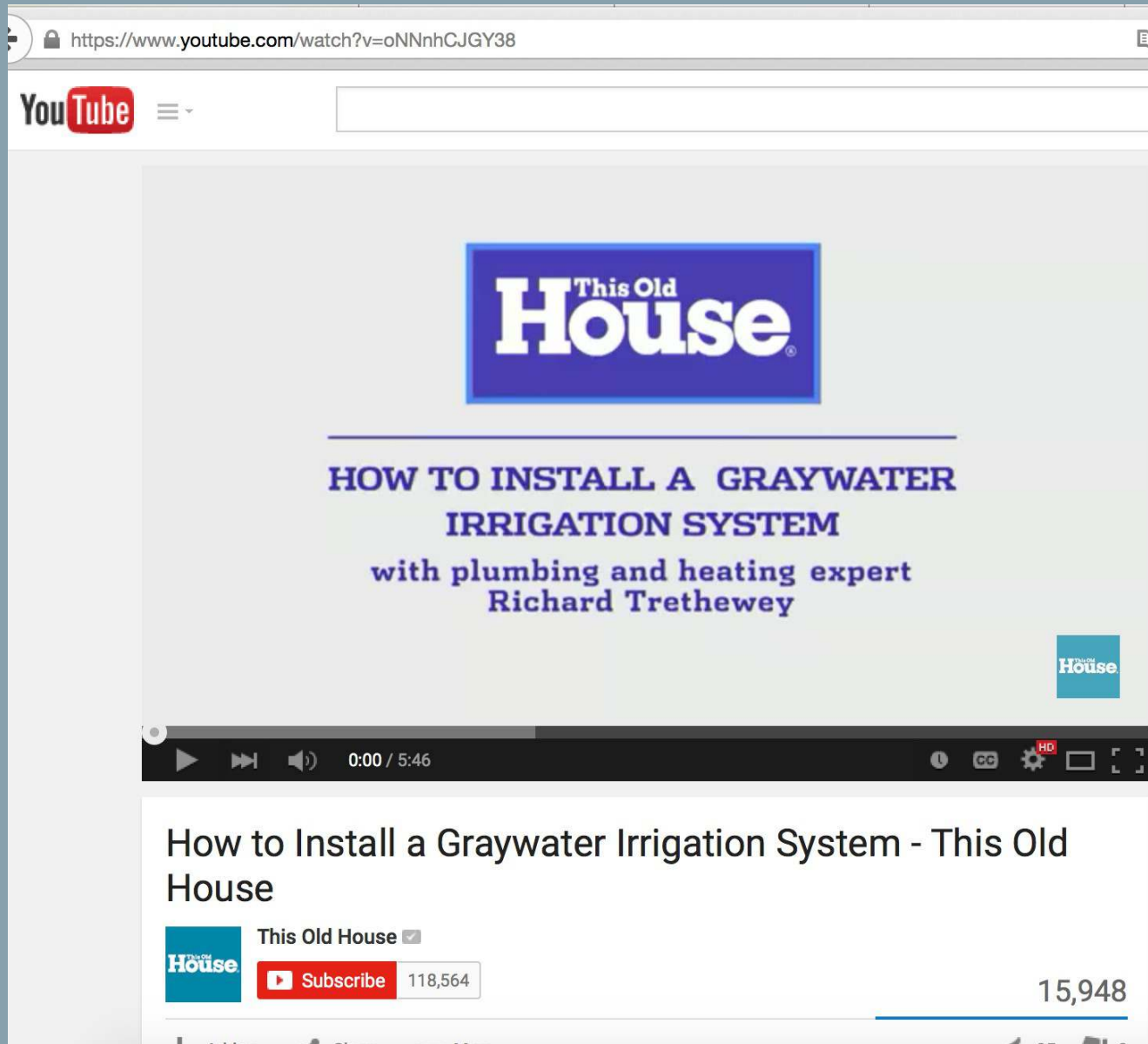


# How-To Book





# Ask This Old House Video



The image shows a screenshot of a YouTube video player. The browser's address bar at the top displays the URL: <https://www.youtube.com/watch?v=oNNnhCJGY38>. The YouTube logo is in the top left corner of the player interface. The video content area features the 'This Old House' logo at the top, followed by the title 'HOW TO INSTALL A GRAYWATER IRRIGATION SYSTEM' in a serif font, and the subtitle 'with plumbing and heating expert Richard Trethewey' in a smaller font. A small 'This Old House' logo is also visible in the bottom right corner of the video frame. Below the video frame is a black playback control bar with a progress slider at 0:00 / 5:46, and icons for play, pause, volume, and other controls. Underneath the video player, the video title 'How to Install a Graywater Irrigation System - This Old House' is displayed. To the left of the title is the 'This Old House' channel logo. To the right of the logo is a 'Subscribe' button and the channel's subscriber count, '118,564'. Further to the right, the video's view count is shown as '15,948'. At the very bottom of the page, there are partial views of social media sharing icons and a 'More' button.

https://www.youtube.com/watch?v=oNNnhCJGY38

You Tube

**This Old House**

**HOW TO INSTALL A GRAYWATER IRRIGATION SYSTEM**

with plumbing and heating expert  
Richard Trethewey

0:00 / 5:46

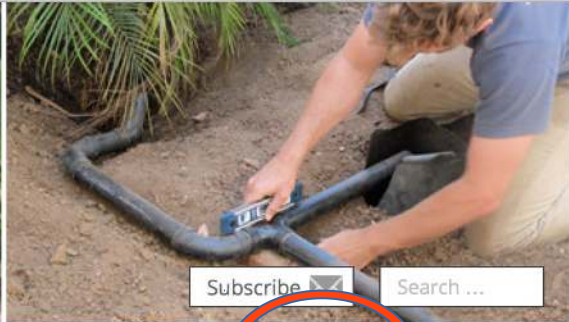



How to Install a Graywater Irrigation System - This Old House

**This Old House** ✓

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15,948

# Q&A Forum



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[Composting toilets- general \(0\)](#)

- Composting toilet codes/permits (0)
- Urine diversion and use (0)

[Greywater reuse- general \(26\)](#)

- Branched drain systems (1)
- Greywater codes/permits (1)
- Greywater plumbing (4)
- Indoor GW reuse (toilet flushing) (0)
- Laundry-to-landscape systems (4)
- Manufactured greywater systems (0)
- Soaps and products (2)

[Rainwater harvesting- general \(2\)](#)

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1  
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[What are good types of plants to irrigate with greywater?](#)

[Greywater reuse- general](#) [plants](#)

I've read that wetland plants are important to use with greywater systems, but I don't really wan...

[Sage-CC](#) asked 3 months ago [last active 2 months ago](#)

0  
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[Washing machine converter for the UK](#)

[Laundry-to-landscape systems](#)

1

# For more information visit

[greywateraction.org](http://greywateraction.org)

## Resources:

- *San Francisco Graywater Design Guidelines for Outdoor Irrigation* (downloadable manual- [sfwater.org/graywater](http://sfwater.org/graywater))
- *The Water-Wise Home* by Laura Allen. How-to book with instructions for greywater irrigation systems.
- Ask This Old House episode “*Graywater, Small Engines*”
- Materials from local irrigation stores (ask them) or on-line at CleanWater Components
- Greywater Action's Q&A forum





# Questions?

[www.greywateraction.org](http://www.greywateraction.org)

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