



What's Graywater, How to Use It, and Why?

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Valley Water

Clean Water • Healthy Environment • Flood Protection

Workshop Summary

What to expect?

1. Who's Valley Water and why does graywater matter?
2. What is graywater (or greywater)?
3. Ways to use graywater and mulch basins?
4. **Activity** then short break
5. What's Laundry to Landscape?
6. **Activity** (time-dependent)
7. **How Can Valley Water Help?**

\$200 Rebate OR

Free to Low-Cost System

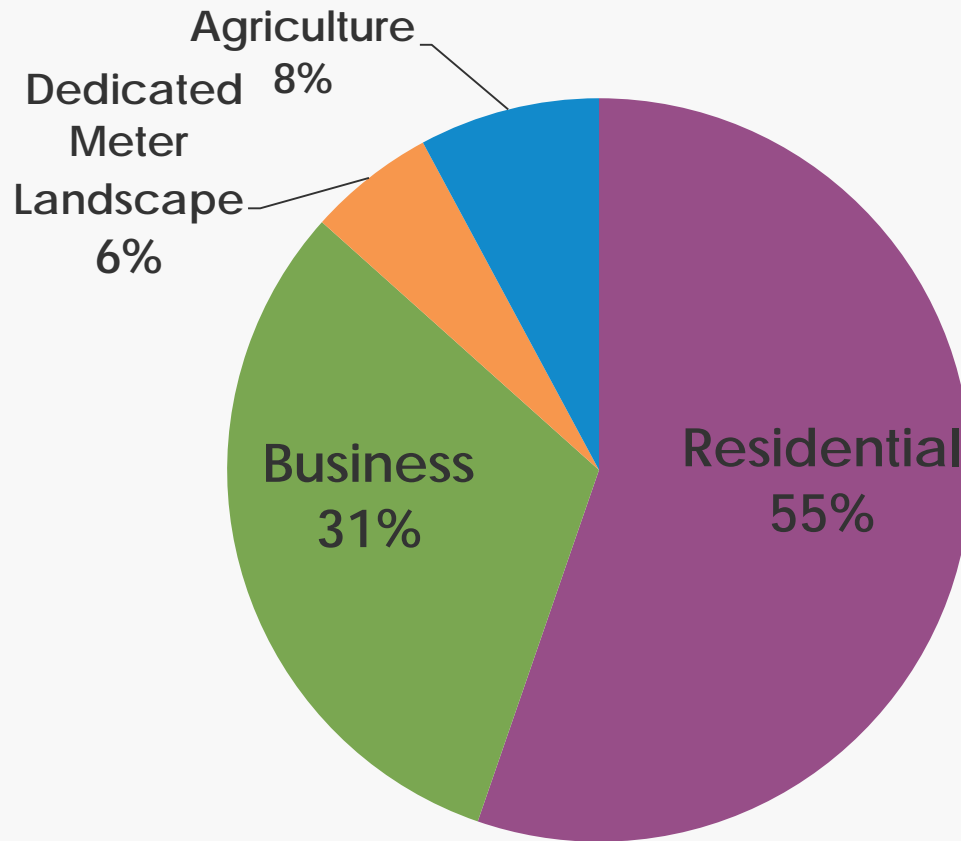
Stay for the duration to find out how!



Credit: Ashini
Fernando



Water demands in Santa Clara County

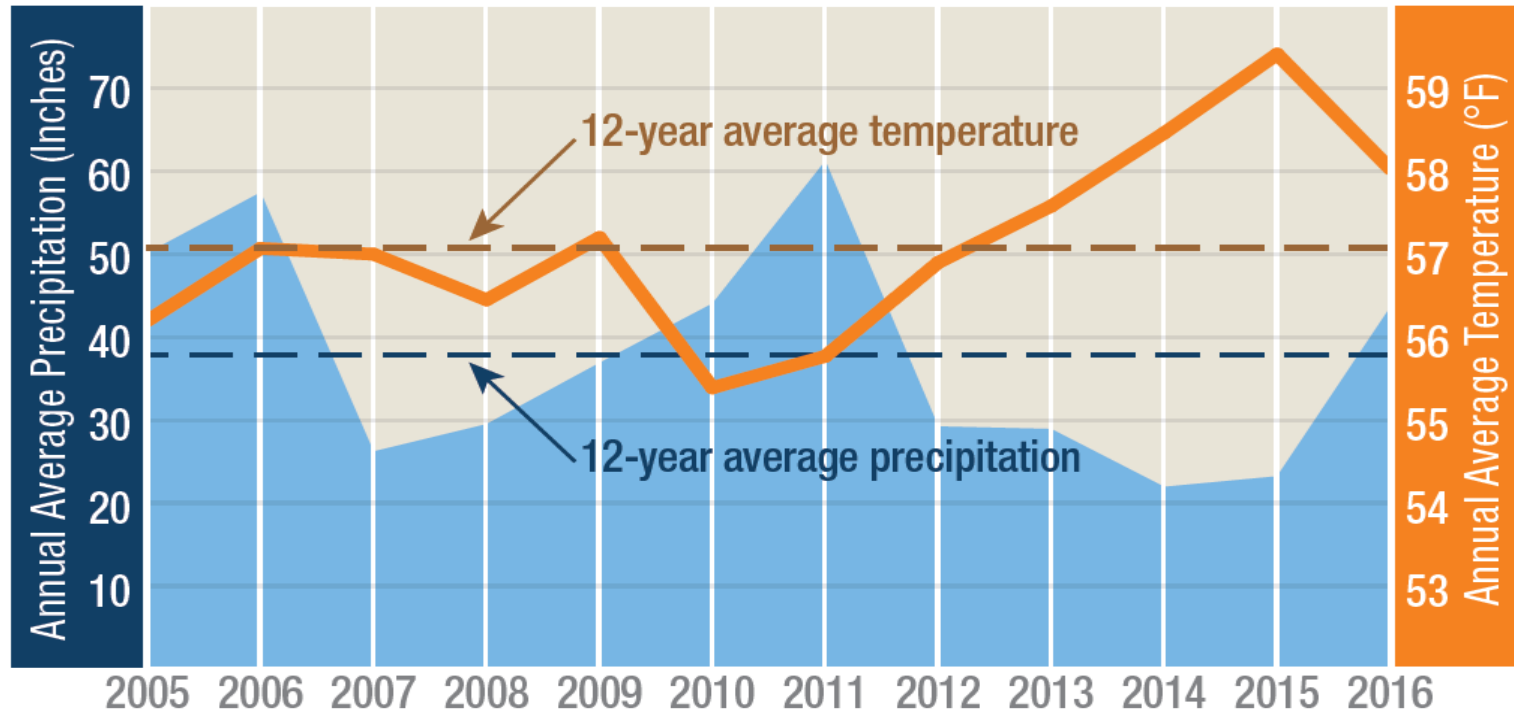


Graywater Matters Because...



Half of water used in homes is used outdoors.

California's Historic 5 Year Drought



California has experienced near-record temperatures in recent years.
Source: California Department of Water Resources

What is graywater?

- ▶ **Graywater** (or greywater) is used water from your bathroom sinks, showers, tubs, and clothes washers
 - ▶ warm-up water in buckets, laundry to landscape, constructed wetlands and more!
- ▶ **Blackwater** is from toilets, diaper washing, and kitchen sinks (in CA)
- ▶ **Rainwater & Stormwater** are quite different
 - ▶ southbaygreengardens.org



Best Practices

▶ Keep on site; out of sight

- ▶ Keep away from streams, creeks, & other water bodies
- ▶ No Runoff, pooling, or ponding
- ▶ No overhead spray irrigation
- ▶ Design system to **prevent clogging**
- ▶ Install only if groundwater is at least five feet below ground surface. **Verified by Valley Water**, no action required.

▶ Use **appropriate soaps and detergents**

- ▶ Don't store it more than 24 hours
- ▶ Don't use it on **root crops** or **edible parts of plants** that touch the soil
- ▶ Design with a **diverter valve** to direct graywater either to the **garden or sewer**



What detergents to use (or avoid)?

- ▶ Chemicals to avoid:
 - ▶ Salts and Boron
 - ▶ Chlorine Bleach
 - ▶ Petroleum distillate
 - ▶ Antibacterial compounds
 - ▶ Whiteners, softeners, enzymes, paraben compounds
 - ▶ **Environmentally friendly ≠ Garden friendly**
- ▶ Liquid detergents/soaps are preferable to powdered: the latter have a greater affect on pH and salinity concentrations in the soil.
- ▶ Be wary of sodium based water softeners: Bypass the laundry machine or switch to a potassium based softener
- ▶ Greywateraction.org and epa.gov/saferchoice/products have lists of soaps that may be appropriate for your project & use

Ways to use graywater

▶ Indoors for toilet flushing:

Tanks, filters, disinfection, pumps, cross-connection protection

▶ Outdoors for irrigation:

▶ Pumped and filtered to **drip irrigation**

Tanks, pumps, filters, automatic backflushing, cross-connection protection, potable water connection

▶ Pumped to **mulch basins**

▶ Direct to **mulch basins**

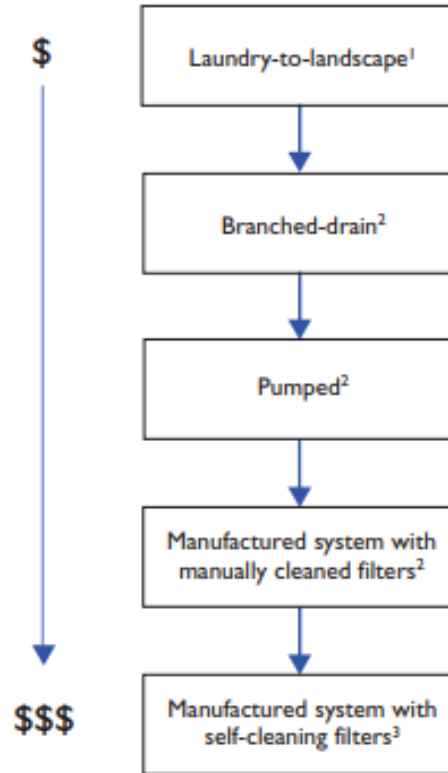
No added pumps or filters



Ways to use graywater

System Complexity and Cost

(In order of increasing complexity and Cost)



- ¹ Systems can use graywater from washing machine only.
- ² System can use graywater from washing machine, shower, tub, or bathroom sink.
- ³ System typically only used for graywater from multiple fixtures



Mulch Basins

distribute the graywater preventing ponding or runoff

Best when: doing other landscape work



freshly dug
mulch basin

Best for:

- ▶ Trees (Fruit trees, too!)
- ▶ shrubs / vines
- ▶ large plants

Too bulky for lawns,
groundcovers, beds with
many small plants



Mulch shields



Graywater **freefalls** through air **onto mulch** placed under shield

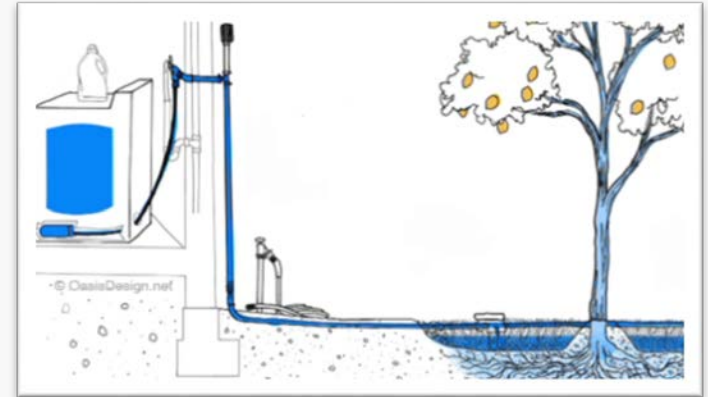
Spreads and soaks into basin

Shield prevents roots from clogging outlet, marks location



What is Laundry to Landscape?

- ▶ “Laundry to Landscape” was introduced in 2008 by Art Ludwig with Oasis Design
- ▶ **Low cost** & maintenance
- ▶ Simple & Flexible design
- ▶ No pumps, no filters, no permits*!

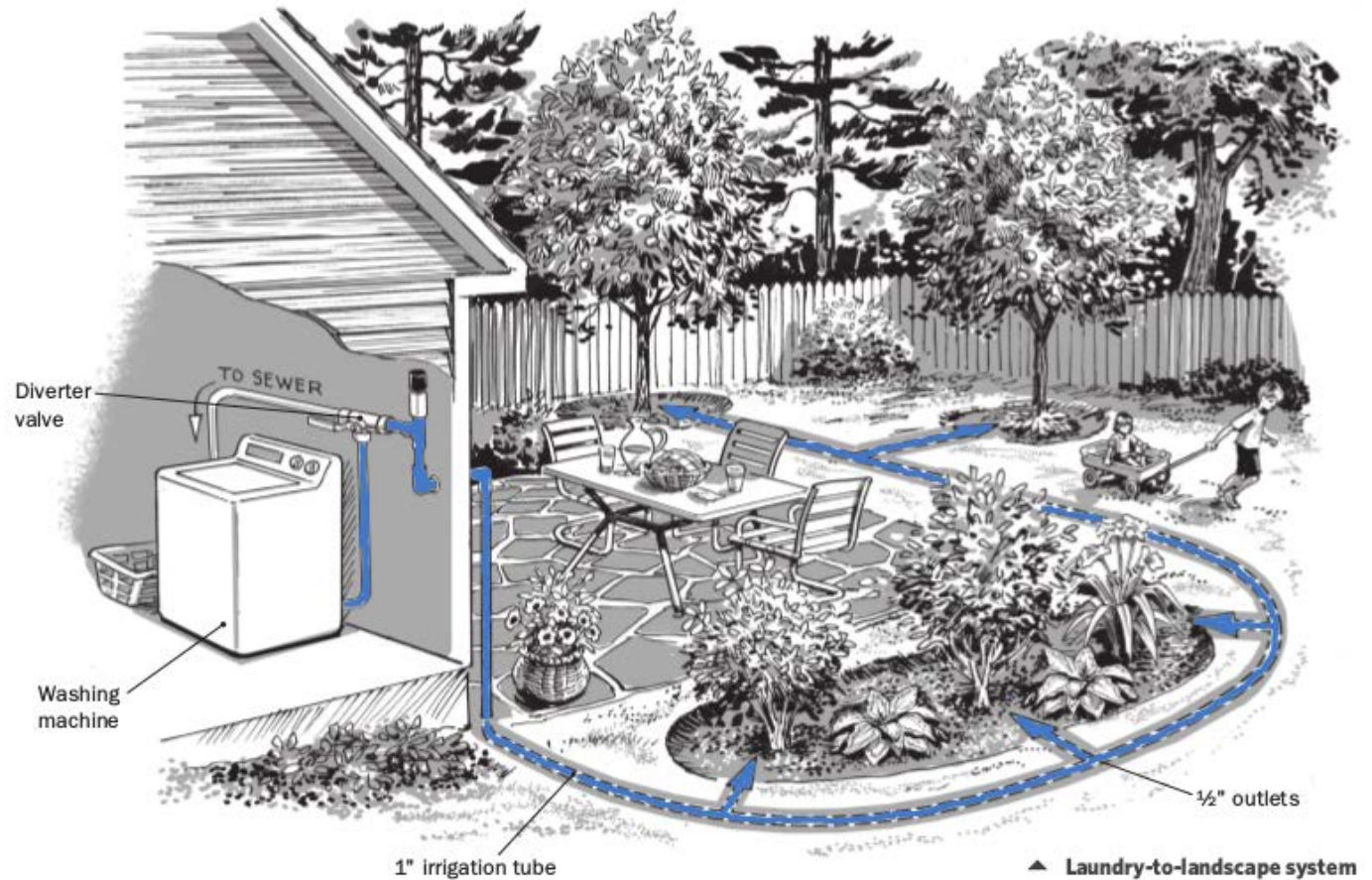


Create An Oasis with Greywater by Art Ludwig



Laundry to landscape graywater system (L2L)

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



©Steve Sanford from The Water-Wise Home

Why Laundry to Landscape?

- ▶ **Sustainable:** Powered by equipment you already have—your clothes washer
- ▶ **Drought-Proof:** We don't know when the next drought will come, but you'll always need to do laundry. Help your plants while you're at it!
- ▶ **Cost-Effective:** Materials cost around \$200, equal to the rebate.
- ▶ **Easy Maintenance:** Check for clogs, replace mulch at least annually.

Will Laundry to Landscape Work?

Accessibility

Is your clothes washer near any of the following:

- External wall
- Wall/Crawl Space

Is the garden receiving graywater **within 50 feet** of your clothes washer? Graywater sent downhill will go further.

Distance from mulch basin:

- At least **1.5 feet** from your **property line** and
- At least **2 feet** from your **foundation**?



Landscape

Are you planning on doing any other landscape **upgrades**?

Do you have specific plants you want to **prioritize**?

Does your landscape have **trees, shrubs or vines**?

YES?

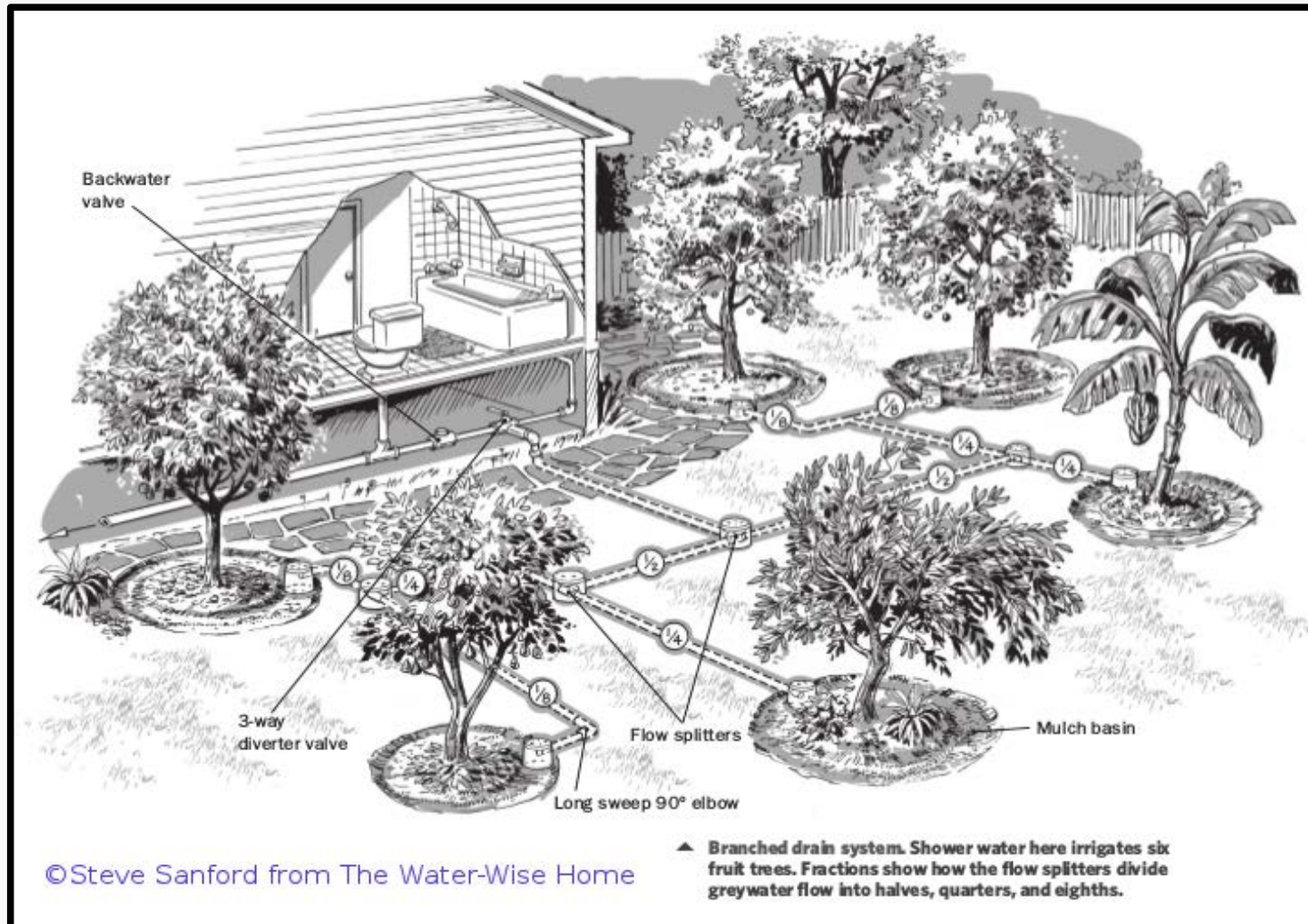
Is your landscape the **same elevation or downhill** from your clothes washer?

Topography

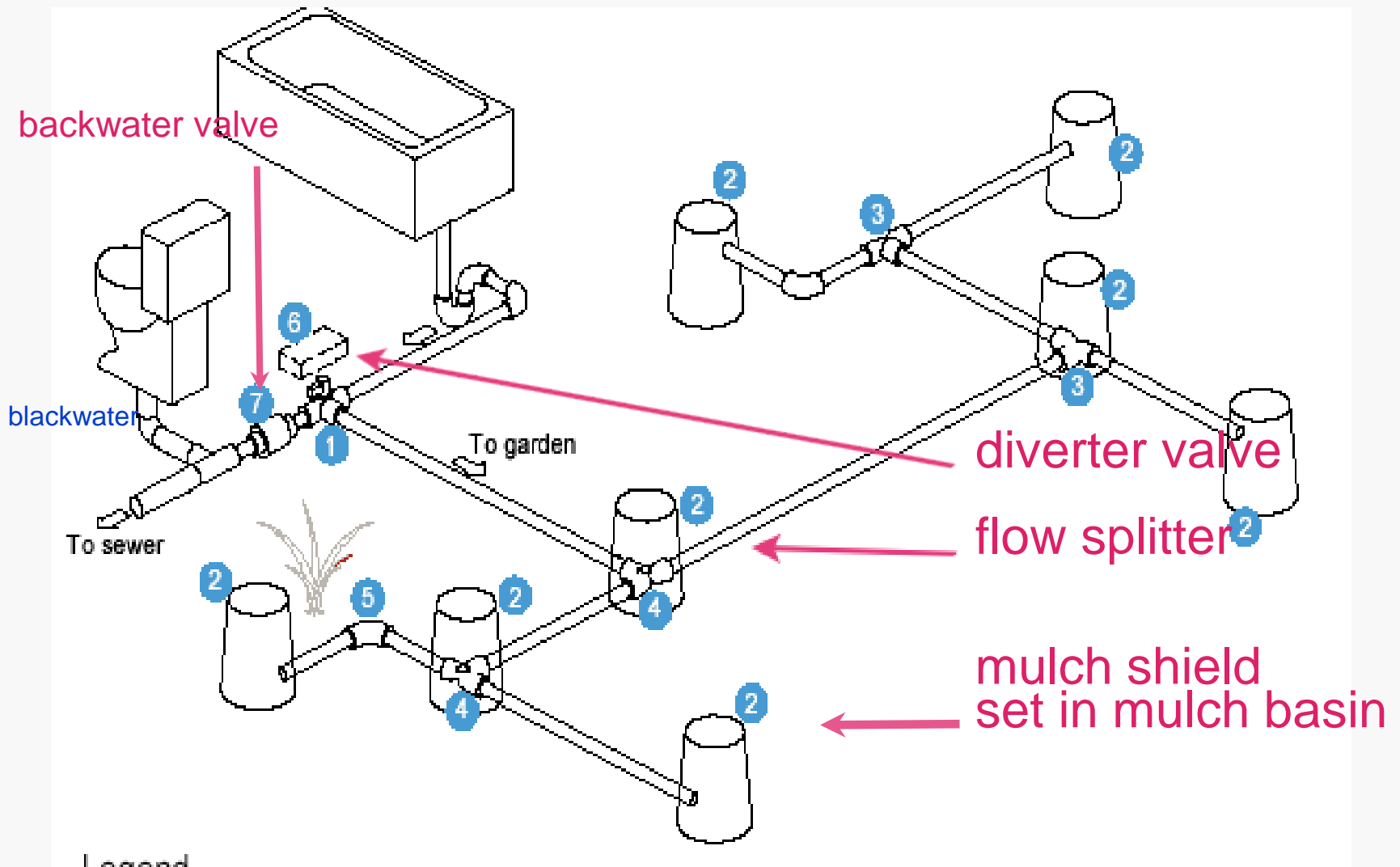
No?

Branched Drain Gravity Systems

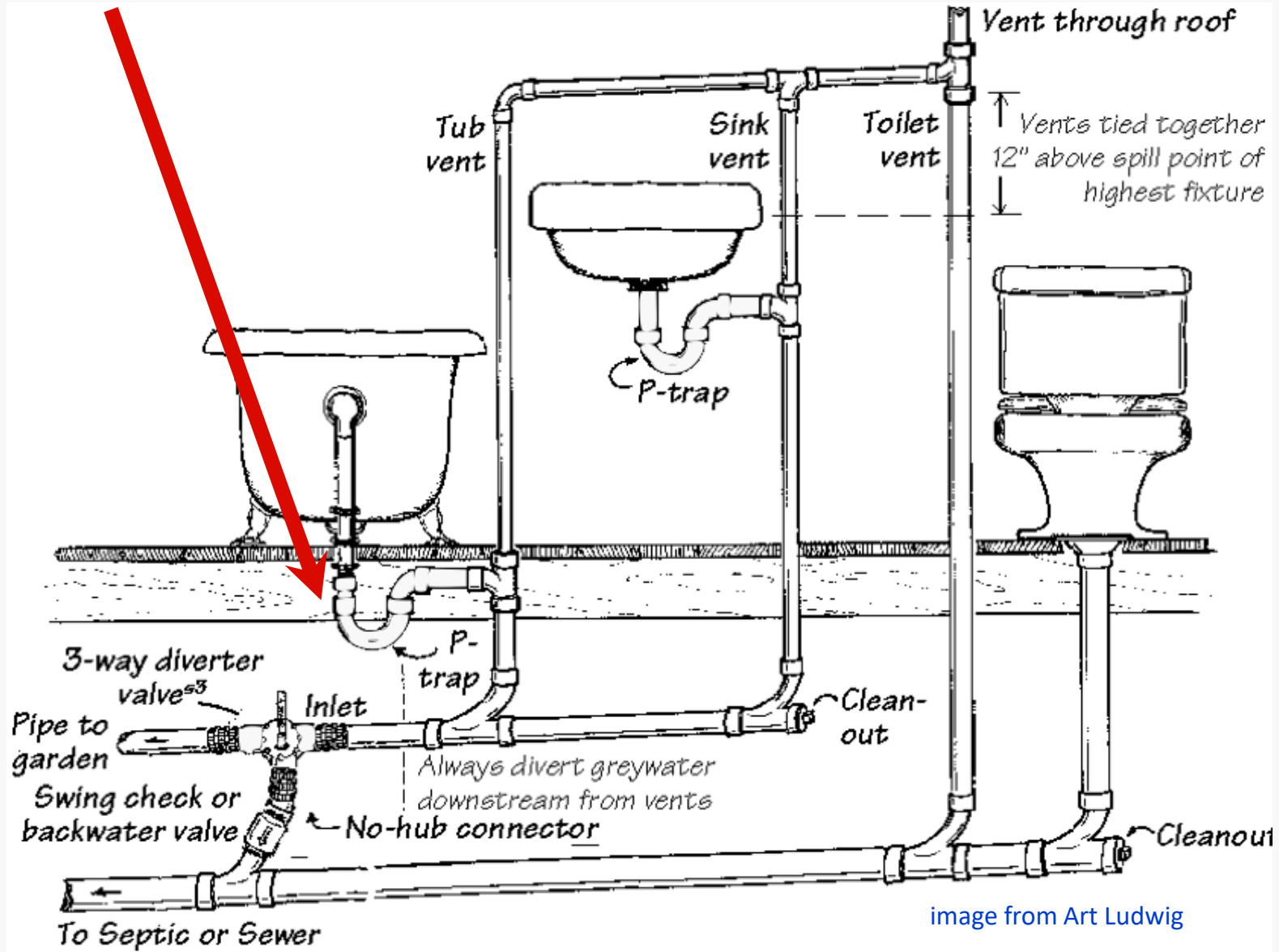
For tubs, showers, or sinks:



Branched Drain Gravity Systems



tub/shower traps are below the floor



three way valve is installed before the greywater joins blackwater

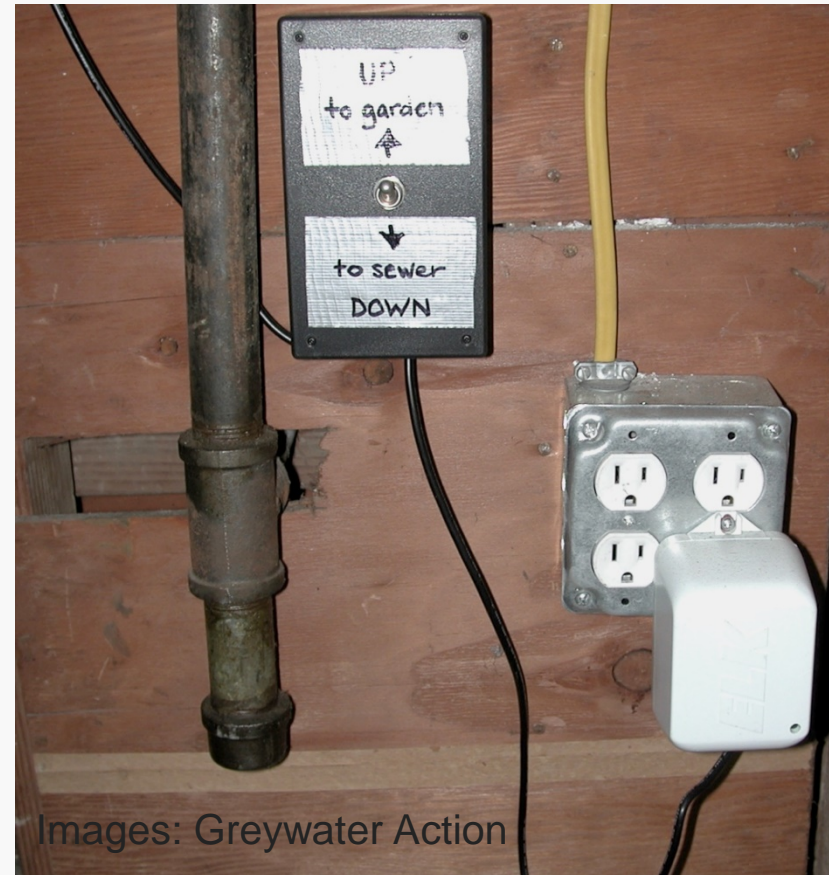


branched drain systems often need
electronic “actuators”
for inaccessible valves:

switch is mounted
in more convenient location



require electricity
must be labeled



Images: Greywater Action

shower graywater branched drain in San Francisco:

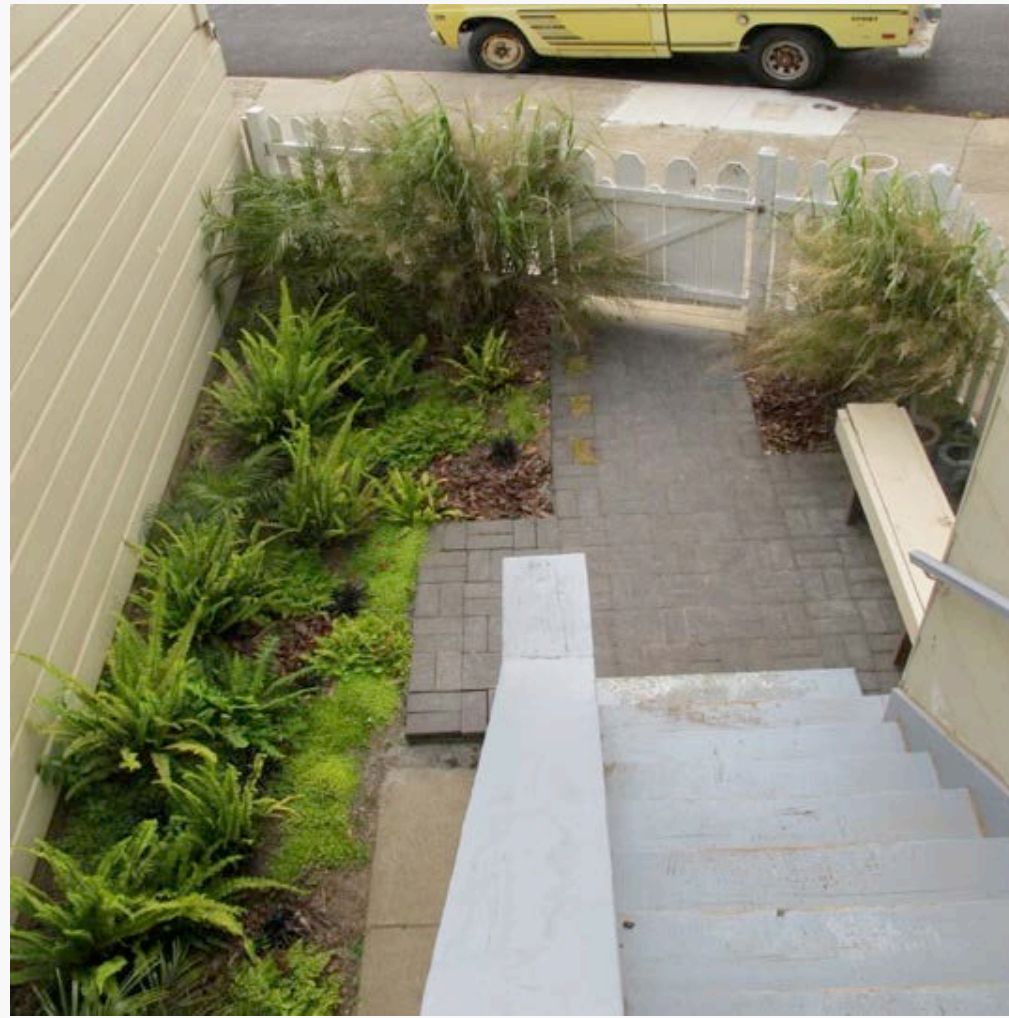


San Francisco project completed



- 1 bedroom house
- Permit: \$170
- Materials: \$200
- Soil test (lab): \$15
- Hand-drawn plot plan submitted
- Sized to low-flow fixtures

one year later



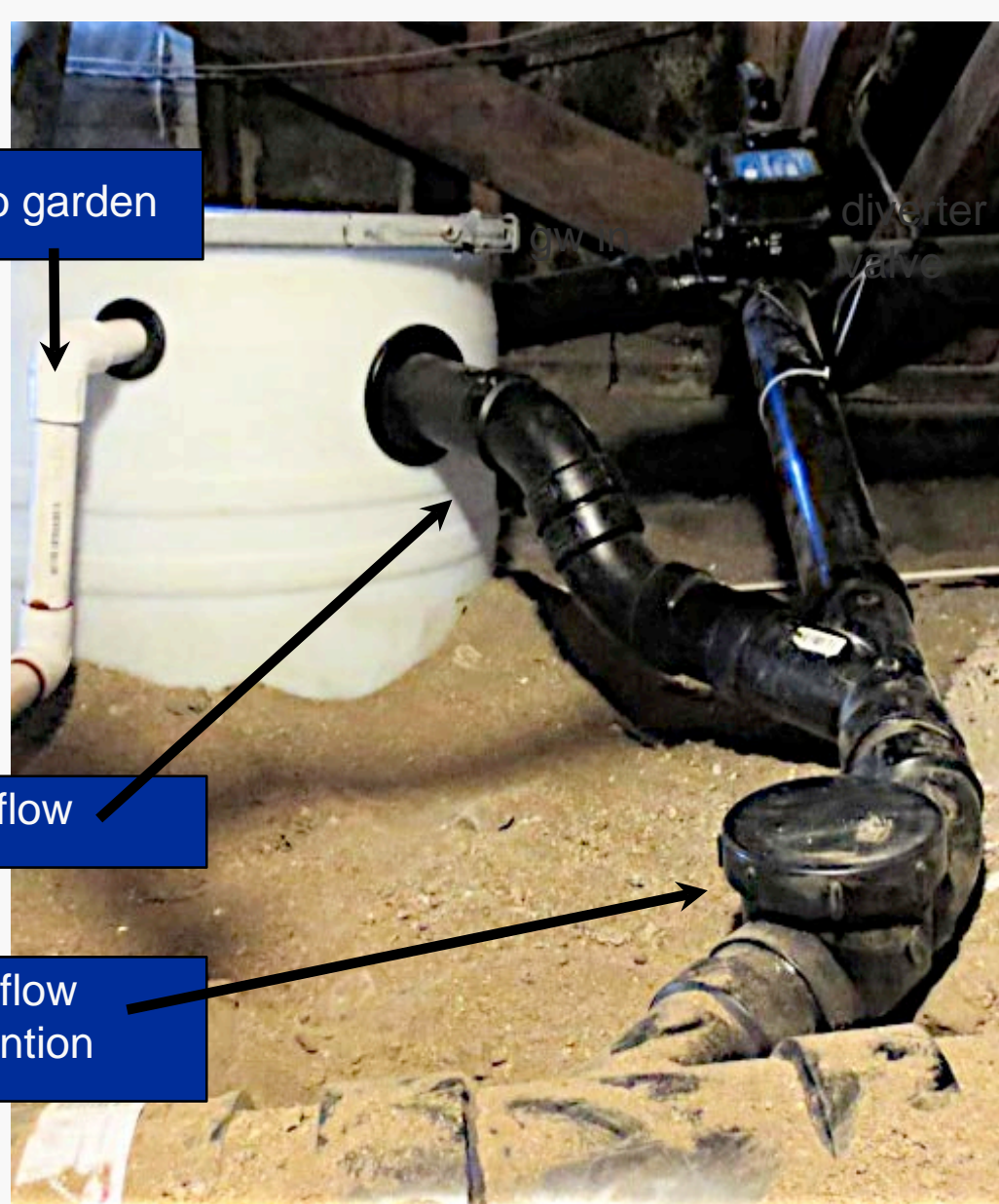


Photo: Leigh Jerrard

pumped system to mulch basins

reduced pressure zone
backflow preventers

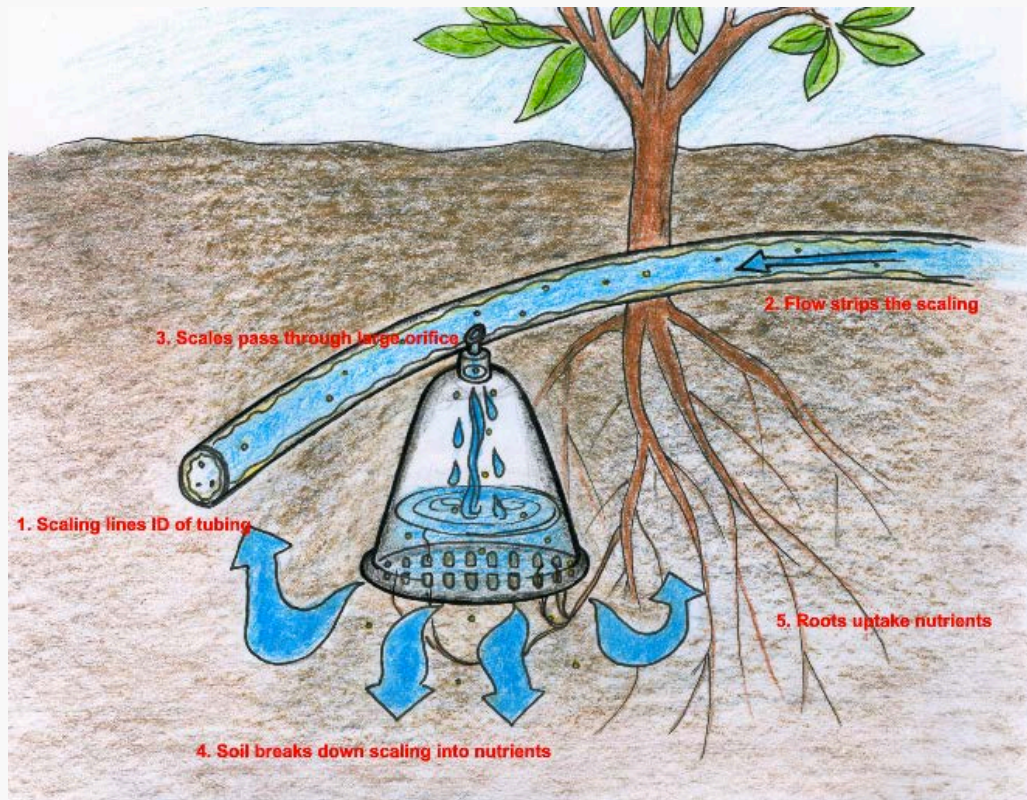
protect the potable water supply
from cross contamination



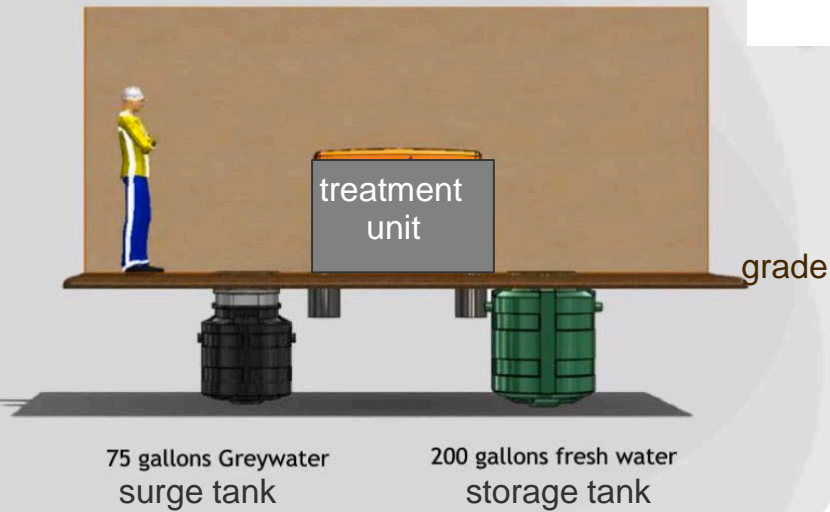
may require annual
inspection

one can find companies that have perfected an

- * **underground drip system** for lawns
- * sand filter, automatic backwash
- * many kits available

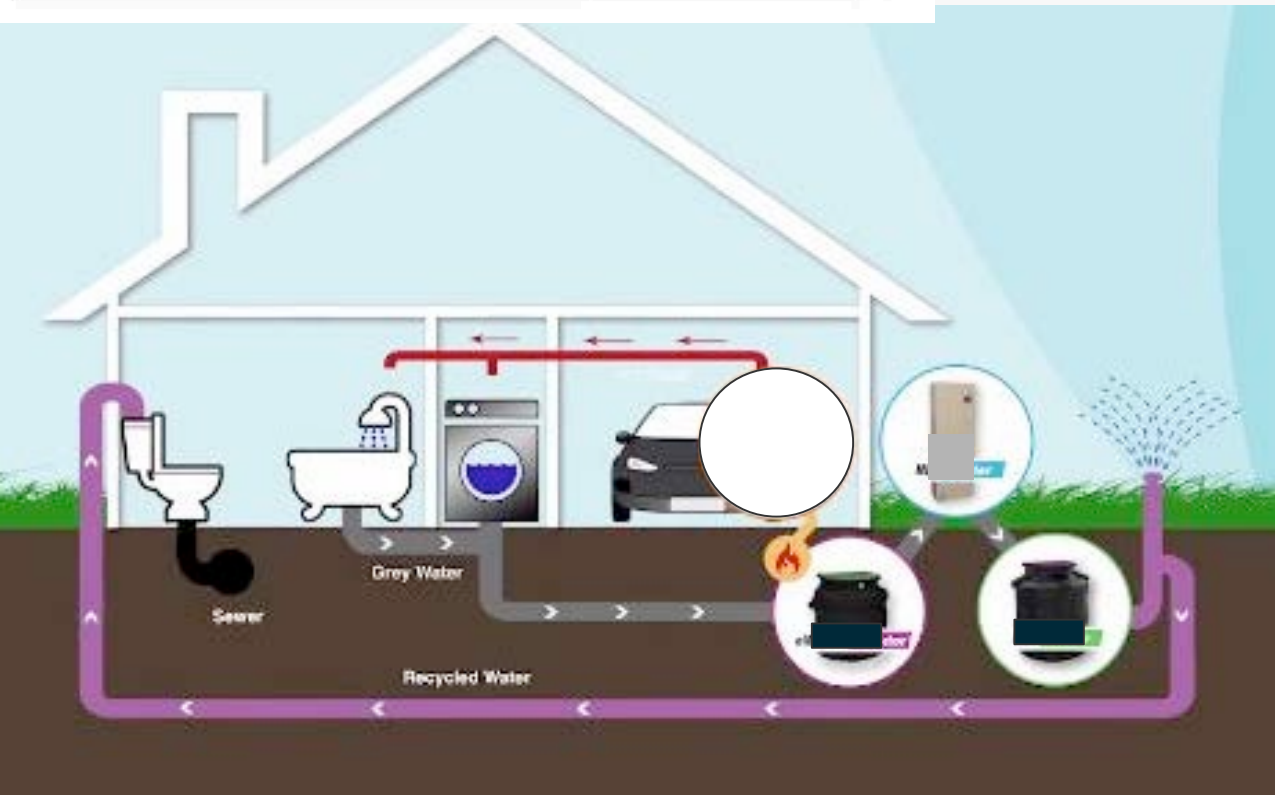


Side View with Tanks (for scale)



some whole house systems treat graywater onsite

- * 200 gallons gw daily
- * treats tub/shower, hand sink, washing machine greywater to **NSF 350** standard (no longer greywater)
- * for **toilet flushing** or above ground irrigation
- * requires no chemicals or biological culture



Constructed Wetlands



~can be a lovely landscape feature
IF the greywater is not needed
for irrigation (transpiration will deplete
much of the water)

~can relieve stress on failing septic systems

~graywater flows through substrate, usually
gravel or rock, that provide habitat for
organisms that “clean” the water

~water level is 2” below surface of gravel so
no mosquitos

~ overflow water is used elsewhere in garden



tiny-mulch basins
and mulch shields

raised beds?
remember,
no root veggies!

edible part
of plant
must not touch
greywatered soil



- ~drill holes in 1" tubing (knowing they will clog and need cleaning out)
- ~mulch around tubing
- ~cover with 3 or 4" pipe or flex tubing, cut in half

drip tubing--
(cover with
2" of mulch)



Image: Leigh Jerrard

Activity

1. Find a partner
2. Read the scenarios
3. Choose a greywater system that you think would be a good fit for the situation
4. Say why you choose that type of system

Why Laundry to Landscape?

- ▶ **Sustainable:** Powered by equipment you already have—your clothes washer
- ▶ **Drought-Proof:** We don't know when the next drought will come, but you'll always need to do laundry. Help your plants while you're at it!
- ▶ **Cost-Effective:** Materials cost around \$200, equal to the rebate.
- ▶ **Easy Maintenance:** Check for clogs, replace mulch at least annually.

Why Laundry to Landscape?

- ▶ **Rebate:** \$200 for Mountain View residents
- ▶ **Direct Installation:** Free to low-cost system for qualifying customers
- ▶ Stay for the end to learn how to sign up!

Why Laundry to Landscape?

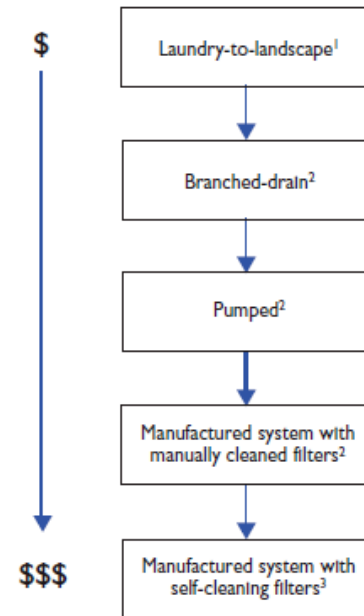
System Type	Approximate Cost	
	DIY	Professional Installation
Laundry to Landscape	\$185	\$1,000
Branched Drain*	\$700	\$1,750
Packaged System*	\$2,050	\$4,000 to \$15,000

* Excluding permit costs and backflow-protection requirements

Sources:

- National Academy of Science. Using Graywater and Stormwater to Enhance Local Water Supplies (2016)
- Greywater Action. Residential Greywater Irrigation Systems in California (2013)
- San Francisco PUC. Graywater Design Manual (2017)

System Complexity and Cost
(In order of increasing complexity and Cost)



- 1 Systems can use graywater from washing machine only.
- 2 System can use graywater from washing machine, shower, tub, or bathroom sink.
- 3 System typically only used for graywater from multiple fixtures

Laundry to Landscape Graywater System

Sewer connection

Anti-siphon

Diverter valve

Graywater goes to landscape out wall or via crawlspace

Photo Credits: Greywater Action



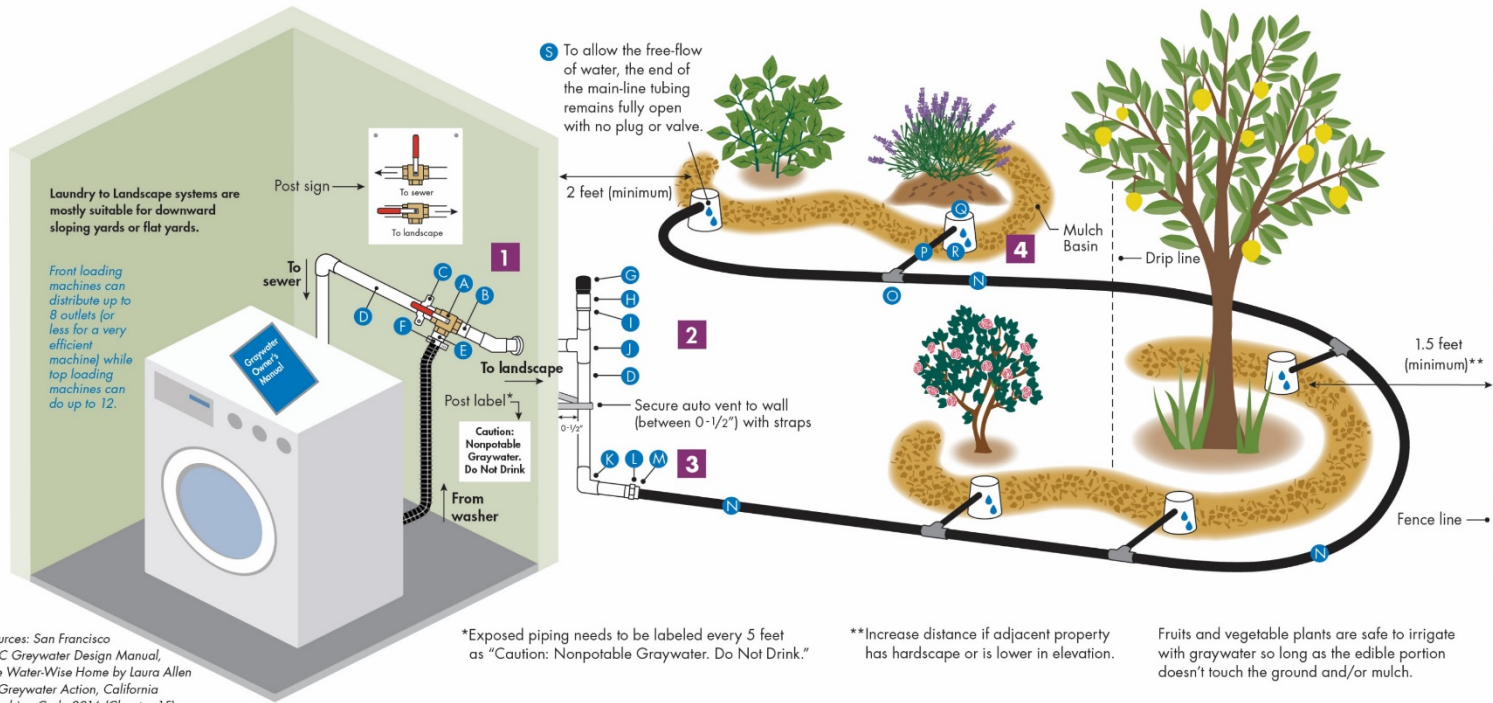
1/2" tubing to mulch shield/basin

Top loading machine: 35-50 gals
can distribute water **up to 20 places***

Front loading: 12-25 gals
can distribute water **up to 8 places**

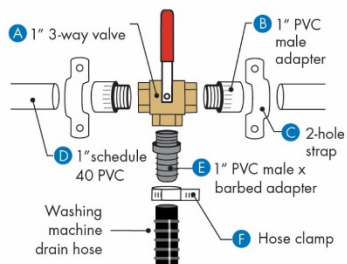
L2L System Components: Big Picture

Laundry to Landscape: Graywater System Example

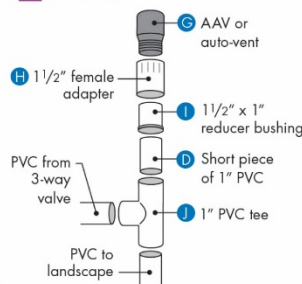


Sources: San Francisco PUC Greywater Design Manual, The Water-Wise Home by Laura Allen of Greywater Action, California Plumbing Code 2016 (Chapter 15)

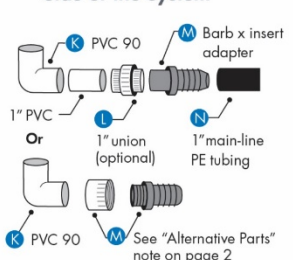
1 Diverter (3-way) Valve



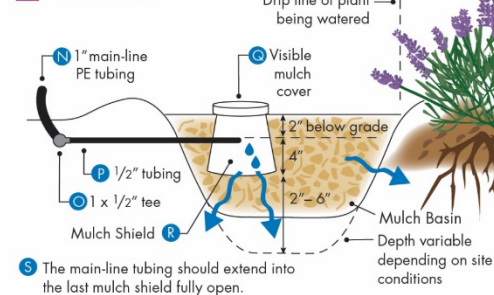
2 Auto Vent



3 Transition to the Landscape Side of the System



4 Mulch Basin



This diagram is not drawn to scale and is provided for reference purposes only. It is your responsibility to properly design, install, maintain, and use your laundry to landscape graywater system (graywater system). If you are unsure of the intricacies of your plumbing system or how to properly design or install a graywater system, please consult with a professional. Valley Water does not accept any liability and responsibility for any direct, special, indirect or consequential loss or damage whatsoever arising out of or in connection with providing you with access to this diagram.

Discuss options for where to install graywater system components...



Discuss options for where to install graywater system components...



Do what works for you (and legal!)



Greywater Action

Be Creative



Make it work



Photo Credit:
Leigh Jerrard

Plant options

Mulch basin systems are **best** for larger plants: **trees, shrubs, vines.**

Impractical for lawns, groundcovers, small shallow rooted plants



To slow flow:

- **Serpentine** the 1" main tubing down a slope
- Use **valves sparingly** (never at the end of the line)
- Position ½" branch outlets **above** the plant to be watered

Photo Credits: Christina Bertea

Rebate!

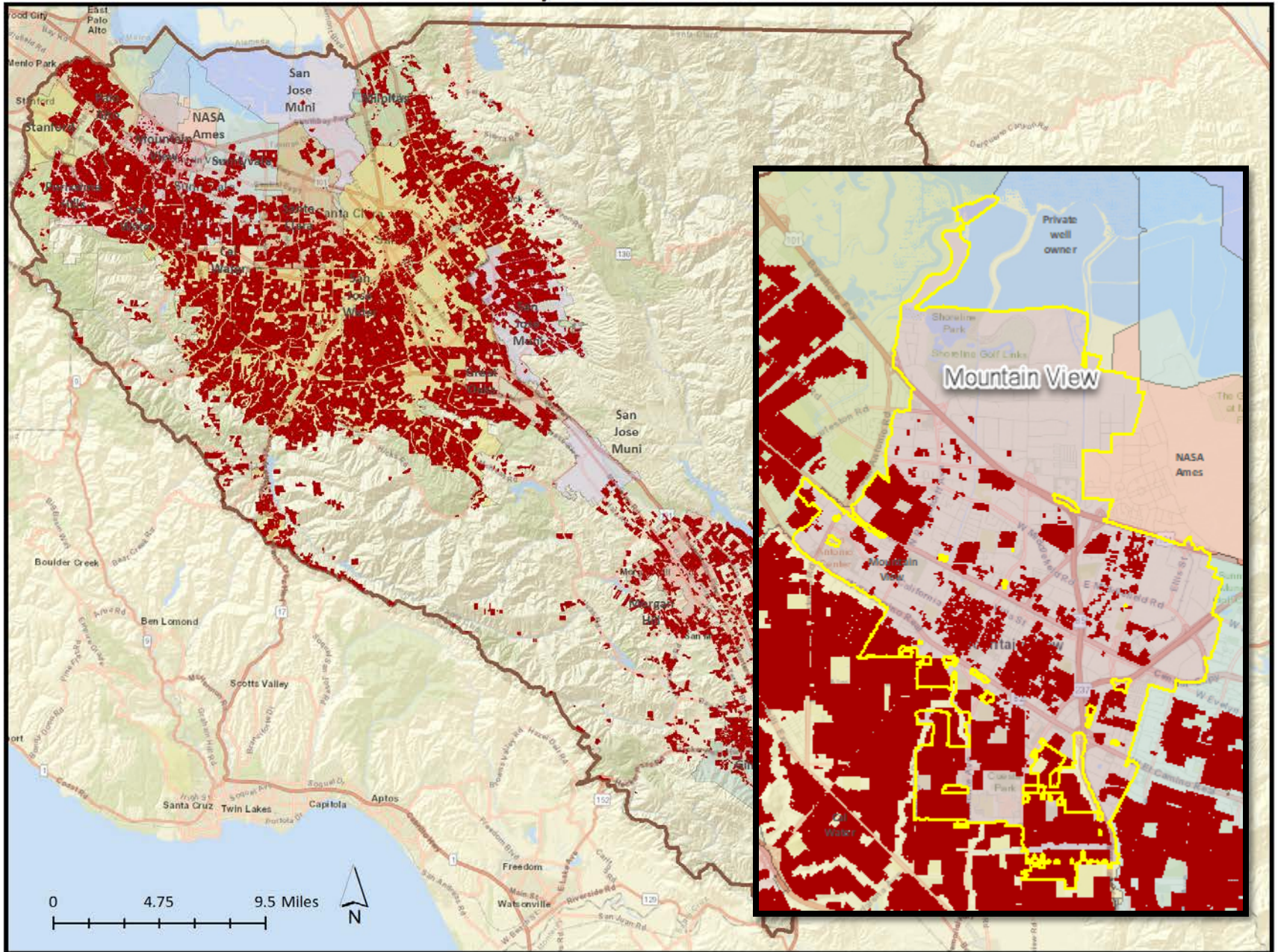
- ▶ Only Laundry to Landscape graywater systems qualify
- ▶ **Apply and wait for approval** before installing the project
- ▶ **\$200 flat rebate** (\$400 in Morgan Hill, Cupertino, and the Evergreen area)
- ▶ No receipts required. Follow the checklist and have a successful post -inspection.
- ▶ Download at www.valleywater.org/graywater. **Broken link?** watersavings.org



**Graywater Laundry to
Landscape Rebate Program**



Graywater Parcels



SCVWD Guidelines

In Addition to the Plumbing Code Requirements

- ▶ Full details in application.
- ▶ All graywater must be distributed from the washing machine to a pre-approved landscape area that is large enough to absorb the graywater. It cannot be stored.
- ▶ The landscape area where the graywater is used must be located at least:
 - 1) Eighteen inches from any property line
 - 2) Two feet from buildings
 - 3) One hundred feet from wells, waterways, or other water sources
 - 4) Five feet from any septic tank
 - ▶ Increase the above distances if the graywater source is uphill of these features
- ▶ Graywater shall not be used to irrigate root crops or edible parts of food crops that touch the soil
- ▶ The site where graywater is used must be located in an area where seasonal high groundwater is at least five feet below ground surface. This will be verified by SCVWD using available information. **This is one reason why we wait to provide you the application.**
- ▶ **And, Comply with CA Plumbing Code** (See valleywater.org/GraywaterResources)

Plumbing Code Requirements

- ▶ Ch 15 of the CA Plumbing Code
- ▶ No permit required for L2L – **why not?**
- ▶ 13 conditions for permit exemption (Section 1502.1.1)
- ▶ Restrictions for public health & safety purposes
- ▶ See valleywater.org/GraywaterResources

CHAPTER 15

ALTERNATE WATER SOURCES FOR NONPOTABLE APPLICATIONS

Intent

The provisions of this chapter are intended to:

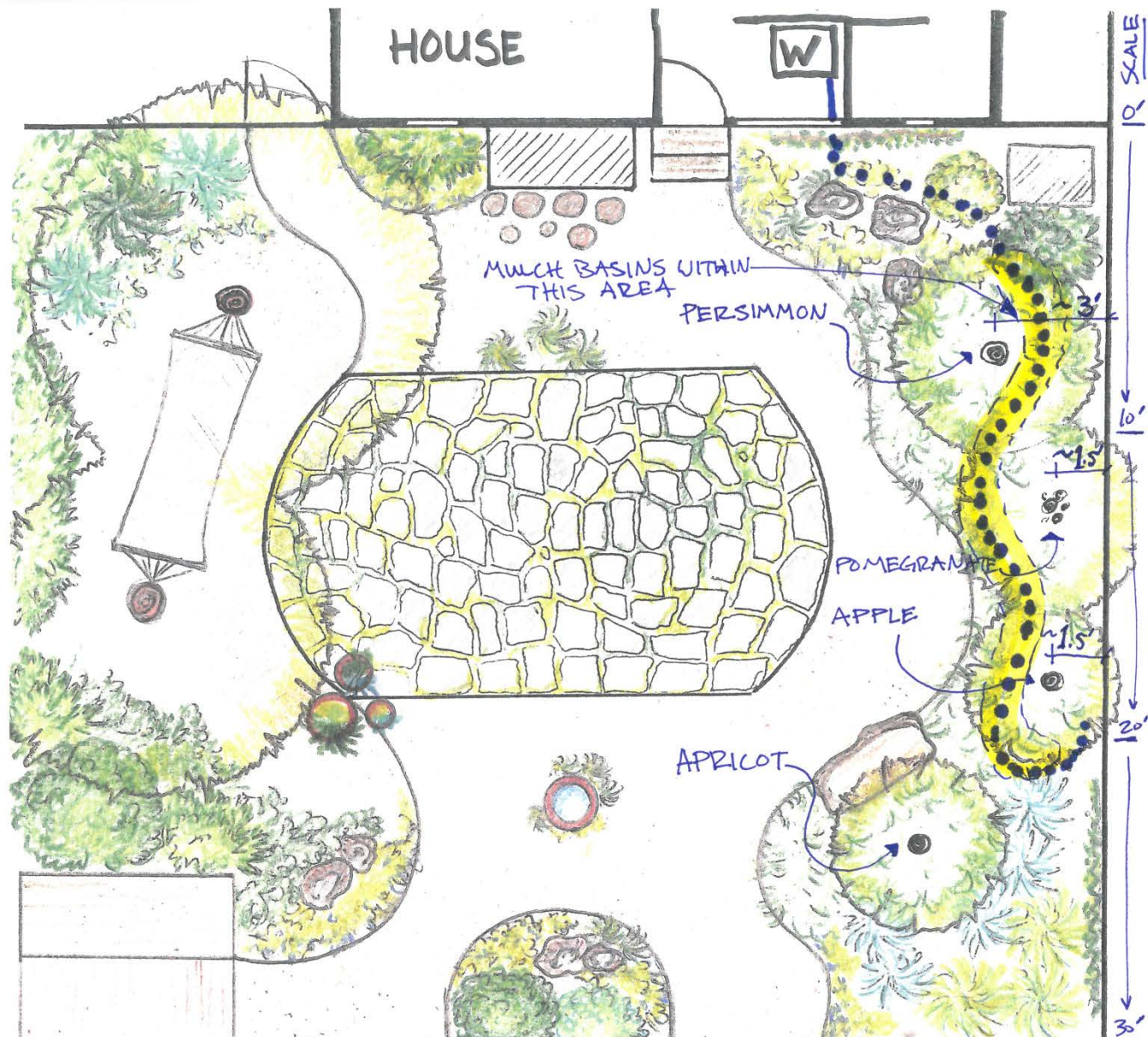
- 1. Conserve water by facilitating greater reuse of laundry, shower, lavatory and similar sources of discharge for irrigation and/or indoor use.*
- 2. Reduce the number of non-compliant gray water systems by making legal compliance easily achievable.*
- 3. Provide guidance for avoiding potentially unhealthful conditions.*
- 4. Provide an alternative way to relieve stress on a private sewage disposal system by diverting the gray-water.*

1501.4 Component Identification. System components shall be properly identified as to the manufacturer.

1501.5 Maintenance and Inspection. Alternate water source systems and components shall be inspected and maintained in accordance with *the manufacturer's recommendations and/or as required by the Enforcing Agency.* **[BSC]** *Where no manufacturers recommendations exist, additional recommendations are listed in Table 1501.5.*

1501.5.1 Maintenance Responsibility. The required maintenance and inspection of alternate water source systems shall be the responsibility of the property owner, unless otherwise required by the Authority Having Jurisdiction.

Example Diagram



Activity

- ▶ 1. find a partner
- ▶ 2. Review the drawings, pretending like it's your own home
- ▶ 3. Draw the route you'd place your piping and where you'd dig mulch basins
- ▶ 4. Describe your thought process

Starting the Rebate: Assess your home

Provide answers on Pre-Inspection Questionnaire in Application

- ▶ **Residence Information** responses help calculate how much graywater you may produce to benefit your landscape.
- ▶ **Landscape Information** responses help determine how much area you'll need and if this will work on your property.

Assess your home

► Q12: Soil type?

► What if
not clay?

► Why does
this matter?

**TABLE 1602.10
DESIGN OF SIX TYPICAL SOILS**

TYPE OF SOIL	MINIMUM SQUARE FEET OF IRRIGATION/LEACHING AREA PER 100 GALLONS OF ESTIMATED GRAY WATER DISCHARGE PER DAY	MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FOOT OF IRRIGATION/LEACHING AREA FOR A 24-HOUR PERIOD
Coarse sand or gravel	20	5.0
Fine sand	25	4.0
Sandy loam	40	2.5
Sandy clay	60	1.7
Clay with considerable sand or gravel	90	1.1
Clay with small amounts of sand or gravel	120	0.8

For SI units: 1 square foot = 0.0929 m², 1 gallon per day = 0.000043 L/s

How much area do you need?

Sizing Mulch Basins

The plumbing code specifies a total **square** footage of mulch basins to avoid maintenance and safety concerns.

1. Calculate maximum graywater production (clothes washer)

_____	x	_____ =	_____
# of loads in a 24-hour period		Gallons per load (see "Supporting Resources" handout)	<i>Gallons Produced/Day</i>

2. Determine Soil Type

_____	÷	_____ =	_____
Gallons Produced/Day (Step 1)		Gallons/Square Feet/Day (use 1.1 for "clay", or use the "Soil Texture" handout to use a different value)	<i>Required Square Feet</i>

Math Averse Option...

Installation Help

Graywater Resources

This graywater resources webpage provides a [graywater introduction](#), how-to videos, resources on finding equipment and installers, soap and plant health, and more. [Click here](#) for an **example system and parts list** [PDF]. Additional details and equipment can be found below.



- + [Frequently Asked Questions](#)
- + [Videos for those New to Graywater](#)
- + [How-To Videos: Ready for Graywater](#)
- + [Equipment Information](#)
- + [Finding Installers and Installation Help](#)
- + [Soap and Detergent Information](#)
- + [Mulch Basins and Soil Health](#)
- + [Other Technical and Design-Assistance Resources](#)
- + [Legal Requirements](#)

Installation Help

greywateraction.org/business-directory/wpbdp_category/san-francisco-bay-area/



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WATER CULTURE



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San Francisco Bay Area

Sort By: **Business Name** ↓

(Reset)

Business Name

Area: San Francisco Bay

About:

Description of Services

Services: Consultation, L2L, Branched drain, All types of Greywater Systems

Business website:

Website URL

Installer's level: 1

View

Direct Installation Program

Sign Up at ecoact.org/greywaterprogram/



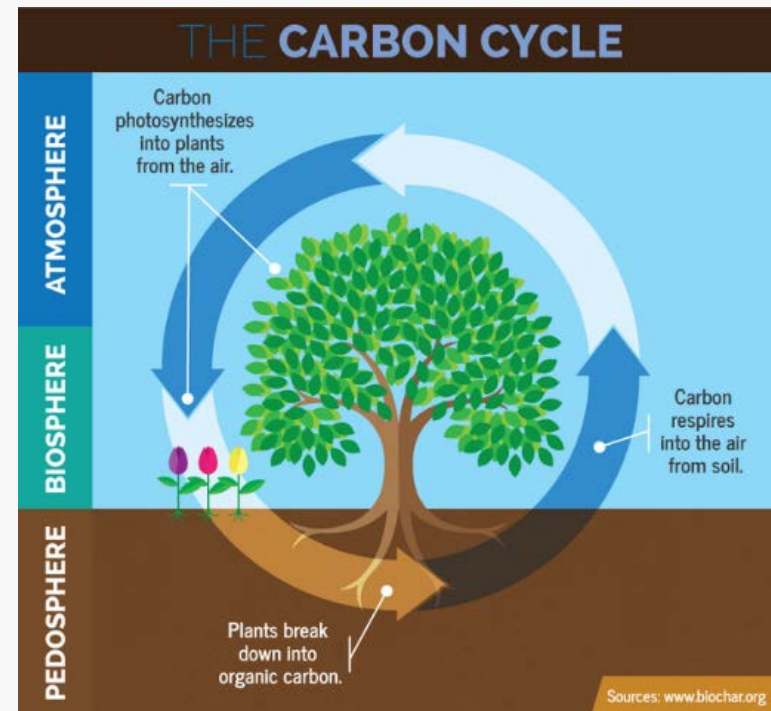
You qualify if you are *any* of the following:

- ▶ 60 years or older
- ▶ United States veteran
- ▶ Person with a disability OR
- ▶ Live in a household with income lower than:

Persons in Family	1	2	3	4	5	6	7	8
Avg. Annual Income	66,150	75,600	85,050	94,450	102,050	109,600	117,150	124,700

Finally a compelling reason to:

- ▶ **Direct graywater** into your soil, not through sewer pipes to the treatment plant and then the bay or ocean
- ▶ **Keep water** on your property instead of running off into storm drains to the bay or ocean
- ▶ Help **protect your landscape** from hotter summers, drier winters: soak water into the soil, grow plants, and support cooler microclimates



Thank You!

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www.valleywater.org/graywater

Valleywater.org/GraywaterResources

www.SouthBayGreenGardens.org

