Residential Greywater



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Home. Life. Solutions.

Residential Greywater

- EcoAssistant intro
- Site-based water management
- Potential for Davis
- Whats and whys of greywater
- Two primary system types
- Design considerations, components, costs
- Wrap up

What Is EcoAssistant?

- Site assessments, designs, workshops
- Greywater
- Rainwater harvesting
- Lawn conversions
- Appliance and fixture recommendations
- Saving resources and living lightly

Who Is EcoAssistant?

Leslie Crenna

- Certified Level 2 Greywater Designer and Installer with **Greywater Action**
- **QWEL Greywater Training** (Qualified Water Efficient Landscaper) USEPA WaterSense approved training (offered through the Sonoma-Marin Saving Water Partnership)
- American Rainwater Capture Systems Association (**ARCSA**)-trained

Greywater Experience Survey

- Who already has a greywater system?
- Who's interested in getting a system?
- Who's just curious?

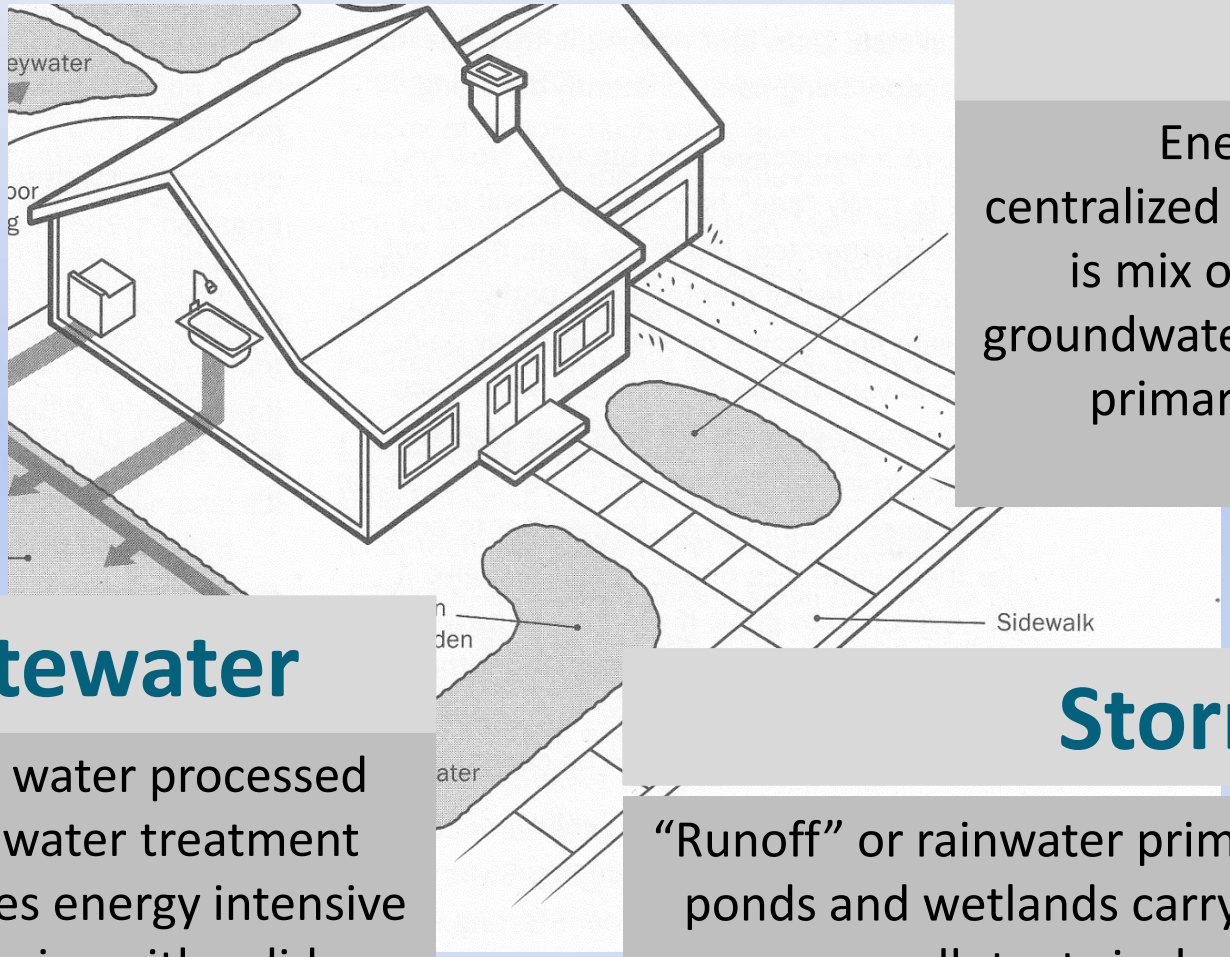
Rate your greywater knowledge level:

- Beginner
- Some experience or knowledge
- Expert

Site-Based Water Management

- Management of water resources on-site at the urban/suburban residential level in harmony with the local watershed as well as existing infrastructure.

The Norm for Davis



Supply

Energy intensive centralized water supply is mix of surface and groundwater dependent primarily on distant snowmelt

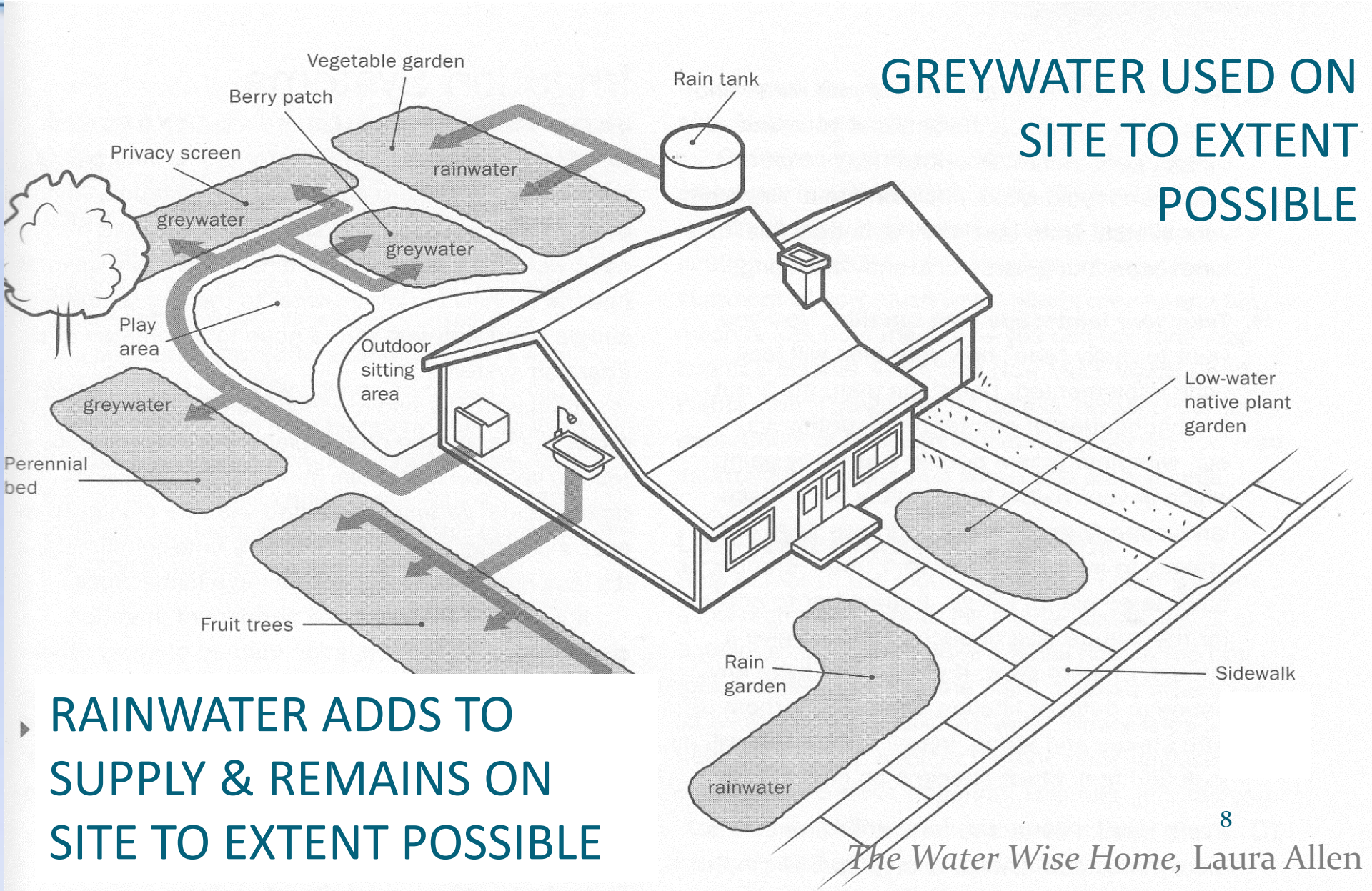
Wastewater

All drain water processed at wastewater treatment plant uses energy intensive technologies with solids byproducts

Stormwater

"Runoff" or rainwater primarily drains to ponds and wetlands carrying non-point source pollutants including fertilizers, pesticides, herbicides, oils, and toxics

Site-Based Management



GREYWATER USED ON SITE TO EXTENT POSSIBLE

RAINWATER ADDS TO SUPPLY & REMAINS ON SITE TO EXTENT POSSIBLE

The Water Wise Home, Laura Allen

What Is Greywater?

Per CA code, greywater is drainage water from . . .

- Clothes washers (laundry)
- Showers and tubs
- Bathroom sinks (“lavatories”)

Different Types

- Washers, showers, tubs, bathroom sinks: **“light greywater”**
- Kitchen sinks, dishwashers: “heavy“ or **“dark” greywater**
- Toilets: “**blackwater**”

Why Greywater?

- Saves or offsets potable water use
- Saves some money
- Great for some outdoor irrigation
- Healthier shade trees
- Increases yield for food producing trees
- Improves groundwater recharge
- Reduces embodied energy consumption

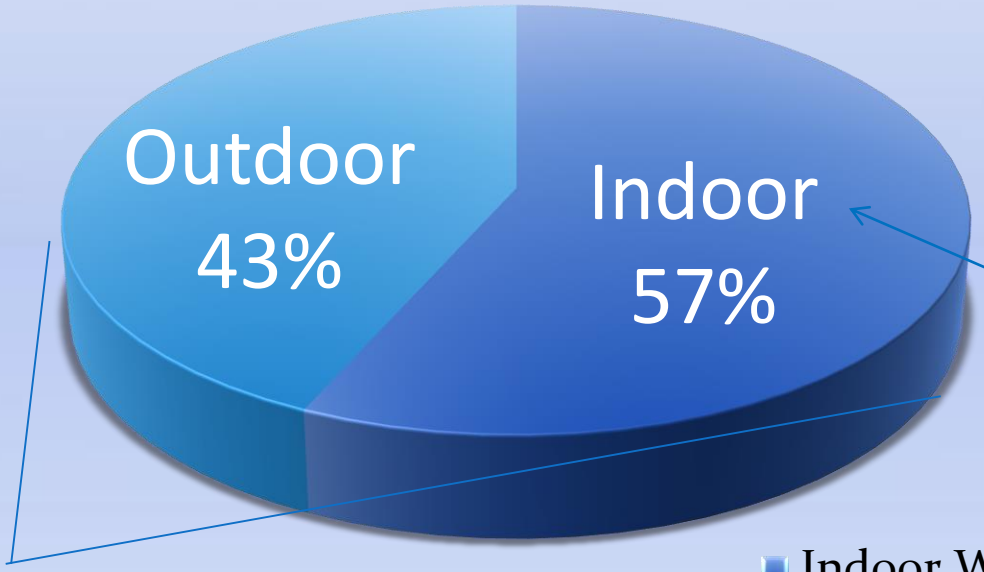
CA State Code Requirements

- No cross connections with potable
- No ponding or runoff
- No storage
- No root crops or those with soil contact
- Valve readily accessible
- No treatment if subsurface irrigation

GREYWATER PRODUCTION - DROUGHT

DAVIS CA PER CAPITA

July & January traditional data points



Winter Use: 64 gals
R-GPCD (Dec 2014)

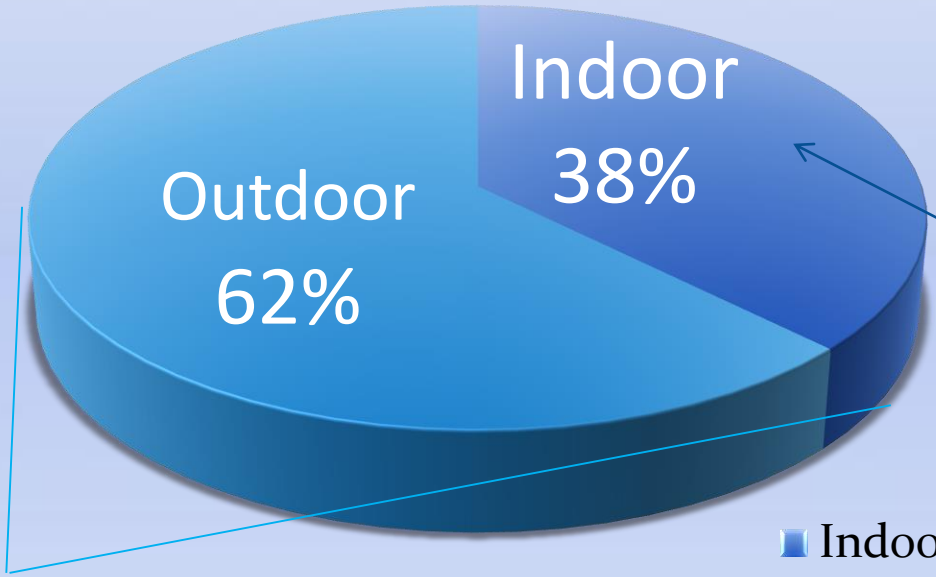
Summer Use: 112 gals
R-GPCD (Aug 2015)

- Indoor Water Use Residential
- Outdoor Water Use Residential

CA Urban Water Supplier Report, Residential gallons per capita per day or R-GPCD

GREYWATER PRODUCTION - UPDATE

DAVIS CA PER CAPITA



Winter Use: **57 gals pd**
R-GPCD (Jan 2019)

Summer Use: **145 gals pd**
R-GPCD (Jul 2018)

CA Urban Water Supplier Report, Residential gallons per capita per day or R-GPCD

Community Greywater Potential

Davis CA

71,311 individuals served (May 2019)

~25 gallons greywater/day per person

= 1,700,000 gallons greywater/day

Total community residential water use (less CII)

7.5 MG (million gallons)/day (May 2019)

Greywater = ~23% water consumed

CA Urban Water Supplier Report, Residential gallons per capita per day or R-GPCD

Is Greywater Right for You?

- Suitable receiving landscape?
- Plumbing accessible?
- Are appliances and fixtures near exterior walls and landscape?
- Costs within budget?

Consider the Landscape First

- Best for trees or thirsty shrubs
- Non-root crop veggies ok
- Great for fruit trees!
- Low tech systems not for lawns



Think about Usage and Needs

- How much water does your household currently consume per month? (Winter/Summer) (1 ccf=748 gals)
- What is the square footage of irrigated landscape in your yard?
- What needs does your landscape serve? Play? Food? Habitat?
- How much are you paying per month for water and sewage service?
- Can you reduce your usage with a low flow shower head or dual flush toilet?

Consider the Whole Landscape

- Reduce or eliminate climate inappropriate landscaping
- Embrace urban agriculture by planting food producing trees and veggies
- Create wildlife habitat with local natives
- Incorporate raingardens
- Convert spray to drip
- Save Our Water.org rebates fully committed

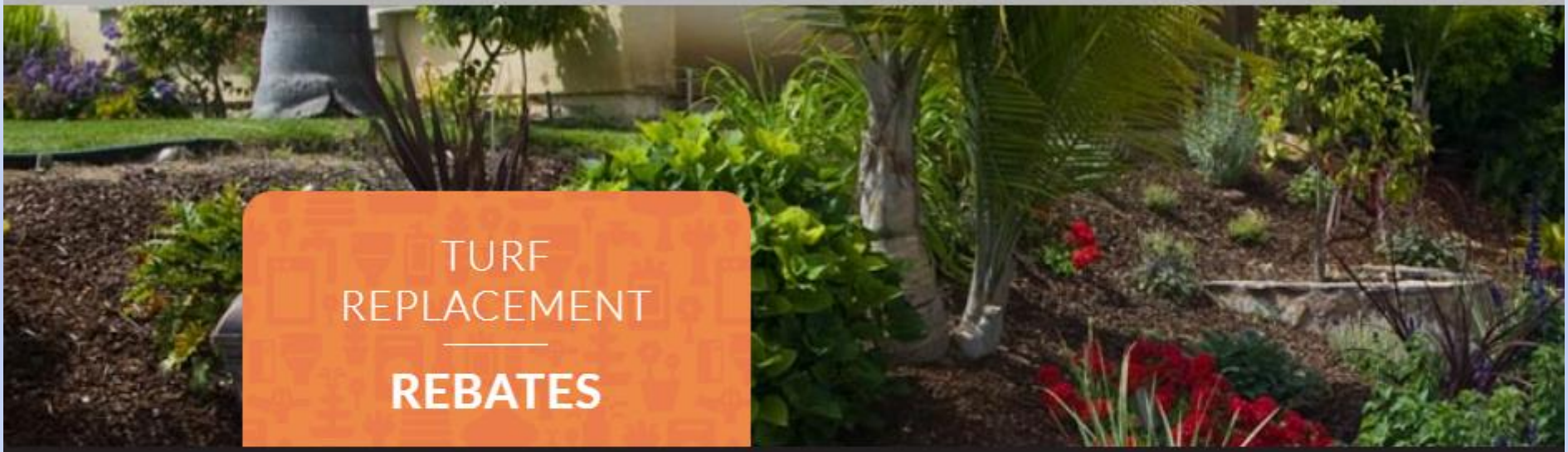




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Save Our Water REBATES

Claim Your Rebate About the Program



Replace your turf grass and receive a rebate of up to $2,000!

Thank you for your commitment to water conservation! Funding for the Save Our Water Turf Replacement Program has been fully committed, and no additional applications for rebates will be accepted at this time. Please continue to check this website for funding changes and program updates.

If you have already submitted an application, please log back into your online account for status information, or contact us directly.

Two Basic System Types

Laundry to Landscape (L2L)

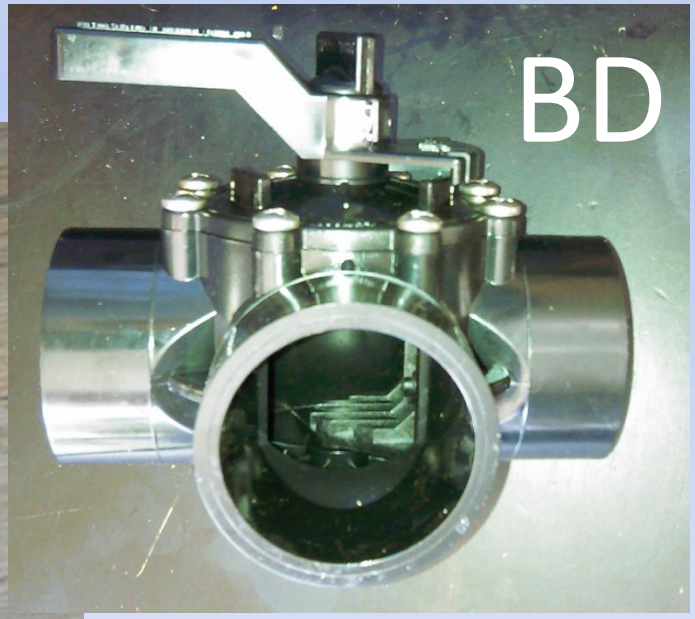
Uses washer pump to move greywater

Branched Drain (BD)

Uses gravity to move greywater

Standard Features (basic systems)

- Landscape distribution
- No storage > than 24 hrs
- 3-way valve





More Complex Features

Higher tech systems may include:

- Pumps
- Filters
- Surge tanks
- Pressure tanks
- Wetlands

Indoor reuse

Laundry to Landscape (L2L)

Requires no permit

Diverts washer water to landscape
(20-100 gallons/week/person depending on output)

Requires special laundry soap

Salts, bleach, oils, and toxics to sewer

Costs $800 to $1200 ($300-400 DIY)

L2L Design Considerations

Exterior

Landscape features concrete walkways

Slope considerations away from house

Water needs WUCOLS

Infiltration rate/soil type jar test

Distance from laundry room

Interior

Access to exterior

Type of washer and gallons per load

Loads per week

Peak flows laundry schedule

Simple Rules of Thumb

- Simplest Code method:

  15gpd/person for laundry

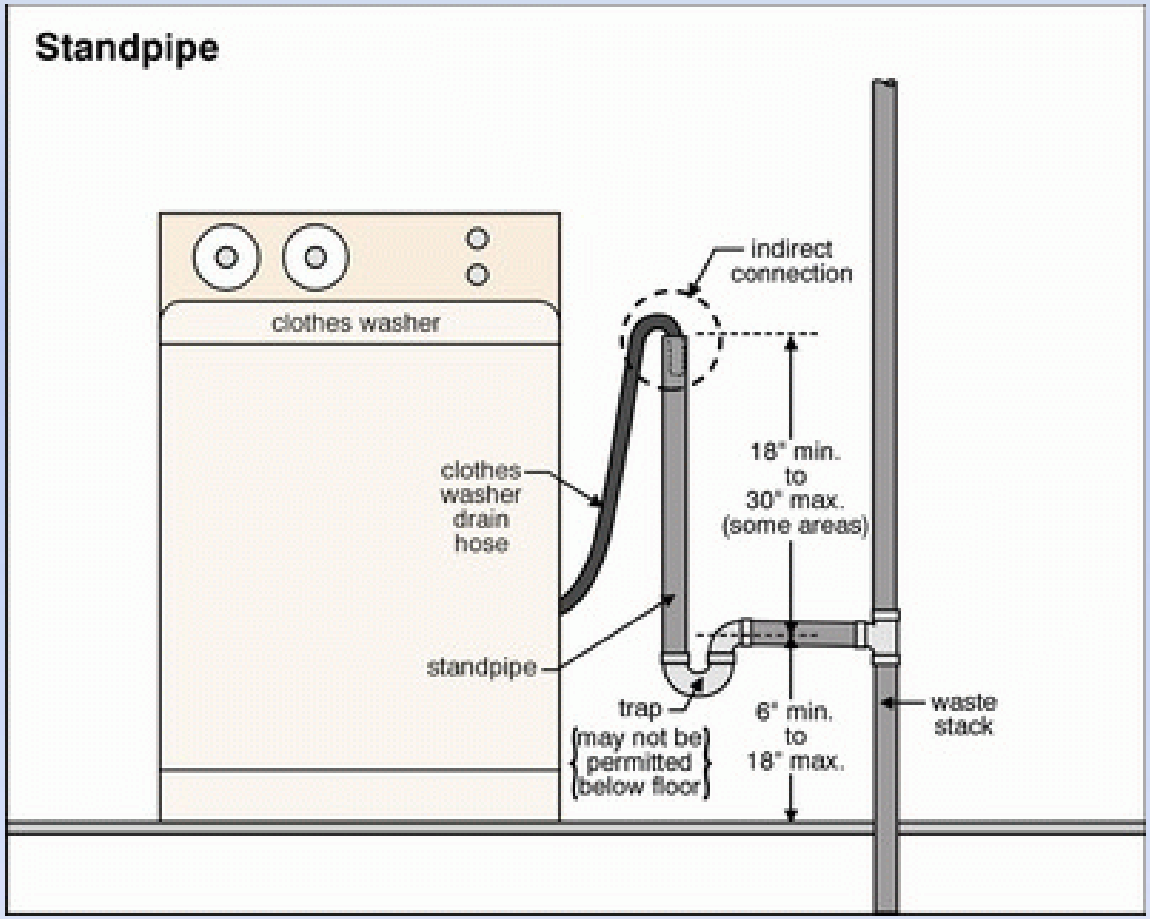
  25gpd/person for showers/lavatory

  Total: 40gpd/person

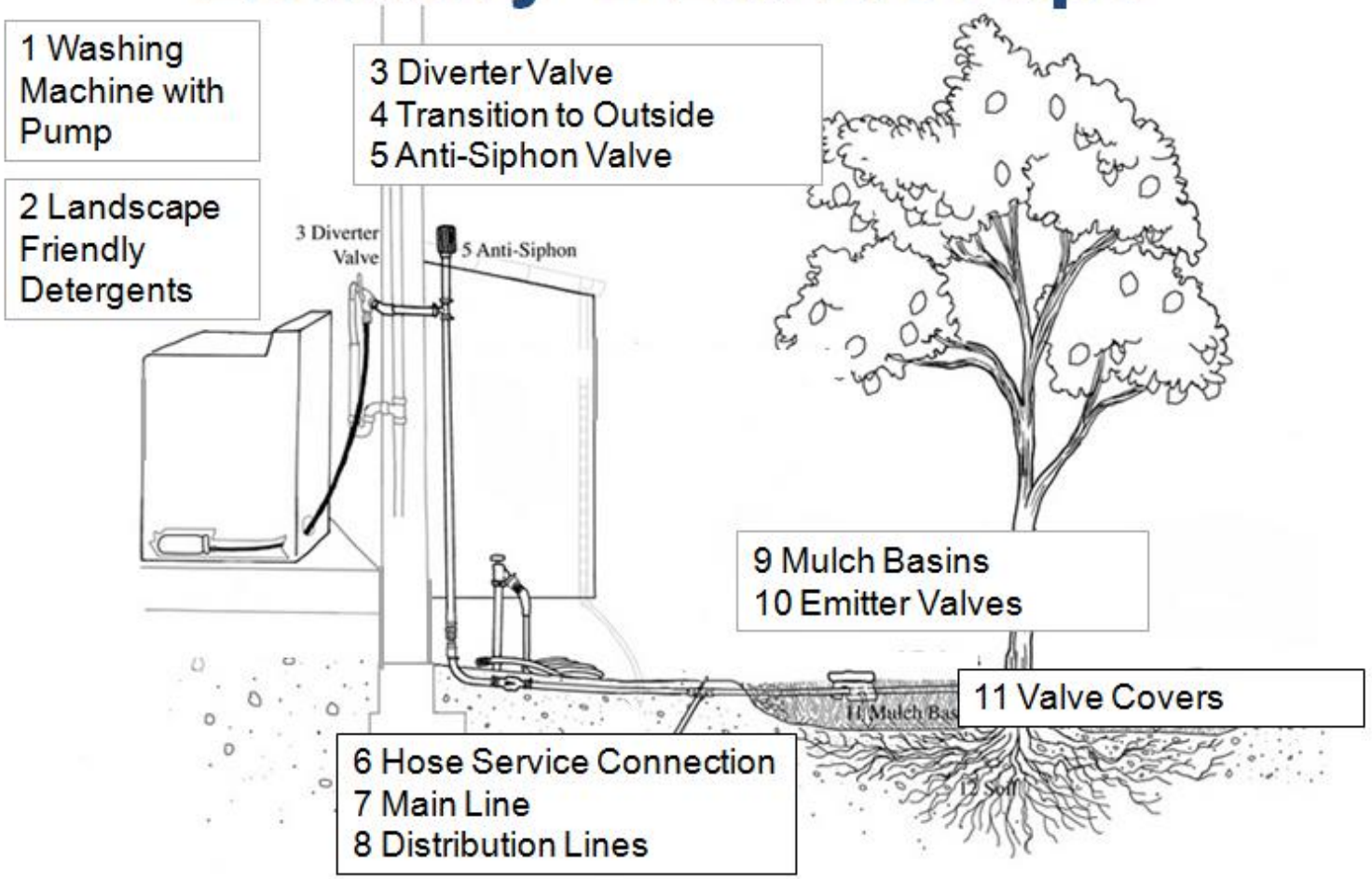
- Plant water needs

  Apple, pomegranate, citrus, fig: ~20gal/week

Typical Washer Drainage



Laundry 2 Landscape



Based on diagram from Art Ludwig: *Creating an Oasis with Greywater*

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Landscape friendly detergents

No sodium, boron, bleach





Balanced pH





3-way valve and air gap



Air gap on exterior





Remodel installation

L2L



Transition to exterior with hose cleanout

L2L



More distance possible with fall on your side



Main distribution line branches to mulch basins



Distribution lines feed into covers that rest in mulch basins filled with chips







Perforated tubing can be buried under mulch layer

Branched Drain (BD) Greywater

- Diverts water from showers and bathroom sinks to landscape
- Seek safe shampoos, soaps, cleansers
- Challenging with slab
- More water but also complexity, cost
- Costs about $1500 to $5000 and up
- Requires permit ($72 min in Davis)

Design Considerations for BD

Exterior

Same but slope is more critical

Will need to trench

Higher water production

Interior

Crawl space v. slab

Remodeling plans

Showerhead gallons per minute

Number of showers per week

Length of showers

Landscape Friendly Hygiene

- No sodium (sodium lauryl and laureth sulfides)
- Neutral pH, bar soaps can be too alkaline
- Skin Deep database



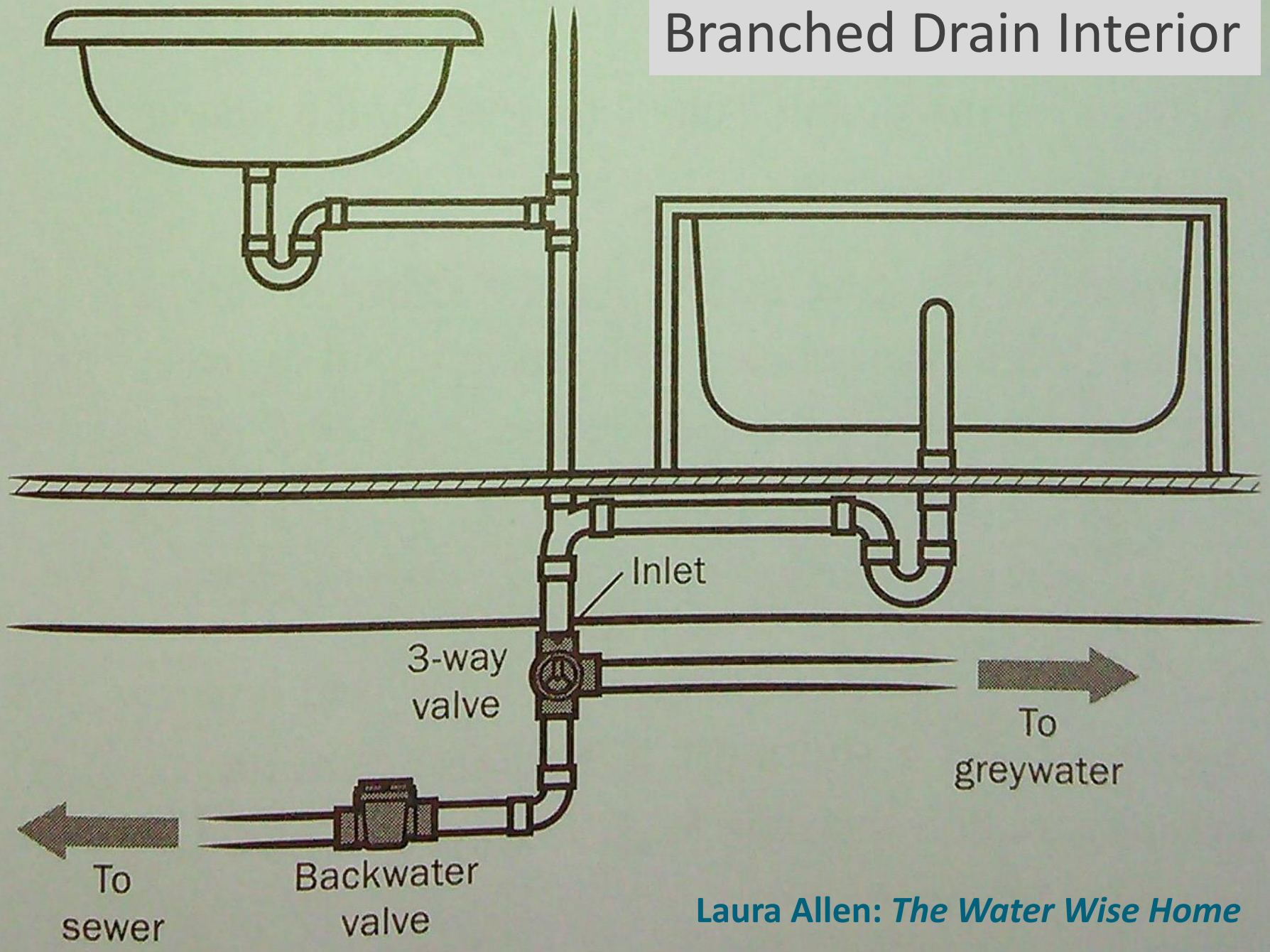


Cleaning Your Tub or Shower

Either send the cleaners to the sewer or use:

- Vinegar
- Landscape friendly liquids

Branched Drain Interior

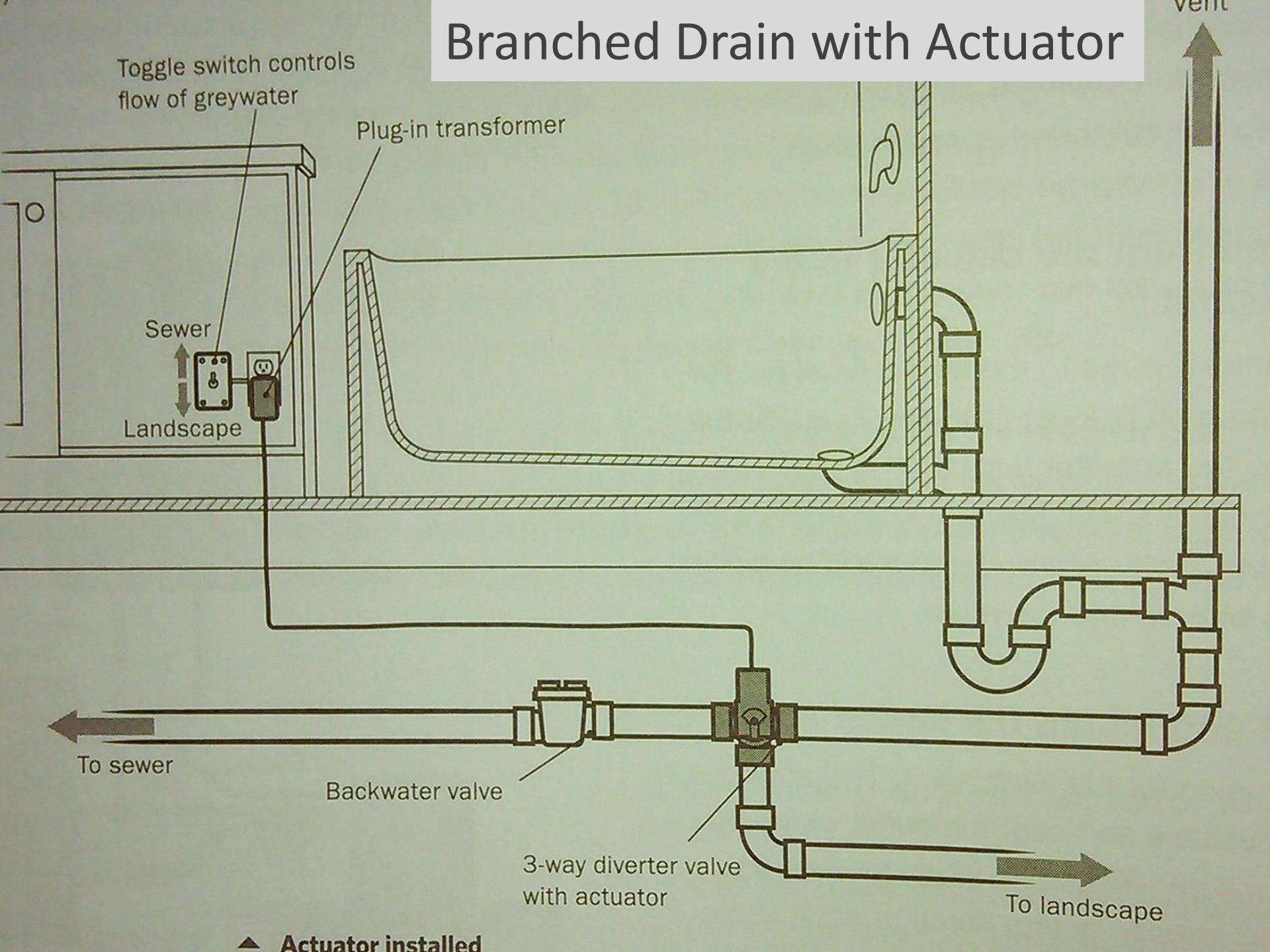


Laura Allen: *The Water Wise Home*

Valve in crawl space with actuator



Branched Drain with Actuator



▲ **Actuator installed**

3-way valve located outside



BD





BD



Cleanout

BD



Distribution plumbing



Anchoring to foundation

BD

Leveling splitters



BD

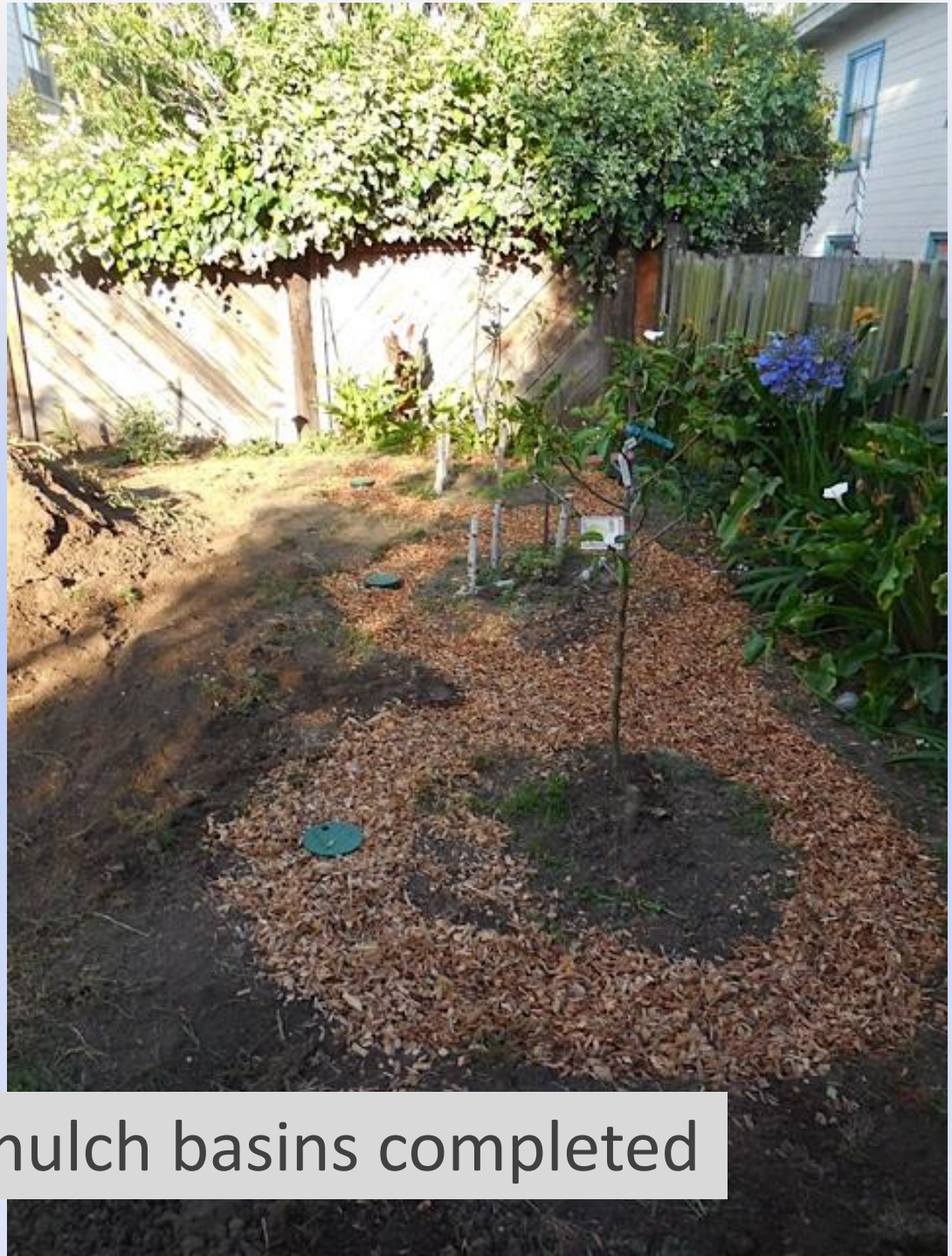


Zone 2 mulch basins open


BD
Zone 2 mulch basins completed


BD
Zone 3 mulch basins open

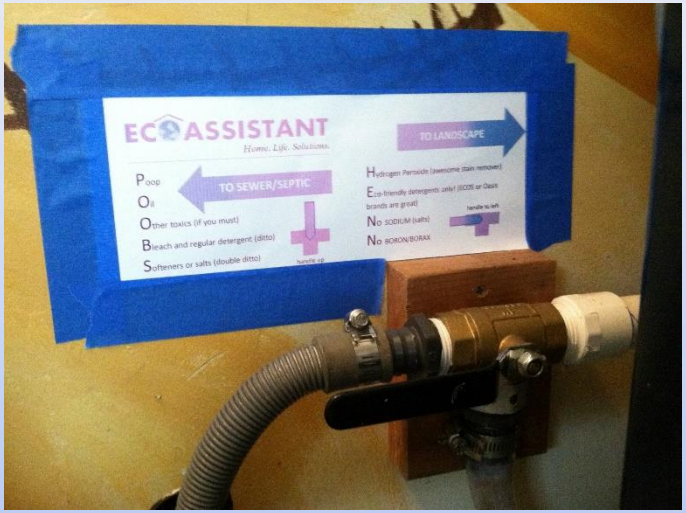
BD



Zone 3 mulch basins completed

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Valve Signage



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TO LANDSCAPE

Poop

Oil

Other toxics (if you must)

Bleach and regular detergent (ditto)

Softheners or salts (double ditto)

TO SEWER/SEPTIC

handle up

Hydrogen Peroxide (awesome stain remover)

Eco-friendly detergents only! (ECOS or Oasis brands are great)

No SODIUM (salts)

No BORON/BORAX

handle to left

Owner's Manual

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Greywater System
Owner's Manual

Congratulations on your new greywater system installed _____[date]. This manual will help you maintain a well-functioning, water-saving greywater irrigation system.

Type of greywater system: ___ Laundry to Landscape ___ Branched Drain

Soil type in irrigation area _____
System was sized to accommodate _____ gallons of water per day
Total mulch basin area is _____ square feet

This manual is to remain with the building throughout the life of the system. Upon change of ownership or occupancy, the new owner or tenant must be notified that the structure contains a greywater system.

A system design showing the location of all greywater system components is included at the end of this owner's manual.

1. The First Year of Greywater.

[Since many new plants were added and the fruit trees are immature some additional watering will most likely be required until the root systems are large enough to reach the mulch basins. You will want to keep an eye on the general health of the plants and water as you would any new plant that you are trying to establish.]

2. What products can I use in my greywater system?

During normal operation of your greywater system, when greywater is being diverted and distributed to the landscape, always use biodegradable and plant friendly soap and washing products. Products must be free of salt (sodium) and boron (borax), common ingredients that are safe for people but harmful to plants and/or the soil. Generally, all powered laundry detergents have boron so you will have to switch to liquid soaps for your greywater fixtures.

Some products also affect the pH of the greywater. In general, liquid soaps do not change the pH, but bar soaps make the water very alkaline (the opposite of acidic). If you use bar soap or are uncertain if the pH is being affected, avoid acid loving plants such as ferns, azaleas, camellias, rhododendrons, and blueberries.

Shampoo is fairly diluted so it is not as important as using plant friendly soap in your washing machine for a laundry to landscape system. but, it is important to have products that are not

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harmful to our health. Surprisingly many shampoos and conditioners contain carcinogenic chemicals, reproductive toxins and neurotoxins. You can find out what's in your products at the Campaign for Safe Cosmetics on-line database (www.cosmeticsdatabase.org)

To the landscape: Salt (sodium) and boron (borax) FREE soaps, shampoos, and other hygiene products. Hydrogen peroxide is less harmful and can be used instead of chlorine bleach. Laundry soaps include Oasis, Dr. Bronner and Eco8 brands.

JR Liggett's Old Fashioned Shampoo Bar: https://jrliggett.com
It's a national brand and is available online if it's not available in a local store.
There's also a North Bay soap company that makes several delicious flavors of shampoo bars: Three Sisters Apothecary. They sell in a few local stores and online http://www.soapcauldron.com/three-sisters-apothecary-2/shampoo-bar.html

http://sisfree.net/an-sls-free-shampoo-list/

To the sewer: If you plan to use any type of cleansing powder, chlorine bleach, or wash diapers, oily rags, or any other toxic substance, switch the diverter valve to direct the greywater to the sewer/septic system.

and should be diverted with any other harmful products to the sewer or septic by switching the 3-way valve.

3. How do I turn my greywater system off?

If you ever need to turn your greywater system off, turn the handle of the diverter valve. (Note the words "off" on the handle show which pipe is shut off. When the sewer pipe is shut off, water flows to the greywater system, and vice-versa.)

INSERT IMAGES of valve in both off and on positions.

These are common situations when you'll need to turn off your system.

- Any time you use products in the greywater fixture that might be harmful to plants (like chlorine bleach or powdered cleaning agents)
- When washing dirty diapers or anything soiled with toxic chemicals (or oils (motor oil, cooking oil, household chemicals)
- Any time you notice water isn't draining well and you see pooling or runoff in the landscape
- During the rainy season if the ground water table has risen above 3 feet

Wrap Up

- Landscape needs dictate system design
- Best for trees and larger landscape features
- Laundry to landscape easiest and cheapest (No permit)
- BD more complex and expensive, also more water (Permit required)
- Sometimes not feasible (slab retrofits not likely)
- Remodeling? Incorporate greywater into your plans

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- Site assessments
- Design
- Workshops



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