Residential Greywater



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Residential Greywater

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

What Is EcoAssistant?

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

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
- Certified Multiple Subjects Educator
- Cool Davis Communications Coordinator

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:

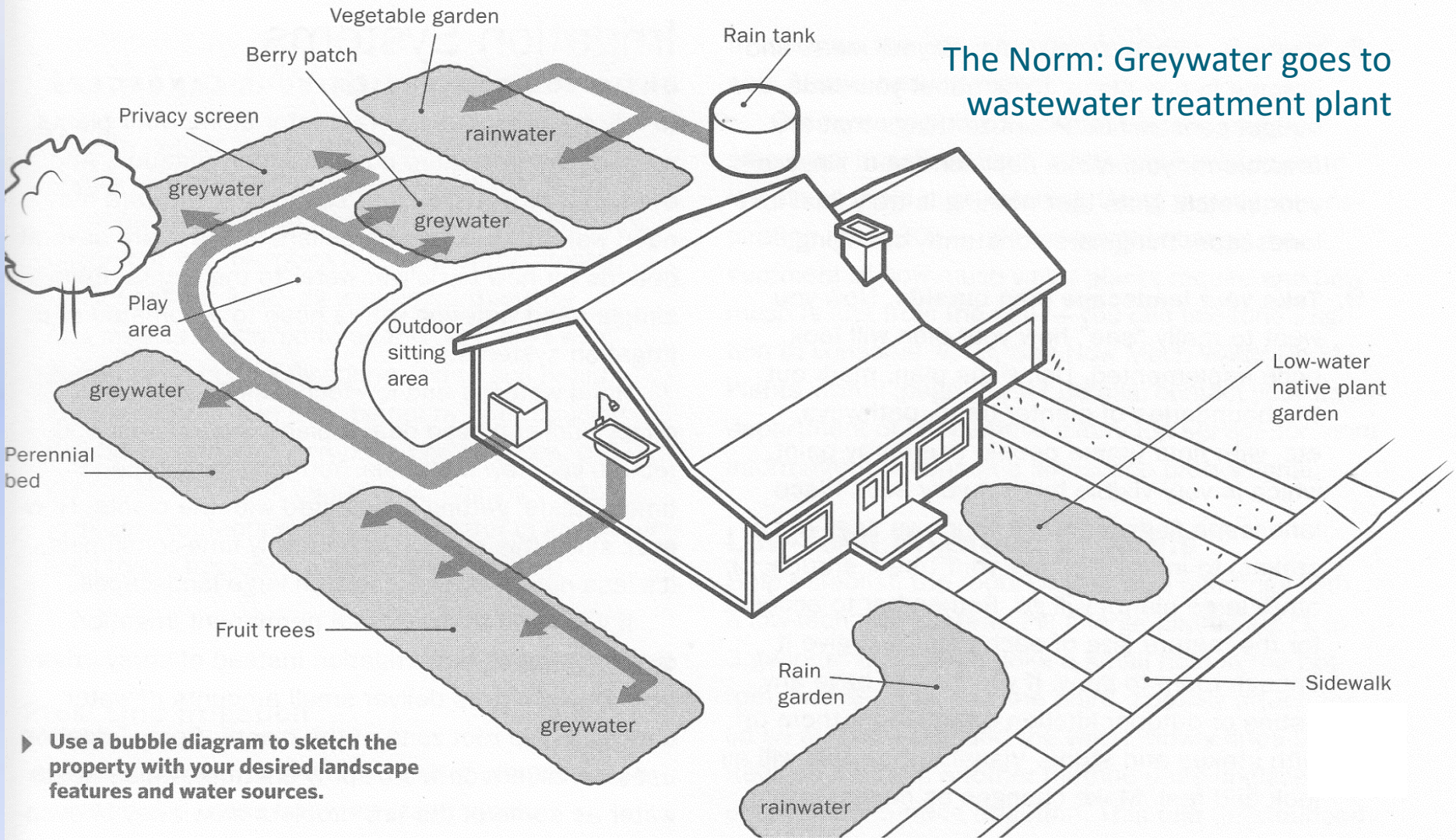
- Beginner
- Some experience or knowledge
- Expert

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 Water Wise Home, Laura Allen

The Norm v. Site-Based



The Norm: Greywater goes to wastewater treatment plant

The Norm: "Runoff" drains to ponds and wetlands carrying non-point source pollutants with it including fertilizers, pesticides, herbicides, oils, and toxics.

What Is Greywater?

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

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

Different Types

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

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
- No permit for laundry system

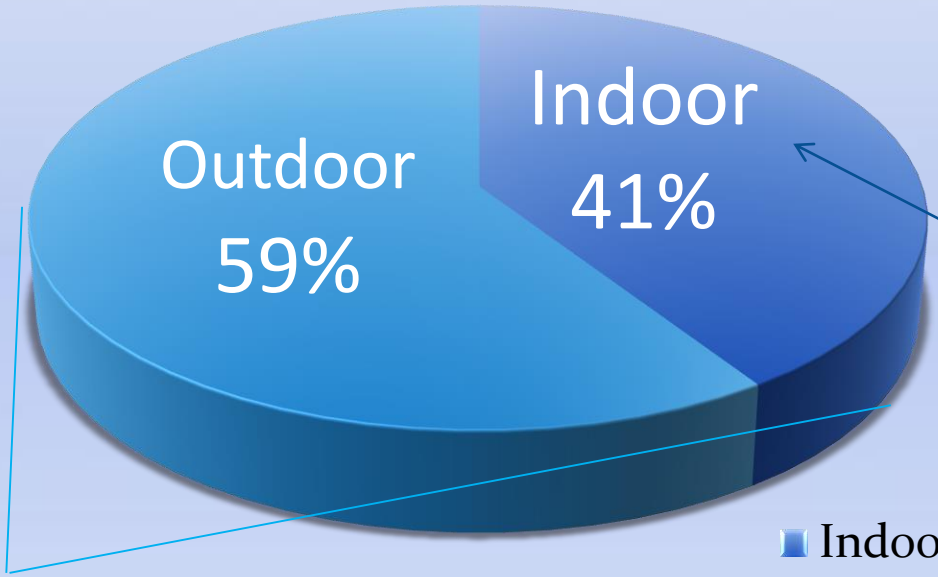
Why Greywater?

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

ESTIMATING GREYWATER PRODUCTION - UPDATE

DAVIS CA PER CAPITA

July & January traditional data points



Winter Use: **53 gals**
R-GPCD (Dec 2016)

Summer Use: 130 gals
R-GPCD (Aug 2016)

- Indoor Water Use Residential
- Outdoor Water Use Residential

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

Community Greywater Potential

Davis CA

68,000 population

~25 gallons greywater/day per person

= 1,700,000 gallons greywater/day

Total community water use

~9,000,000 gallons/day

Light greywater = ~18% water discharged to wastewater treatment plant

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



Two Primary System Types

Laundry to Landscape (L2L)

Uses washer pump to move greywater

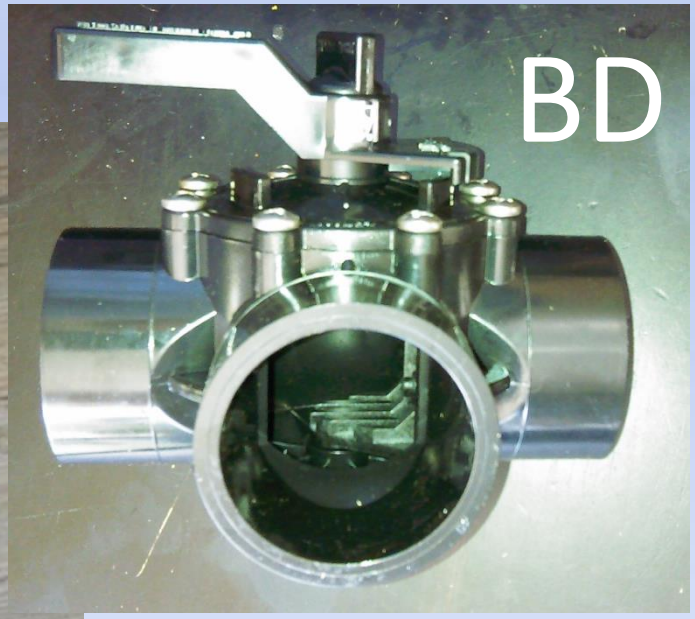
Branched Drain (BD)

Uses gravity to move greywater

Standard Features (all 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

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 $500 to $1200 ($200-300 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

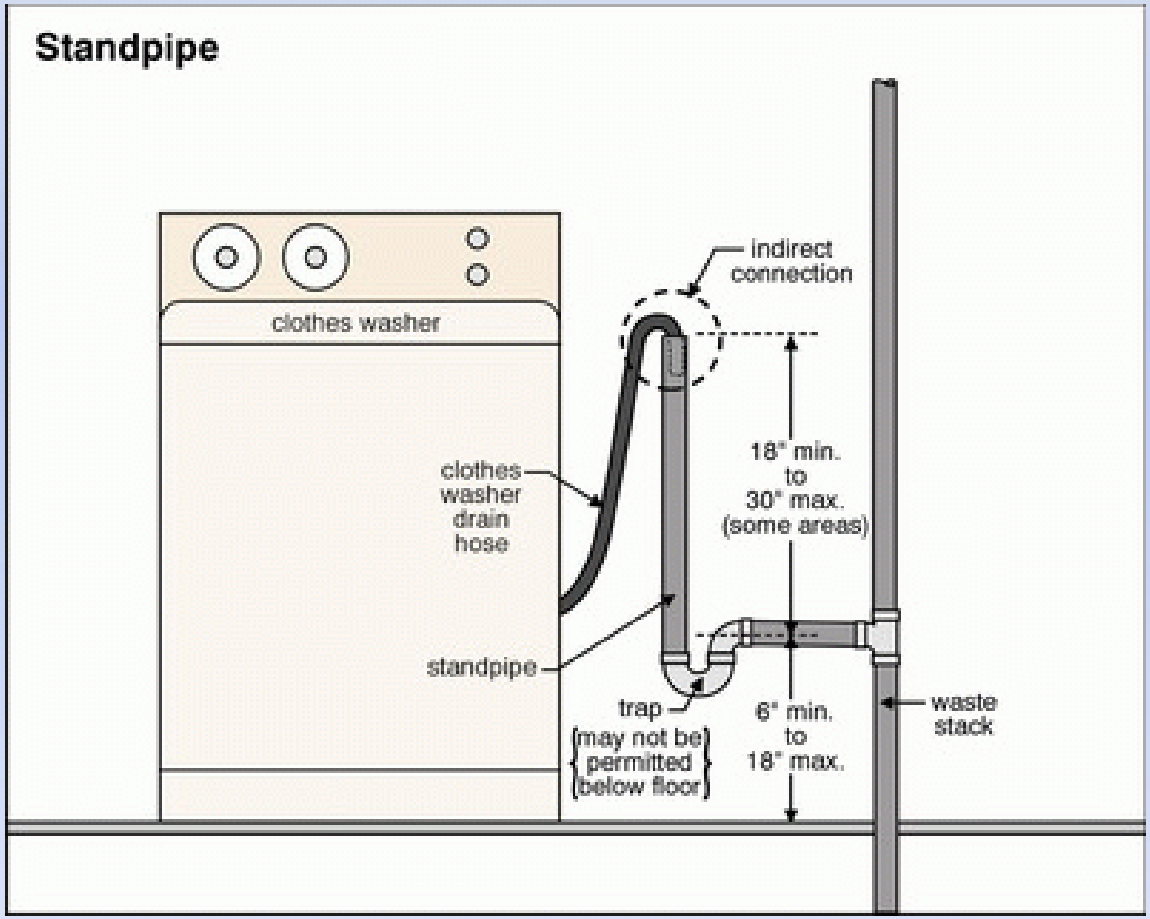
Access to exterior

Type of washer and gallons per load

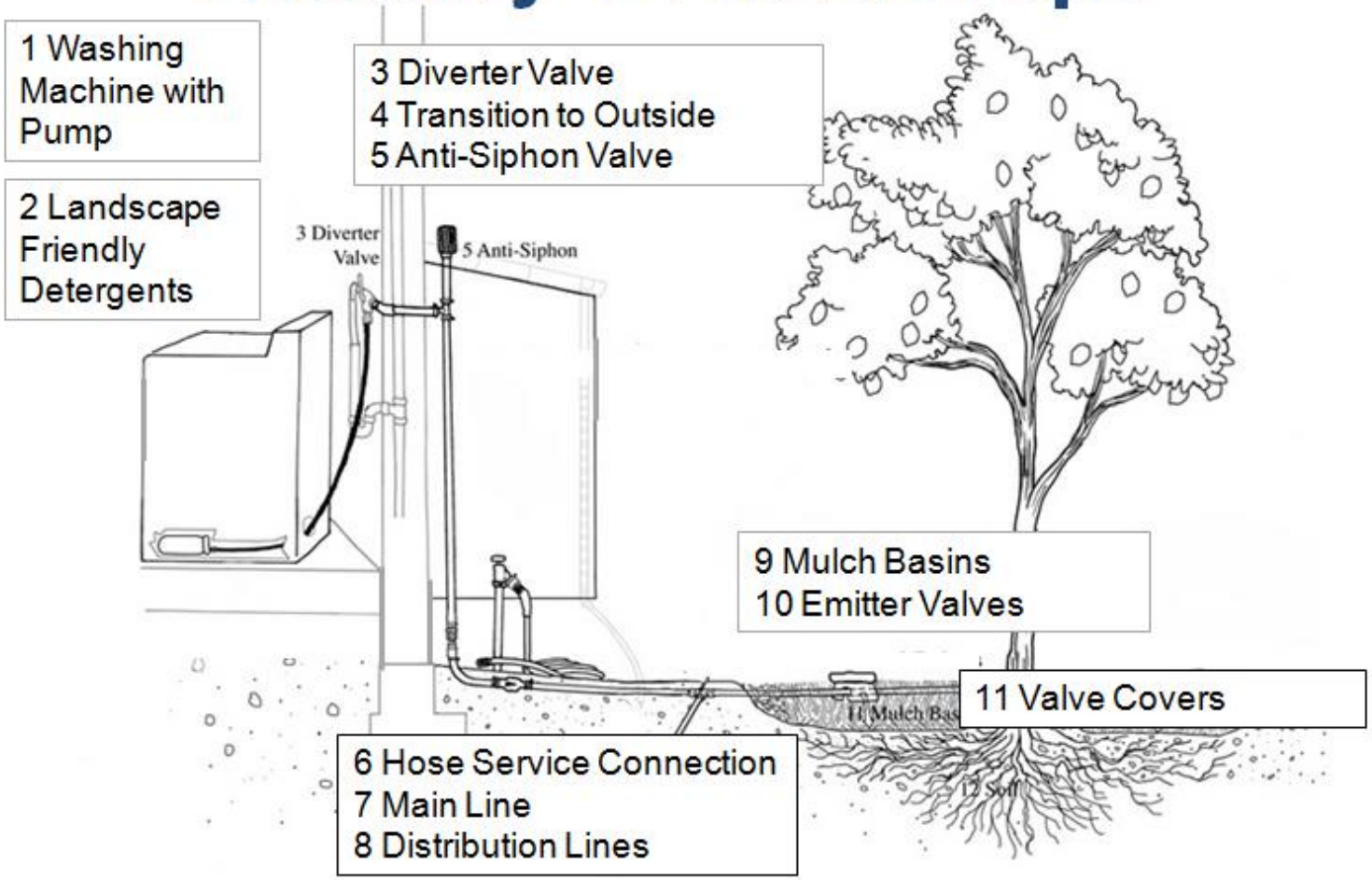
Loads per week

Peak flows laundry schedule

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





Branched Drain (BD) Greywater

- Diverts water from showers and bathroom sinks to landscape
- Safe shampoos, soaps, cleansers
- Often not feasible with slab
- More water but also complexity, cost
- Costs about $1200 to $2200 and up
- Requires permit ($72 min in Davis)

Design Considerations for BD

Exterior

Same but slope is more critical

Will likely need to trench some

Higher water production

Interior

Crawl space

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



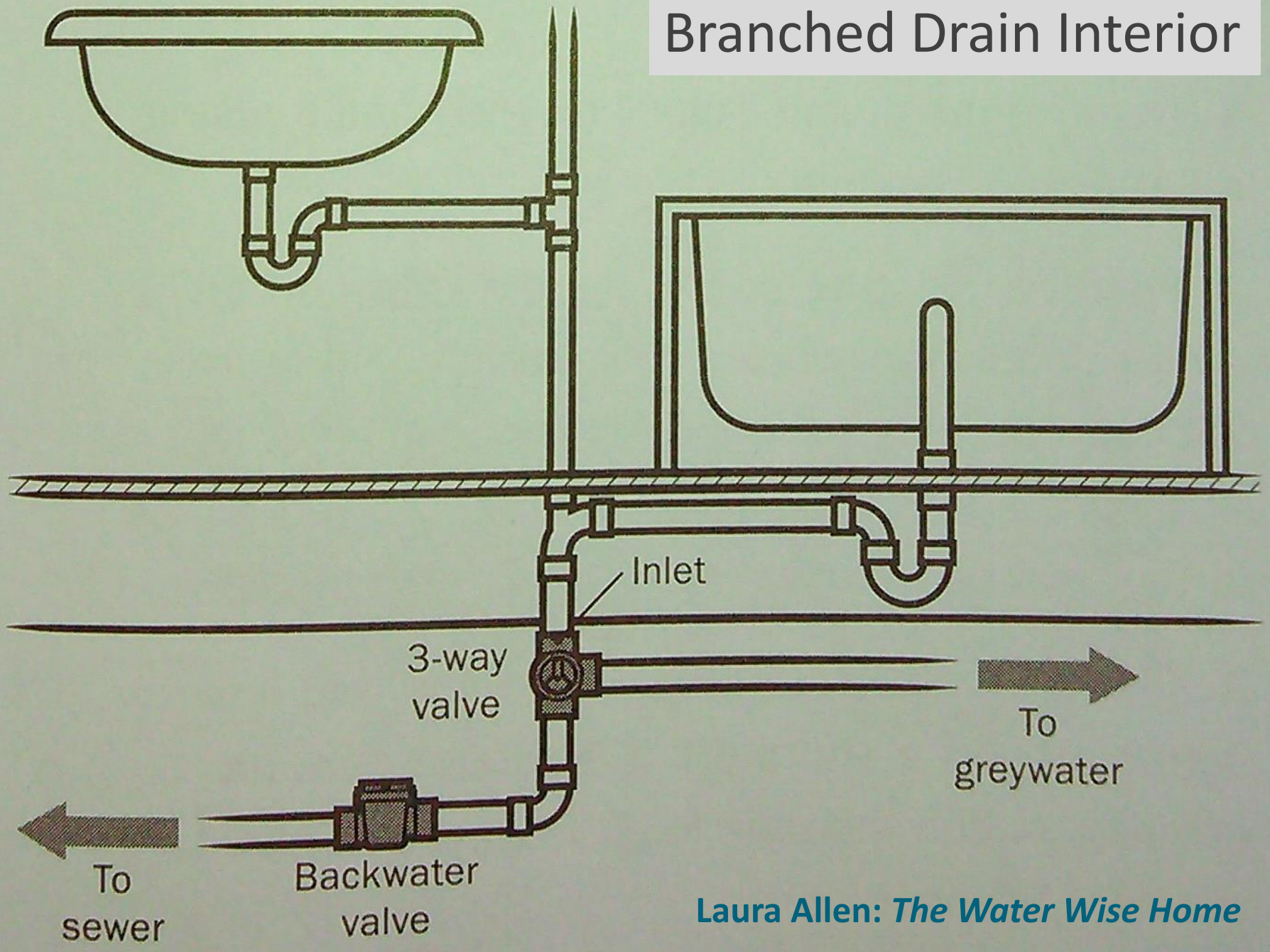


Cleaning Your Tub or Shower

Either send the cleaners to the sewer or use:

- Baking soda
- Vinegar
- Oasis
- Orange oil
- Bio Pac

Branched Drain Interior



Laura Allen: *The Water Wise Home*

Valve in crawl space with actuator



BD





BD



Cleanout

BD



Distribution plumbing



Anchoring to foundation

BD

Leveling splitters



BD

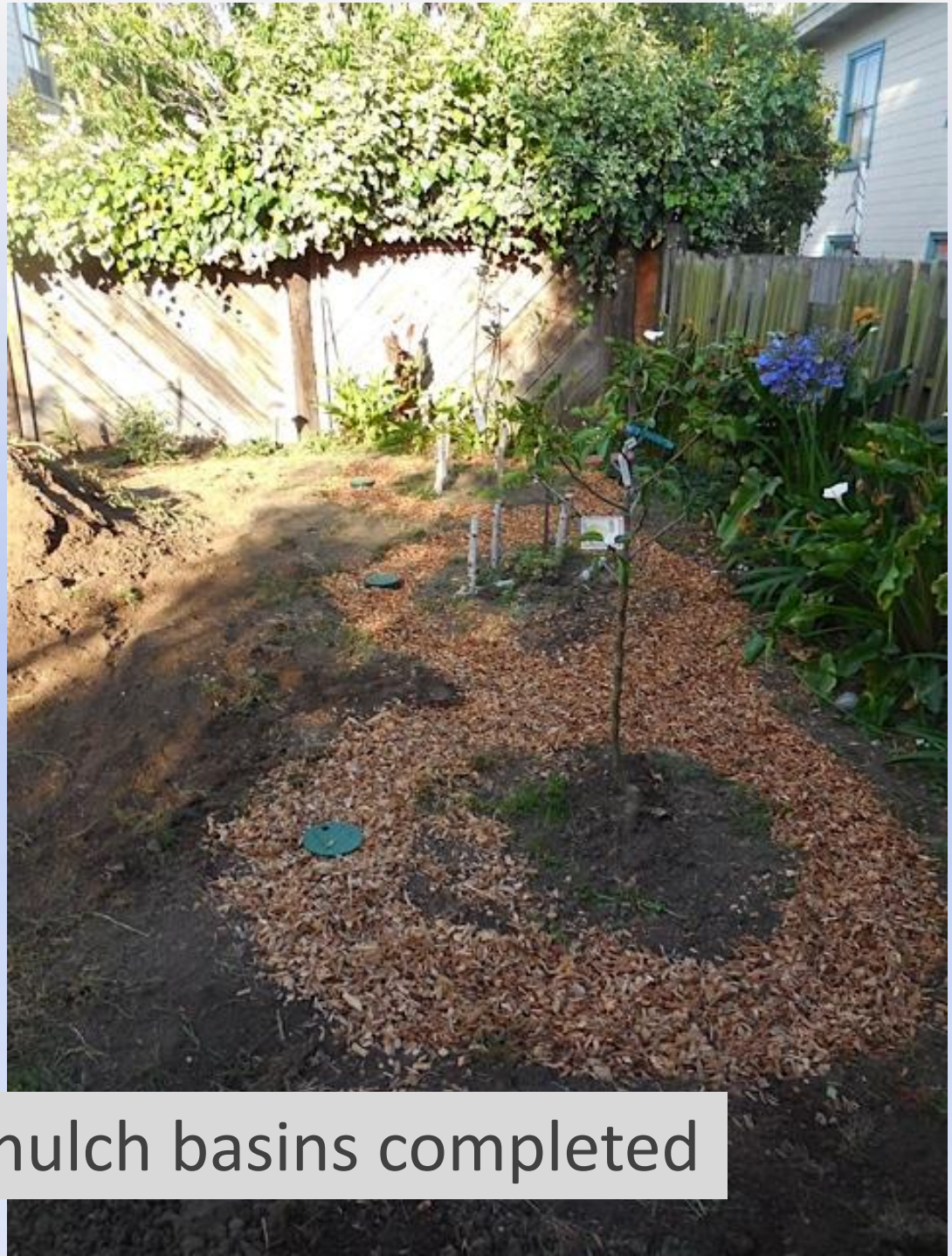


Zone 2 mulch basins open


BD
Zone 2 mulch basins completed


BD
Zone 3 mulch basins open

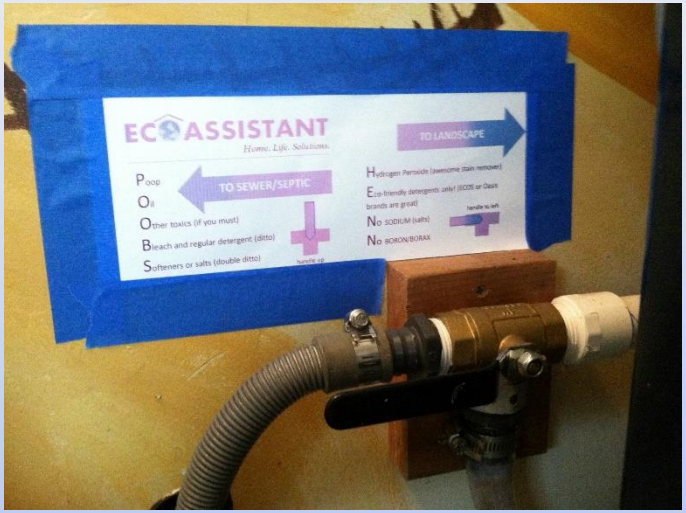
BD



Zone 3 mulch basins completed

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Valve Signage



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TO LANDSCAPE

Poop

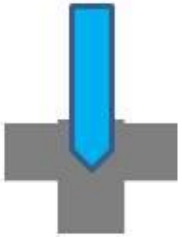
Oil

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, more water (Permit required)
- Sometimes not feasible
- Remodeling? Incorporate greywater into your plans

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- Site assessments
- Design
- Workshops



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