EAST BAY MUNICIPAL UTILITY DISTRICT

Graywater: Laundry to Landscape

October 8, 2020

Anya Kamenskaya, EBMUD Water Conservation Representative
Laura Allen, Greywater Action

Upcoming Fall Webinars

Big Gardens in Small Spaces
Thursday 10/15, 1pm - 2pm
Register at
www.ebmud.com/watersmart

Backyard Composting
Saturday 10/17, 9am - 10:30am
Register at
www.StopWaste.org

Agenda

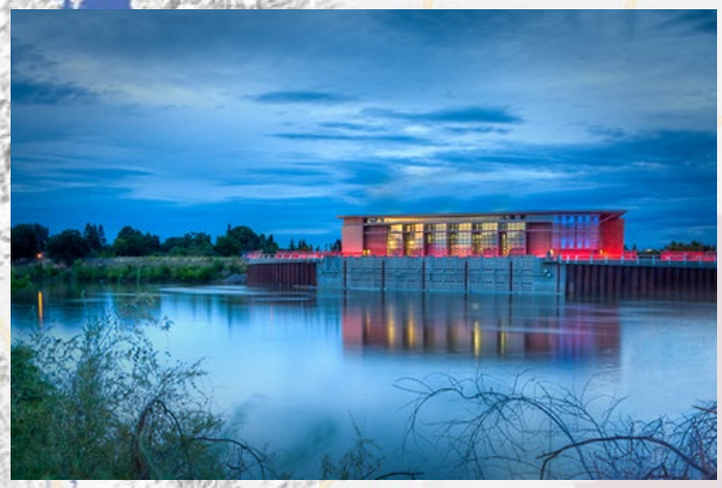
1. EBMUD water supply
2. Benefits of graywater
3. Suitable sites, plants, detergent
4. Do I need a permit?
5. EBMUD Rebate
6. Parts overview
7. Installation
8. System Maintenance
9. Q and A

Mokelumne River- 627 square miles of pristine, protected watershed

90% of our water is from snow melt

Supplies up to 325 million gallons of water daily

EBMUD WATER SUPPLY



AUBURN

SACRAMENTO

FREEPORT REGIONAL WATER FACILITY
SUPPLEMENTAL WATER SUPPLY FOR DRY YEARS

MOKELUMNE RIVER FISH HATCHERY

CAMANCHE RESERVOIR
FLOOD CONTROL

PARDEE RESERVOIR
MUNICIPAL WATER SUPPLY

MOKELUMNE RIVER WATERSHED
575 SQUARE MILES

Lower Mokelumne River

FAIRFIELD

SACRAMENTO — SAN JOAQUIN DELTA

LODI

CONCORD

STOCKTON

EBMUD MOKELUMNE AQUEDUCTS
3 - 85 MILE LONG WATER SUPPLY PIPELINES

EBMUD SERVICE AREA
332 SQUARE MILES

DUBLIN

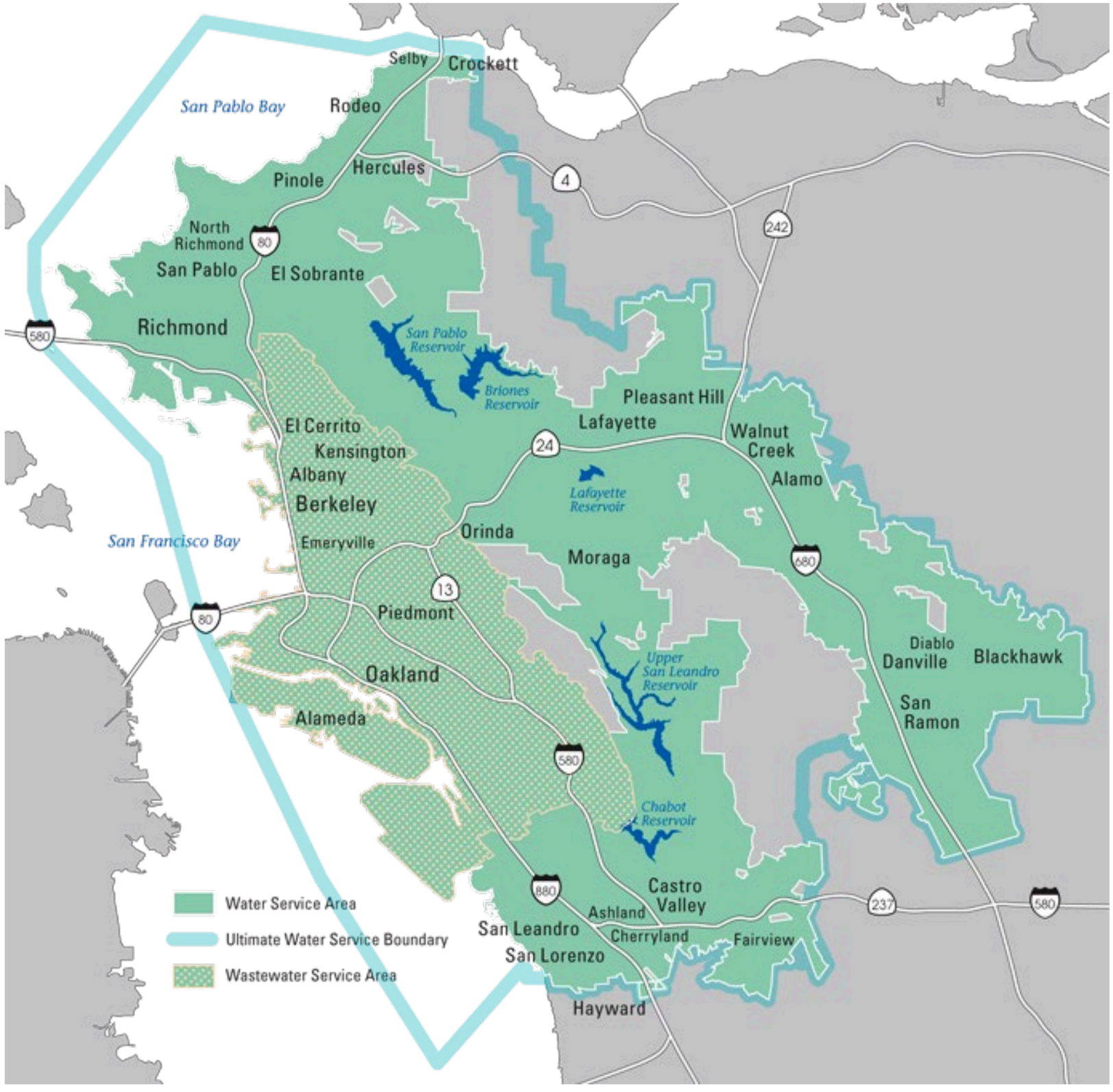
TRACY

SFPUC Hetch He

MC

AN FRANCISCO

TAH



Water and Wastewater Service Areas

1.4 million water customers

685,000 wastewater customers

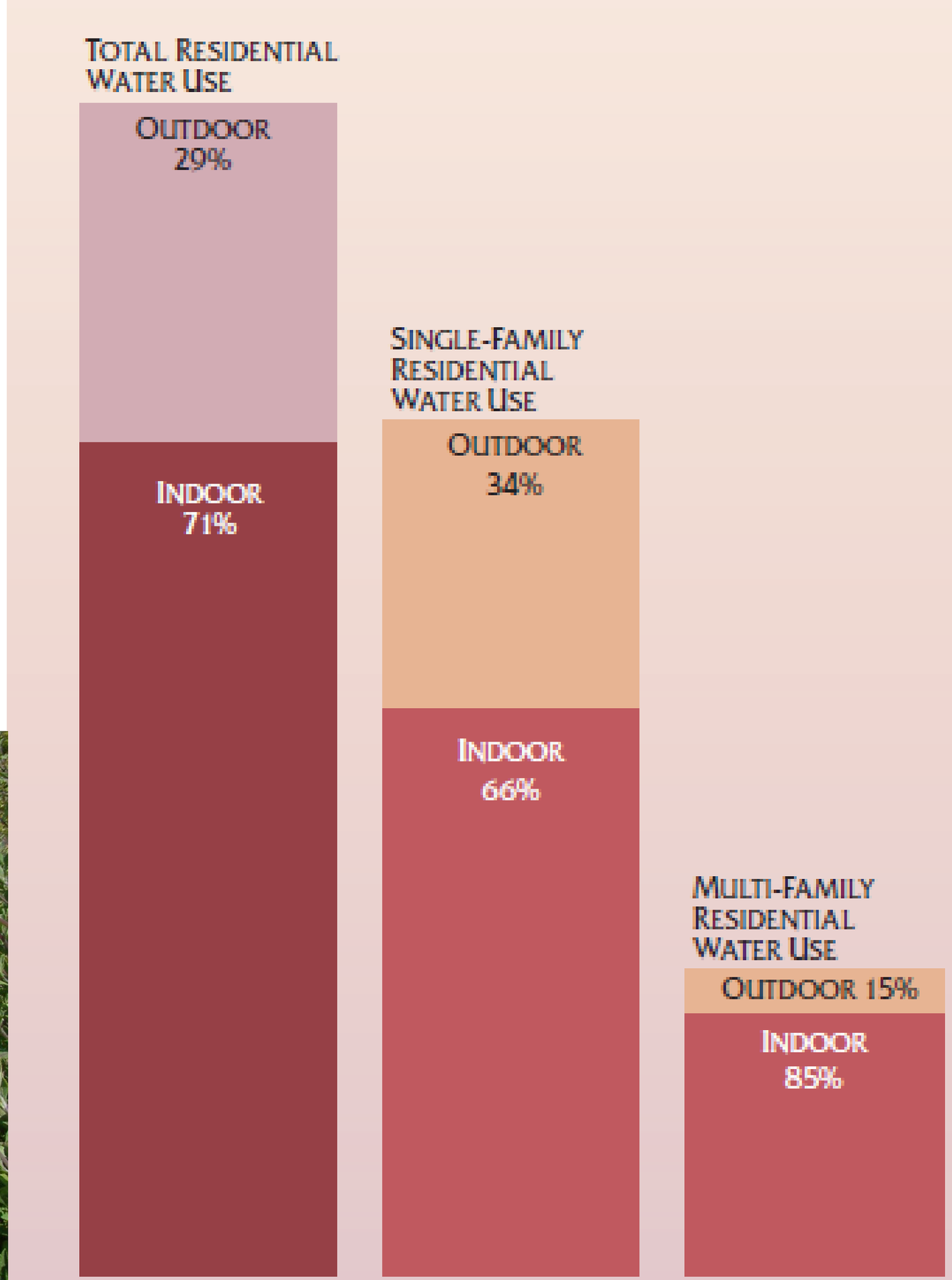
>4,200 miles of pipe

400,000 meters

Average EBMUD Household Water Use

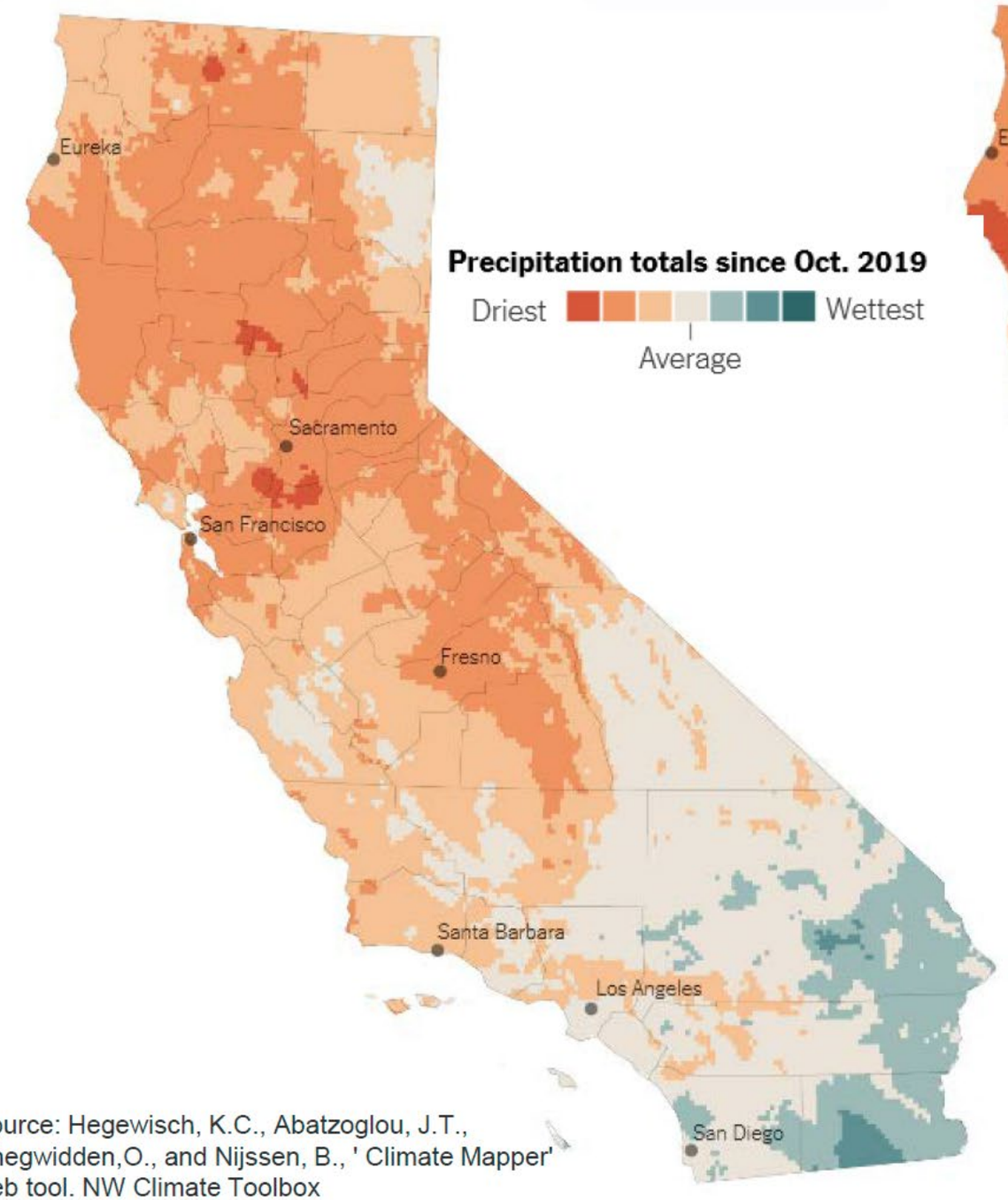
Outdoor water use: 34%

Indoor water use: 66%



NOTE:
Based on Calendar Year 2005-2015 metered consumption data.

Driest February on Record



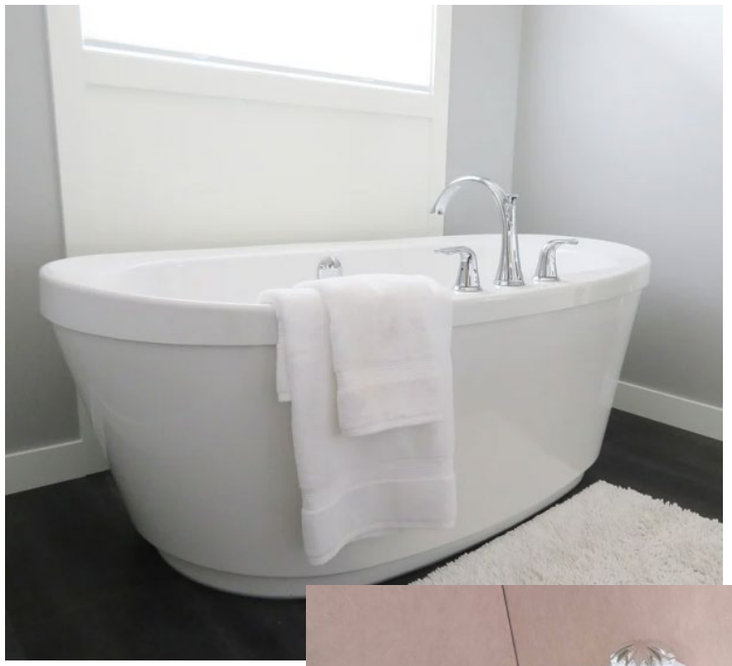
Source: Hegewisch, K.C., Abatzoglou, J.T., Chegwidden,O., and Nijssen, B., ' Climate Mapper' web tool. NW Climate Toolbox (https://climatetoolbox.org/) accessed on 3/1/2020.

What is Graywater?

Indoor wastewater that is captured and reused

Sources include:

- Laundry
- Bathroom faucet
- Shower
- Bathtub



What is Graywater?

Graywater sources do not include:

- Kitchen sink
- Dishwasher
- Toilet
- Diaper washing in washing machine

Benefits of Graywater

Saves water through reuse

Lowers summer water bill

Helps preserve landscaping during water shortages

Reduces flow to septic tanks or wastewater facilities

Why Laundry to Landscape

Can save up to 11,200 gal/yr if you have an older top-loader

Can save around 3,600 gal/yr for an HE washer

Why Laundry to Landscape

Permit not required

Relatively easy to DIY if desired

Relatively low cost if paying contractor

Where To Install (Overview)

Consider relative elevation

Consider soil permeability

Consider washer’s water volume output

Consider water table

Must not be within 100 ft of a creek

Graywater-Friendly Plants

Suitable Plants:

- Trees, including fruit trees
- Perennial shrubs
- Perennial vegetables and fruit, like tree collards or berries

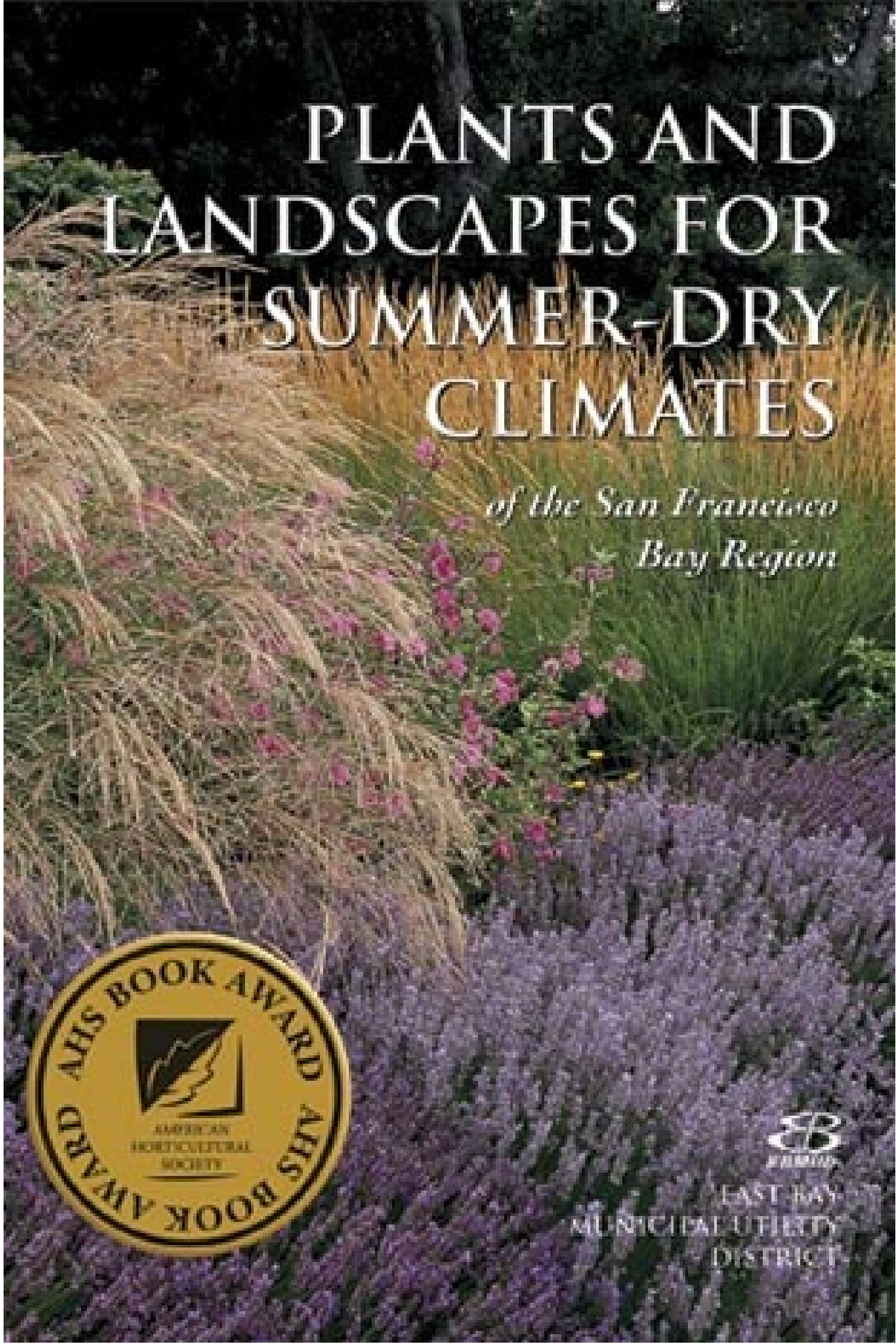
Graywater-Friendly Plants

Unsuitable Plants:

- Annual Vegetables
- Root crops
- Turf

Plant Resources

- EBMUD Plant Book
- EBMUD low water use plant list
- UC Davis All Star Plant List
- WUCOLS Database
- CalScape
- CNPS Design Templates
- Firescape Booklet



Plant-Friendly Detergents

Must be non-toxic and biodegradable

No chlorine bleach

No boron and little to no sodium (salts)

Ideally doesn’t change pH of water

Plant-Friendly Detergents

Beware false advertising!

Read ingredients list

Visit **Greywater Action** and
Berkeley Ecology Center websites

If in doubt, turn 3-way valve to sewer

Do I need a permit?

No permit required for Laundry to Landscape systems

Indoor use requires local building permit

Should be closed system to prevent mosquitoes, other vectors

Graywater Rebate

Up to $50 for a 3-way diverter valve or purchase price, whichever smaller

Rebates issued as a credit to an EBMUD account

To be eligible:

- Be an EBMUD customer
- Submit a completed application (www.ebmud.com/rebates)
- Provide a copy of the receipt

Landscape Rebates

- Up to $2,000 for Residential
- Up to $15,000 - Commercial & Multi-family (5+ units)

- Lawn Conversion
- Irrigation Upgrades
  - Sprinklers
  - Drip
  - Irrigation Timers
  - …and more!

Questions?

Laundry-to-Landscape Graywater

Laura Allen

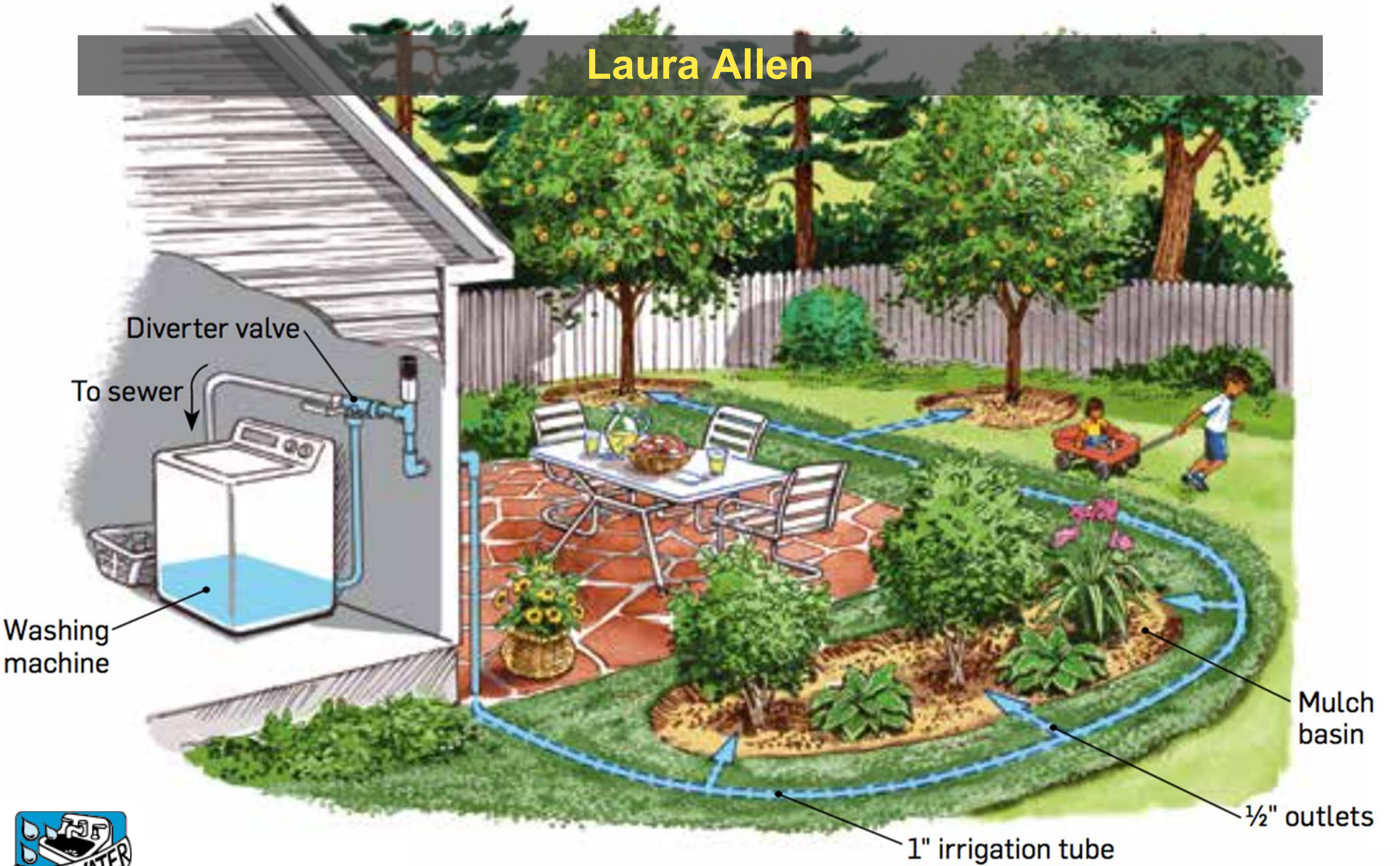


Image credit: ©Steve Sanford in Greywater, Green Landscape

Other Graywater Systems

- From showers
- Gravity options
- Pump options
- Filtration options

We won’t discuss these today

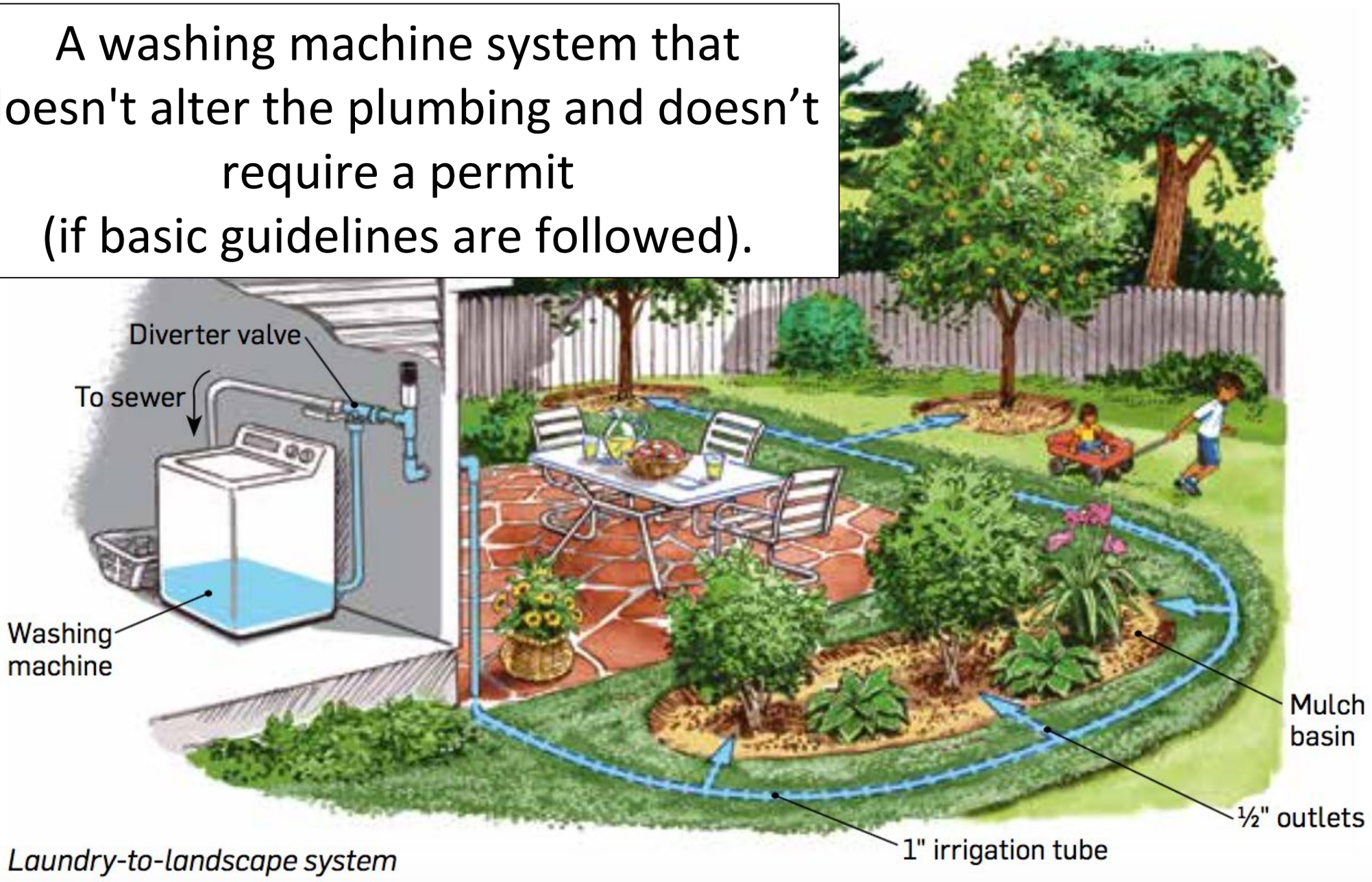
Improper Designs Won't Save Water

GW outlets planted in the middle of turf grass

Image credit: City of Long Beach office of Sustainability

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).



Laundry-to-landscape system

Credit: ©Steve Sanford in Greywater, Green Landscape

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

Connections Inside the House

Loose fitting connection to the sewer/septic

Anti-siphon vent installed on the landscape side of the valve

Diverter valve

Washer drain hose

Graywater goes to landscape

3-Way Valve Configurations

1. Valve must be above **“flood rim”** of machine
2. Washer hose must connect to middle port

Washer hose connected to middle port

Image credit: Leonard Edmonson

Possible to conceal pipes in wall

Takes a little more planning and work

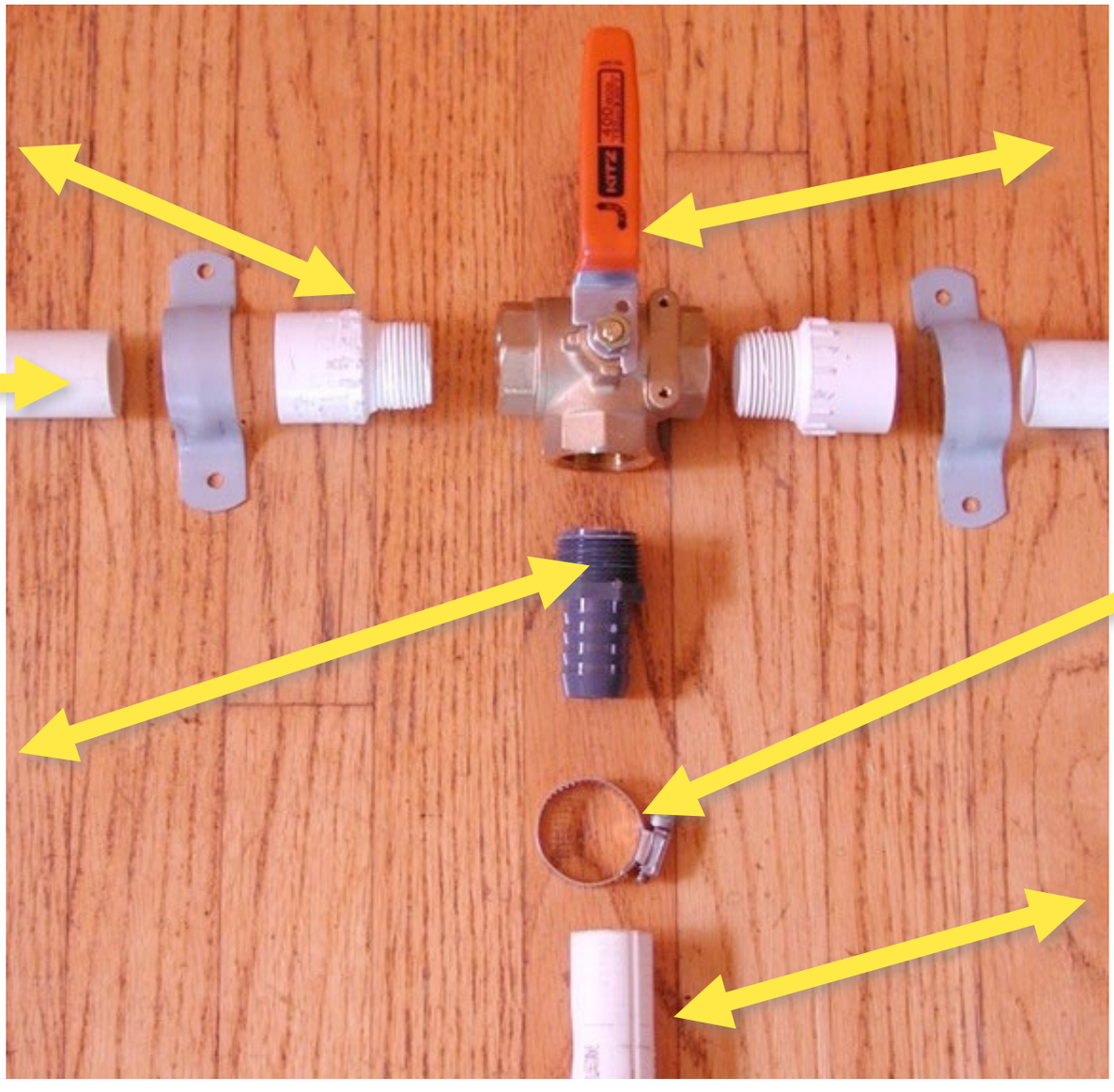
Image credit: Ty Teissere

Connect the 3-Way Valve

1” PVC
male adapter

1”schedule
40 PVC pipe

1”PVC barbed
male adapter



1”-brass 3-way
valve

Hose clamp

Washer hose
(from machine)

Anti-Siphon Component

Prevents an accidental siphon of the machine as it tries to refill

Can be inside or outside (may need freeze protection)

Must be at the high point of the system

Must be accessible/visible in case of future leaks (e.g. not behind a wall)

Label Pipe and 3-Way Valve

Label above ground pipe:

"CAUTION: Non-potable graywater, do not drink"

Label valve:

show direction of graywater

1. How much graywater?

2. What plants to water?

3. How many plants?

Image credit: Leigh Jerrard

Estimate Graywater Production

1. Number of loads of laundry done each week?

2. Number of gallons per load?
   - Top loading machine uses ≈ 40 gallons/load
   - Front loading machine uses ≈ 15 gallons/load
   - Top efficient machines uses ≈ 25 gallons/load

3. Future changes?
   - New machine? Change in usage?

Estimate Graywater Production

Formula:

# of loads per week x gallons per load = gallons/week of graywater

Example:

4 loads/week X 25 gallons/load = 100 gallons/week of graywater

puddle-stompers.com

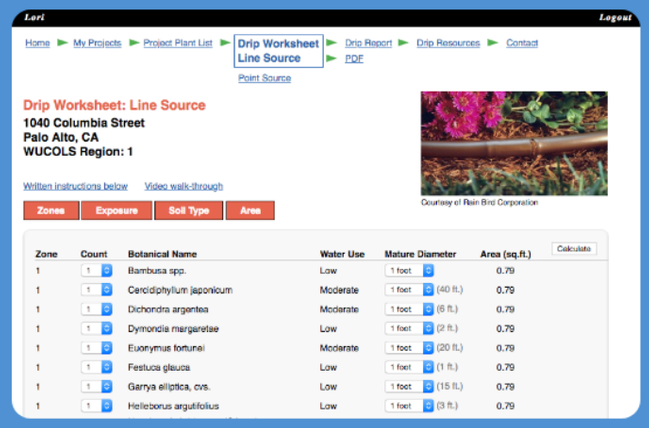
Puddle-Stompers

Home Events About **Apps** Learn Pricing News Blog Me

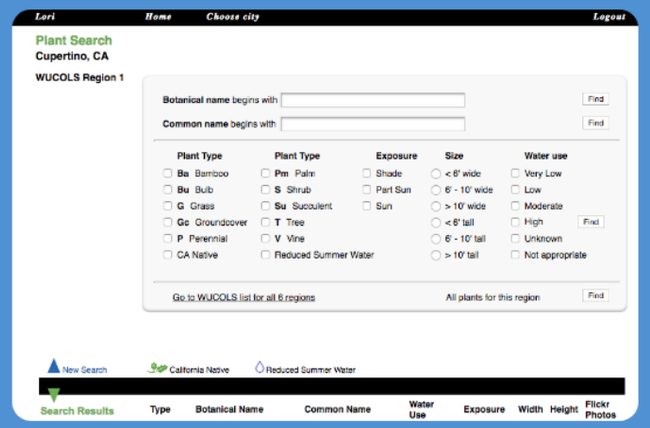
Meet the WaterWonk Apps and Tools

At a Glance

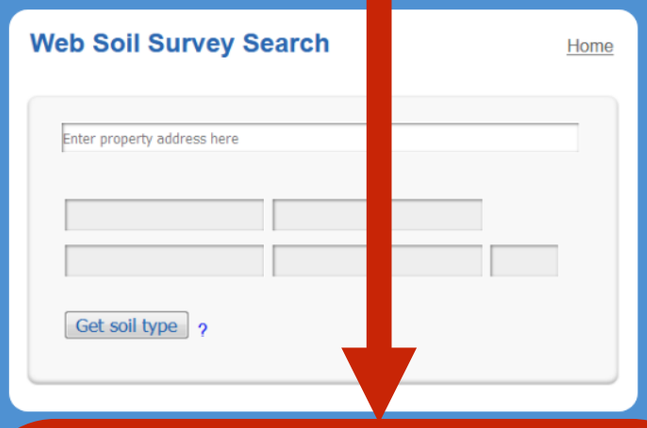
Drip Designer



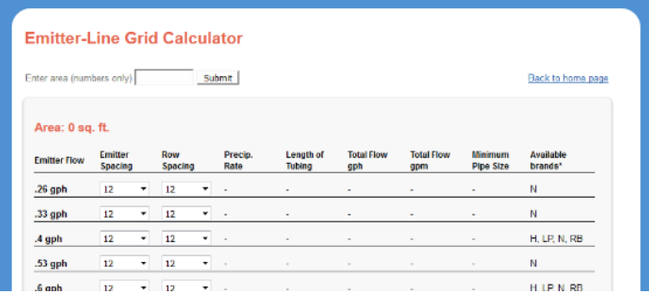
Enhanced WUCOLS Tool



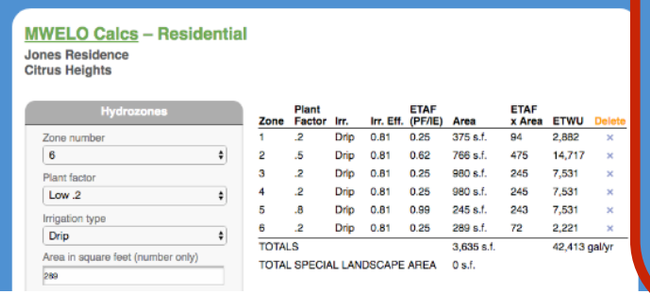
Soil App



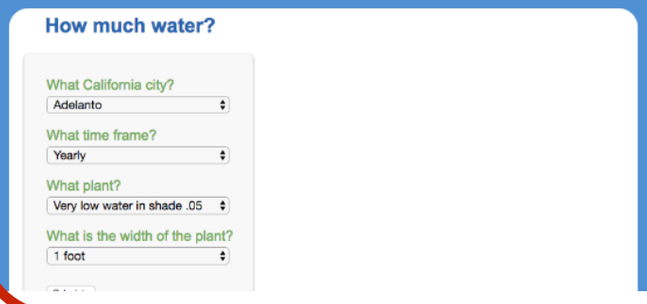
Emitterline Calculator



WELO Calculator



How Much Water App



How much water?

What California city?

Oakland

What time frame?

Weekly in July

What plant?

Moderate water in sun .6

What is the width of the plant?

6 feet

Calculate

Water need: 14 gallons per week in July

How much water?

What California city?

Oakland

What time frame?

Weekly in October

What plant?

Moderate water in sun .6

What is the width of the plant?

6 feet

Calculate

Water need: 7 gallons per week in October

Simple Graywater Irrigation Design

Match graywater with the plant water needs as best you can

Maximize efficiency- you don't have to meet peak plant needs year long

Shut off existing irrigation that was replaced with graywater

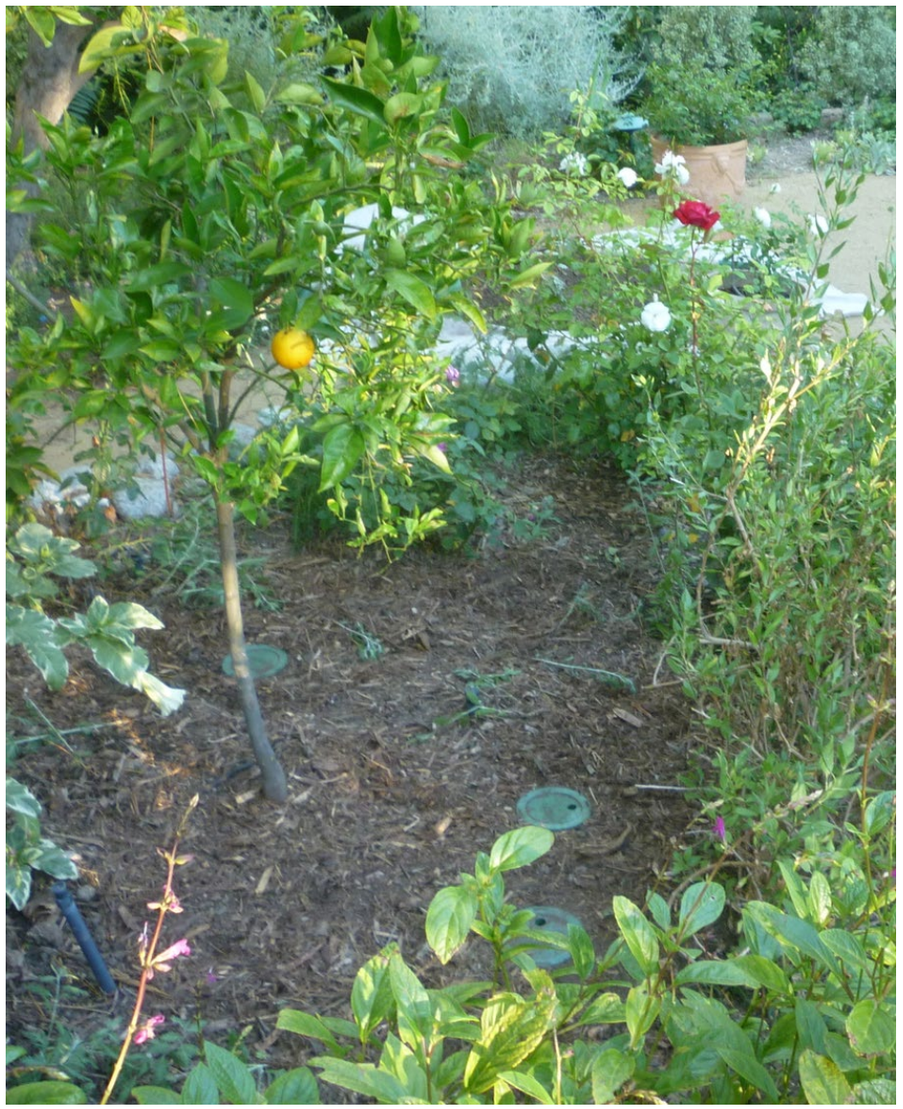
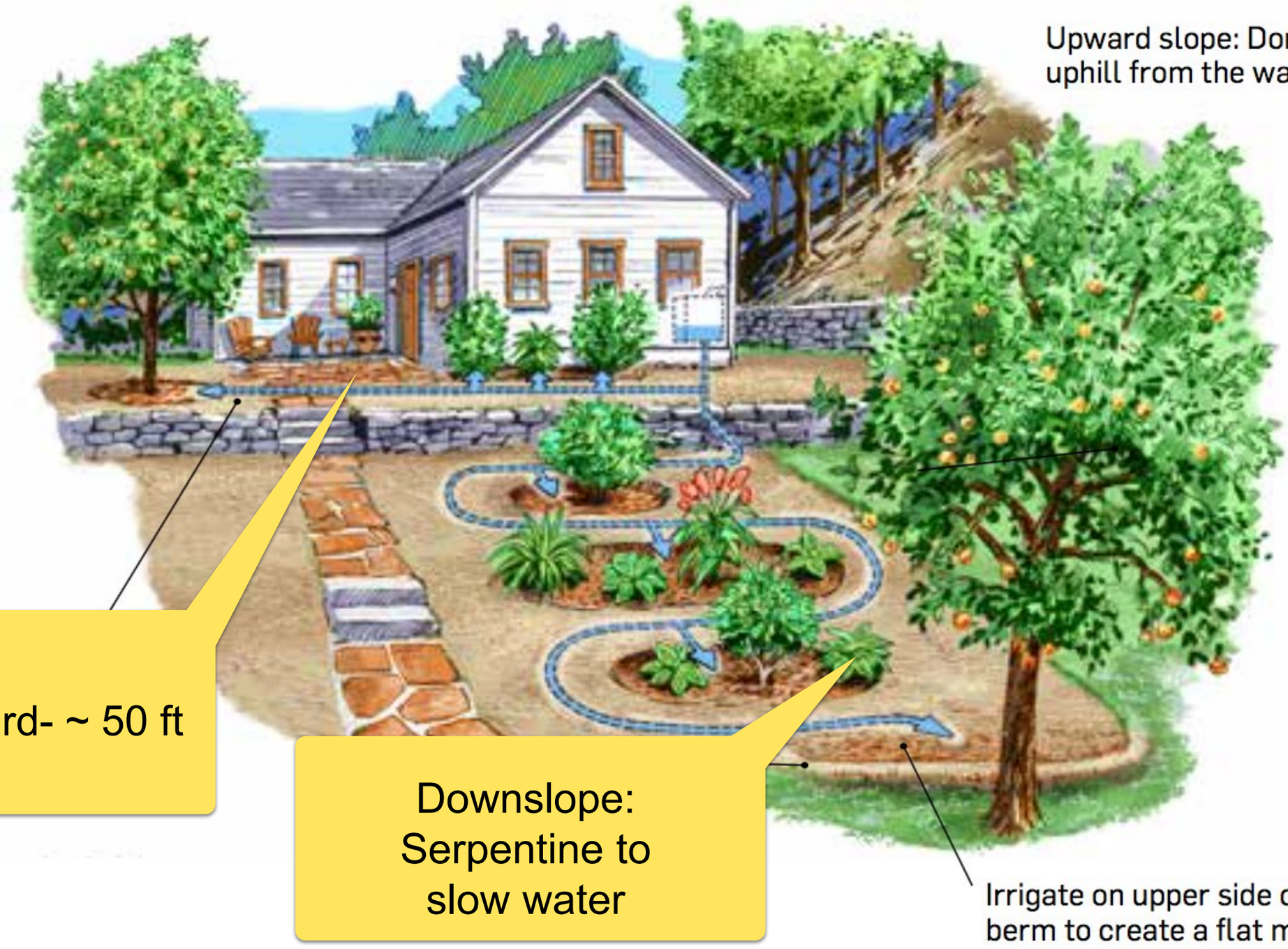


Image credit: Leigh Jerrard



Distributing water to different sloped landscape with an L2L system

Image Credit: ©Steve Sanford in Greywater, Green Landscape

How many outlets?

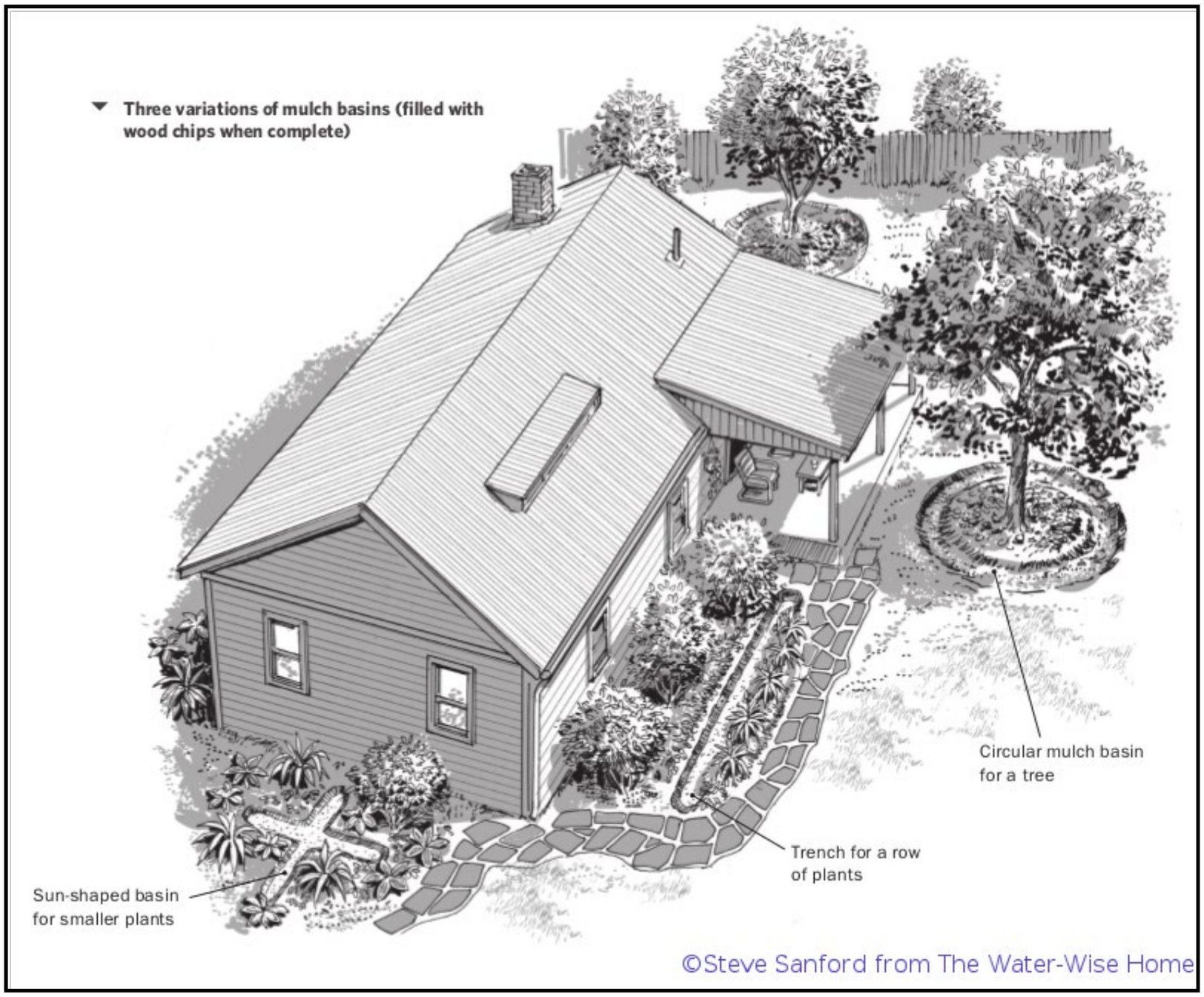
Top loading machine

No more than 15 distribution points
(reduce to 10 for top-efficient machine)

Front loading machine

No more than 6-8 distribution points
(reduce to 4 for ultra-efficient machines)

Locate Basins in “Drip Line”



Where to put the outlets?
(Irrigation Field)

Example from CA Plumbing Code

- 2 ft from buildings
- 1.5 ft from property lines
- 100 ft from wells or creeks
- 3 ft above groundwater table

Piping to Landscape

Passing through or under hardscape

Crossing steps

How to Size a Mulch Basin

Make each basin large enough to soak up graywater without ponding or runoff.

Clay soils need larger basins.

Basins in drip line of plant

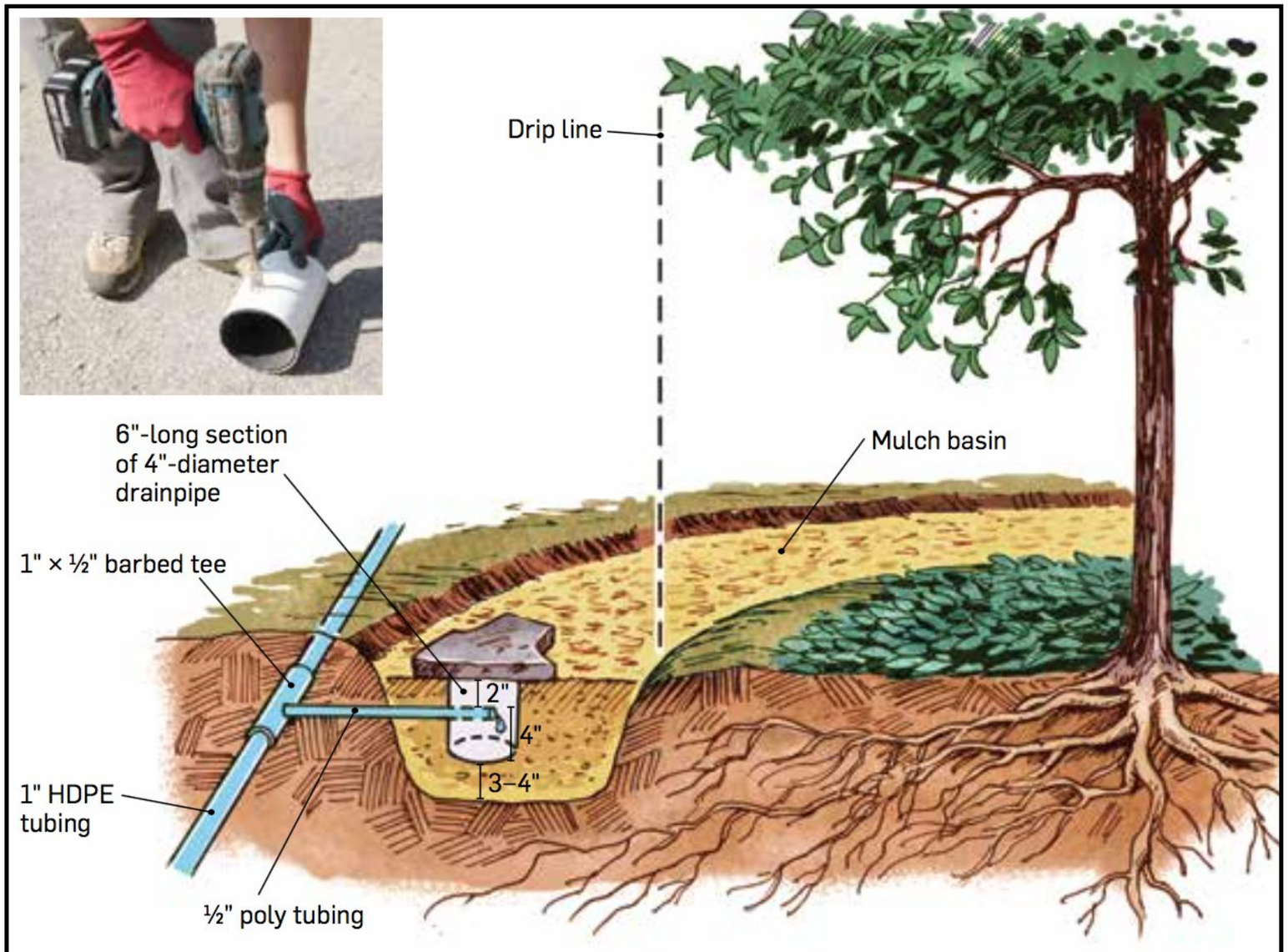
Image credit: Ty Teissere

Use WEEKLY graywater production to decide how many plants to water.

Use DAILY MAXIMUM FLOW and soil conditions to determine size of mulch basins.

Mulch Shield

prevents roots from clogging outlet



MAKING A MULCH SHIELD FROM 4" DRAINPIPE. *Cut the pipe into 6" lengths, then drill a hole 2" down (see photo) just large enough to insert the greywater tubing. Put something on top to cover it, like a flat rock. This can be used with water-efficient machines or pumped systems.*

Image Credit: ©Greywater, Green Landscape

Mulch Shield- Irrigation Valve Box

Trench and Install Tubing to Basins

Note: *If there are any elevation changes between basins, run the tubing to the highest point and then come down.*

Keep tubing out of the way, and out of sunlight.
Stake down as needed.

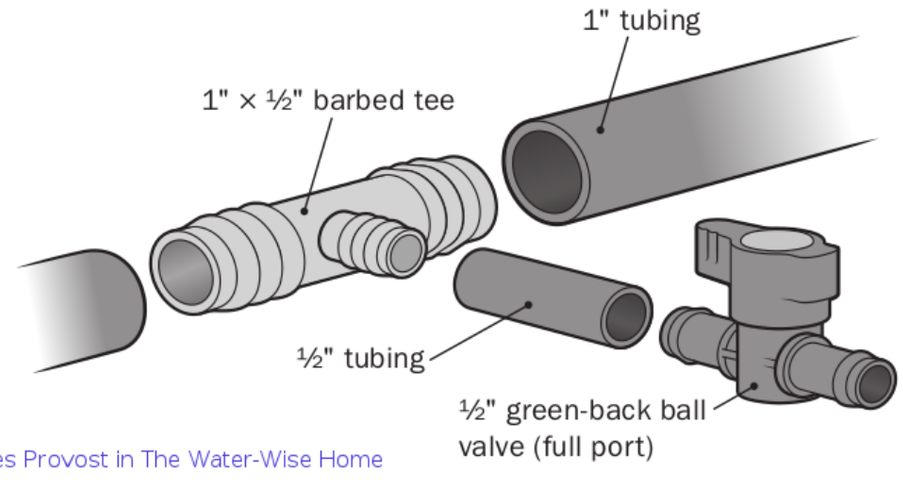
Avoid Clogs

Minimize use of ball valves

Use full port valves (that have large orifice inside)

Open outlet is best!!!!!

Check for clogs when valves are used



▲ **Green-back ball valve installed on outlet line to control flow**

Follow Up

- ✓ Bury tubing
- ✓ Check for leaks inside
- ✓ Paint exposed PVC pipe
- ✓ Caulk holes
- ✓ Post signs
- ✓ Post maintenance manual
- ✓ Get graywater friendly soap
- ✓ Do laundry.. and water plants

What will you irrigate?

Use:

- Gallons per week of graywater
- Plant water requirements
- Choose what plants you'll irrigate
- (for those with existing irrigation systems) try and find a zone you can shut off and replace with graywater

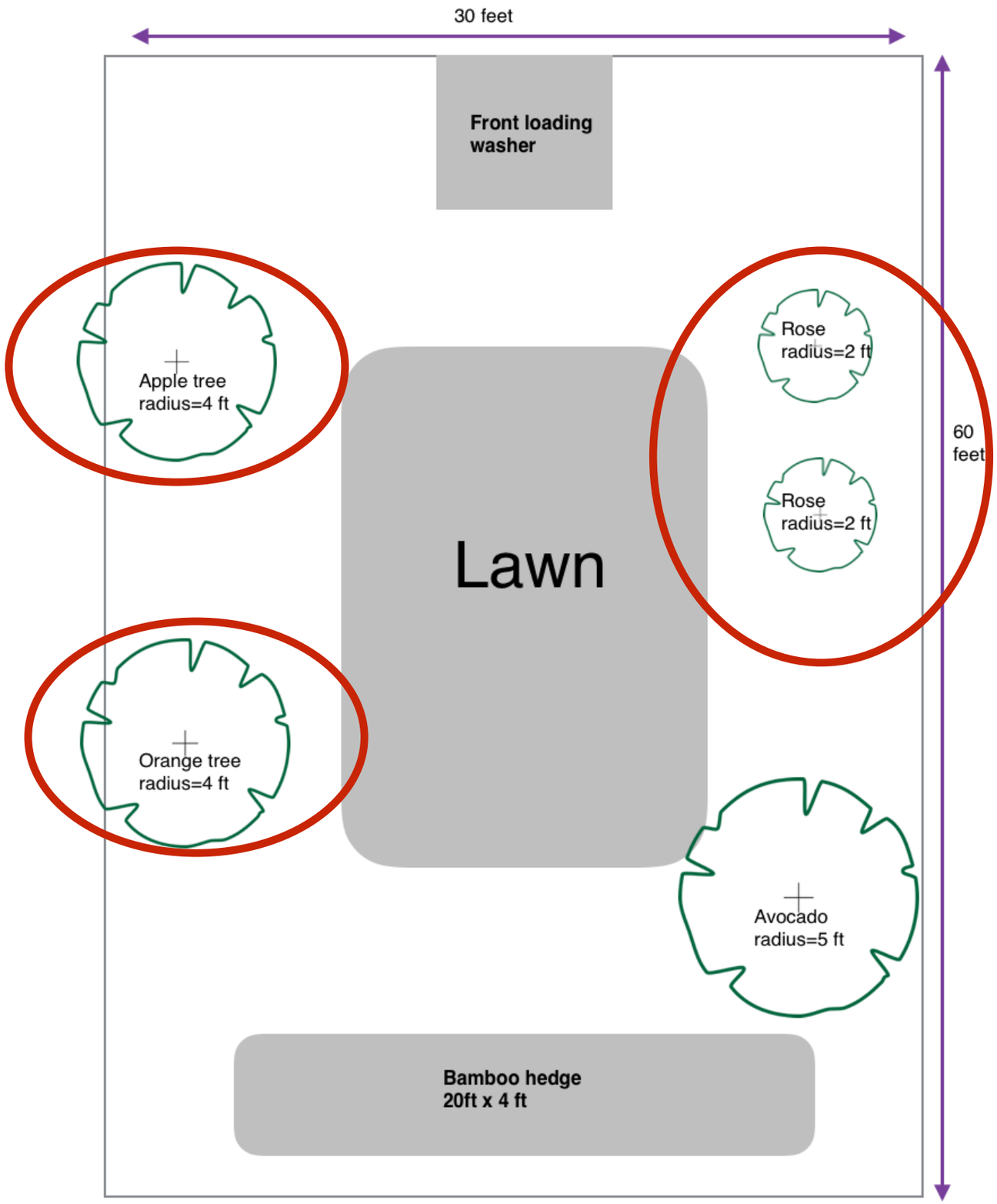
Design Practice

Graywater amount

- 15 gall/load
- 4 loads/week
- 15x 4 = 60 gpw

Plant water needs

- Apple 24 gpw
- Orange 24 gpw
- Roses 6 and 6 gpw
- Avocado 36 gpw
- Bamboo 40 gpw



Annual Maintenance

Visually inspect valve and anti-siphon for leaks

Check mulch basins. Dig out and replace composted mulch with fresh woodchips

Check valves for clogs (unclog if necessary)

Materials

Be sure to use:

- **1” HDPE (blulock, ecolock, or thick black tubing)**
- full-port ball valves

Kits are available

Image credit: ©Greywater, Green Landscape

For more information visit:
greywateraction.org

SUMMARY

1. Benefits of graywater

- Saves water when replacing irrigation

2. Why laundry-to-landscape?

- Permit not required
- Relatively easy to DIY if desired

3. EBMUD rebate

- Up to $50 for a three-way diverter valve

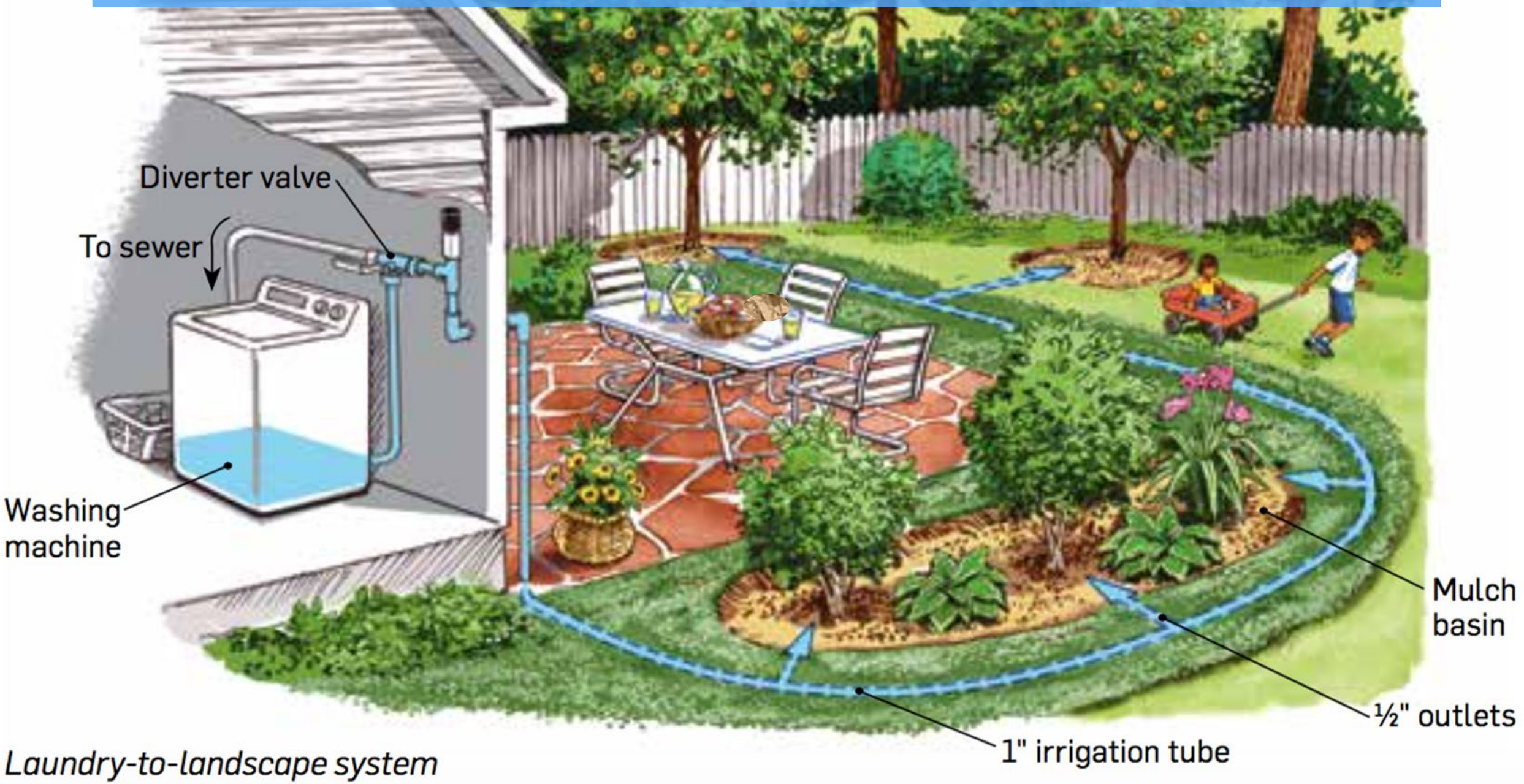
4. Basic setup

- Washer drain hose, connection to the sewer/septic, three-way diverter, anti-siphon vent, connection to landscaping

5. Trench and install tubing to basins

6. Use WEEKLY graywater production to decide how many plants to water

Questions?



Laundry-to-landscape system

Image credit: ©Steve Sanford in Greywater, Green Landscape

Thank you!

Anya Kamenskaya

Water Conservation Representative

Anya.Kamenskaya@ebmud.com

510-986-7613

Laura Allen

Greywater Action

Laura@greywateraction.org