Greywater in the Landscape

What it is & How to use it

Terrain Integration

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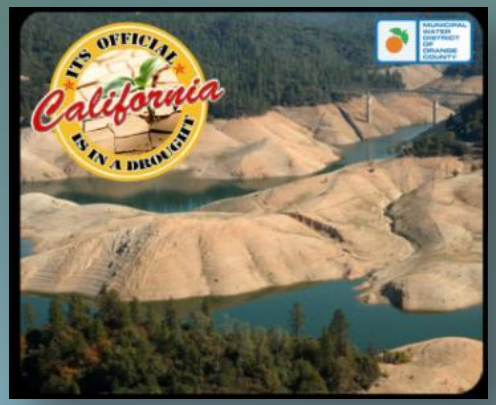
50% of Orange County Water is Imported from Northern California & Colorado River

Where Does Our Water *Come From?*

Remaining Water Comes from Groundwater, Aquifers & Recycled Water

California Drought



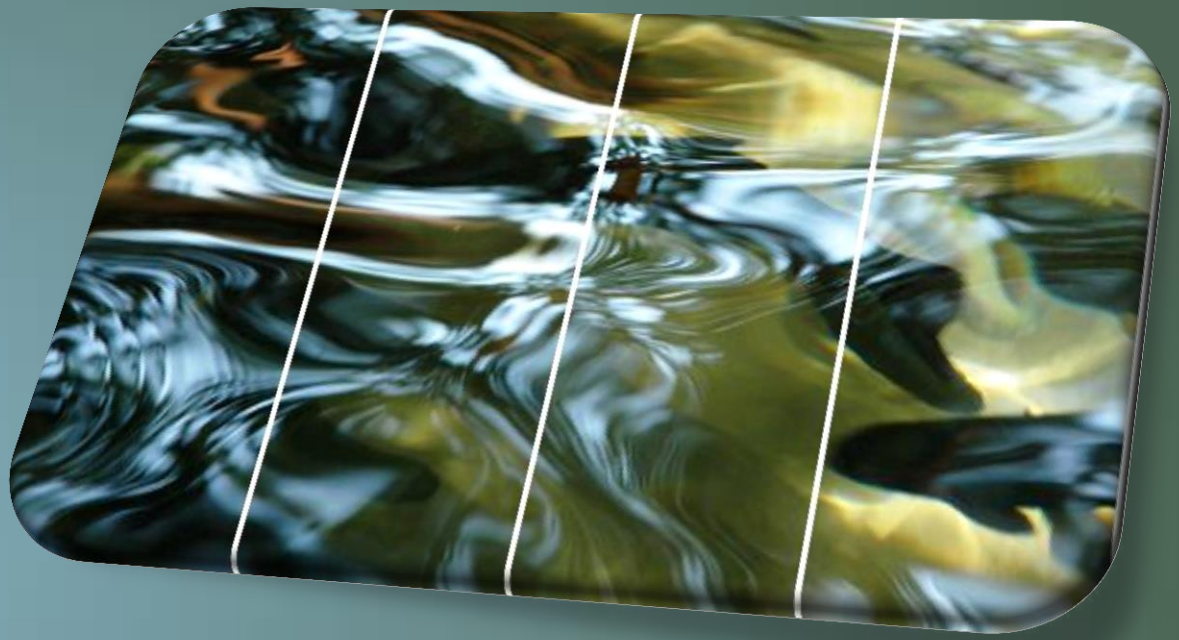
Courtesy: www.ryot.org & Municipal Water Dist.

- April 1, 2015, Governor Brown implemented mandatory water restrictions to reduce water use statewide by 25%
- Rebate programs are useful incentives to reduce water- but no Greywater rebate yet exists!
- Sierra Nevada mountains measure 5% of their average snowfall
- Colorado River is at 50% of its regular capacity
- Lowest precipitation on record
- Fishery & Wildlife causing lower water allocations

What is *Greywater* ??

- Reused untreated wastewater that has not been contaminated by toilet discharge or unhealthful processing, and not infected or contaminated by bodily waste
- Wastewater from bathtubs, bathroom sinks, showers or washing machines
- Greywater comprises up to 50-80% of residential "waste" water.
- This water can be reused for other purposes such as flushing toilets and landscape irrigation.

Reused Water Terms



Blackwater:

- Toilet water
- Kitchen Sink

Clearwater:

- Wastewater from reverse-osmosis, refrigerator compressor drip, etc.

Reclaimed (Recycled) water:

- Highly treated municipal water from grey and black water

History of *Greywater*

- Used worldwide before 20th century
- Piped water & dense populations slowed Greywater use
- Deemed 'needless' because clean water became cheap & available
- *Ongoing drought pushes us to re-establish our wastewater usage*

Courtesy: www.archives.claycerk.com

Why do we NEED *Greywater*??

- Less Fresh Water Use & Waste
- Less Strain on Septic & Treatment Plants
- Reduces Chemical & Energy Use
- Helps Recharge Groundwater
- Soil Fertility, Clean Water & Habitat
- Reconnects People to Natural Water Cycles

Water Facts

90-270 gal. / household water used per person per day (Orange County)

Greywater constitutes about 50% of total household wastewater generated

6 valves run up to 70 gpm for 10 min/day for 3 days/week = 2,100gal/week

Greywater use is exempt to drought water mandates

YES !!!

Public Health Issues

- Below Grade
- No Direct Contact to Edibles
- Don't Store It…… Use it (septic!)
- Avoid Pooling – Ponding – Runoff

Environmental Health Issues

- Use Biodegradable / Biocompatable Products
- Don't Drain Into Freshwater
- Don't Use Toxic Substances (Bleach)

Is *Greywater* safe??

biokleen™

Is *Greywater* Legal??

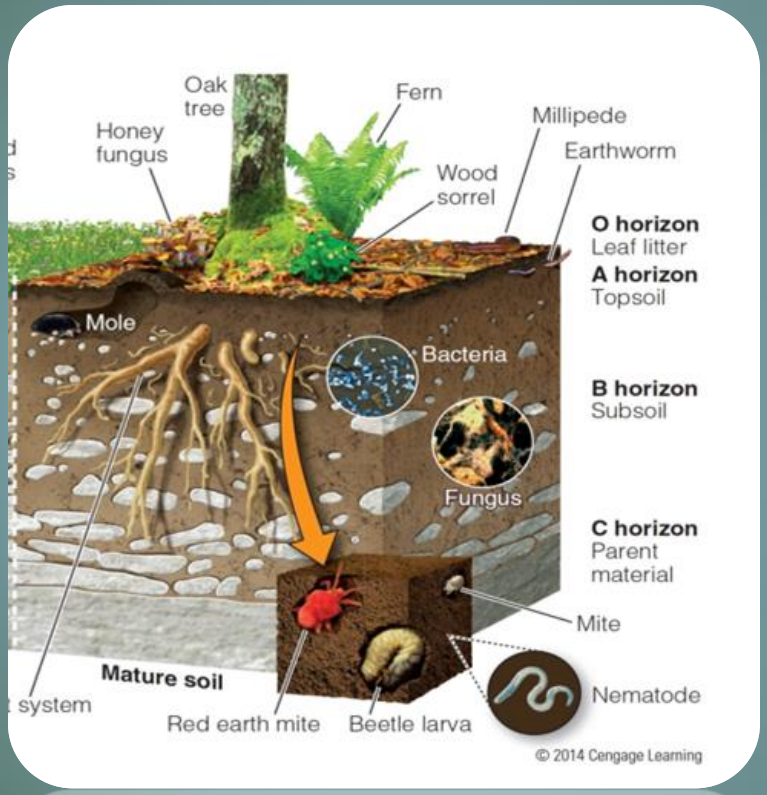
YES !!!

- Chapter 16A- *Department of Housing and Community Development* = 12 Guidelines
- "Clothes Washer System"= No Permit
- Check Your Local Codes
- Arizona, California, New Mexico & Texas

Chapter *16A* Guidelines

1) Notify your Enforcing Agency of proposed system
2) Design should direct flow straight to irrigation, disposal field, or sewer
3) System doesn't have a pump or a potable water connection AND doesn't affect bldg. plumbing
4) Greywater must stay on-site
5) Greywater must be contained by irrigation/ field
6) No ponding or run-off
7) Greywater must have 2" mulch/soil above emitting device
8) Minimize contact with humans & pets
9) Infected water shall be diverted to sewer
10) Hazardous materials shall be allowed
11) Construction must meet any additional ordinances by Enforcing Agency
12) Operation & maintenance manual must remain with building throughout the life of the system.

How does *Greywater* filter H2O?



Works like a Wetland system

Greywater particulates enters soil

Soil organisms (Fungi, Bacteria, Protozoa, Earthworms) decompose chemicals, materials, and biological elements

Soil = Filters + Detoxifies + Degrades + Buffers + Immobilizes

<u>Biological Water Purification</u>…… More effective than Engineered treatment systems

Define your *Greywater* Goals

- Lifestyle Aesthetic/Standard of Perfection
- Hygiene standard
- Involvement in Your Garden
- Landscape goal- Native, Food, Outdoor Living, Erosion, etc.
- Economic Payback

SITE – IRRIGATION – WATER USE

Assess the Whole

- Site Considerations
  - All Water Resources
    Rain- Greywater- Municipal
  - Existing Treatment
    Municipal or Septic Tank
  - How much Greywater do you make?
  - Slopes & Elevations
  - Soil Percolation

Assess the Whole

- Irrigation Considerations
  - Types of Plant Material
  - Water Demands of Plants
  - Square Footage of Plant Areas
- Water Use Considerations
  - Water Records/ Bill
  - California Graywater Standards Calculations
  - Read Appliance Specifications

What are you?

Existing / Retrofitting

New Construction

Existing / Retrofitting

Advantages

- Raised foundation
- Plumbing on outside walls

Disadvantages

- Insufficient space
- Inaccessible plumbing
- Unsuitable soil – Clay/ Low perc rate can cause ponding

New Construction

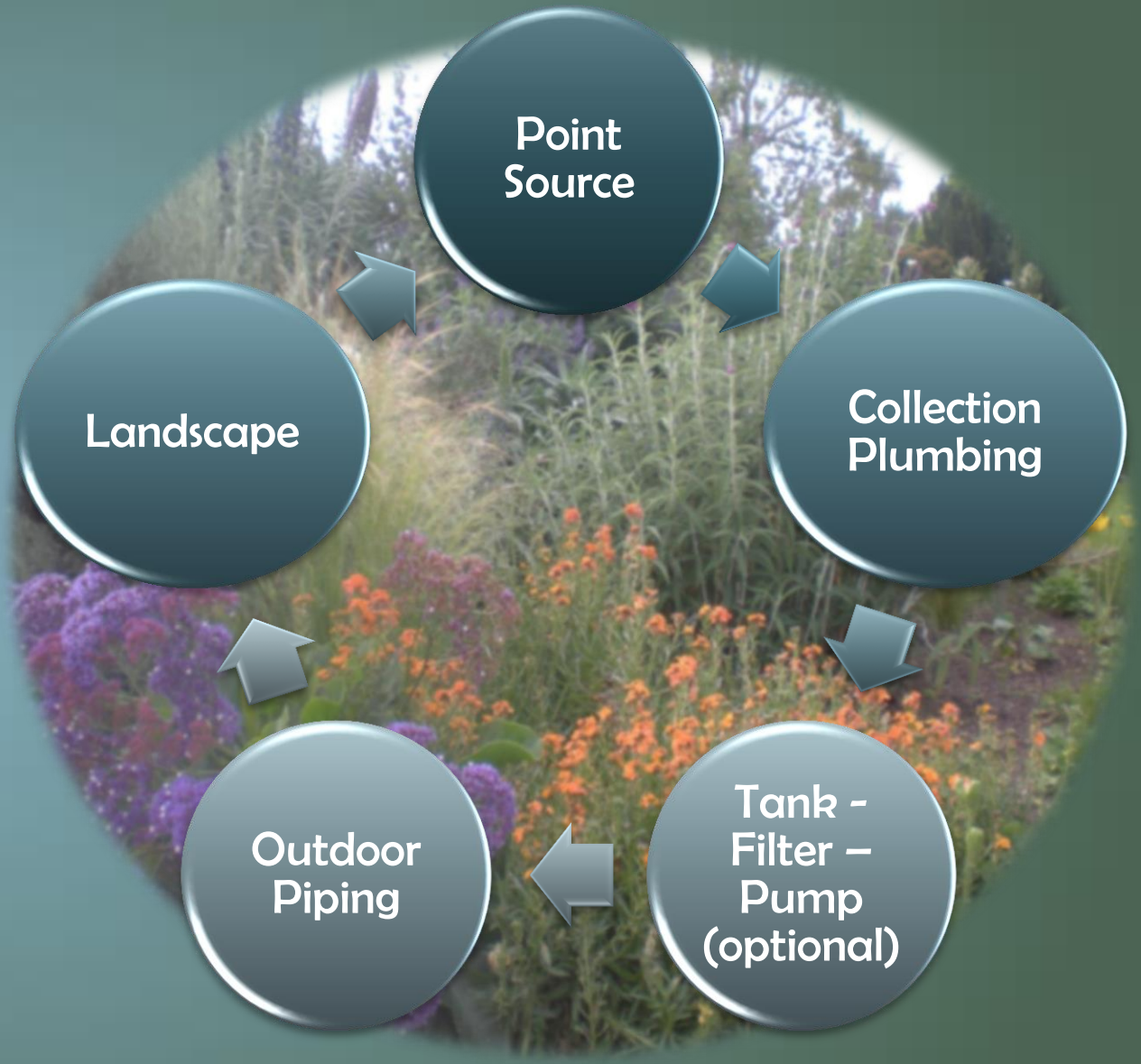
Advantages

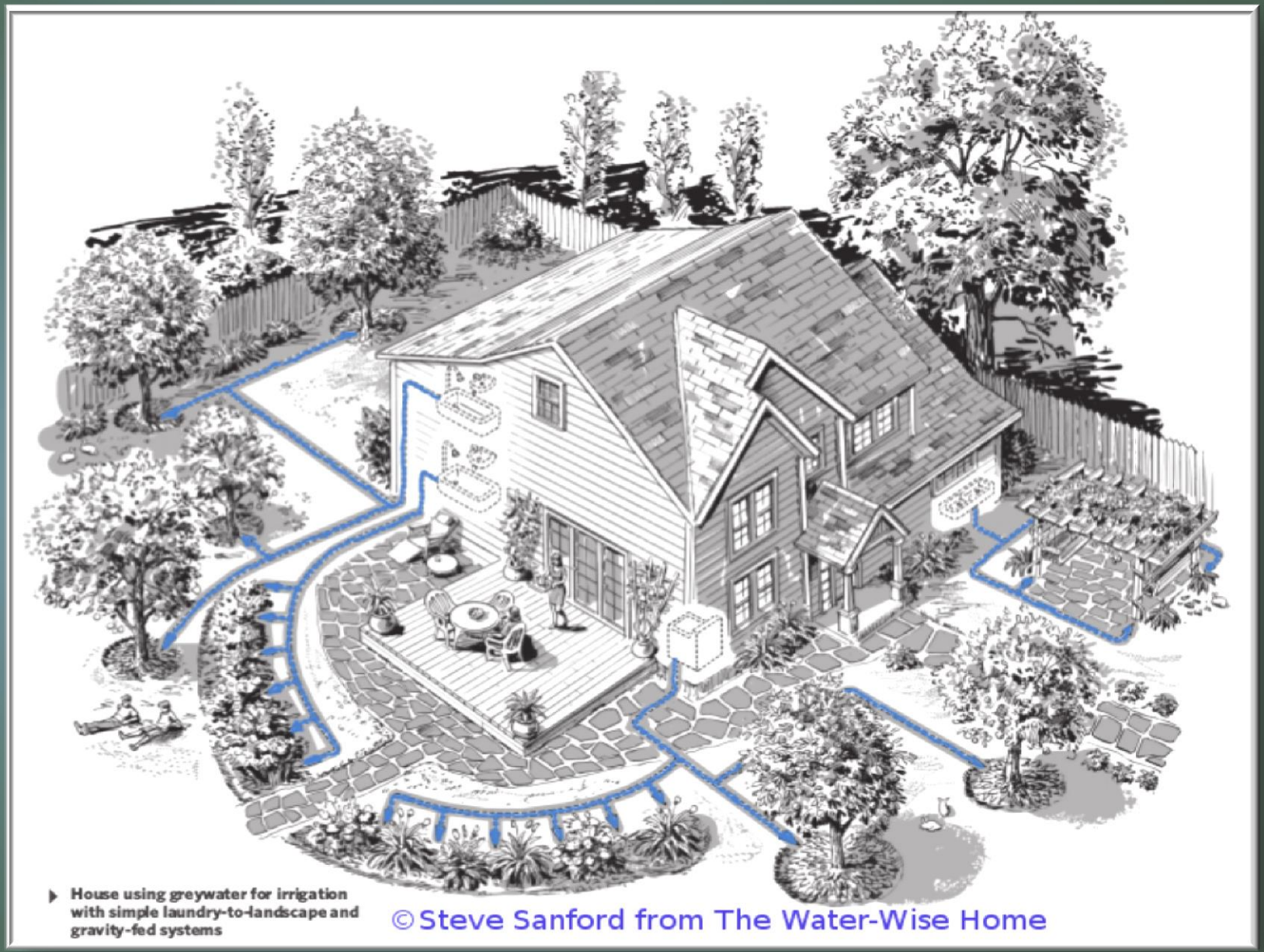
- Plumbing routed ahead of time
- $ Cost of plumbing figured into home price
- Planned placement of bathrooms & laundry rooms
- Better overall integration
- Take advantage of elevations

Disadvantages

- Permitting
- $ Cost

Parts of a *Greywater* System





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

Greywater

Point Source

Step 1

Point Sources-

Washing Machine 12-50 gal/load

Bathroom Sink

Shower

Bathtubs

A. Do you want to combine?
B. Do you want to Separate?

This will determine the layout of your collection plumbing in Step 2

Greywater

Collection Plumbing

Step 2

Collection Plumbing

1) Do you need a plumber?
2) ALWAYS stay to code!
3) Keep a proper slope
4) Always separate from toilet water
5) Install diverter valves
6) Allow for reconfiguration
7) Connect downstream of traps & tents
8) Provide cleanouts
9) Design for easy maintenance
10) Oversee & verify plumbers work

Collection Plumbing Example

Greywater

Tank – Filter - Pump

(optional)

Step 3

Tank – Filter - Pump

Surge Tank – Buried is Best

Filter

Tank, Filter & Pump Example

Courtesy: ReWater & Flo Tender

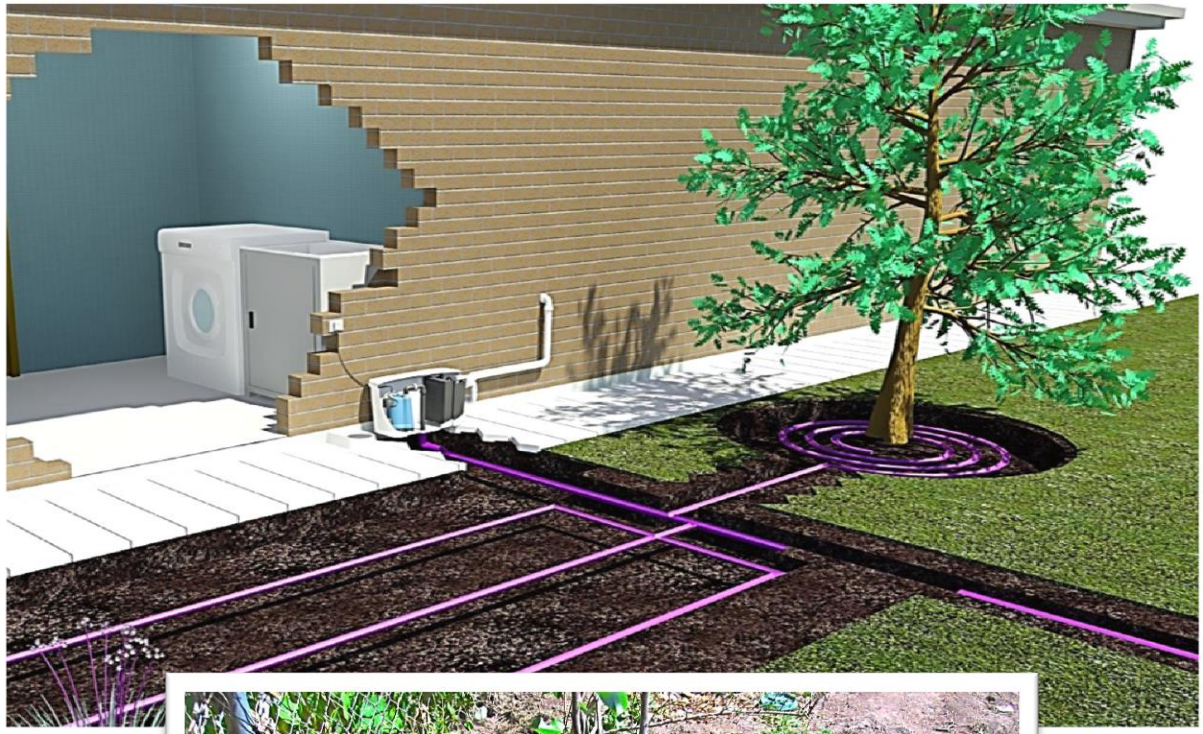
Greywater
Landscape
Distribution

Step 4

Landscape Distribution

- Land should be flat or downward sloping for non-pumped systems
- Soil Perc & Plant Needs
- Integrate with existing irrigation
- Surge based source NOT demand based
- Meet demand of peak dry season
- Distribution tubing – Filtered or Not?
- Design like Recycled (Reclaimed) system

Greywater Landscape Distribution



Courtesy: GreywaterAction.org

Preserving Soil Quality

Greywater Nasties =

Lint, dead skin, sweat, hair, food particles, dirt, salt from urine, etc.

Toxins to Divert =

Boron (Borax), Chlorine Bleach, Whitening-softening- enzymatic powers, Sodium

Plants for *Greywater*

Appropriate Plants

- Tolerate wet conditions
- Makes their own mulch
- Evergreen
- Wetland Plants
- 36” sized plants or larger

Inappropriate Plants

- Acid loving
- Native Dry
- Root Rot
- Root Crops- Carrots, etc.

Plants for *Greywater*

Avocado

Betula (Birch)

Bougainvillea

Callistemon (Bottlebrush)

Feijoa (Pineapple Guava)

Gardenia

Lagerstroemia (Crape Myrtle)

Juniperus (Juniper)

Juncus (Rush grass)

Lobelia (Cardinal Flower)

Lonicera (Honeysuckle)

Magnolia

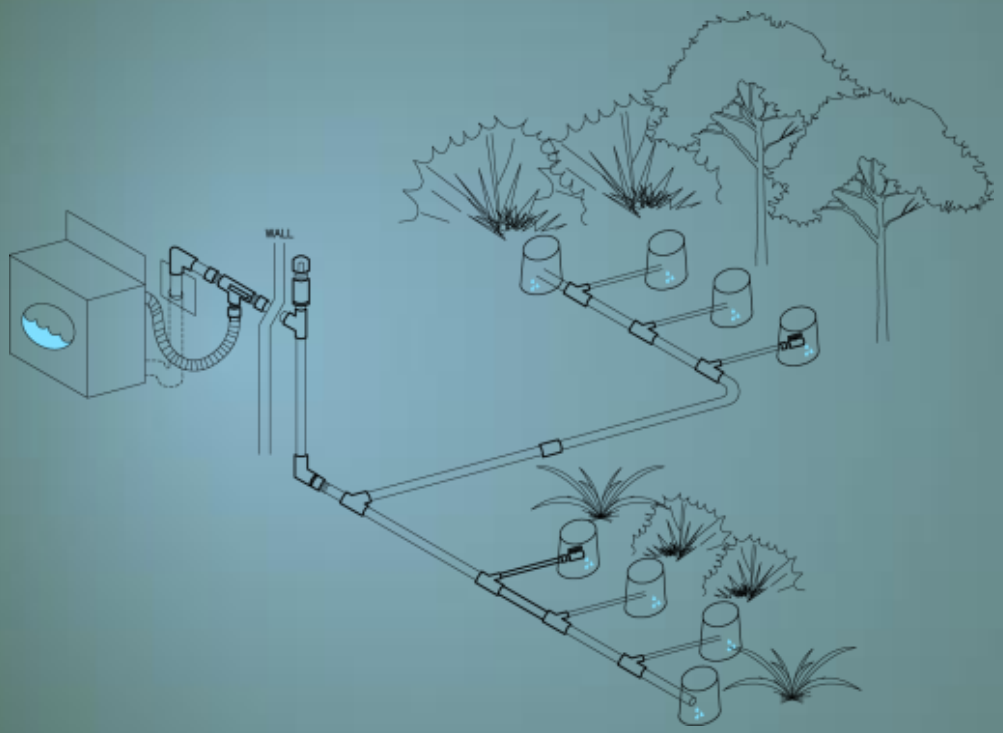
Miscanthus (Maiden Grass)

Musa/Ensete (Banana)

Phormium (Flax)

Rosmarinus (Rosemary)

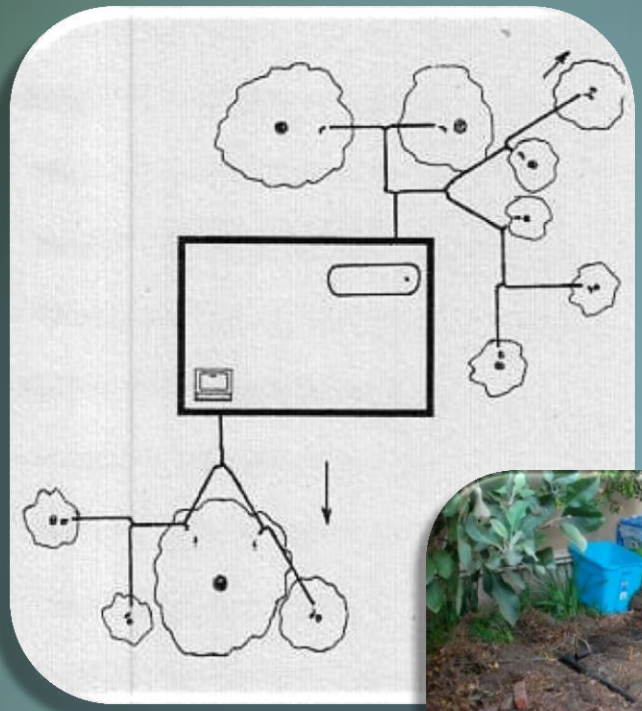
Laundry 2 Landscape – *Simple System*



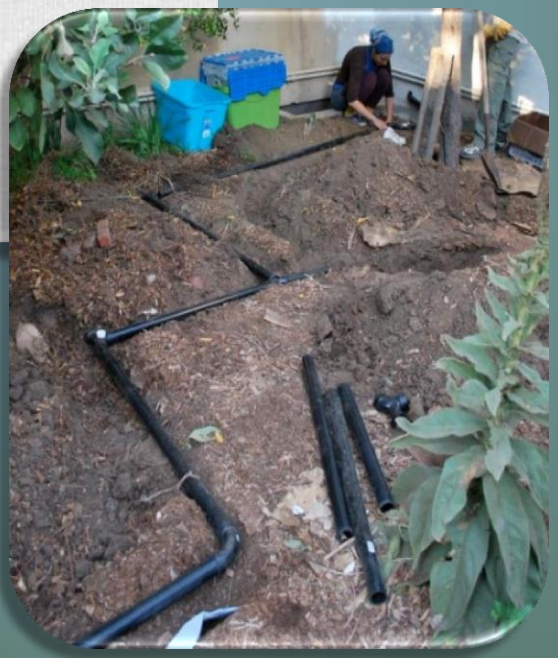
- no filter
- no pump
- no surge tank
- uses very little pipe
- low maintenance
- low economic cost
- low ecological cost
- anyone can build it
- failure rate is low
- parts cost $150 - $250
- professional installation costs $700- $2,500

Courtesy: GreywaterAction.org

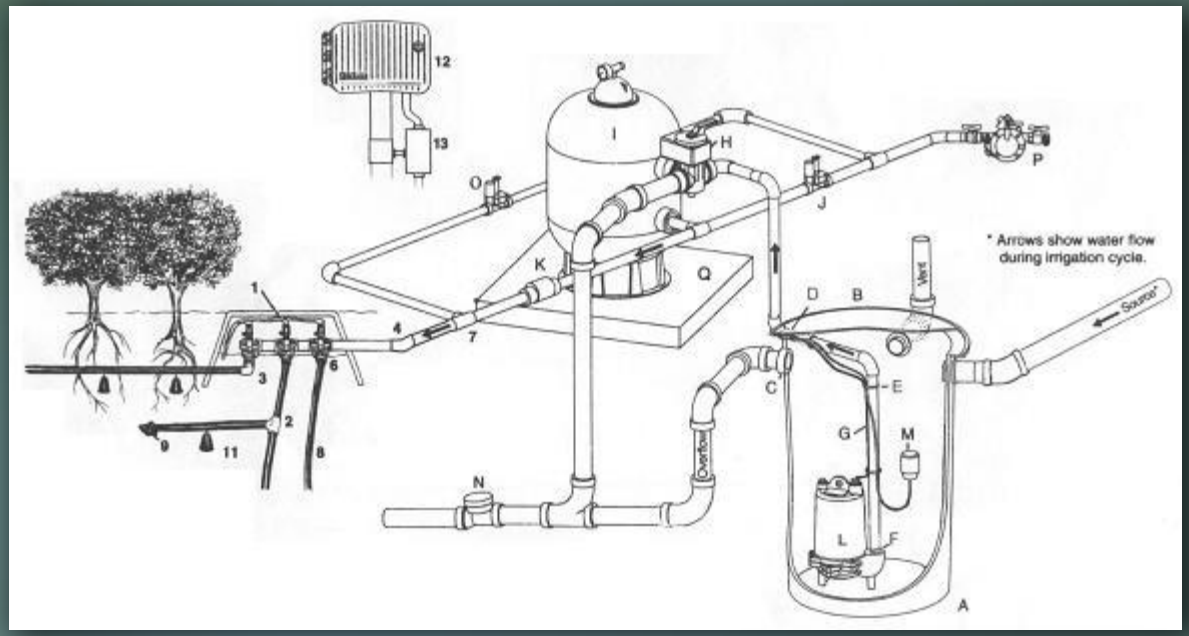
Branched Drain- *Simple to Moderate*



- same as drain-mulch basin
- higher costs but higher volumes or Greywater
- uses multiple mulch basins
- automatically disperses greywater to several locations



Pumped & Filtered System- Complex



- Water is filtered – pressurized – pumped
- Higher costs but higher efficiency ($1,800 to $9,000 for pump/filter alone)
- Interacts with automatic irrigation systems
- Caters to needs of plants & hydrozones
- Cleaner water output
- Frequent manual filter cleaning

Courtesy: ReWater.com

Installers & Equipment Suppliers

- Greywater Action – Hire an Installer
- www.greywateraction.org/business-directory/

- Ty Teissere
- (562) 314-7509
- ISA Certified Arborist/ Certified Greywater & Rainwater Installer

- Gray 2 Green - Greywater kits for the DIY'er
- www.gray-2-green.com

- Ewing Irrigation Supply Store
- Anaheim, CA 714-447-9530

- ReWater Greywater Products
- www.rewater.com

- Flo Tender
- www.flotender.com

Resources

- Greywater Action

  www.greywateraction.org
- Oasis Design

  www.oasisdesign.net
- Let's Go Green – Greywater Recycling Basics

  www.letsgogreen.com/greywater-recycling.html
- Organic Farming Solutions – Soil Organisms

  www.organicfarmingsolutions.com/soilorganisms.php
- Rainwater Harvesting for Drylands and Beyond by Brad Lancaster

  www.harvestingrainwater.com
- Wholly H2O

  www.whollyh2o.org
- ReWater Greywater Products

  www.rewater.com