Green your Garden with Greywater

APPLEGATE WATER SECURITY EDUCATION DAY

February 3rd, 2024

1. What is greywater
2. Why irrigate with greywater
3. DEQ Permits
4. Greywater site assessment
5. Greywater systems
6. Laundry to Landscape (L2L)
7. Branched Drain
8. Mulch Basins
9. Maintenance/Soaps

Resources

Potential Greywater Sources

Shower

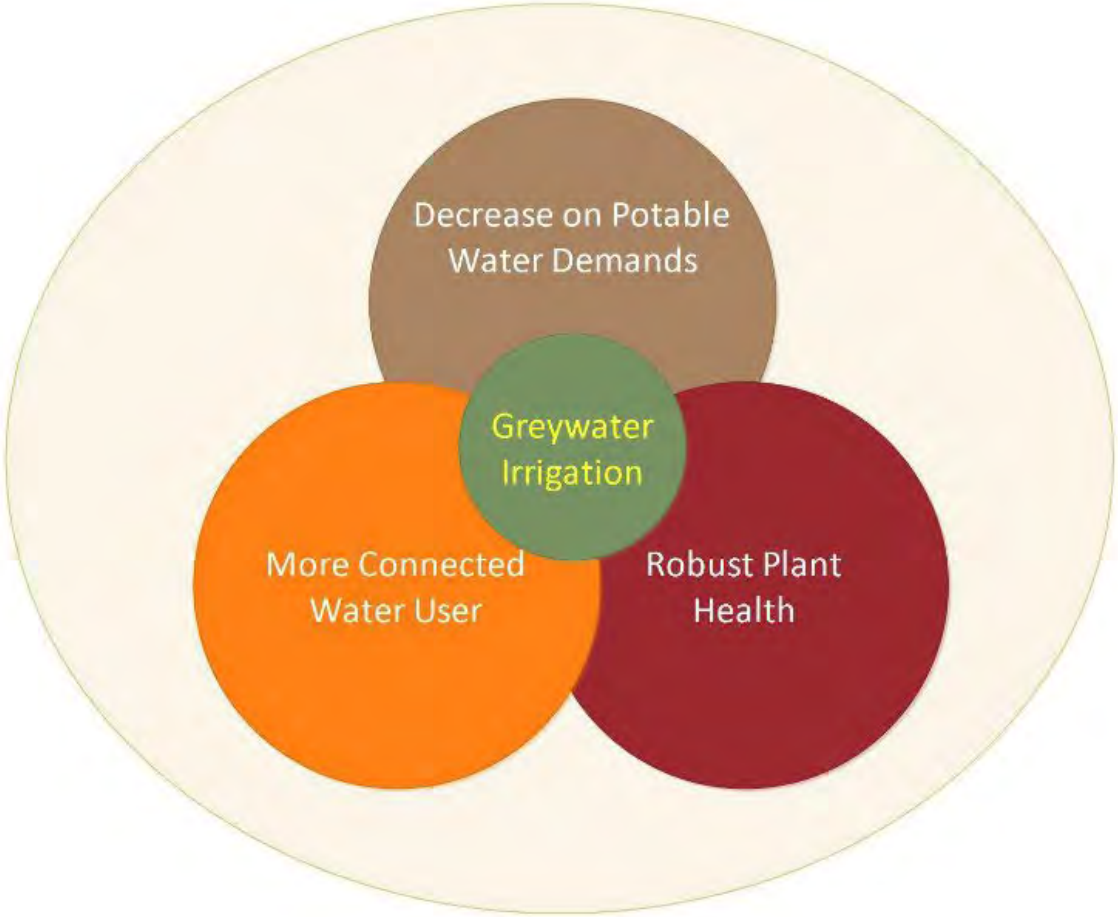
No Toilet

Bathroom sink

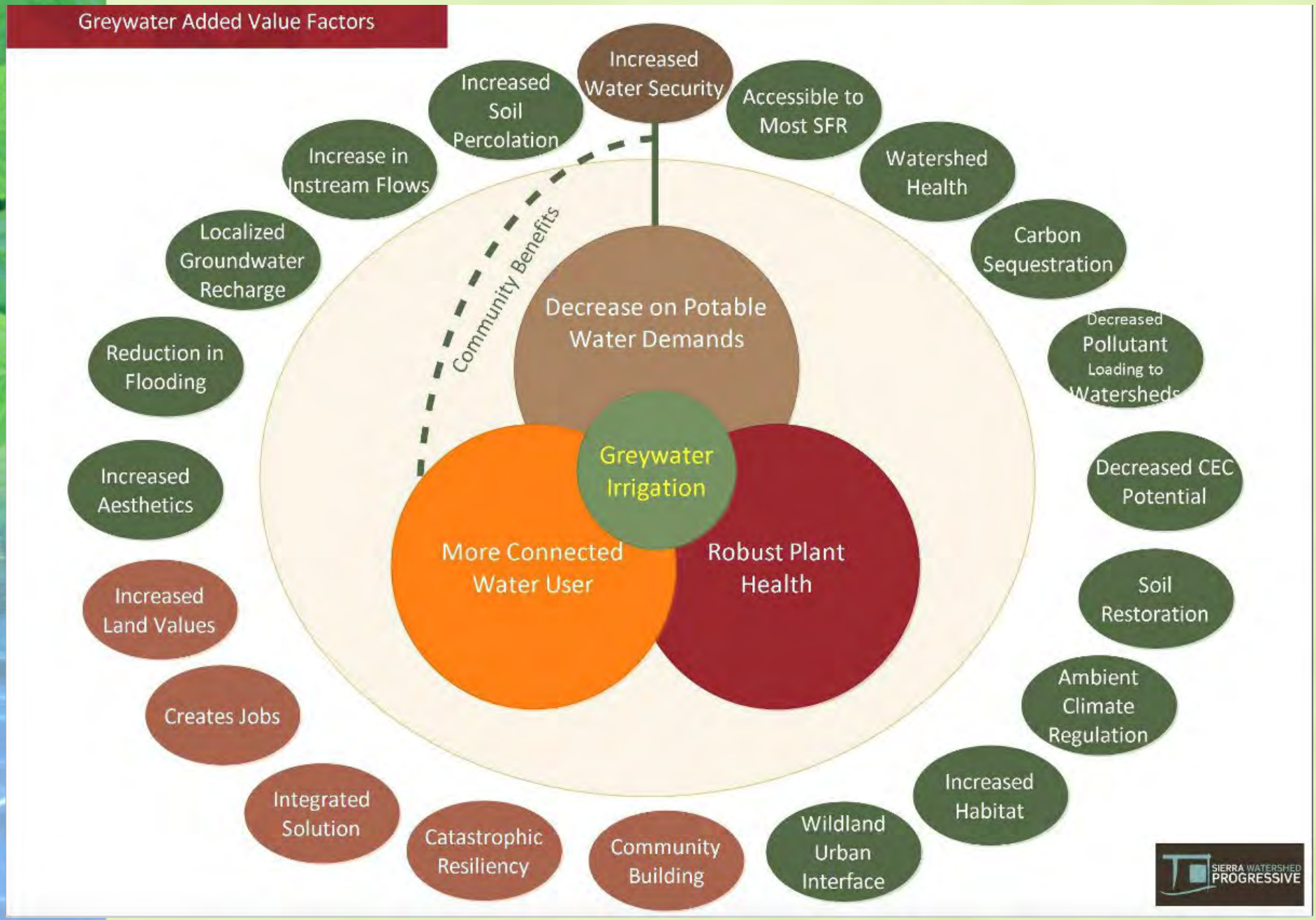
Kitchen Sink (no garbage disposal)

Washing machine

Greywater Added Value Factors



SIERRA WATERSHED PROGRESSIVE


Greywater Added Value Factors
Increased Water Security
Accessible to Most SFR
Watershed Health
Carbon Sequestration
Decreased Pollutant Loading to Watersheds
Decreased CEC Potential
Soil Restoration
Ambient Climate Regulation
Increased Habitat
Wildland Urban Interface
Community Building
Catastrophic Resiliency
Integrated Solution
Creates Jobs
Increased Land Values
Increased Aesthetics
Reduction in Flooding
Localized Groundwater Recharge
Increase in Instream Flows
Increased Soil Percolation
Community Benefits
Decrease on Potable Water Demands
Greywater Irrigation
More Connected Water User
Robust Plant Health
SIERRA WATERSHED PROGRESSIVE

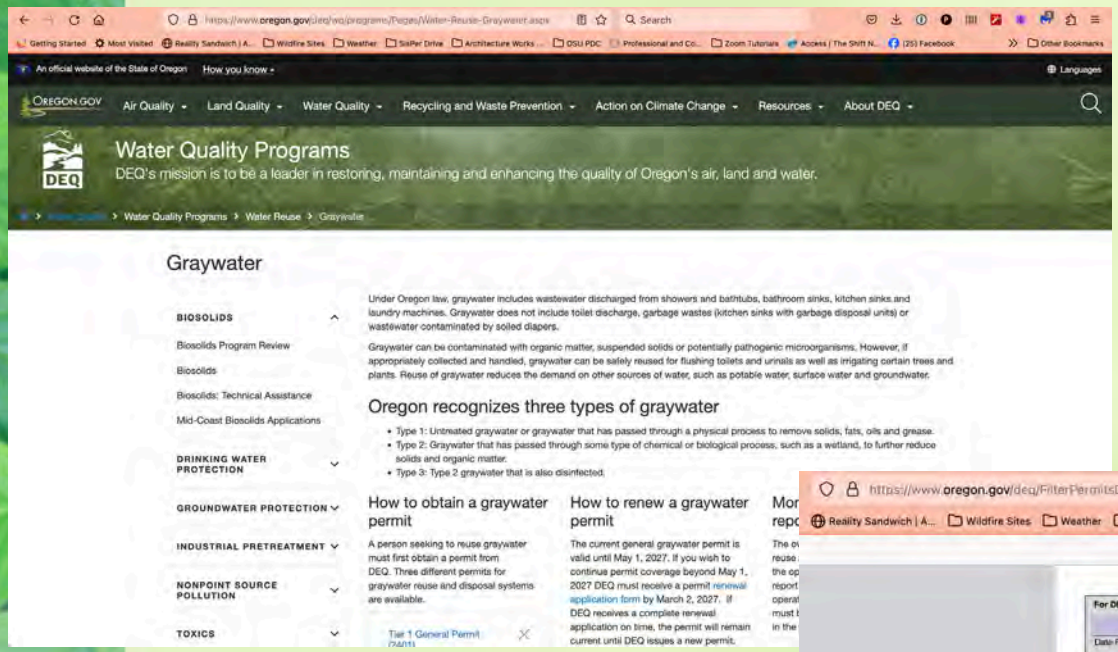
Oregon Grey Water Codes

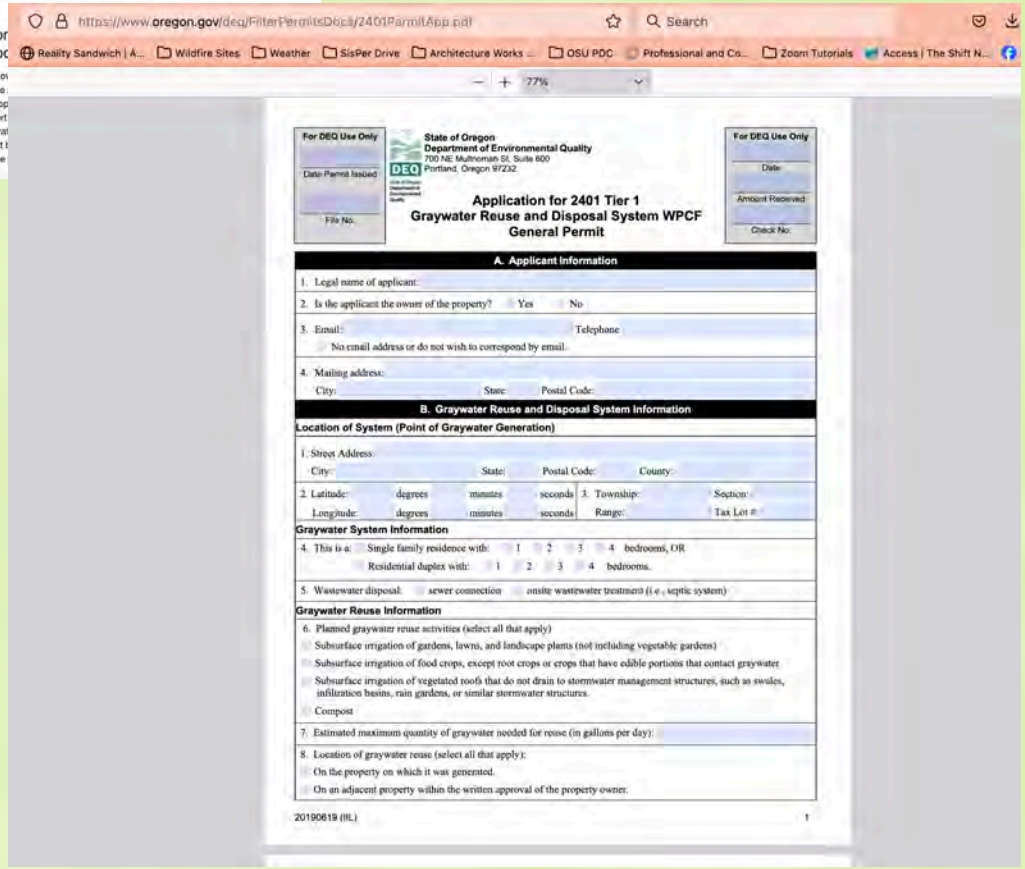
- Oregon recognizes three types of graywater:
  - Type 1: Untreated graywater or graywater that has passed through a physical process to remove solids, fats, oils and grease.
  - Type 2: Graywater that has passed through some type of chemical or biological process, such as a constructed wetland, to further reduce solids and organic matter.
  - Type 3: Graywater that is also disinfected.
- There are three tiers.
  - Tier 1 – single family residence or duplex producing less than 300 gal per day of greywater that is used only for subsurface irrigation. A person obtaining a Tier 1 permit must submit a new permit application. New permit $97 ($54 new-permit application fee and $43 annual fee)
  - Tier 2 – Commercial or Institutional structure producing less than 1,200 gal per day. A person wishing to obtain a Tier 2 permit must submit information to DEQ for review and approval before getting a permit.

Oregon Grey Water Codes

- Tier 3 – generally for systems producing more than 1,200 gal of greywater daily. Because these systems are potentially large and complex, DEQ will evaluate each system individually and develop site-specific conditions necessary to protect public health and the environment.

- If you want to install and use a greywater system, you must complete the following:
  - Develop a system design plan
  - Develop an operations and maintenance manual
  - Obtain a plumbing permit from the local city or county
  - Request a greywater reuse and disposal permit from DEQ


Water Quality Programs
DEQ's mission is to be a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.
Graywater
Under Oregon law, graywater includes wastewater discharged from showers and bathtubs, bathroom sinks, kitchen sinks and laundry machines. Graywater does not include toilet discharge, garbage wastes (kitchen sinks with garbage disposal units) or wastewater contaminated by soiled diapers.
Graywater can be contaminated with organic matter, suspended solids or potentially pathogenic microorganisms. However, if appropriately collected and handled, graywater can be safely reused for flushing toilets and urinals as well as irrigating certain trees and plants. Reuse of graywater reduces the demand on other sources of water, such as potable water, surface water and groundwater.
Oregon recognizes three types of graywater
Type 1: Untreated graywater or graywater that has passed through a physical process to remove solids, fats, oils and grease.
Type 2: Graywater that has passed through some type of chemical or biological process, such as a wetland, to further reduce solids and organic matter.
Type 3: Type 2 graywater that is also disinfected.
How to obtain a graywater permit
A person seeking to reuse graywater must first obtain a permit from DEQ. Three different permits for graywater reuse and disposal systems are available.
How to renew a graywater permit
The current general graywater permit is valid until May 1, 2027. If you wish to continue permit coverage beyond May 1, 2027 DEQ must receive a permit renewal application form by March 2, 2027. If DEQ receives a complete renewal application on time, the permit will remain current until DEQ issues a new permit.


Application for 2401 Tier 1 Graywater Reuse and Disposal System WPCF General Permit
A. Applicant Information
B. Graywater Reuse and Disposal System Information
Location of System (Point of Graywater Generation)
Graywater System Information
Graywater Reuse Information

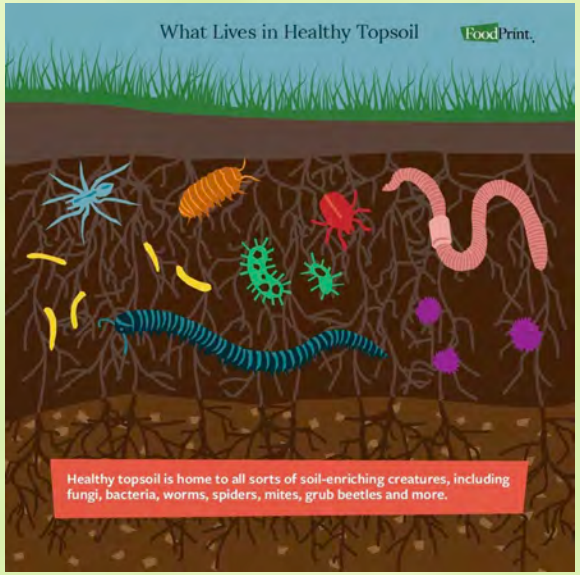
One general principle in greywater system design is - There are no general principles!

Elements of a Greywater system

- Greywater source(s)
- Collection plumbing
- Surge tank, filter, and pump (only if needed)
- Distribution Plumbing
- Receiving landscape
- People

Site Considerations for Greywater Discharge

- What kind of Soils
  - Rocky, sandy, clay,
  - biologically active high carbon soils
- Soil Drainage
  - Perk Test
- Distance to water table 3’+
- Slope Less than 45 degrees
- Water Source/Quality
  - rain, well, city, softened, minerals
- Amount of Greywater available for reuse
- Receiving landscape



Setback Distance Requirements for Type 1 & Type 2 Greywater Systems

Sensitive Feature	Distance from GW Irrigation Type 1	Distance from GW Irrigation Type 2
Groundwater Well & Springs	100’	50’
Rivers, Streams, Lakes, Ocean	50’	25’
Stormwater management structures such as Raingardens, Bioswales and Catch Basins	10’	10’
Underground Injection Control Systems	10’	10’
Property Lines	2’	2’

INDOOR WATER USE EVALUATION GUIDE

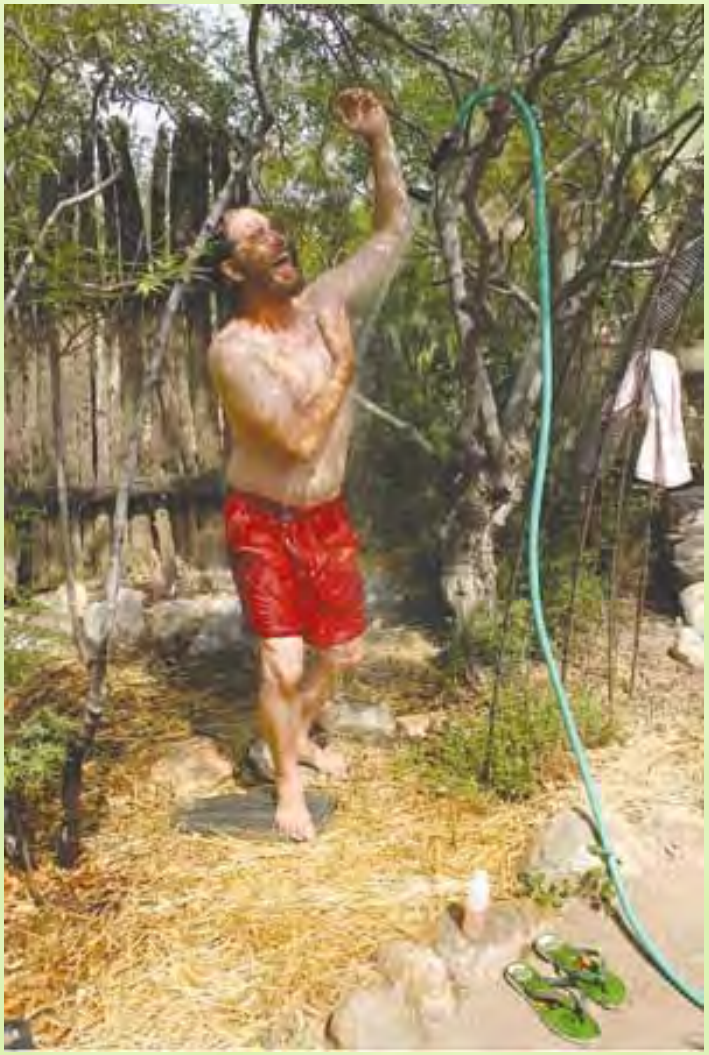
Information summarized by the
City of Ashland Public Works Department
June 2012

FIXTURE	TYPE	WATER USE RATE		FAMILY SIZE		
				1	2	4
TOILETS		Gallons / Flush	* Uses / Day	Daily Water Use (Gallons)		
	Older than 1950	6.0	5.0	30.0	60.0	120.0
	1950 - 1980	5.0	5.0	25.0	50.0	100.0
	1980 - 1994	3.5	5.0	17.5	35.0	70.0
	1994 or newer	1.6	5.0	8.0	16.0	32.0
	WaterSense	1.3	5.0	6.5	13.0	26.0
	Dual Flush	1.0	5.0	5.0	10.0	20.0
SHOWERS		Gallons / Minute	* Minutes / Shower	Daily Water Use (Gallons)		
	Older than 1980	5.0 - 7.0	10.0	50.0 - 70.0	100.0 - 140.0	200.0 - 280.0
	1980 - 1994	3.5	10.0	35.0	70.0	140.0
	1994 or newer	2.5	10.0	25.0	50.0	100.0
	WaterSense	2.0	10.0	20.0	40.0	80.0
	WaterSense	1.5	10.0	15.0	30.0	60.0
KITCHEN & BATHROOM FAUCETS		Gallons / Minute	* Minutes / Day	Daily Water Use (Gallons)		
	No aerator	7.0	8.0	56.0	112.0	224.0
	Older than 1980	5.0	8.0	40.0	80.0	160.0
	1980 - 1994	3.0	8.0	24.0	48.0	96.0
	1994 or newer	2.5	8.0	20.0	40.0	80.0
	Standard	2.2	8.0	17.6	35.2	70.4
	WaterSense	1.5	8.0	12.0	24.0	48.0
	WaterSense	1.0	8.0	8.0	16.0	32.0
BATHTUB (22" x 54")	Water Depth	Gallons / Use	* Uses/Person/Day	Daily Water Use (Gallons)		
	4 inches	21.0	1.0	21.0	42.0	84.0
	8 inches	41.0	1.0	41.0	82.0	164.0
CLOTHES WASHERS		Gallons / Full Load	*Loads/Person/Week	Daily Water Use (Gallons)		
	Older than 1980	55.0	2.0	15.7	31.4	62.8
	Top Load	40.0	2.0	11.4	22.8	45.6
	Front Load	25.0	2.0	7.1	14.2	28.4
	Energy Star	14.0	2.0	4.0	8.0	16.0

***Actual usage may vary.** *Sources: American Water Works Association (AWWA), Residential End Uses of Water, 1999. Amy Vickers, Handbook of Water Use and Conservation, 2001. Environmental Protection Agency (EPA), Water and Energy Savings from High Efficiency Fixtures and Appliances in Single Family Homes, 2005. EPA, WaterSense & Energy Star Programs, 2012.*

Quick Fix “systems”

- 5-gal bucket under the sink
- Dish pan dumped on plants
- Bucket in shower
- Hose out back from sink or laundry



Two Simple Greywater Systems

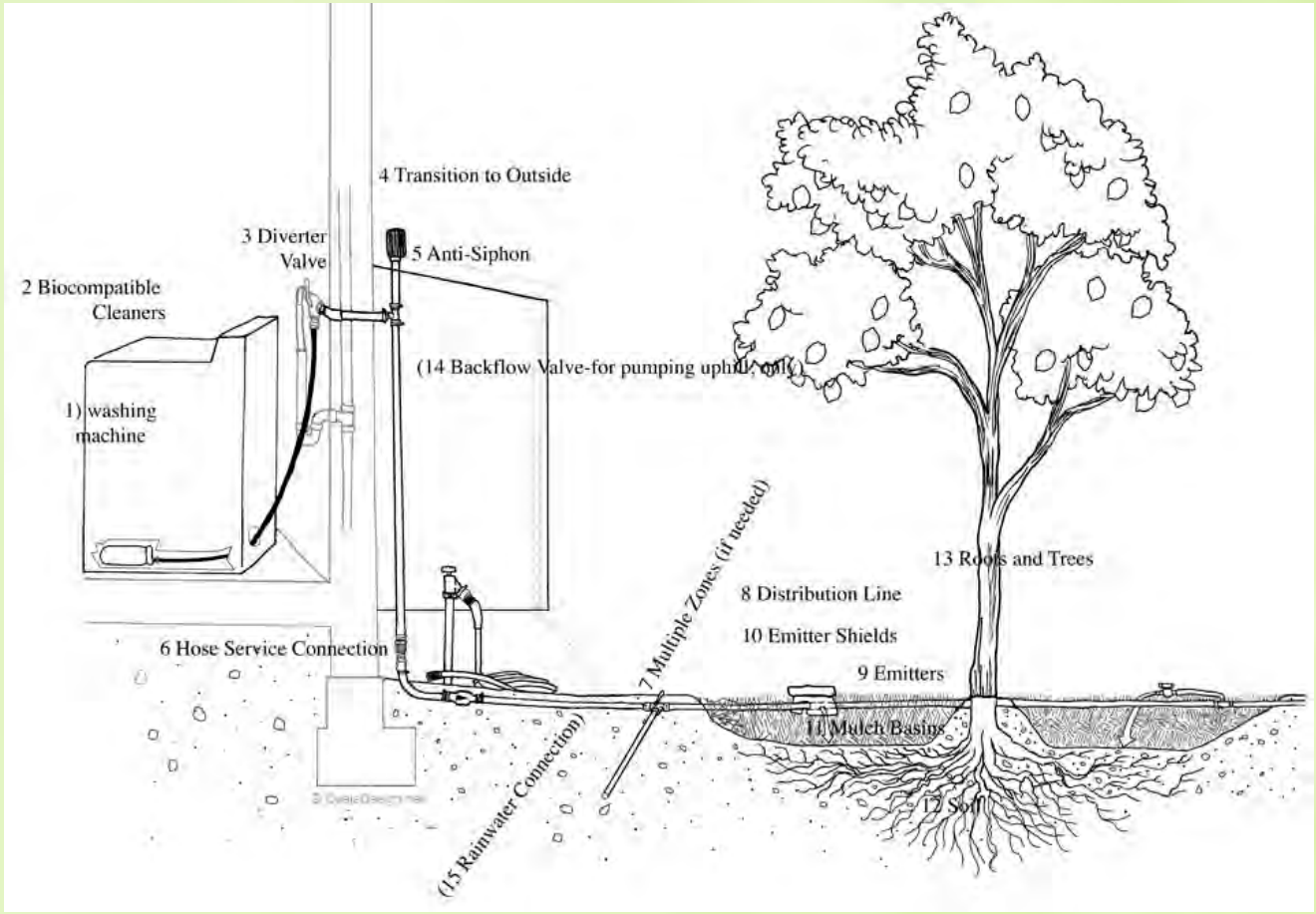
Branched Drain

- Sink and Shower
- Plumbing permits
- Uses rigid ABS pipe in the ground to distribute water
- Depends on slope for gravity flow
- Can be divided to account for water surge and amount.
- Needs clean outs at branches
- Needs to discharge into a mulch basin

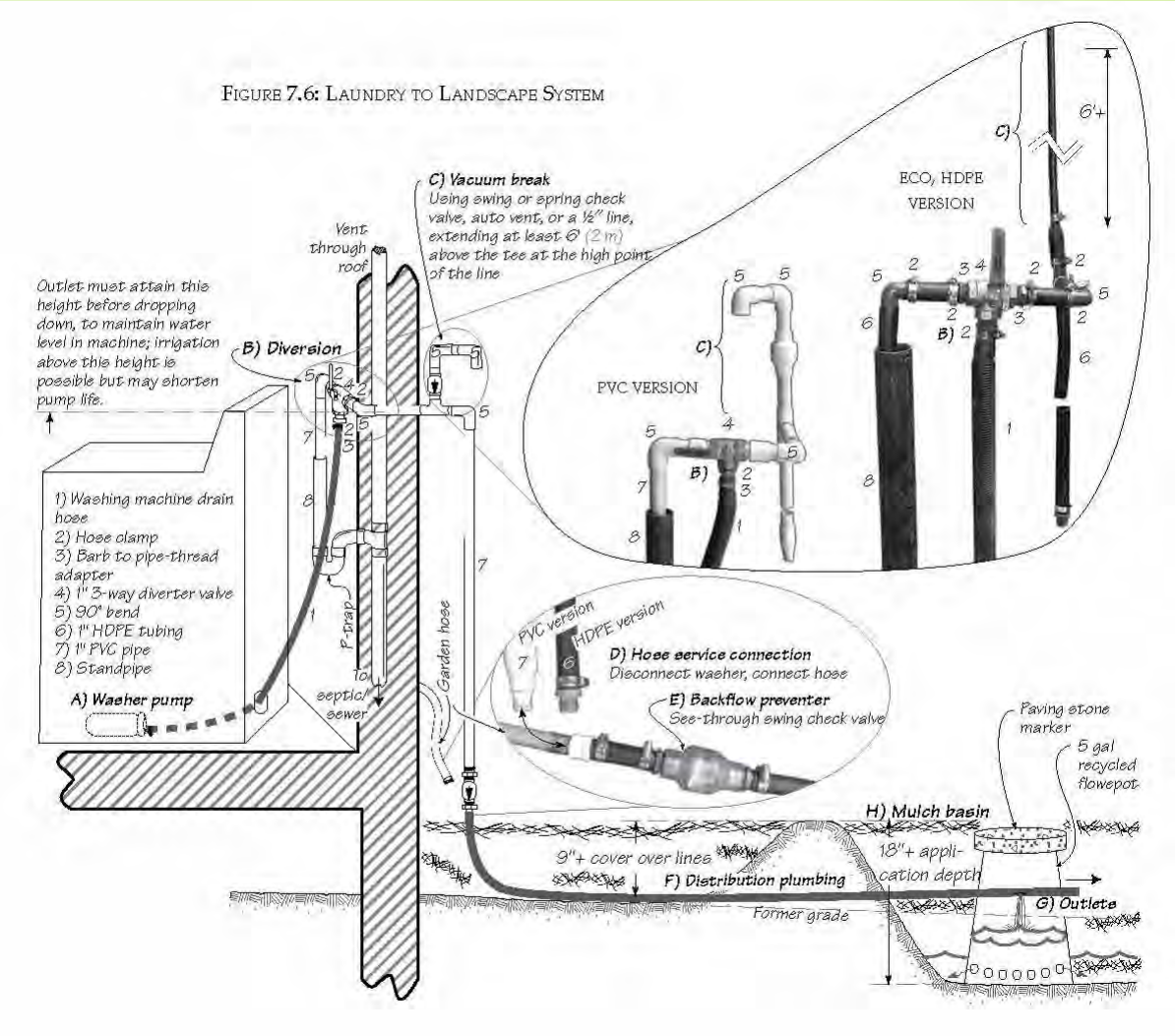
Laundry to Landscape

- Washing machine source
- Usually does not need plumbing permits
- Uses the pump from the washer to move water
- Uses HDPE poly tube
- Discharge into mulch basins and tree wells
- Can be spread out among multiple plantings

Laundry to Landscape



Laundry to landscape system

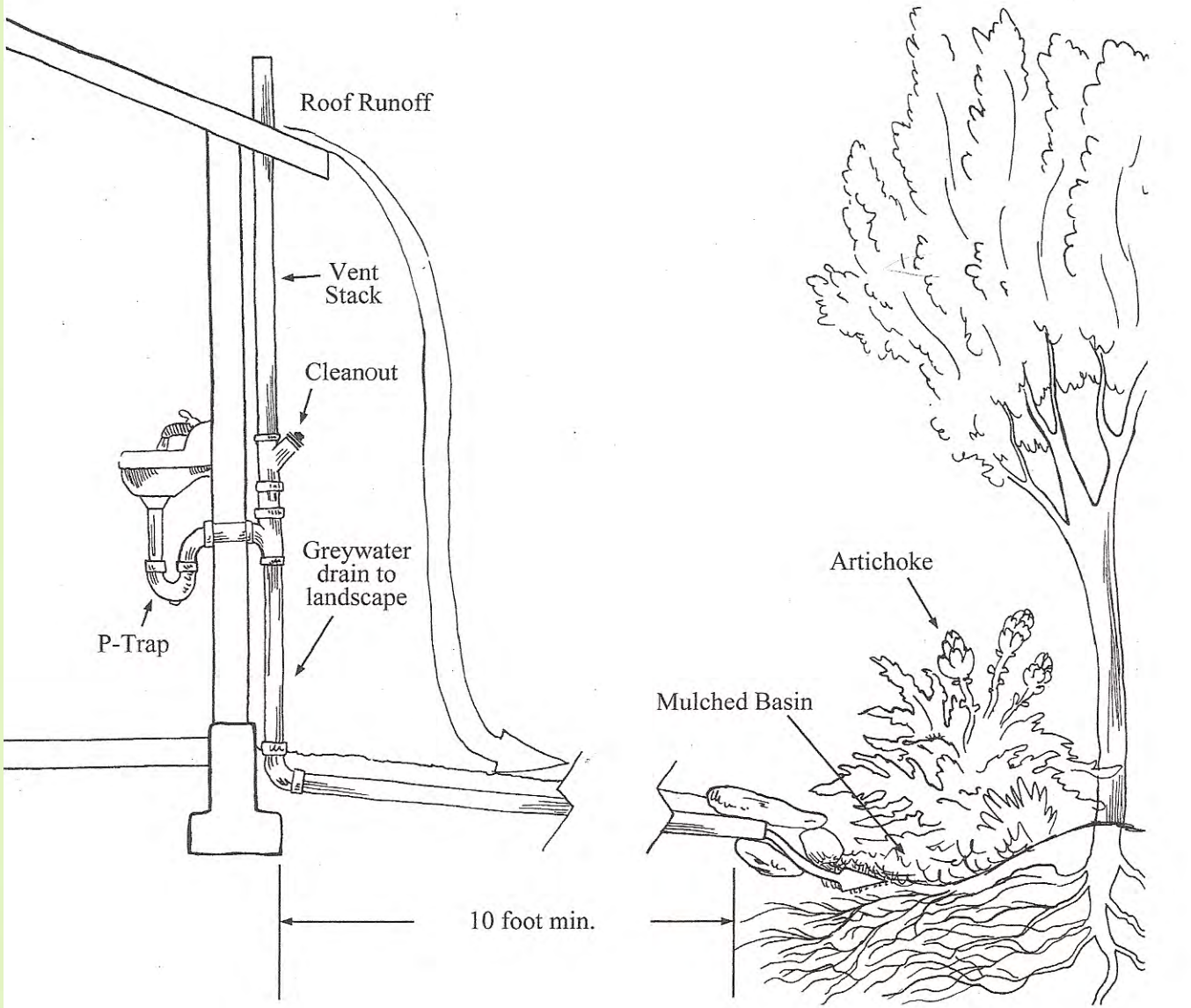



What CAN go to the GREYWATER SYSTEM
*Oasis, ECOS or BioPac LIQUID detergent
*Soap nuts
*Other liquid detergents that are SALT (sodium) and BORON (borax) free
What CANNOT go to the GREYWATER SYSTEM
*Powdered detergents
* Salt/sodium compounds
* Boron /Borax
* Bleach
HANDLE HERE TO GREYWATER
HANDLE HERE TO SEWER
Apollo
CONBRACO
U.S.A.


TEMPERATURE
Warm
Cold
Hot
WATER LEVEL
Low
Normal
WASH CYCLE
Permanent
Normal
Delicate
Medium
Light
Heavy
Prewash
Stop
Rinse 1
Rinse 2
Spin
Power
Locked
Pull to Start
Push to Stop
ORANGE
WHITE SAPOTE
FIG
PEACH


GREYWATER
SURGE
TANK
HarvestingRainwater.com © Brad Lancaster

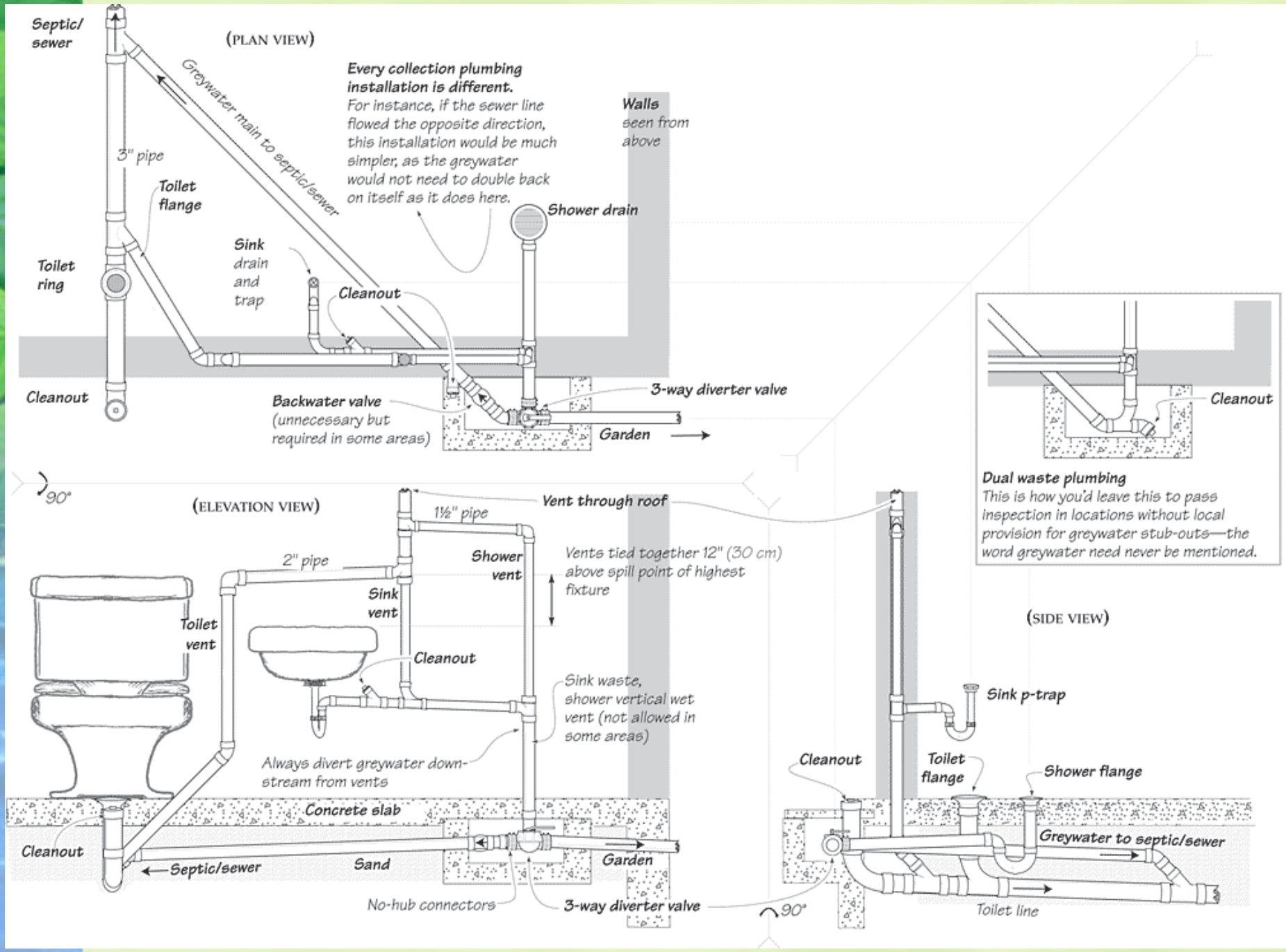
Branched Drain



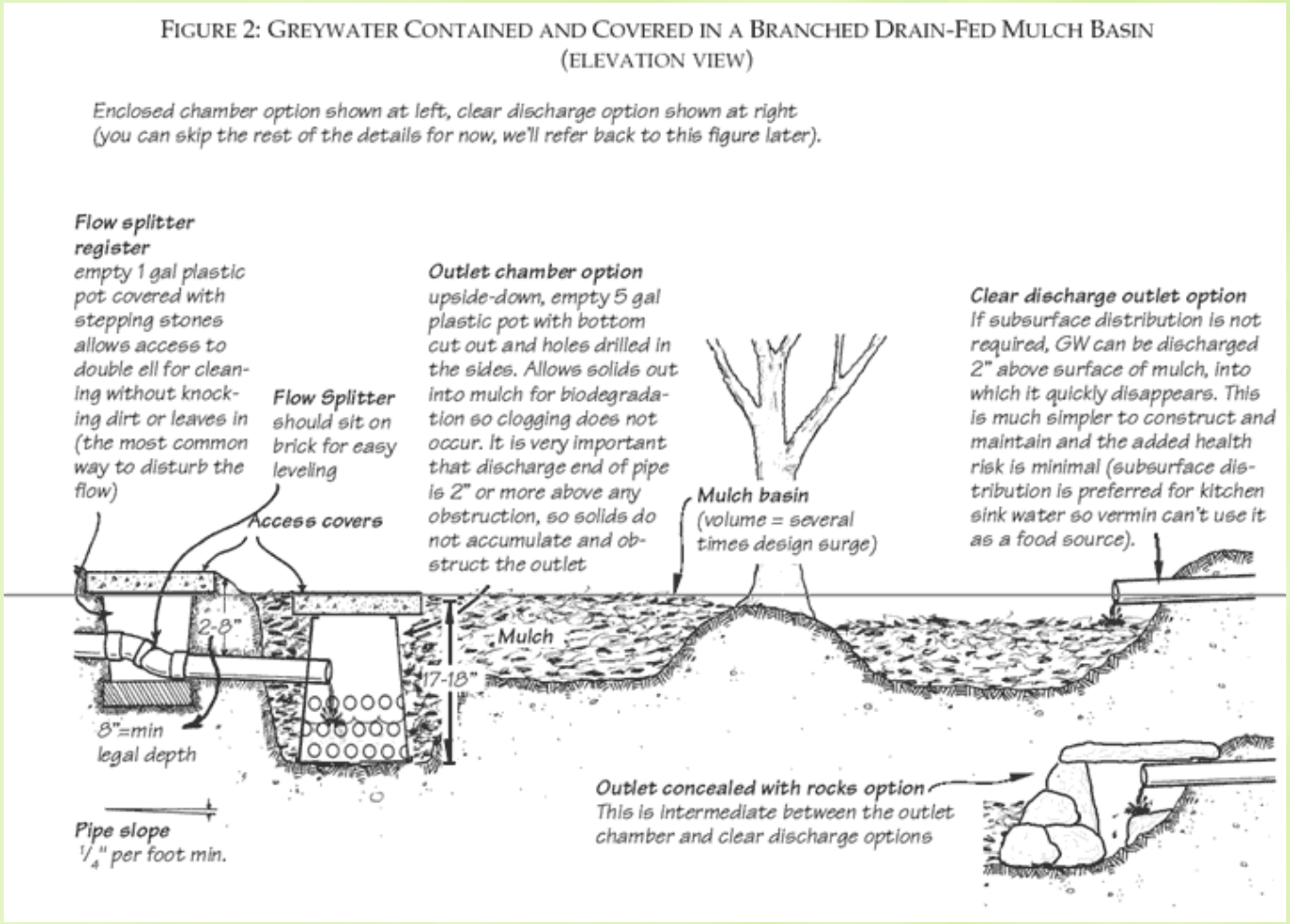
3-way valves

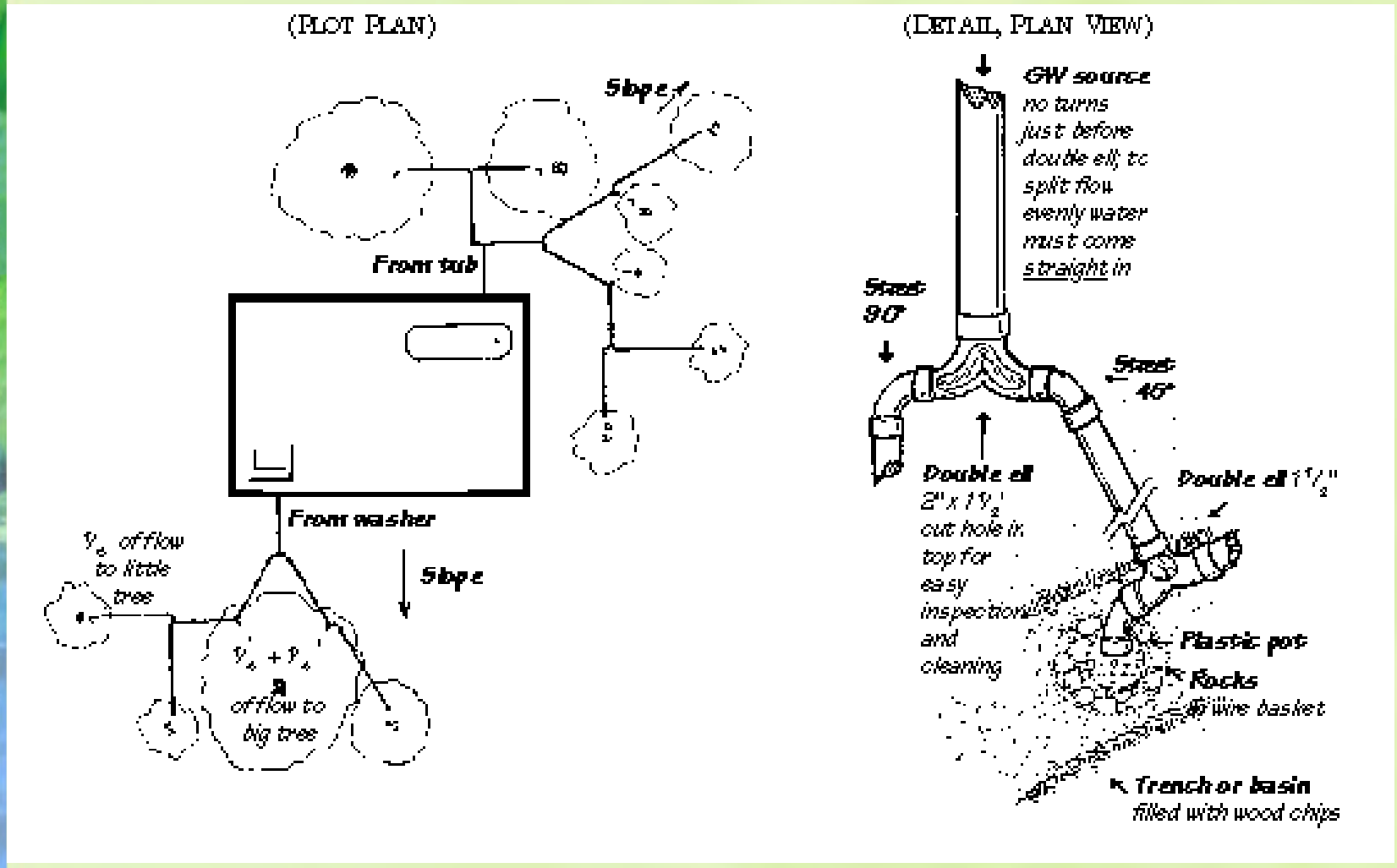
Jandy Three way valve or another option is the Pentair 3-way valve pictured below.

Pentair 3-way valve


Septic/
sewer
(PLAN VIEW)
Greywater main to septic/sewer
Every collection plumbing installation is different.
For instance, if the sewer line flowed the opposite direction, this installation would be much simpler, as the greywater would not need to double back on itself as it does here.
Walls
seen from above
3" pipe
Toilet flange
Shower drain
Toilet ring
Sink drain and trap
Cleanout
Cleanout
Backwater valve
(unnecessary but required in some areas)
3-way diverter valve
Garden
Cleanout
Dual waste plumbing
This is how you'd leave this to pass inspection in locations without local provision for greywater stub-outs—the word greywater need never be mentioned.
90°
(ELEVATION VIEW)
1½" pipe
Vent through roof
2" pipe
Shower vent
Vents tied together 12" (30 cm) above spill point of highest fixture
Sink vent
Toilet vent
Cleanout
Sink waste, shower vertical wet vent (not allowed in some areas)
Always divert greywater downstream from vents
Concrete slab
Cleanout
Septic/sewer
Sand
Garden
No-hub connectors
3-way diverter valve
90°
(SIDE VIEW)
Sink p-trap
Cleanout
Toilet flange
Shower flange
Greywater to septic/sewer
Toilet line

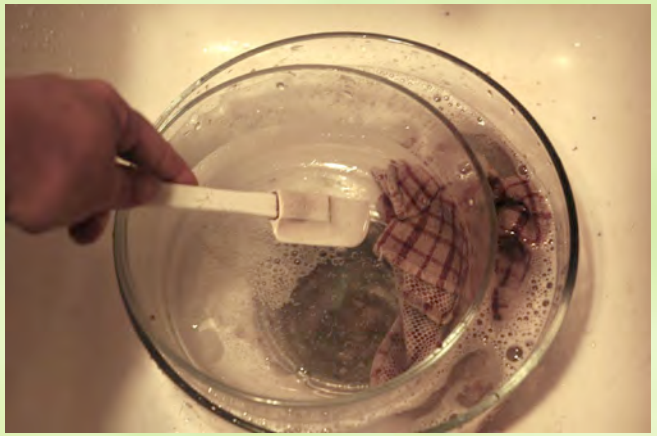
Branched drain system




(Plot Plan)
Slope
From tub
From washer
Slope
½" offlow to little tree
½" + ¾" offlow to big tree
(Detail, Plan View)
GW source
no turns just before double ell to split flow evenly water must come straight in
Steel 90°
Steel 45°
Double ell
2" x 1½" cut hole in top for easy inspection and cleaning
Double ell 1½"
Plastic pot
Rocks
@ wire basket
Trench or basin
filled with wood chips


HarvestingFarmland.com © Brad Lancaster

Greywater system maintenence



Monitor the system

Clean Filters

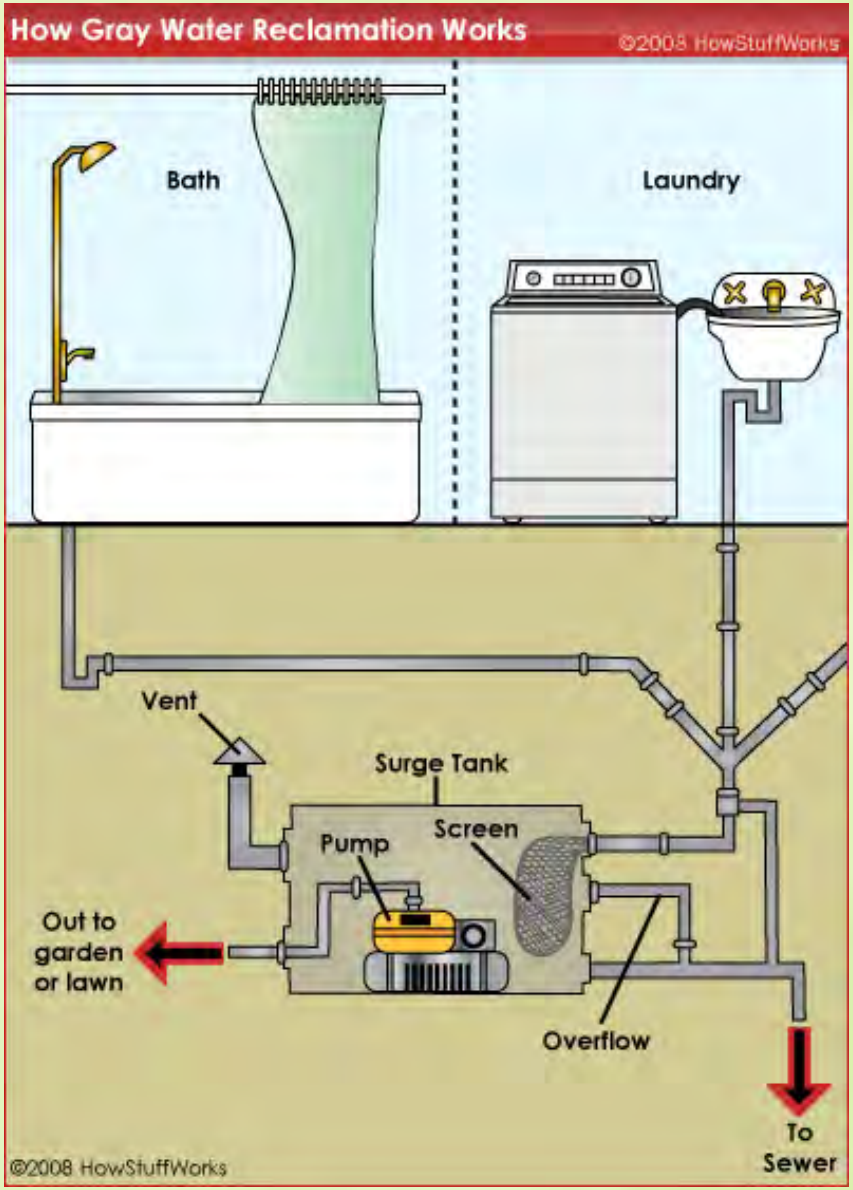
Check flow splitter and emitter cleanouts

Don’t dump oils, food, meat - things that might clog the system


LANDSCAPE
SEWER
Directions:
• Concentrated!
• Effective at all temperatures
• Safe for fine washables

Some Common Greywater Mistakes

1. Complicated systems that need constant maintenance (filters, grease traps, storage tanks, pumps)



2. Storage Tanks for greywater

3. Greywater discharged too deep & gravel instead of wood chips

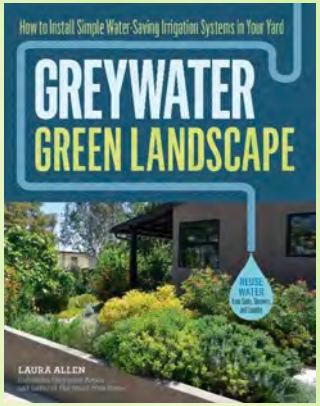
4. Discharging greywater when soil is saturated or where there is a high water table.

5. Greywater overflows basin or has surface flow

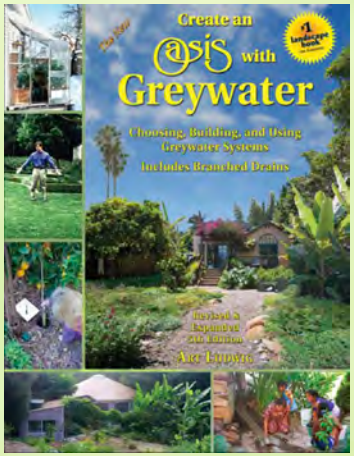
For Further Information

- Oregon DEQ

https://www.oregon.gov/deq/wq/programs/Pages/Water-Reuse-Graywater.aspx



- Greywater Action
  https://greywateraction.org/
- Greywater Green Landscape
  by Laura Allen



- Create an Oasis with Greywater
  by Art Ludwig
- Oasis Design

www.oasisdesign.org

Thank you!

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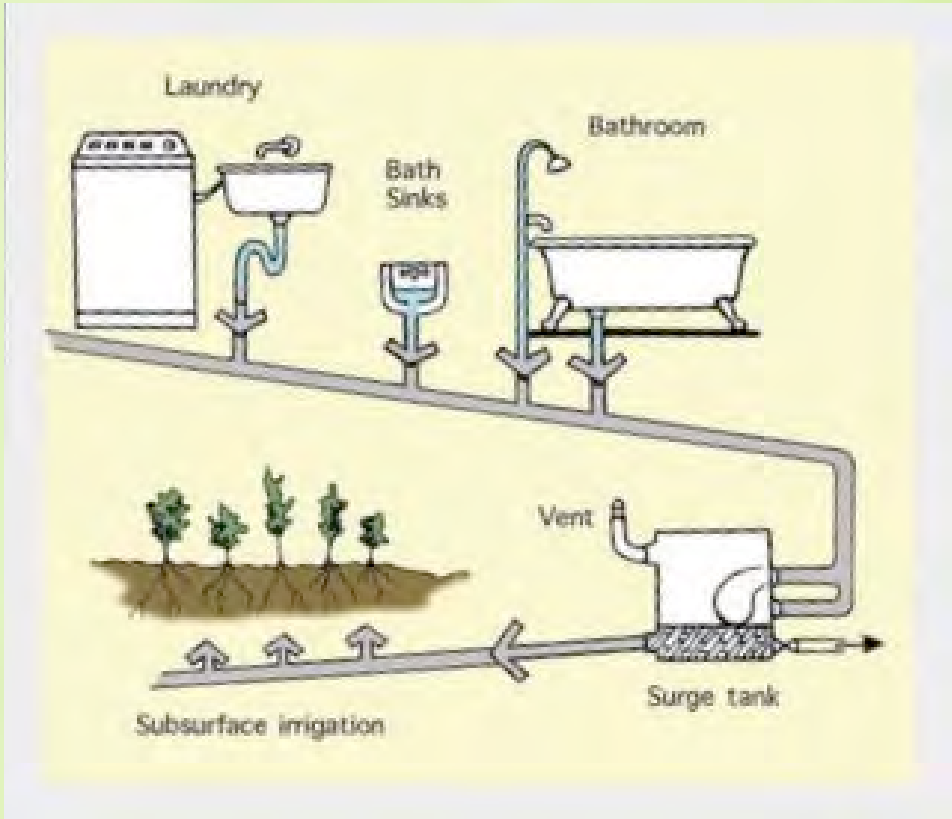
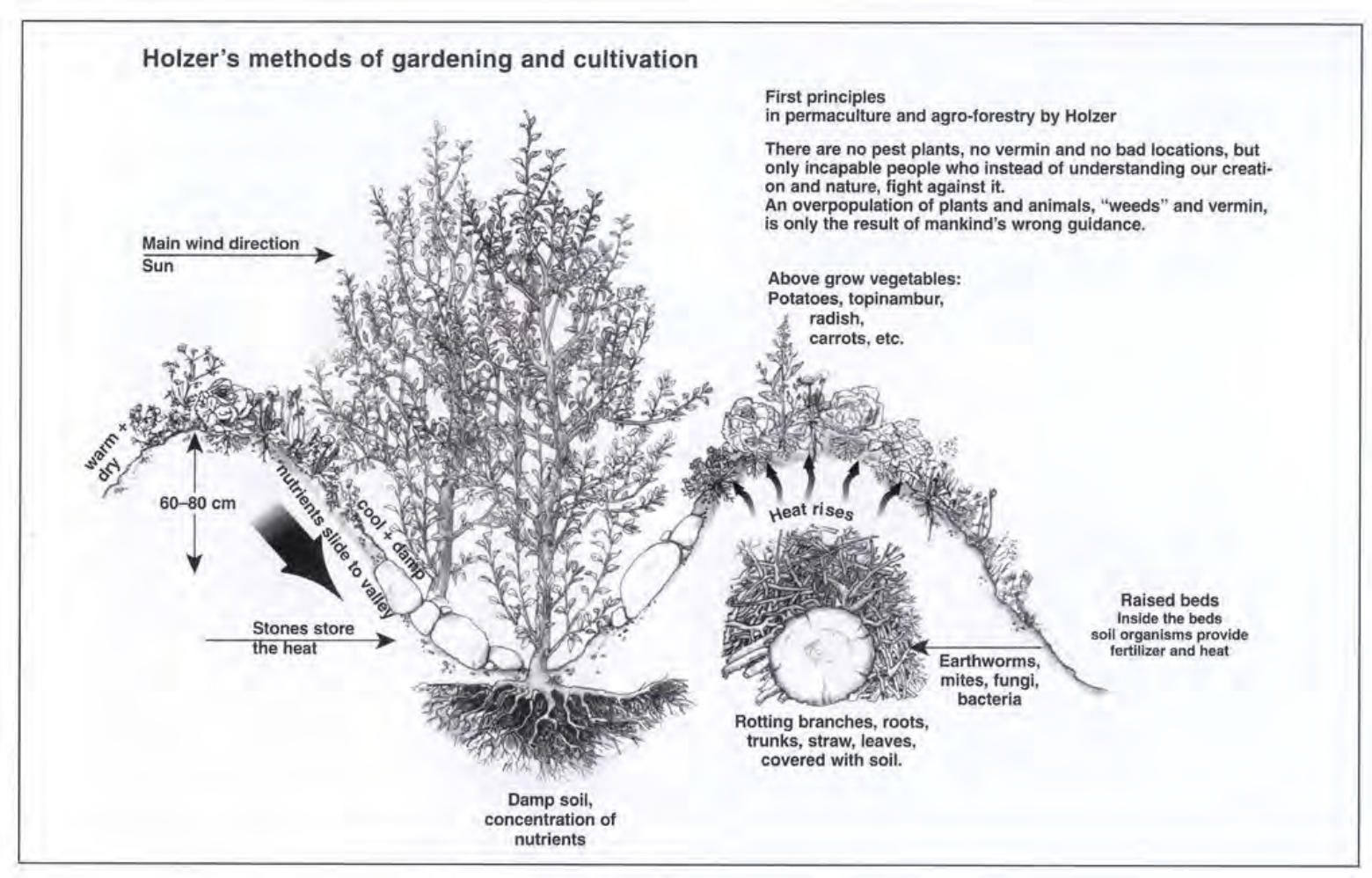
541-690-7376

SiskiyouPermaculture.org

Surge tank to subsurface irrigation



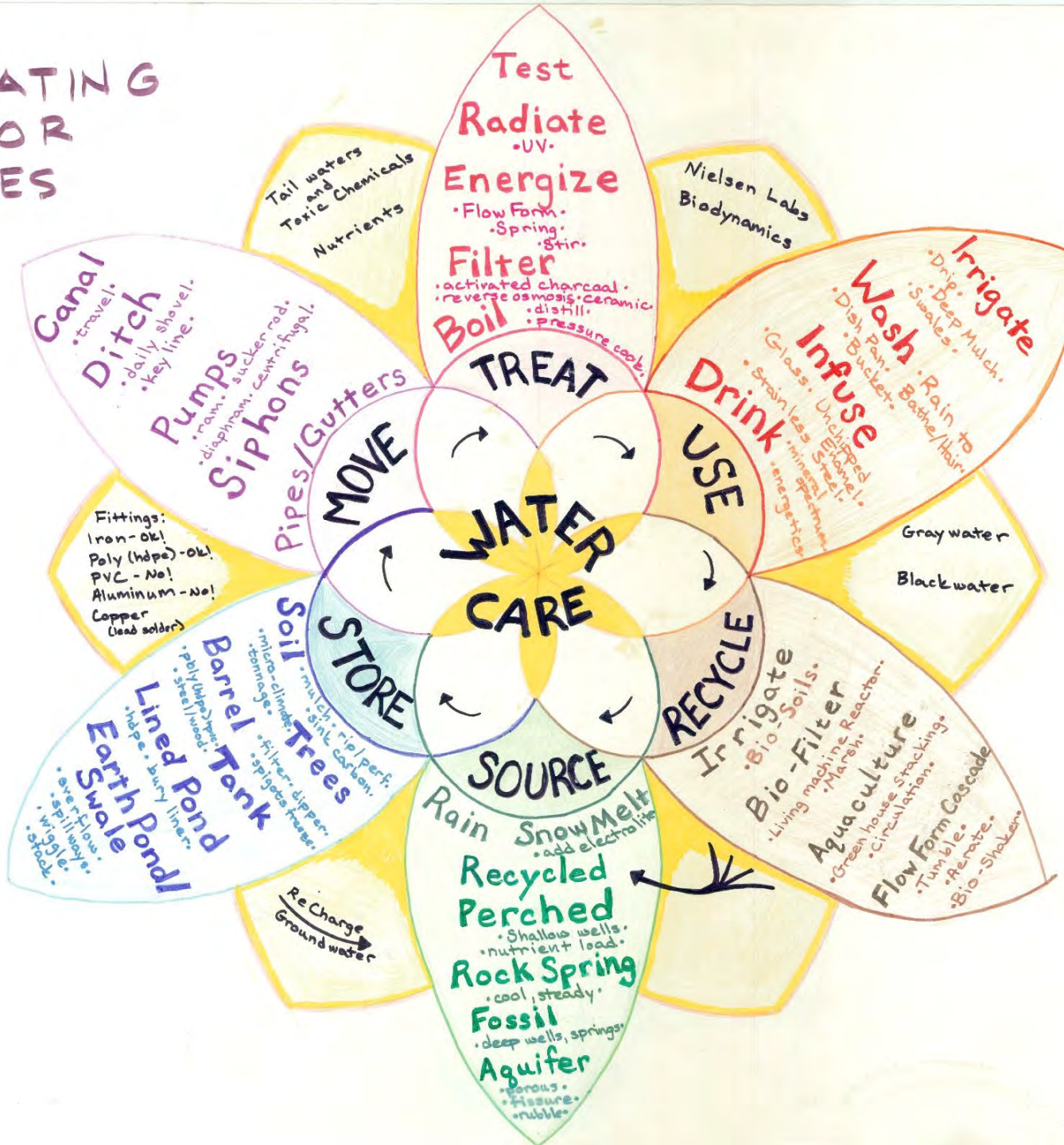
Hügelkultur



When not to use Greywater

- Source water quality (high boron)
- Water softeners
- Insufficient space
- Inaccessible drain pipes
- Unsuitable soils
- Unsuitable climate
- Legal concerns/permit hassles
- Health concerns
- Poor cost/benefit ratio
- Inconvenience
- High water table

RADIATING SECTOR CYCLES



Hanya Z 2/09