



## Laundry to Landscape Information Packet

Info provided by:  
Central Coast Greywater Alliance &  
Aromas Water District

### Central Coast Greywater Alliance

The mission of the Central Coast Greywater Alliance is to facilitate the adoption of code-compliant greywater systems into the culture of mainstream water conservation practices in Central Coast communities through information exchange and public education initiatives.

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*The Aromas Water  
District is dedicated to  
providing a reliable  
supply of high quality  
water.*



## PAJARO VALLEY WATER MANAGEMENT AGENCY

36 BRENNAN STREET • WATSONVILLE, CA 95076  
TEL: (831) 722-9292 FAX: (831) 722-3139  
email: [info@pvwater.org](mailto:info@pvwater.org) • <http://www.pvwater.org>

### Residential Graywater System Rebate Application

Pajaro Valley Water Management Agency (PVWMA) offers rebates to residential customers that install qualifying graywater systems to irrigate landscape. Graywater is wastewater collected from the following sources: clothes washing machines, showers, bathtubs, and bathroom sinks. Please see our website at [www.pvwater.org](http://www.pvwater.org) for more information on graywater systems or call (831) 722-9292 for assistance.

**This rebate requires a post-installation inspection by PVWMA personnel. Please read all the Rebate Program Requirements on the backside of this Application. All rebate applications require the signature of the property owner (if different than the applicant).**

Indicate the graywater rebate type and the total purchase price for all system parts and materials (excluding sales tax and labor). Complete the Account & Applicant Information below.

Graywater System Rebate Type	Rebate Amount	Purchase Price for System Parts & Materials
Clothes Washing Machine to Landscape	\$100	

#### Account & Applicant Information

Property address (where rebated system is installed)

City

Zip Code

Applicant name

Name on water account (if different from applicant)

Account Number

Assessor's Parcel Number (APN)

Applicant mailing address (if different from property address)

City

State

Zip Code

Daytime phone#

Alternative phone #

e-mail address (optional)

**Complete both sides of application.**

See other side for rebate program rules, requirements and signature.

# Residential Graywater Rebate application: Rules & Requirements

1. Rebate application must be submitted within 90 days of item(s) purchase. An original, dated sales receipt showing itemized cost for the rebated item(s) must be provided. If you need the original receipt(s) returned, please enclose a self-addressed, stamped envelope with your rebate application. For online purchases, a print out of the final invoice and an original packing or delivery slip is required.
2. All rebate applications must be signed by the legal property owner.
3. Backflow protection is required on any graywater system that uses a pump to distribute the graywater, or if a storage tank larger than 250 gallons is used to store graywater.
4. The rebate applicant must identify and comply with all applicable state and local (i.e. County of Santa Cruz or City of Watsonville) laws pertaining to graywater systems.
5. A representative of Pajaro Valley Water Management Agency (PVWMA) must be permitted to inspect the property to verify installation and proper construction.
6. The maximum graywater system rebate is \$100 per household for graywater to landscape connections.
7. No rebate will exceed the purchase price of the item(s) or material(s). Sales tax and labor are not rebated.
8. The rebated equipment must be installed at an existing PVWMA service address and must be installed prior to rebate request. New development is not eligible for rebates.
9. Rebates will first be applied as a credit against any outstanding augmentation charge, with the balance to be mailed to account holder or property owner.
10. Installation of any rebated device, appliance or fixture is the sole responsibility of the applicant, as is determination of the adequacy and compatibility of the existing plumbing system.
11. The applicant is solely responsible for the proper disposal of all materials associated with the installation of rebated fixtures and equipment and the PVWMA assumes no responsibility or liability. Please recycle materials.
12. PVWMA does not endorse specific brands, products or dealers; nor does it guarantee materials or workmanship; acceptance of such is customer's responsibility.
13. PVWMA assumes no responsibility or liability for any damage that may occur to an applicant's property as a result of participation in this program. Due to circumstances beyond its control, PVWMA cannot guarantee that installation of rebated fixtures or measures will result in lower utility costs.
14. The IRS requires all rebate program participants receiving \$600 or more per calendar year in rebates to be issued an IRS Form 1099 unless exemptions apply. If you have received rebates from PVWMA totaling \$600 or more in the current calendar year, you must submit a completed IRS W-9 form (see our website for a copy of this form) with your rebate application to receive a rebate. The Social Security or Tax ID number requested in the rebate application process is in compliance with exemptions to the Federal Privacy Act of 1974, 42 UCS 405(c)(2)(c). Social Security numbers provided as part of the application process are held in confidence under terms of the Privacy Act and are not divulged or otherwise conveyed to individuals or organizations outside the PVWMA Rebate Program.
15. PVWMA may at any time, modify, suspend, or terminate this program without prior written notice.
16. Incomplete or illegible applications will be denied.

**I have read, understand, and agree to the Rebate Program Rules & Requirements as stated above.**

**Applicant Signature** \_\_\_\_\_ **Date** \_\_\_\_\_

**Property Owner's Signature** \_\_\_\_\_ **Date** \_\_\_\_\_  
(if different than applicant)

After completing BOTH sides of the application, mail application and original receipt(s) to:

**Pajaro Valley Water Management Agency, 36 Brennan Street, Watsonville, California 95076**

**Agency Use Only:** Application approved ☐ Total rebate Amount granted \$ \_\_\_\_\_ Application denied ☐

Staff Reviewer \_\_\_\_\_ Date: \_\_\_\_\_

Reason for Denial: \_\_\_\_\_

Inspection by: \_\_\_\_\_ Waived ☐ Date: \_\_\_\_\_

## Monterey Bay 100 Greywater Systems Challenge Laundry to Landscape Installation Instructions

### Things to consider before your installation:

- How many loads of laundry are done per week?
- Who does the laundry? Will everyone agree to use no/low sodium detergents?
- What is the soil texture in graywater irrigation zones?
- What is the estimated plant water requirement of the landscape? (See *Sizing Graywater Irrigation Fields* template)
- Are there kids or animals who may mess around with things (i.e. valves) in the yard?
- (For multiple zoned systems) Who is responsible for switching zone valves?
- Is the washing machine near an exterior wall of the house? If not, is there a crawl space that is accessible enough to run the pipe under the house and outside through an air vent?
- Does the washing machine hose have a 1" outlet? ¾"? other size?
- Is the washing machine hose made of soft or rigid material?
- Is the irrigation area near the washing machine?
- Is the yard sloped away from the washing machine or sloped to it?
- Can the washing machine pump move water to the irrigation area? Remember that washing machines pumps are rated to pump a few feet above their rim, and that 50' of level ground is equivalent to one vertical foot of head.

### Tools Required:

- Measuring tape
- 4 in 1 screwdriver
- Pencil
- PVC cutting tools (ratcheting cutters, saw)
- 2 pairs of channel locks
- Torpedo level
- Tubing cutters
- Drill,
- 1 ½ " hole saw
- 1/4" pilot bit, (*1/4" masonry bit if drilling through a stucco wall*)
- hammer
- Tin snips
- Shovel
- Wheelbarrow
- Pick ax

## Monterey Bay 100 Greywater Systems Challenge Laundry to Landscape Installation Instructions

**Materials Needed:** Fill in boxes for a complete materials list for laundry to landscape system:

Part	Where to buy	Quantity
<b><i>Indoor Collection Plumbing/Clothes Washer Connection</i></b>		
1" 3-port valve	plumbing/mechanical supply (Grainger), Kennedy Ag-Rubber, oasisdesign.net cleanwatercomponents.com	
1" PVC male adaptor	Dripworks, local irrigation supply or hardware store	
1" PVC male adaptor by barbed fitting	Dripworks local irrigation supply or hardware store	
1" PVC 90	Dripworks, local irrigation supply or hardware store	
1" PVC 45	Dripworks, local irrigation supply or hardware store	
Hose clamps	local irrigation supply or hardware store	
1" PVC pipe	local irrigation supply or hardware store	
Part	Where to buy	Quantity
<b><i>Air gap assembly</i></b>		
Auto vent	local hardware store	
1 ½" female adaptor (FPT x Slip)	Dripworks, local irrigation supply or hardware store	
1 ½" to 1" PVC bushing	Dripworks, local irrigation supply or hardware store	
1" PVC Tee	Dripworks, local irrigation supply or hardware store	
<b><i>Tubing for outside</i></b>		
1" Polyethylene	Ewing irrigation, local irrigation supply	
1" x ½" barbed Tee	Dripworks, irrigation store	
1" barbed plug	Dripworks, irrigation store	
1" PVC slip x barbed coupling	Dripworks, irrigation store	
½" greenback ball valve	Dripworks, irrigation store	
½" PE tubing	Dripworks, irrigation store	
<b><i>For multiple zones</i></b>		
1" greenback barbed valve	Dripworks, irrigation store	
1" barbed Tee	Dripworks, irrigation store	
OR 1" 3-port valve	See above	
(3) 1" PVC male adaptor by barbed fitting	Dripworks local irrigation supply or hardware store	
<b><i>Glue, etc.</i></b>		
Gorilla PVC glue or other PVC glue and primer	Dripworks, Orchard Supply Hardware, hardware store	
Teflon tape	Dripworks, local irrigation supply or hardware store	
1" pipe straps	Local hardware store	
Outlet shields (hard plastic pots or 7" irrigation valve boxes)	Local nursery, garden center, or irrigation store	
Mulch (1 cubic yard)	Municipal green waste recycling, landscape supply	

# ***Monterey Bay 100 Greywater Systems Challenge Laundry to Landscape Installation Instructions***

## **Steps for Laundry to Landscape Installation**

### **Making the hole in wall**

1. Before you drill, look for potential hazards in the wall- outlets can give clues to where electrical wires may be, there could be vents in the wall, etc. Set up drill with 1/4" pilot bit and drill a hole through the wall from the inside, all the way through the wall to exterior of house. If you hit a stud (solid wood all the way through), try another location.
2. Once you have made a clear exit of the house, check to see where the pipe will end up outside.
3. If the path is clear (no studs, pipe, electrical) on inside and outside, set up drill with 1 1/2" hole saw.
  - For a wooden house: Using the pilot bit hole as the center hole for the hole saw, drill halfway through starting from inside the house out, then drill the other half starting from the outside of the house inwards. This will make a clean hole on both sides
  - For a stucco house: On the outside of the house line up the hole saw with the pilot bit hole, then trace the edge of the hole saw with a Sharpie, making a circle on the house. Set up the drill with a 1/4" masonry bit. Drill small holes along the circle outline all the way through stucco, then chip out stucco with the hammer and chisel. Cut the wire holding stucco so it is clear of the hole. You've now created a 1.5" hole in the stucco. Next, set up the drill with the hole saw and continue to drill out the wood from the outside.

### **Preparing the 3-way valve**

1. Check the 3-way valve for defects (defective threads, valve doesn't close completely on one side, etc.)
2. Wrap teflon tape clockwise around all threaded fittings.
3. With your hands, gently turn the male adapters into the threads of the run of the tee making sure not to cross-thread plastic threads. Do the same with the male adapter x barbed fitting into the branch of the tee. Turn clockwise with your hands until you can't tighten anymore.
4. With two pairs of channel locks continue to tighten the fitting until it is hard to turn with the tools.
5. Remove laundry drain hose out from sewer connection (utility sink, stand pipe, etc.) and place a hose clamp over the hose. Connect the hose to the barbed fitting coming from the branch of the tee and use the hose clamp to secure it in place, making a watertight seal. If the plastic from the laundry hose is hard, you may need to heat it with a blow drier or hot water to soften it.

### **Plumbing to and from three way valve**

1. Hold 3-way valve up and look at what position the 3-way valve will sit so the handle can turn freely, and uses the fewest turns and shortest run of pipe to connect one branch of the valve to the sewer and the other out the exterior wall (or through the floor if the machine is in an interior room- in this situation install the auto-vent inside the room at the high point of the graywater line).
2. Measure and cut all the 1" PVC and fit the pipe and fittings together without glue (dry fit the pipe). Make sure the pipe exits the exterior wall (or down through the floor) with enough room to glue a fitting on with space between the wall and the end of the fitting so the glued joint isn't



## ***Monterey Bay 100 Greywater Systems Challenge Laundry to Landscape Installation Instructions***

inside the wall.

3. Make a mark along each joint so, when you glue the fittings stay in the correct position.
4. Protect the surfaces underneath the areas you will be gluing with newspaper.
5. One at a time, glue all of the pipe and fittings together with gorilla PVC glue (our favorite, but any PVC glue will suffice).
6. Go outside (or under the house) and connect the rest of the line to the landscape. Be sure to leave enough space between the wall and the glued joint for inspection during the test to ensure there are no leaks in the walls of the house. While the glue is wet adjust the tee with a level so the tee is pointing straight up and down.
7. Glue the bushing into the slip portion of the 1 ½" FPT x slip coupling,
8. Apply teflon tape to the auto vent and thread into the threaded part of the coupling, then glue a 2" stub of 1" PVC out of the bushing then glue the stub to the top of the tee.
9. Measure, cut and glue a piece of PVC with a 90 to the bottom of the tee that extends to the level of the ground.
10. Place the 1" barbed x PVC fitting in the 90 pointing towards the HDPE or PE that goes to the garden.

### **Running 1" tubing (PE, polyethylene or "poly")**

1. Once you've transitioned to the tubing, you'll install a hose connection as a place to flush the system if it ever clogs. Choose location that is easy to get to, then attach a 1" barbed by male hose thread fitting to the tubing, next thread a female hose thread by barbed fitting (with a swivel connection) to the male thread and use the barbed end as your starting point for the trunk line. This will allow you to unscrew the female hose thread fitting and attach a garden hose to it to test and flush out the system.
2. Roll out the 1" trunk line to all the areas that the main line will reach. If there are multiple zones, roll out one complete zone, cut the pipe at the end, then roll out a separate line for each zone. Try to visualize the shortest distance of pipe while maximizing the desired irrigation area. The trunk line(s) do not need to be straight. The pipe is flexible and can meander through the yard in order to reach all irrigation areas. Try and make the longest turns possible to avoid a crimp in the tubing, also try and go either flat or slightly down hill when ever possible.
3. If you are running multiple zones: you have the choice of using two ball valves or another brass 3-way valve.
  - The brass 3-way valve is more expensive but ensures that the graywater will always go out through one of the zones. It is installed the with 1"male adapters x barbed fittings in every port.
  - If you use two ball valves, use a 1" barbed tee with a small pieces of tubing and two 1" greenback ball valves. We suggest using the "greenback" valves because their orifice for the water is larger than other barbed ball valves. PVC threaded valves are more expensive but can be used. One branch of the tee is for the inlet and the other two are for the two irrigation zones. With this type of zone creating the homeowner must be responsible and ensure that both valves are NOT turned off at the same time!
  - For additional zones, use either the brass 3-way or the two ball valves to split one or both lines again.
4. To make sharp turns use barbed 90s.

## **Monterey Bay 100 Greywater Systems Challenge** **Laundry to Landscape Installation Instructions**

5. At or near the mulch basins cut into the 1" tube with tubing cutters (if the blade squishes the pipe, rotate your hand as you are pressing so the blade moves along the pipe where you want it to be cut).
6. Insert a 1" x 1/2" barbed tee into the mainline. To do this, press one end of the pipe all the way onto the 1" barbed portion of the tee; do the same with the other end of the pipe. This process is called cutting in a tee. If you use HDPE the tubing may be hard to work with, and hard to push in the barbs. You can use hot water to soften the tubing, or liquid soap to make it slippery and make the job easier.
7. Cut in tees in all the areas you wish to water (depending on plant size this may be a 1" tee or a 1" x 1/2" tee). If the 1" main line is too far to reach to the plant then use a small piece of 1/2" tubing to reach the mulch basin.

**Minimum and maximum number of emitters per zone to ensure adequate flow  
to avoid pump overloading and uneven distribution**

<b>Tubing size</b>	<b>Diameter (in)</b>	<b>Cross- sectional area (in<sup>2</sup>)</b>	<b>Number to equal 1"</b>	<b>Minimum number of emitters</b>	<b>Maximum number of emitters</b>
<b>1" poly line</b>	1.04	0.85	1.00	<b>1</b>	<b>2</b>
<b>3/4" poly line</b>	0.83	0.54	1.59	<b>2</b>	<b>4</b>
<b>1/2" poly line</b>	0.57	0.26	3.34	<b>4</b>	<b>6</b>
<b>1/2" poly line w/ barbed ball valve</b>	0.47	0.18	4.88	<b>6</b>	<b>10</b>

### **Testing the system**

There are two steps to testing the laundry to landscape system.

1. Balance the irrigation lines so that the water is distributed evenly throughout the system: (1) Undo the male hose thread fitting and attach a garden hose to the female swivel, keeping all other barbed attachment in place. (2) Turn on the hose and walk to all irrigation zones. Observe how much water is coming out of each tee. If flow is evenly distributed you're in luck! (3) If not, attach a small piece PE to a greenback ball valve, then attach tubing to the high flow tees. Turn the ball valve slowly towards the off position until you reached the desired flow rate. Do this to all the high flow tees, or until the flow rate of the system is balanced. (4) Turn off the hose and reconnect the male hose thread fitting to the female hose thread swivel.
2. Check that the glued joints are water tight inside the house and to balance the system with the washing machine pressure, (1) turn the 3-way valve to direct water to the graywater system and run the washing machine. (2) When the wash water is draining first check the 3-way valve and then all of the glued joints and then walk outside and re-balance the ball valves so they are balanced to washing machine pressure. (3) Test the glued joints from the sewer side of the 3-way valve and make sure the water isn't shooting out of the sewer (standpipe or utility sink, etc.) connection.



## Monterey Bay 100 Greywater Systems Challenge Laundry to Landscape Installation Instructions

### **Follow-up**

1. Print a copy of your homeowners maintenance and operations manual. The manual should contain a drawing of system that shows the location of the mulch basins, and instructions on how and when to move 3-way valve to sewer and graywater. Templates are available at [centralcoastgreywater.org](http://centralcoastgreywater.org)
2. Label the orientation of your 3-port valve. Pre-printed labels are available at [centralcoastgreywater.org](http://centralcoastgreywater.org)
3. Walk through the system with all users and explain the function of all the parts. Demonstrate with users how to switch back to the sewer.

### **Potential problems and solutions**

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Soap suds coming out of outlets	Too much detergent is being used	Use less detergent
Some or all of outlets are clogged	Time and use	Connect hose bib to maintenance hose bib and flush out system.
3-way valve set to graywater; no water coming out	Kink in line	Find kink, cut out portion of PE or HDPE and replace with barbed coupling and hose clamps or spinlock fitting.
Water pooling in mysterious places	Puncture in the line	Locate puncture, cut out punctured portion and replace with barbed coupling and hose clamps or spinlock fitting
Water pooling in mulch basins	Mulch has decomposed	Dig out old mulch, compost it and refill mulch basins with new mulch

# Where to Buy Parts for Laundry to Landscape Systems

L2L Component	EWING (Monterey & Santa Cruz)	Scotts Valley Sprinkler 438-6450	Pro Build (River St.) 426-1020 ext. 1	Drip Works 800-522-3747 or dripworks.com	Orchard Supply Hardware OR Home Depot	AVG QTY
<b>From the Washer to Outside the House</b>			Sells L2L kit	(Add shipping)		
3-port valve* (see information on page 2)			✓			1
1" PVC	✓	✓	✓		✓	10-30'
1" PVC MPT x 1" barb adaptor	✓	✓	✓	✓		1
1" PVC male adaptor	✓	✓	✓	✓	✓	2
1 1/4" stainless steel hose clamp (box 10)	✓	✓	✓	✓	✓	1
1" PVC 90	✓	✓	✓	✓	✓	6
1" PVC 45	✓	✓	✓	✓	✓	4
1" PVC Tee	✓	✓	✓	✓	✓	1
1 1/2" Auto Vent (Air Admittance Vent)			✓		✓	1
1 1/2" female adaptor (Slip x FIP)	✓	✓	✓	✓	✓	1
1 1/2" x 1" PVC bushing	✓	✓	✓	✓	✓	1
optional 1" FPT Clear Swing Check Valve for landscapes uphill of washer fill line	✓	✓	✓			1
<b>Adapt PVC to PE Outside the House</b>						
1" PVC slip x barb OR 1" PVC insert x barb OR 1" Spinloc or Easyloc insert adaptor	✓	✓	✓	✓		1
optional 1" barb x female hose beginning (swivel)	✓	✓	✓	✓		1
optional 1" barb x male hose end	✓	✓	✓	✓		1
Hose bib backflow preventer	✓	✓	✓	✓	✓	1
<b>In the Landscape</b>						
1" PE tubing	✓	✓	✓			50-100'
1" x 1/2" barbed tee (MAX 10-12 outlets per zone)	✓	✓	✓	✓		10 per zone
1/2" greenback ball valve	✓	✓	✓	✓		5 per zone
1/2" PE tubing 100' roll	✓	✓	✓	✓	✓	20'
1" barbed coupler	✓	✓	✓	✓		3
Recycled 1 gal hard plastic pots- nurseries OR 7" round irrigation valve boxes	✓	✓	✓	✓	✓	10 per zone 10 per zone
<b>To create Multiple Zones</b>						
1" barbed tee OR 1" Spinloc or Easyloc tee	✓	✓	✓	✓		1 per extra zone 1 per extra zone
1" greenback barbed valve OR 3-port valve (see page 2)	✓	✓	✓	✓		1 per extra zone 1
1" PVC MPT x Barb Adaptor	✓	✓	✓	✓		3
<b>Misc.</b>						
PVC Glue	✓	✓	✓	✓	✓	
Landscape staples	✓	✓	✓	✓	✓	20
Teflon tape 3/4"	✓	✓	✓	✓	✓	1
Screws (match to wall material eg: drywall)	✓	✓	✓		✓	20
Plastic Hanger Tape 3/4" (10' roll)	✓	✓	✓		✓	1
1" Pipe Strap	✓	✓	✓	✓	✓	3
Recycled Wood Chip Mulch	www.omexchange.org for FREE					
	Vision Recycling, Buena Vista Landfill, Ben Lomond Transfer Station, Salinas Sun St Transfer Station visionrecycling.com					
	Dimeo Lane Resource Recovery Facility, 605 Dimeo Lane, north of Santa Cruz on Hwy 1					
	Waste Management Earth Care Mulch, Carmel Valley and Salinas, <a href="http://wmearthcare.com">http://wmearthcare.com</a>					
	Monterey Regional Waste Management, 14201 Del Monte Blvd., Marina					

## Where to Buy Parts for Laundry to Landscape Systems

### Local suppliers of 3-port valves

**Pro-Build**

235 River St., Santa Cruz  
831-426-1020, ext. 1.

**BANJO 1" poly side load 3-port valve**

Manufacturer Model BNJ-V100SL

**Grainger - Salinas**

1334 Dayton St Salinas  
(831) 757-0991

**Apollo 1" brass 3-port valve**

Manufacturer Model #7060501  
Grainger Item # 1CKG4

**Kennedy Ag Green Rubber**

246 Walker Street  
Watsonville, CA 95076  
Tel: 831.761.9395  
1310 Dayton Street  
Salinas, CA 93901  
Tel: 800.273.2464

**BANJO 1" poly side load 3-port valve**

Manufacturer Model BNJ-V100SL

### Online suppliers of 3-port valves

[www.cleanwatercomponents.com](http://www.cleanwatercomponents.com)

[www.oasisdesign.net](http://www.oasisdesign.net)

## **Laundry to Landscape Irrigation Field and Mulch Basin Sizing Worksheet**

### **1. Determine daily output of graywater fixture (gallons/week)**

# \_\_\_\_\_ gal/load x # \_\_\_\_\_ loads/week = \_\_\_\_\_ gal/week

### **2. Determine Required Mulch Basin Surge Capacity Volume per Zone**

(Max # \_\_\_\_\_ gal/day / 7.48gal/ft<sup>3</sup>) / 0.80 = \_\_\_\_\_ ft<sup>3</sup>

### **3. Estimate the Peak Plant Water Requirement (PWR) (gallons/week)**

**PWR = 0.62 x peak weekly ETo x Area of Hydrozone x Species Factor (Sf)**

- Coastal influence: Weekly peak ETo = 1.19" /week
- Coastal Mountains & Valleys = Weekly peak ETo = 1.35" /week
- Use SF = 0.5 for fruit trees and most ornamental landscaping
- Use SF = 0.8 for annual and perennial vegetables, brambles and sub-tropical plants.

(Hydrozone 1) 0.62 x \_\_\_\_\_" x \_\_\_\_\_ft<sup>2</sup> x \_\_\_\_\_(Sf) = \_\_\_\_\_ gal/week

(Hydrozone 2) 0.62 x \_\_\_\_\_" x \_\_\_\_\_ft<sup>2</sup> x \_\_\_\_\_(Sf) = \_\_\_\_\_ gal/week

(Hydrozone 3) 0.62 x \_\_\_\_\_" x \_\_\_\_\_ft<sup>2</sup> x \_\_\_\_\_(Sf) = \_\_\_\_\_ gal/week

**TOTAL PEAK WEEKLY PLANT WATER REQUIREMENT** \_\_\_\_\_ gal/week

**Cross Check: Does plant water requirement for hydrozone(s) match actual graywater output?**

**PWR (step 3) \_\_\_\_\_ gal/week (=) (>) (<) graywater output (step 1) \_\_\_\_\_ gal/week**

If PWR is more than 20% greater than graywater output, plants may experience drought stress and require supplemental water. If PWR is less than graywater output, plants may receive too much water, especially in soils with poor drainage.

### **Minimum/Maximum # of emitters per zone to avoid pump overloading/uneven distribution**

Tubing size	Diameter (in)	Cross-sectional area (in <sup>2</sup> )	Number to equal 1"	Minimum number of emitters	Maximum number of emitters
1" poly line	1.04	0.85	1.00	1	2
1/2" drip ball valve barb	0.47	0.18	4.88	6	10
3/8" drip barb	0.30	0.07	12.48	12	15
1/2" poly line	0.57	0.26	3.34	4	6
3/4" poly line	0.83	0.54	1.59	2	4
3/8" drilled hole	0.38	0.11	7.74	8	12
1/4" drilled hole	0.25	0.05	17.42	15	16

**Determining Required Irrigation Field - Calculation from Chapter 16A 1606A**

**1. Determine daily output of graywater fixture (gallons/day)**

# \_\_\_\_\_ occupants x 15 gallons/day = \_\_\_\_\_ gal/day

**2. Determine Required Minimum Irrigation Field Size (square feet)**

Total daily graywater output (step 1) / max daily absorption (Table 16 A-2)

\_\_\_\_\_ gal/day (from step 1) / \_\_\_\_\_ gal/ft<sup>2</sup>/day = \_\_\_\_\_ ft<sup>2</sup>

**Cross Check: Total area of hydrozone(s) = or > required irrigation field (step 2)?**

Yes or No

If No, expand hydrozone/irrigation field area to meet code requirement.

**Table 16A-2 Design Criteria of Six Typical Soils**

Type of Soil	Square Feet	Gallons	Square Meters	Liters
	Minimum square feet of irrigation/leaching area per 100 gallons of estimated graywater discharge per day	Maximum absorption capacity in gallons per square foot of irrigation/leaching area for a 24-hour period	Minimum square meters of irrigation/leaching area per liter of estimated graywater discharge per day	Maximum absorption capacity in liters per square meter of irrigation/leaching area for a 24-hour period
Coarse sand or gravel	20	5.0	0.005	203.7
Fine sand	25	4.0	0.006	162.9
Sandy loam	40	2.5	0.010	101.8
Sandy clay	60	1.7	0.015	69.2
Clay with considerable sand or gravel	90	1.1	0.022	44.8
Clay with small amounts of sand or gravel	120	0.8	0.030	32.6



## *Laundry to Landscape Graywater System Owner's Maintenance & Operations Manual*

Congratulations on your new graywater system! This manual will help you maintain a well-functioning, water-saving graywater irrigation system.

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 graywater system. A map showing the location of all graywater system components is attached to this owner's manual.

### **1. How do I turn my graywater system off?**

If you ever need to turn your graywater system off, go to the three-way valve and turn the handle to direct the water towards the sewer or septic system. The first few times you do this check and make sure the system is turning off when you want and your 3-way valve is labeled correctly.

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

- During the rainy season if the ground water table has risen above 3 feet
- When washing dirty diapers
- When washing anything with chemicals, such as oily rags
- Anytime you notice that the water isn't draining well and you see pooling or runoff in the landscape
- If you think your plants are receiving too much water
- Anytime you may use products that are harmful to plants (like bleach or harsh cleaners)

### **2. What products can I use in my graywater system?**

Plant friendly products are key when reusing your graywater. All products should be biodegradable and non-toxic. In addition, they should be free of salt (sodium) and boron (borax), two common ingredients that are non-toxic to people but are harmful to plants and/or the soil. Chlorine bleach is also harmful to plants and should be diverted with any other harmful products to the sewer or septic by switching the 3-way valve. Hydrogen peroxide bleaches are less harmful and can be used instead of chlorine. Another consideration with cleaning and beauty products is their affect on the pH of the water. While many soaps do not change the pH, some do. In general, liquid soaps do not change the pH, while bar soaps make the water very alkaline (opposite of acidic). Certain acid loving plants may not be happy with this kind of water. If you're uncertain if the pH is being affected choose plants that are not acid loving to irrigate. Acid loving plants include ferns, azaleas, camilias, rhododendrons, and blueberries.

**Products we recommend:** (they are salt and boron free, and pH neutral)

**Laundry:** Oasis, Ecos, Biopac liquid detergent. There are also soap alternatives that are graywater friendly, like soap nuts, and "wonder balls".





## Laundry to Landscape Graywater System Owner's Maintenance & Operations Manual

### 3. How do I maintain my graywater system?

The main thing you'll need to do to in order to maintain the system is to periodically check on the mulch basins (the mulch layer the graywater flows onto) and make sure the graywater is draining properly and that there is no pooling or runoff. If you notice any pooling or runoff you should dig out the mulch area and replace it with new mulch (wood chips or bark). This typically needs to be done once every eighteen months or two years.

At the beginning of the irrigation season and periodically thereafter, check to ensure that graywater is coming out evenly among the outlets. If you notice uneven distribution of graywater you should check the outlets for clogs and manually remove the debris causing the obstruction.

#### **To “flush” the system and remove multiple clogs:**

Open any partially closed ball valves, and make sure the end of each line is open. Attach a garden hose to the clean out point and blast system with water to flush any particles in the system. ***Any time you attach a garden hose to temporarily flush the system, make sure you have an anti-siphon valve or vacuum breaker on your garden hose-bib!***

### 4. What are the minimum requirements that I need to follow for my graywater system to comply with the law?

Under the California graywater code, CPC Title 24, Part 5, Chapter 16A, washing machines do not require a permit as long as the installer follows the following minimum requirements outlined in the code.

1. If required, notification has been provided to the Enforcing Agency regarding the proposed location and installation of a graywater irrigation or disposal system. *Note: A city, county, or city and county or other local government may, after a public hearing and enactment of an ordinance or resolution, further restrict or prohibit the use of graywater systems.*
2. The design shall allow the user to direct the flow to the irrigation or disposal field or the building sewer. The direction control of the graywater shall be clearly labeled and readily accessible to the user.
3. The installation, change, alteration or repair of the system does not include a potable water connection or a pump and does not affect other building, plumbing, electrical or mechanical components including structural features, egress, fire-life safety, sanitation, potable water supply piping or accessibility.
4. The graywater shall be contained on the site where it is generated.
5. Graywater shall be directed to and contained within an irrigation or disposal field.
6. Ponding or runoff is prohibited and shall be considered a nuisance.



## *Laundry to Landscape Graywater System Owner's Maintenance & Operations Manual*

7. Graywater may be released above the ground surface provided at least two (2) inches (51 mm) of mulch, rock, or soil, or a solid shield covers the release point. Other methods which provide equivalent separation are also acceptable.
8. Graywater systems shall be designed to minimize contact with humans and domestic pets.
9. Water used to wash diapers or similarly soiled or infectious garments shall not be used and shall be diverted to the building sewer. Graywater shall not contain hazardous chemicals derived from activities such as cleaning car parts washing greasy or oily rags, or disposing of waste solutions from home photo labs or similar hobbyist or home occupational activities.
10. Exemption from construction permit requirements of this code shall not be deemed to grant authorization for any graywater system to be installed in a manner that violates other provisions of this code or any other laws or ordinances of the Enforcing Agency.
11. An operation and maintenance manual shall be provided. Directions shall indicate the manual is to remain with the building throughout the life of the system and indicate that upon change of ownership or occupancy, the new owner or tenant shall be notified the structure contains a graywater system.

### **5. Other Considerations:**

For maintenance and operations questions regarding this graywater system, please contact:

Name of Installer & Company: \_\_\_\_\_

Address/City/State/Zip: \_\_\_\_\_

Contact Telephone Number: \_\_\_\_\_

Date of Installation: \_\_\_\_\_