

# Graywater: What is it and How can we use it

By ACCES

for

Cal/Neva Annual Conference

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Sacramento

# What Is Graywater?

- ▶ Graywater in general is defined as household wastewater generated from wash hand basins, showers and baths, and washing machines which can be recycled on-site for uses such as **flushing** and **landscape irrigation**.
- ▶ The California Plumbing Code defines graywater as “untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. Graywater includes but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.”

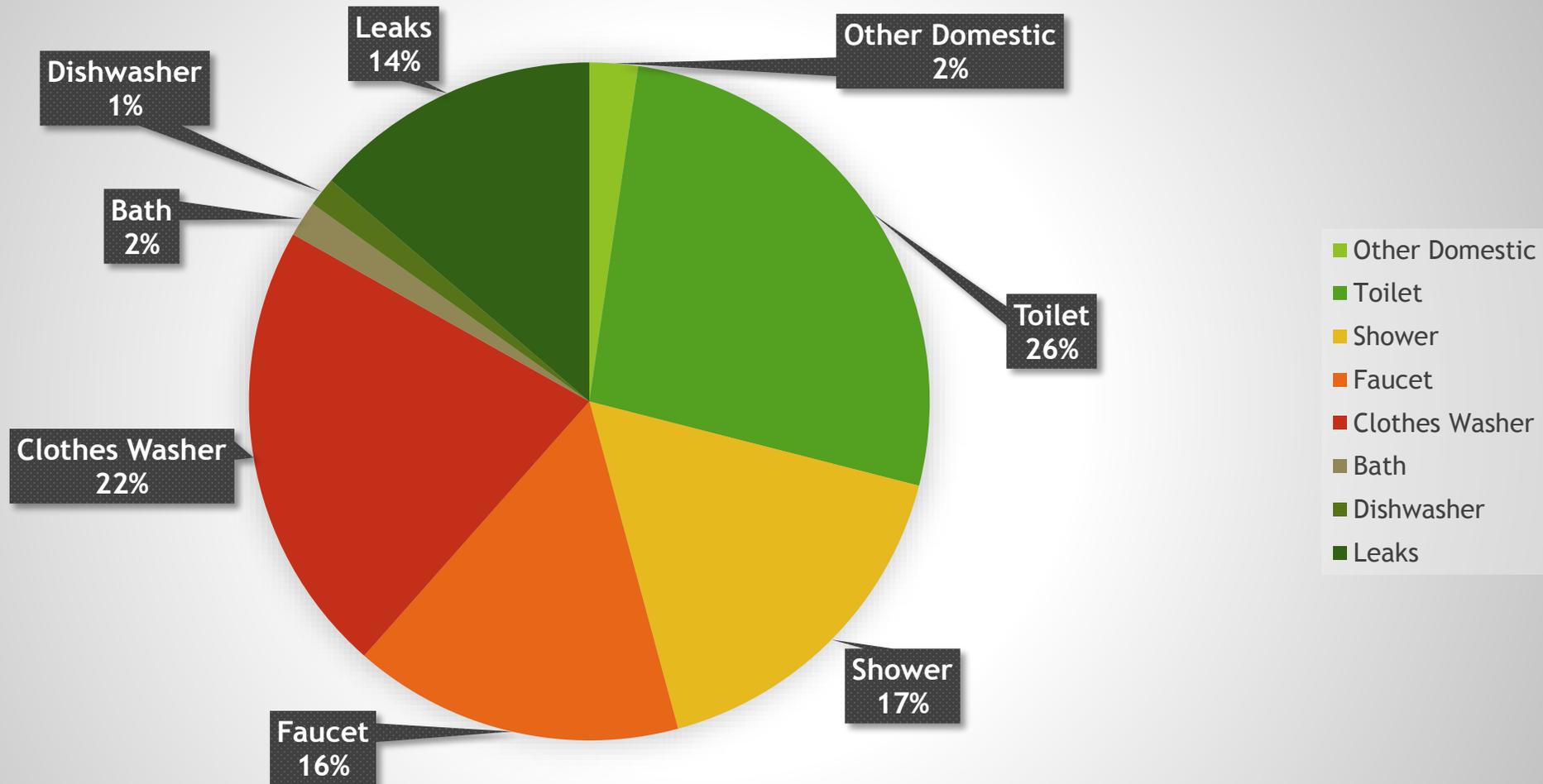
# Graywater vs. Blackwater

- ▶ Graywater is completely different than black water.
- ▶ Blackwater has come in contact with fecal matter which houses harmful bacteria and disease causing pathogens. Blackwater can be treated at water treatment plants, and reused as “reclaimed wastewater” for irrigation and industrial purposes.
- ▶ Much of this water goes towards watering golf courses, landscape irrigation of public areas, and power generation. Graywater can be used for landscape irrigation without treatment.

# California Water Statistics

- The water use outside the home (water grass, plants etc.) uses more than 50% of the normal residential water that is used for family consumption
- 56% of household water use results in potential graywater (sinks, showers, clothes washers)
- Each household of 4 uses about 181,000 gallons/year
- Each household could save 101,360 gallons/year by reusing its graywater for landscaping and other non-potable use such as washing cars
- If just 10% of California's 12 million + households captured and reused graywater, the state could save 373,000 acre feet (AF) annually
  - To put this in perspective the Hetch Hetchy reservoir from the Tuolumne River Holds 360,000 AF
  - Cachuma Lake Reservoir from the Santa Ynez River holds 190,500 AF
  - Chatsworth Reservoir in Los Angeles county holds 7,400 AF

# Typical Household Water Use



# California Drought Statistics

- ▶ January 17, 2014 Governor Brown has declared a statewide drought emergency
- ▶ Californians are asked to reduce their water use by 20%
- ▶ 2013 was the driest year in recorded history for many areas of California, and current conditions suggest no change is in sight for 2014
- ▶ Snow normally provides about a third of the water for California homes and farms as it melts into streams, reservoirs and aquifers
- ▶ Currently since the monthly measuring of the snowpack started in January the snowpack's statewide water content is at some of the lowest measurements ever taken
- ▶ With a dry snowpack California has also suffered from a lack of rain.
  - ▶ Sacramento ended 2013 with 5.72 inches of rain, vastly lower than the normal 18 inches the area usually receives
  - ▶ Downtown Los Angeles received 3.4 inches of rainfall with a city average usually being 14.74.

# Why Is Our Water Supply Stressed?

- ▶ Water deliveries from some key water projects have been permanently reduced due to environmental restrictions, while other systems struggle with aging infrastructure and other challenges.
- ▶ Our state's population continues to grow, with 60 million Californians expected by 2050. That means more people, farms and businesses will rely on our rivers, reservoirs and groundwater basins for their daily needs.
- ▶ Climate change already is affecting California's water resources. Experts say the changing rain and snowfall patterns will result in longer periods of drought.

# What Kind of Applications Can Graywater be used in?

## ▶ Residential Use

- ▶ Graywater systems for residential use work by diverting water from washing machines, bathtubs and showers into areas such as gardens and flower beds.
- ▶ Some graywater systems have a multi-stage filtration which screens out debris such as dirt and lint, some systems have storage tanks to house the water to be used at later times, while other systems, automatically send the graywater to landscape as the potable water is being used.

# Benefits of Graywater

- ▶ Families can save on water and sewer bills. California can create a more secure and sustainable water supply if household conserved and reused.
- ▶ California taxpayers also save by allowing the state to avoid costly alternatives to providing safe drinking water and reduce our reliance on imported water. Overall California reduces its energy use when it uses less water—because 20% of CA’s electricity goes to moving, treating, and heating water.

# Remember: Why should we think GRAY!

- ▶ **The current drought.**

Earlier statistic: 2013 was the driest year in recorded history for many areas of California, and current conditions suggest no change is in sight for 2014. California will always have water problems.

- ▶ **Cost of water will go up.** In each water service territory the water rates differ widely.

- ▶ **We can only control ourselves.**

The cost of water will go up!

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### Los Angeles Department of Water and Power Charges

 800-342-5397	Water Charges 3/18/11 - 5/17/11 20 HCF	\$72.47
	<b>Total LADWP Charges \$ 72.47</b>	

LADWP provides billing services for the Bureau of Sanitation. All money collected for the services listed below is passed on to the Bureau of Sanitation.

### City of Los Angeles Bureau of Sanitation Charges

 SANTINATION DEPARTMENT OF PUBLIC WORKS 800-773-2489	Sanitation Charges 3/18/11 - 5/17/11	\$42.87
	<b>Total Sanitation Charges \$ 42.87</b>	

**Total New Charges \$ 115.34**

# Cost for Tier 2 was \$5.56 in 2011



## Water Charges

**BILLING PERIOD**                      **DAYS**  
 3/18/11 - 5/17/11                      60

**RATE SCHEDULE**  
 B - Multi-Family Water

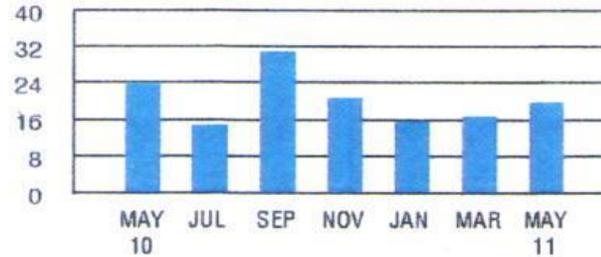
**NEXT SCHEDULED READ DATE**  
 7/18/11

**TIER 1 ALLOTMENT**  
 48 HCF

**SERVES**  
 941-41 1/2

Questions about these charges? 1-800-342-5397

**USAGE HISTORY (Total HCF)**



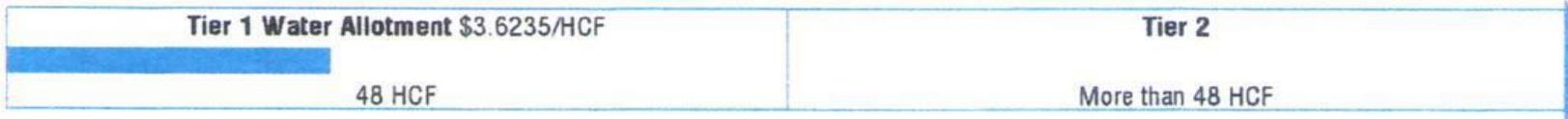
	May 10	May 11
Total HCF used	24	20
Average daily gallons	299	249
Days in billing period	60	60

1 Hundred Cubic Feet (HCF) = 748 Gallons

METER NUMBER	CURRENT READ	-	PREVIOUS READ	=	TOTAL USED
49174538	1785		1765		20 HCF
Tier 1 Water			20 HCF x \$3.62350		72.47

**Total Water Charges \$ 72.47**

## Your Water Usage by Tier



Usage is billed at 2 different rates, depending on how much you use. The graph shows how your water usage relates to these tiers, and the rate you paid in each tier. For more, visit [www.ladwp.com](http://www.ladwp.com)

CITY OF LOS ANGELES



## SANITATION

DEPARTMENT OF  
PUBLIC WORKS

[www.lacitysan.org](http://www.lacitysan.org) 1-800-773-2489

Hours of operation - Mon - Fri, 8 am to 5 pm

### DEFINITIONS

**Low Income Sewer Surcharge** - an amount charged to each customer to help cover the costs of providing sewer service subsidies to low income customers, required by state and federal law.

**Sewer Service Charge** - (SSC) a charge for use of the sewer system, to cover the costs of constructing and maintaining wastewater facilities such as sewers and sewage treatment plants, and for treating sewage.

## Sanitation Charges

Questions or other information, please call 1-800-773-2489

BILLING PERIOD	DAYS	SEWER RATE SCHEDULE	
3/18/11 - 5/17/11	60	Residential	
<hr/>			
Sewer Service Charge*		13 HCF x \$3.27	42.51
Low Income Sewer Surcharge		\$42.51 x 0.0084	0.36
<hr/>			
<b>Total Sanitation Charges</b>			<b>\$42.87</b>

*\*Your Sewer Service Charge (SSC) is based on your Winter Water Use (WWU), which is your average daily water use during the part of the winter when you are least likely to use water for irrigation, adjusted by a Dry Winter Compensation Factor (DWCF). To see how **YOUR SSC** was calculated, see "Bureau of Sanitation—Sewer Service Charge and Winter Water Use Calculation" on the next page.*

# LADWP water rates

## First and Second Tier Rates per HCF

	2013		2014	
	Tier 1	Tier 2	Tier 1	Tier 2
Jan	\$3.963	\$5.800	\$4.685	\$5.805
Feb	\$3.963	\$5.800	\$4.685	\$5.805
Mar	\$3.963	\$5.800	\$4.685	\$5.805
Apr	\$4.049	\$5.823	\$4.725	\$5.846
May	\$4.049	\$5.823	\$4.725	\$5.846
Jun	\$4.049	\$5.823	\$4.725	\$5.846
Jul	\$4.210	\$5.781		
Aug	\$4.210	\$5.781		
Sep	\$4.210	\$5.781		
Oct	\$4.642	\$5.787		
Nov	\$4.642	\$5.787		
Dec	\$4.642	\$5.787		

In each water service territory  
the water rates differ widely.

## CPUC regulated investor owned water utilities: <http://www.cpuc.ca.gov/PUC/water/>

The CPUC is responsible for ensuring that California's investor-owned water utilities deliver clean, safe, and reliable water to their customers at reasonable rates. There are 116 investor-owned water utilities under the CPUC's jurisdiction providing water service to about 16 percent of California's residents. Approximately 95 percent of that total is served by 10 large water utilities each serving more than 10,000 connections. Annual water and wastewater revenues under the CPUC's regulation total \$1.4 billion.

## 2013 Current average monthly water and sewer rates in some California cities

Rate estimates are based on an assumed average monthly consumption of 20 hundred cubic feet (HCF) of water (~15,000 gallons/month or 500 gallons/day/family of 4). Normal size of a residential meter is usually 5/8 to 3/4 ins.

Source: Rate information provided by cities or service providers, amounts compiled by News-Sentinel staff.

City	Water	Sewer
San Clemente	\$42.99	\$30.02
Stockton	\$29.90	\$20.00
Milpitas	\$33.97	\$25.12
Camarillo	\$34.45	\$23.21
Manteca	\$31.35	\$27.87
Lodi*	\$26.83	\$20.26
Davis	\$25.78	\$25.38
Tracy	\$28.75	\$22.25

## CALIFORNIA WATER SERVICE COMPANY: Bakersfield and vicinity, Kern County

### ▶ RATES 2013

#### ▶ Quantity Rates:

- ▶ For the first 1,300 cubic feet, per 100 CF..... \$1.4921
- ▶ For the next 2,100 cubic feet, per 100 CF..... \$1.6178
- ▶ For all over 3,400 cubic feet, per 100 CF.....\$1.8847

#### ▶ Service Charge: Per Meter Per Month

- ▶ For ..... 5/8 x 3/4 - inch meter \$13.40
- ▶ For ..... 3/4 - inch meter \$20.10
- ▶ For ..... 1 - inch meter \$33.06
- ▶ For ..... 1-1/2 - inch meter \$66.99
- ▶ For ..... 2 - inch meter \$107.18
- ▶ For ..... 3 - inch meter \$200.97

## CALIFORNIA WATER SERVICE COMPANY: Bakersfield and vicinity, Kern County

- ▶ **ITEM DETAIL 20 Ccf CHARGE**
- ▶ Meter 5/8 - inch meter \$ 13.40
- ▶ Quantity charge (Tier 1)  $\$1.4921 \times 13 \text{ Ccf}$  \$ 19.40
- ▶ Quantity charge (Tier 2)  $\$1.6178 \times 7 \text{ Ccf}$  \$ 11.32
- ▶ Other Charges and Credits  $\$0.16090 \times 20 \text{ Ccf}$  \$ 3.22
- ▶ LIRA flat-rate surcharge \$0.75 \$ 0.75
- ▶ Rate Support Fund surcharge  $\$0.01 \times 20 \text{ Ccf}$  \$ 0.20
- ▶ CPUC fee 1.5% x above charges \$ 0.31
- ▶ LIRA quantity surcharge  $\$0.072 \times 20 \text{ Ccf}$  \$ 1.44
- ▶ PBOP amortization surcharge  $\$0.004 \times 20 \text{ Ccf}$  \$ 0.08
- ▶ **TOTAL : \$ 22.51**
- ▶ Your water rate tiers are as follows
- ▶ Tier 1: For the first 13 Ccf -- \$1.4921
- ▶ Tier 2: From 14 to 20 Ccf -- \$1.6178

CALIFORNIA WATER SERVICE COMPANY: Stockton and vicinity, San Joaquin County

▶ **RATES 2013**

▶ Quantity Rates:

▶ For the first 900 cubic feet, per 100 CF..... \$1.9420

▶ For the next 1,100 cubic feet, per 100 CF.....\$2.1074

▶ For all over 2,000 cubic feet, per 100 CF..... \$2.4794

▶ Service Charge: Per Meter Per Month

▶ For ..... 5/8 x 3/4 - inch meter \$13.05

▶ For ..... 3/4 - inch meter \$19.58

▶ For ..... 1 - inch meter \$32.63

▶ For ..... 1-1/2 - inch meter \$65.25

▶ For ..... 2 - inch meter \$104.40

▶ For ..... 3 - inch meter \$195.75

## CALIFORNIA WATER SERVICE COMPANY: Stockton and vicinity, San Joaquin County

### ▶ ITEM DETAIL 20 Ccf CHARGE

- ▶ Meter 5/8 - inch meter \$ 13.00
- ▶ Quantity charge (Tier 1) \$1.9420 x 9 Ccf \$ 17.48
- ▶ Quantity charge (Tier 2) \$2.1074 x 11 Ccf \$ 23.18
- ▶ Other Charges and Credits \$0.25540 x 20 Ccf \$ 5.11
- ▶ Rate Support Fund surcharge \$ 0.01 x 20 Ccf \$ 0.20
- ▶ CPUC fee 1.5% x above charges \$ 0.34
- ▶ LIRA quantity surcharge \$ 0.072 x 20 Ccf \$ 1.44
- ▶ PBOP amortization surcharge \$ 0.004 x 20 Ccf \$ 0.08
- ▶ **TOTAL : \$ 24.22**
- ▶ Your water rate tiers are as follows
- ▶ Tier 1: For the first 9 Ccf -- \$1.9420
- ▶ Tier 2: From 10 to 20 Ccf -- \$2.1074

# CALIFORNIA WATER SERVICE COMPANY: East Los Angeles, Commerce and vicinity, Los Angeles County

## ▶ RATES 2013

### ▶ Quantity Rates:

- ▶ For the first 800 cubic feet, per 100 CF..... \$3.0463
- ▶ For all over 800 cubic feet, per 100 HCF..... \$3.7166
  
- ▶ Service Charge: Per Meter Per Month
- ▶ For ..... 5/8 x 3/4 - inch meter \$14.48
- ▶ For ..... 3/4 - inch meter \$21.71
- ▶ For ..... 1 - inch meter \$36.19
- ▶ For ..... 1-1/2 - inch meter \$72.38
- ▶ For ..... 2 - inch meter \$106.00
- ▶ For ..... 3 - inch meter \$201.10

## CALIFORNIA WATER SERVICE COMPANY: East Los Angeles, Commerce and vicinity, Los Angeles County

- ▶ **ITEM DETAIL 20 Ccf CHARGE**
- ▶ Meter 5/8 - inch meter \$ 14.48
- ▶ Quantity charge (Tier 1) \$3.0463 x 8 Ccf \$ 24.37
- ▶ Quantity charge (Tier 2) \$3.7166 x 12 Ccf \$ 44.60
- ▶ Other Charges and Credits \$0.19840 x 20 Ccf \$ 3.97
- ▶ Rate Support Fund surcharge \$ 0.01 x 20 Ccf \$ 0.20
- ▶ CPUC fee 1.5% x above charges \$ 0.38
- ▶ LIRA quantity surcharge \$ 0.072 x 20 Ccf \$ 1.44
- ▶ PBOP amortization surcharge \$ 0.004 x 20 Ccf \$ 0.08
- ▶ **TOTAL : \$ 27.31**
- ▶ Your water rate tiers are as follows
- ▶ Tier 1: For the first 8 Ccf -- \$3.0463
- ▶ Tier 2: From 9 to 20 Ccf -- \$3.7166

We can only control ourselves.

# How is Graywater Currently Used in California

- ▶ The plumbing code was updated as an emergency measure to deal with the drought conditions that have impacted the state.
- ▶ Under the new code there are three types of systems describe:
  1. Clothes Washer System,
  2. Simple System, and a
  3. Complex System.

# Clothes Washer System aka Laundry to Landscape

- ▶ The Clothes washer system does not require a permit if it is in compliance with the plumbing code and if it does not require cutting of the existing plumbing piping.
- ▶ This system is for only a single domestic washing machine in a one or two family dwelling.
- ▶ It cannot use a secondary pump and relies either on the washing machine pump or gravity to irrigate the garden areas.
- ▶ It must have an easy way to direct flow back to the sewer/septic an example would be a three way valve.
- ▶ This system must send the water to irrigate landscape plantings, keep the water on the same property it is produced, have a maintenance manual to stay with the dwelling, and discharge graywater under a 2" cover of mulch, plastic shield, or stones.

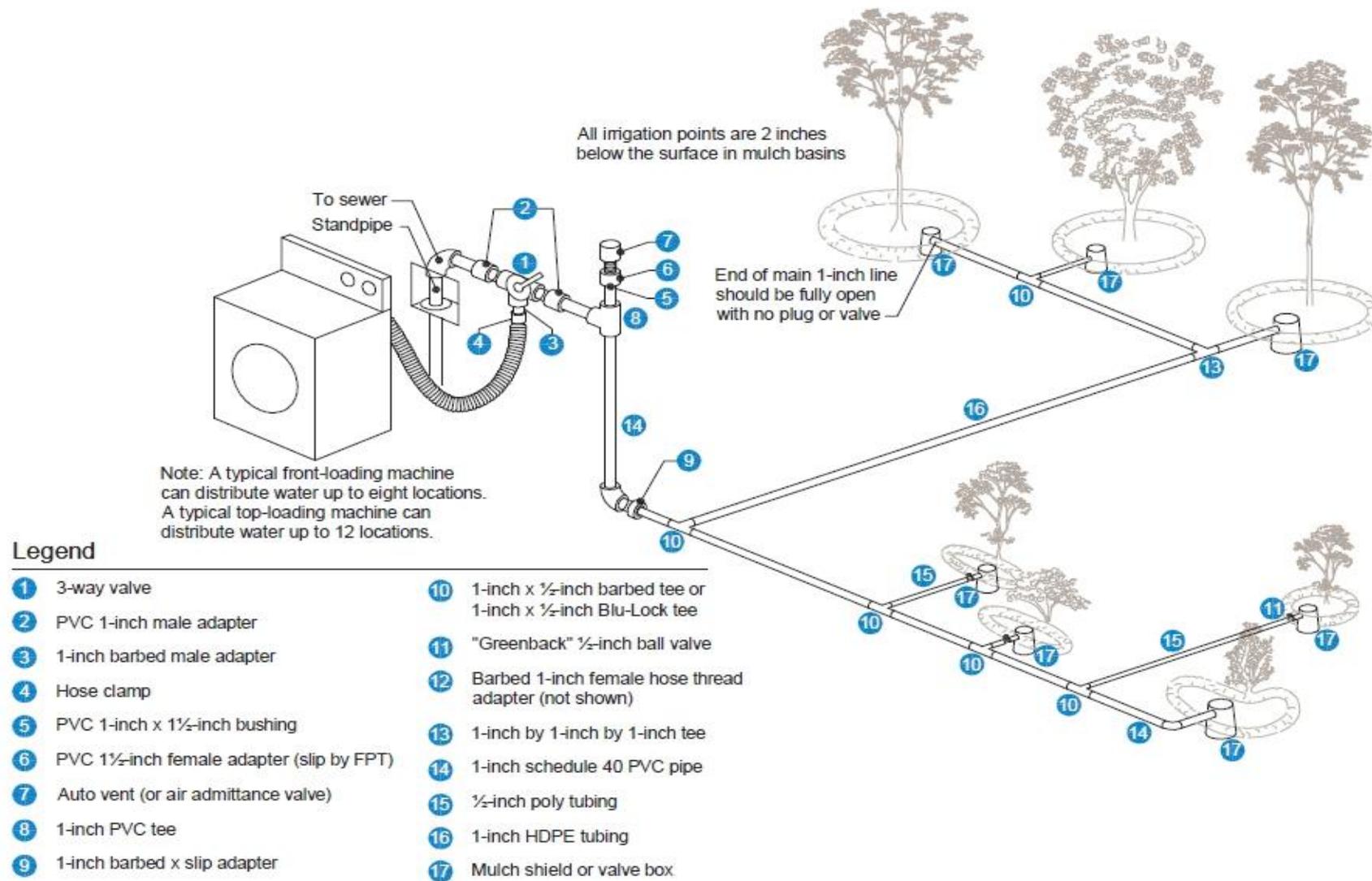
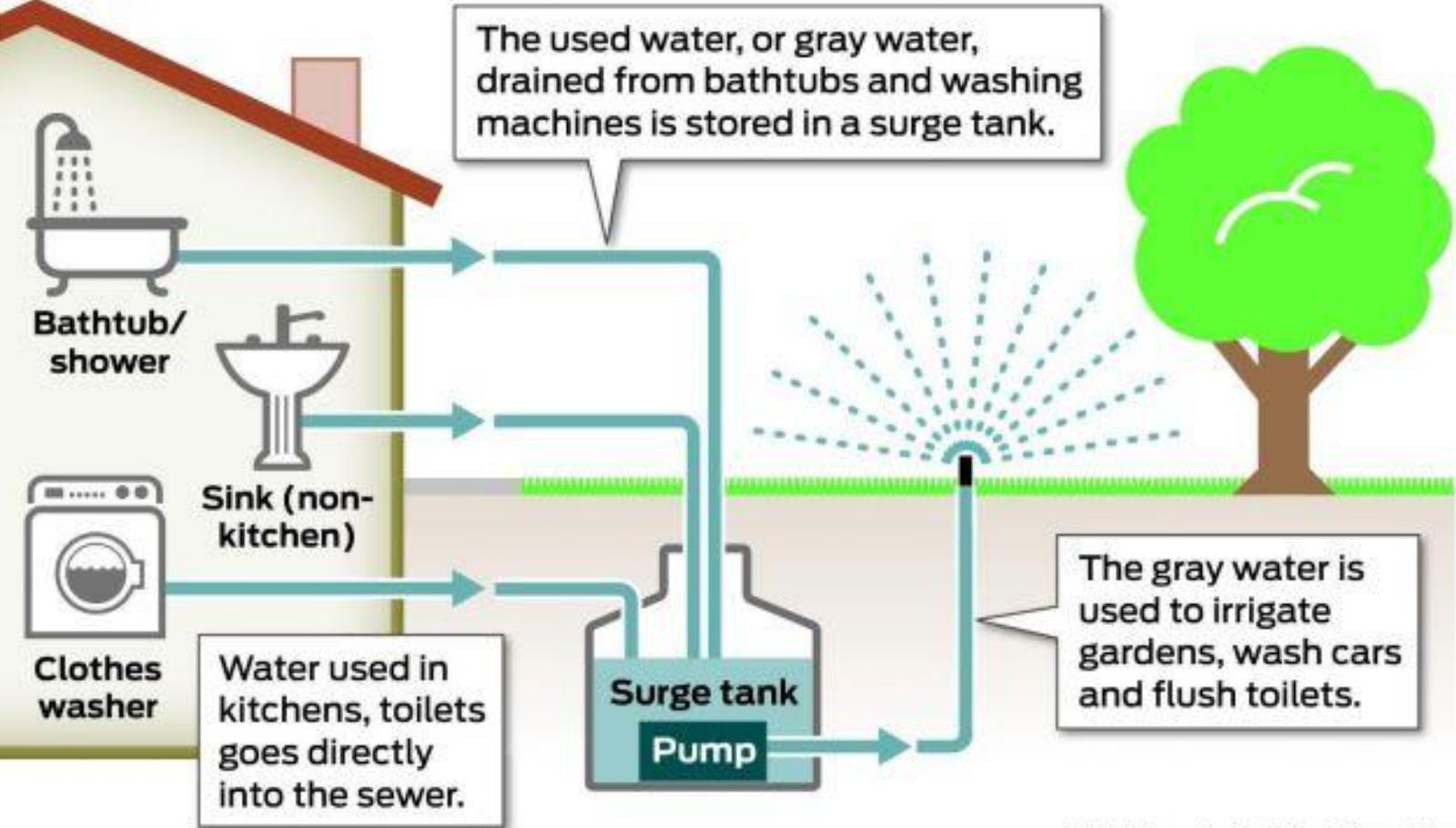


Figure 3. Laundry-to-landscape overview. Source: Clean Water Components.

# Simple System

- ▶ A simple system serves a one or two family dwelling with a discharge of 250 gallons per day or less.
- ▶ These systems include reusing water from a bathroom sink or shower.
- ▶ Simple systems require a construction permit and involve altering plumbing and can include surge tanks and pumps.

# How gray water systems work



Todd Trumbull / The Chronicle

# Complex System

- ▶ The complex system discharges over 250 gallons per day and must be designed by a person who can demonstrate competence to the satisfaction of the enforcing agency.
- ▶ These systems supply a large volume of water and rely on pumps, surge tanks, and filtration systems.
- ▶ It is important to note that the code can be superseded by local municipalities' codes and regulations, so it is important to understand your local codes before beginning.

# How Can We Use Graywater in the Low-Income Programs

- ▶ Graywater is a great way to conserve potable water as California is experiencing a severe drought, and low income housing is often the most in need for energy and conservation upgrades.
- ▶ Single Family Homes can benefit from the laundry to landscape projects. Not only is laundry to landscape the easiest to install it often times does not require a permit
- ▶ Multifamily homes are much more complicated proceed and require permitting. In most cases it is harder to retrofit existing multifamily housing to utilize graywater for irrigation purposes

# San Francisco Water and Power

<http://sfwater.org/index.aspx?page=100>

- ▶ Currently San Francisco Water Power Sewer are offering a Laundry-to-Landscape Graywater program, a residential graywater permit rebate, and a graywater design manual for outdoor irrigation.
- ▶ The manual provides an overview of the benefits of graywater systems, when and where to install the systems, permitting requirements, what products to use, and operation and maintenance requirements.
- ▶ San Francisco's Laundry-to-Landscape graywater program offers a \$112 subsidy towards the cost of a \$117 laundry-to-landscape graywater kit. Participants also receive a free workshop on how to properly install the kit, in-home technical assistance from a graywater expert, access to a tool kit for installation, and a copy of the San Francisco Graywater A Design Manual for Outdoor irrigation.
  - ▶ However the program is limited to 150 qualifying single-family and two-unit residential properties.
- ▶ Graywater projects that require a permit San Francisco Water Power Sewer offers a rebate up to \$225 towards the cost of the permit.

# Other water collection systems:

## ► Rainwater:

Did you know the average roof collects 600 gallons of water for every inch of rainfall? Don't let all that water go to waste! You can make a rainwater collection system for under a hundred dollars and store hundreds of gallons of water to use for your garden or other purposes. Read on to learn how to prepare your water storage unit and start collecting rainwater.

<http://www.sandiego.gov/water/conservation/rainwater.shtml>

<http://www.wikihow.com/Build-a-Rainwater-Collection-System>

[http://www.ci.berkeley.ca.us/Planning\\_and\\_Development/Energy\\_and\\_Sustainable\\_Development/Rainwater\\_Harvesting.aspx](http://www.ci.berkeley.ca.us/Planning_and_Development/Energy_and_Sustainable_Development/Rainwater_Harvesting.aspx)

# What Is ACCES Doing?

- ▶ Currently ACCES is writing a White Paper for submittal to CSD in hopes a pilot project can occur with the possible CAP & Trade Funding coming down the pipeline
- ▶ ACCES also plans on using the research to apply for grants to conduct graywater pilot projects with willing energy network participants
- ▶ ACCES is creating a comprehensive compiling of all water utilities in the state of CA by county too maximize the use of rebates if available

**THANK YOU!**

**Questions & Answers**

**For More Information Please**

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