

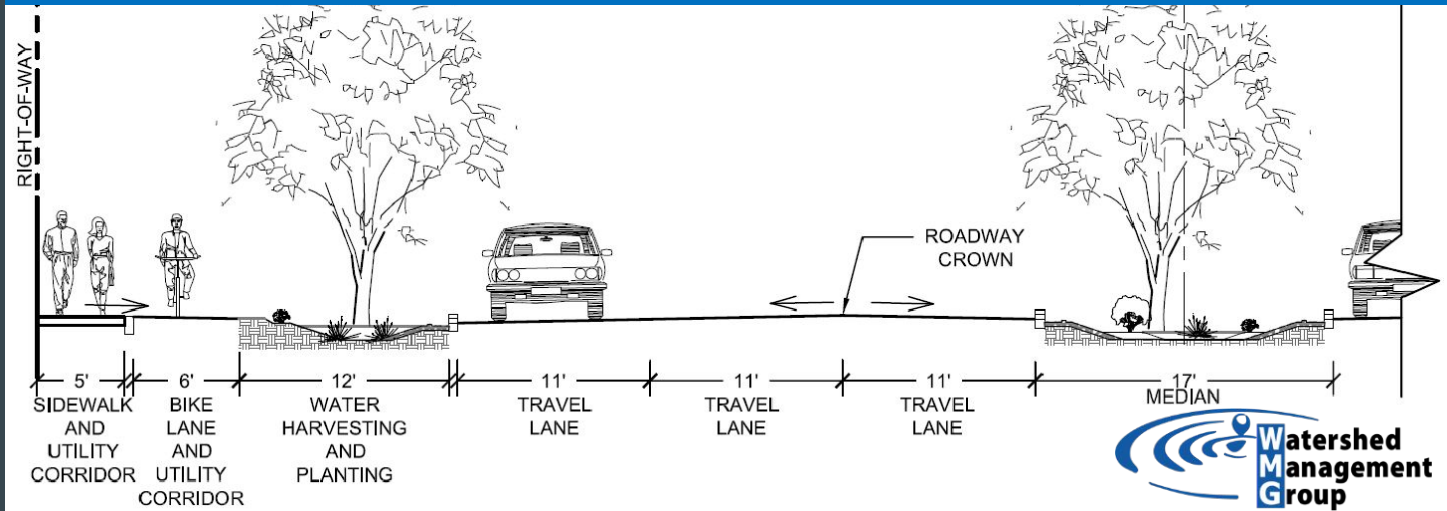
# How to Install a Laundry-to-Landscape Greywater System



Watershed Management Group



**Watershed Management Group** develops and implements community-based solutions to ensure the long-term **prosperity of people** and **health of the environment**. We provide people with the knowledge, skills, and resources for sustainable livelihoods.



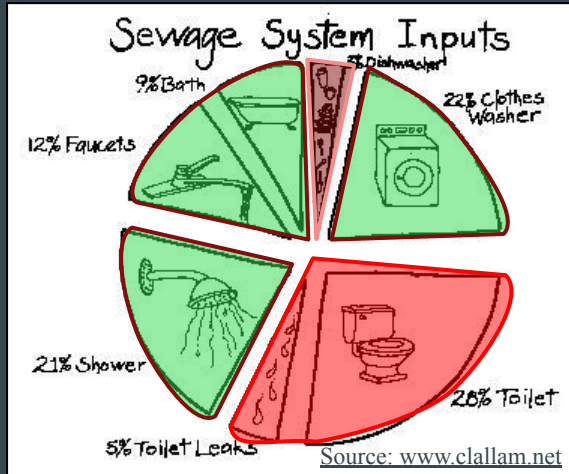
# Overview

- Greywater in AZ
- Tucson Water Rebate
- Calculating Supply
- Distributing/Irrigating (outdoor)
- Pairing production with need
- Upkeep



# What is Greywater?

- From the shower, hand sinks, and laundry  
*(and sometimes the kitchen sink).*
- Reused for beneficial purposes.
- It does not include toilet water (blackwater) or dishwashing machine water.

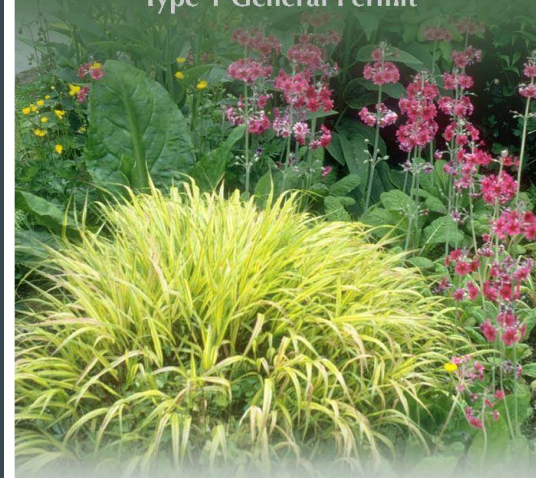


# Greywater Use in Arizona - No Permit needed if...

- No fees, permit applications, or inspections if...
- Single family home that produces less than 400GPD
- Following 13 Best Management Practices is required (set by ADEQ)
- Systems that don't follow greywater guidelines are subject to inspection

## Using Gray Water at Home

Arizona Department of Environmental Quality's Guide to Complying with the Type 1 General Permit



# GRAY WATER USE MUST ABIDE BY ADEQ REQUIREMENTS

## TYPE 1 GENERAL PERMIT BMPS

Follow these best management practices to comply with Arizona's rules for gray water use.

- First and foremost, avoid human contact with gray water, or soil irrigated with gray water.
- You may use gray water for household gardening, composting, and lawn and landscape irrigation, but use it in a way that does not run off your own property.
- Do not surface irrigate any plants that produce food, except for citrus and nut trees.
- Use only flood or drip irrigation to water lawns and landscaping. Spraying gray water is prohibited.
- When determining the location for your gray water irrigation, remember that it cannot be in a wash or drainage way.
- Gray water may only be used in locations where groundwater is at least five feet below the surface.
- Label pipes carrying gray water under pressure to eliminate confusion between gray water and drinking water pipes.
- Cover, seal, and secure surge tanks to restrict access by small rodents and to control disease carrying insects, such as mosquitoes.
- Gray water cannot contain hazardous chemicals such as antifreeze, mothballs or solvents. Do not include wash water from greasy or oily rags in your gray water.
- Surface accumulation of gray water must be kept to a minimum.
- Gray water from washing diapers or other infectious garments must be discharged to a residential sewer or other wastewater facility, unless it can be disinfected prior to its use.
- Should a backup occur, gray water must be disposed into your normal wastewater drain system. To avoid such a backup, consider using a filtration system to reduce plugging and extend the system's lifetime.
- If you have a septic or other on-site wastewater disposal system, your gray water use does not change that system's design requirements for capacity and reserve areas.

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[Conservation Rebates](#)
[Residential Rebates](#)
[Commercial and](#)
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## Apply for Water Conservation Rebates

Learn more about receiving rebates for installing high-efficiency toilets and urinals, purchasing a high-efficiency washer, installing rainwater harvesting and gray water systems, and receiving customized incentive packages for businesses.



### Other rebates/incentives available:

- [Southwest Gas Residential & Commercial Energy Efficiency Rebates](#)
- [Tucson Electric Power Renewable and Conservation Programs](#)

#### Residential Rebates

Learn how you can receive Tucson Water rebates of \$75 to \$2,000 for installing high-efficiency toilets, high-efficiency clothes washers, and rainwater harvesting and gray water systems.

- High-Efficiency Toilet (HET) Rebate
- Limited-Income, High-Efficiency Toilet (HET) Rebate
- Clothes Washer Rebate
- Rainwater Harvesting Rebate
- Rainwater Harvesting Grant (Limited-Income Program)
- Gray Water Rebate

#### Commercial and Multifamily Rebates

Learn more about receiving rebates for installing high-efficiency toilets and urinals and saving money via water-saving audits.

- High-Efficiency Toilet (HET) Rebate
- High-Efficiency Urinal (HEU) Rebate
- Tucson Audit Program (TAP)

# Gray Water Rebate

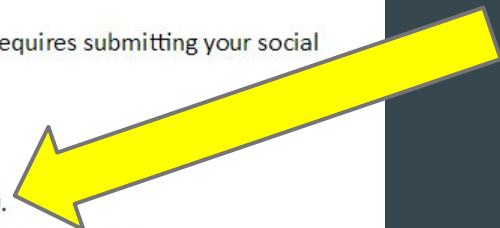
Gray water is wastewater collected from the drains of hand-washing sinks, showers, bathtubs and clothes washing machines. Of the total amount of wastewater generated in a typical home, 12% is from clothes washers, 10% is from faucets, and 9% is from showers. That's a total of 31% that can be re-used as gray water for landscape plants, fruit trees, and lawns.

Tucson Water's Single Family Residential Gray Water Rebate Program will reimburse you up to \$1,000 when a permanent gray water irrigation system is installed in your home.

Applicants must submit a [W-9 form](#) for rebates of \$600 or more, which are subject to tax, and will be issued a [1099-MISC](#) for miscellaneous income. The W-9 form requires submitting your social security number.

## Rebate

- Half of qualifying residential gray water system costs, up to \$1,000.
- Rebate funds are limited and will be distributed on a first come, first served basis.





# Rebate Covers

- Design costs (up to \$200)
- Materials
  - Pipe, fittings, valves
  - Storage tanks (not recommended)
  - Filters, pumps (not recommended)
  - Backflow prevention assembly
  - Mulch for basins
- Installation - licensed contractor

## Does not cover

- Hoses other non-permanent fixtures, bathroom remodel materials, workshops, plants and sales taxes.

# How to Apply

- Complete the greywater [online rebate application form](#)
- Upload images of the original itemized receipt(s) for the qualifying materials and labor costs.
- Create an aerial Project Plan with details about your system and upload
- Questions? Call Tucson Water 520-791-4331

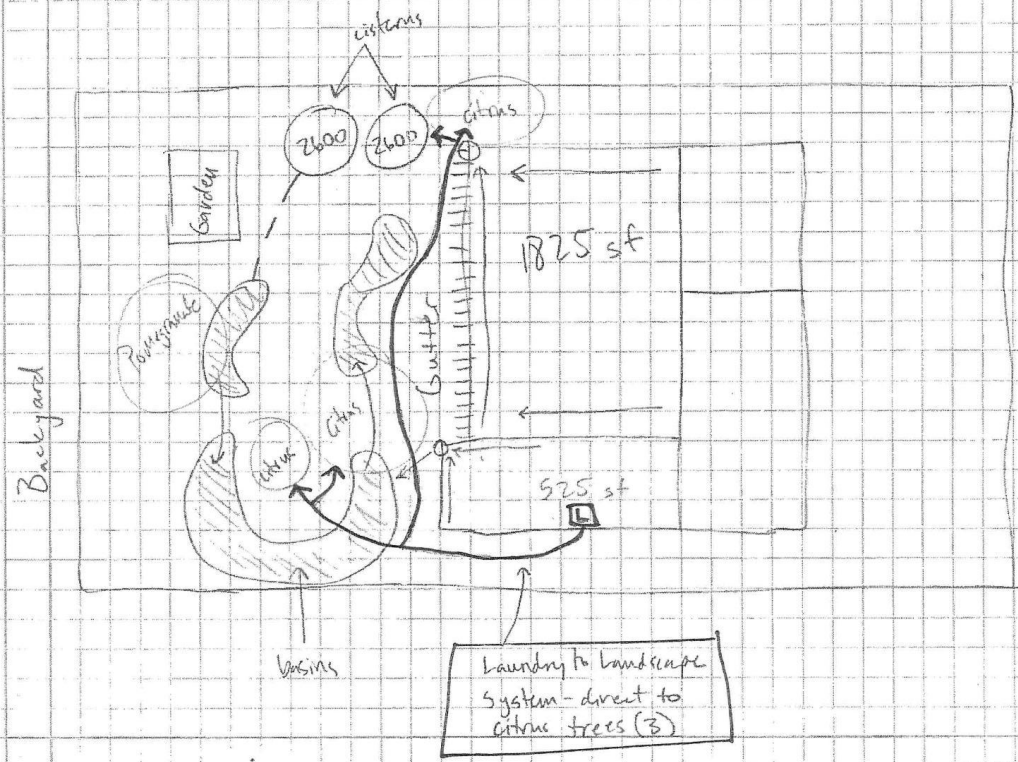
# Tucson Water Requires a Project Plan with Your Application

- Can be hand drawn
  - Label North
  - Include street address, first and last name, & property lines
  - Label Greywater Source
  - List system components
  - Show intended use for greywater

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# Level 2 - Rainwater Harvesting (backyard only) ↑ N

Address: [Redacted]



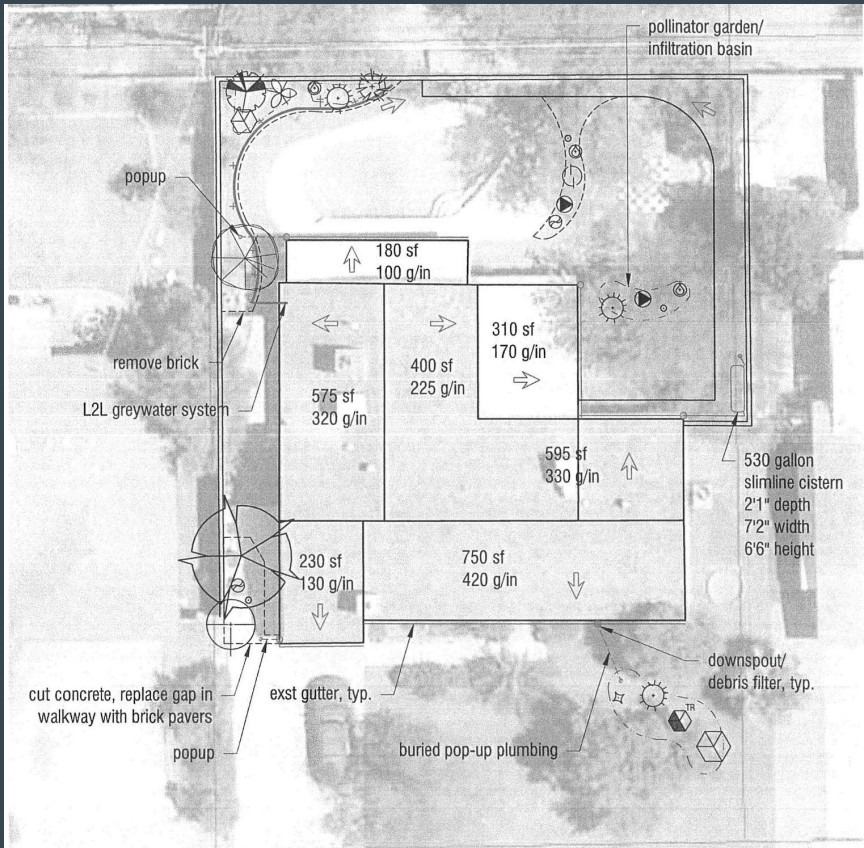
## Catchment Area

Roof = 1,825 sq. ft.  
 Patio = 525 sq. ft.

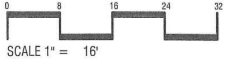
## Storage

Cistern = 2600 gal  
 x2

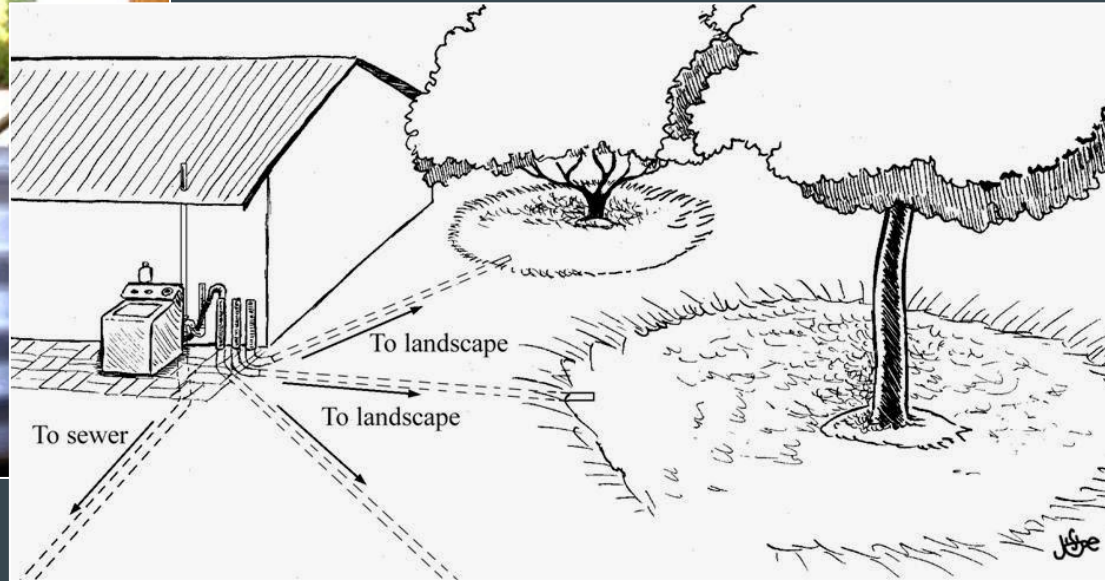
Street



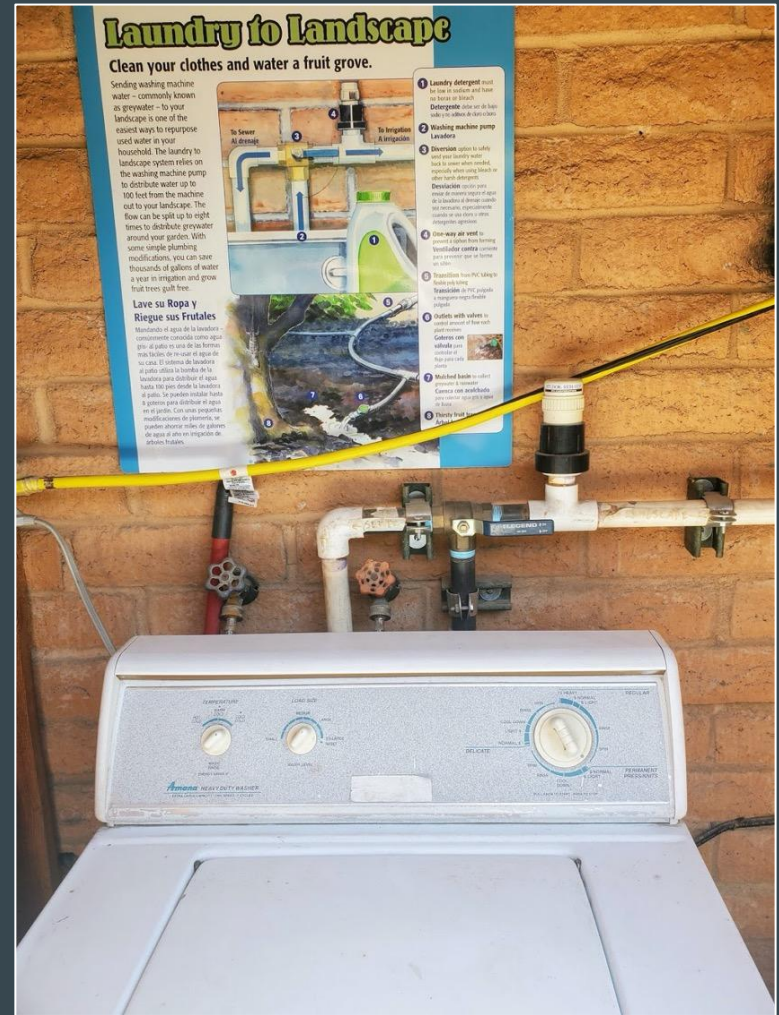
Name & Address



# Branched drain: laundry washer



# Greywater L2L Systems



## Laundry to Landscape

Clean your clothes and water a fruit grove.

Sending washing machine water - commonly known as greywater - to your landscape is one of the easiest ways to repurpose used water in your household. The laundry to landscape system relies on the washing machine pump to distribute water up to 100 feet from the machine out to your landscape. The flow can be split up to eight times to distribute greywater around your garden. With some simple plumbing modifications, you can save a year in irrigation and grow fruit trees guilt free.

### Lave su Ropa y Riegue sus Frutales

Manejar el agua de lavandería comúnmente conocida como agua gris, al jardín es uno de los mejores usos fáciles de re- usar el agua de lavandería. El sistema de lavandería al jardín utiliza la bomba de la lavadora para distribuir el agua hasta 100 pies desde la lavadora al jardín. El flujo puede dividirse hasta 8 veces para distribuir el agua a su jardín. Con algunas modificaciones de plomería, se puede ahorrar un año de riego de agua al año en irrigación de árboles frutales.



- 1 Laundry detergent must be free of bleach and fabric softener.**  
Detergente debe ser de tipo suave y libre de blanqueador.
- 2 Washing machine pump activates diverter.**  
Cuando la lavadora comienza a lavar, la bomba de la lavadora activa el diverter para que el agua de lavandería se distribuya a su jardín.
- 3 Diverter splits the water into two paths: one to the sewer and one to the pump.**  
El diverter divide el agua en dos caminos: uno al alcantarillado y otro a la bomba.
- 4 The pump lifts the water to the distribution system.**  
La bomba levanta el agua al sistema de distribución.
- 5 The distribution system waters the tree.**  
El sistema de distribución riega el árbol.
- 6 The diverter returns to the sewer when the pump is not running.**  
Cuando la bomba no está funcionando, el diverter devuelve el agua al alcantarillado.
- 7 The diverter is controlled by the pump.**  
El diverter es controlado por la bomba.

# Your typical Supply

- Top loading = ~30-40 gallons/load
- Front loading = ~15-20 gallons/load
  
- Front, 3 loads/wk = ~2,800 gallons per year
  - Irrigate 1 mature dwarf citrus or 2 pomegranates or 1 fig
  
- Front, 5 loads/wk = ~4,700 gallons per year
  - Irrigate Citrus + Pomegranate or ...





# Let's calculate how much greywater you produce

Average annual production:

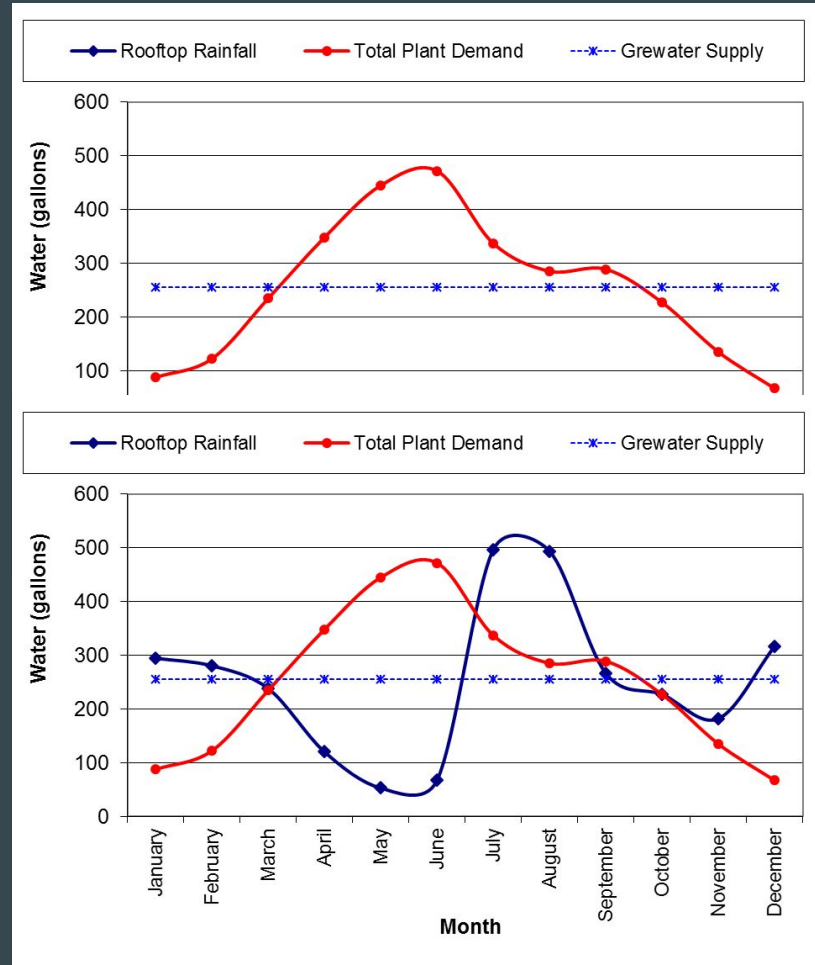
Laundry: \_\_\_gal/use \* \_\_\_ uses/week \* 52 weeks

Shower: \_\_\_gal/min \* \_\_\_\_ min \* \_\_\_ persons \* 350 days

# Pairing Your Supply and Demand

Greywater = 3000gal/yr  
10 ft diameter Citrus Demand  
= 3000gal/yr

Greywater = 3000gal/yr  
Rainfall = 500 sq.ft. roof  
Citrus Demand = 3000gal/yr



# Create a Water Budget

Use greywater as a supplement irrigation resource for your tree

- Greywater: excess production in cool season; deficit in warm season
- Make up remaining warm season demand with stored rainwater, AC condensate, Evaporative cooler bleed-off

# General Precautions

- No bleach
- No soaps with high salt content
- No clothes soiled with bodily fluids
- Avoid over-saturating soil
  - You can drown plants
  - Causes anaerobic soil with unpleasant smells
- Avoid human or animal contact with graywater – due to higher bacterial content

# Products/Items to AVOID

- chlorine or bleach
- Peroxygen
- Salts (sodium)
- sodium perborate
- sodium tetrachlorite
- Sodium lauryl sulfate
- boron
- borax
- petroleum distillate
- alkylbenzene
- "whiteners"
- "softeners"
- "enzymatic" components

- **Recommended detergents**
  - Oasis
  - ECOS liquid detergent
  - Vaska
  - Trader Joe's Liquid Detergent
  - Puretergent



# Size of Basin?



Calculate the worst case for a single day

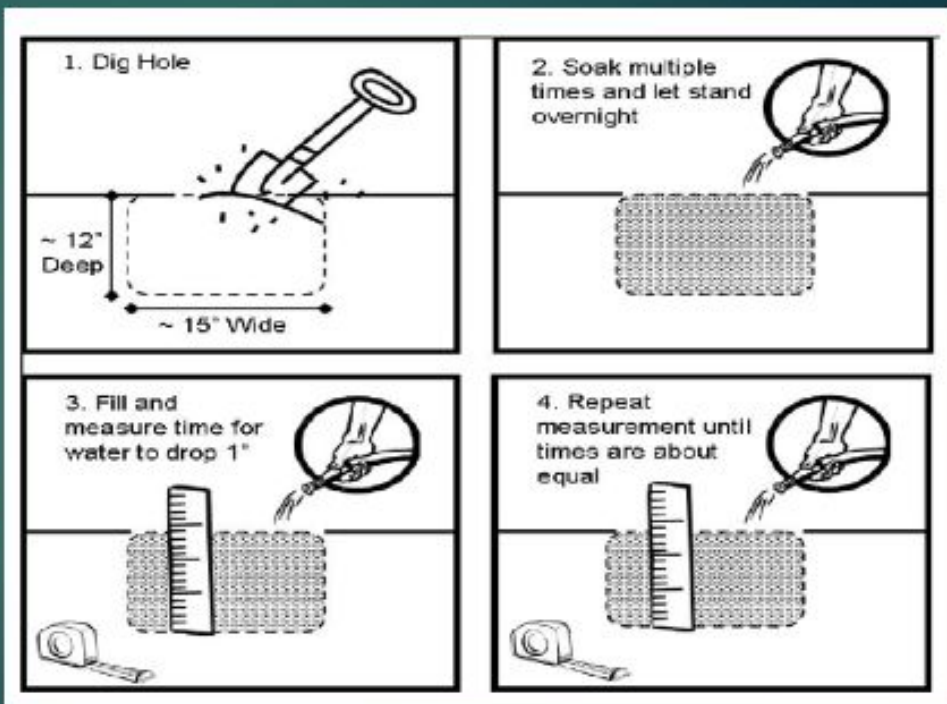
Ten loads at 15 gallons per load = 150 gallons

Build Basin to hold it

150 Gallons = 5 foot by 8 foot basin, 6 inches deep  
(7.48 gallons/cubic ft)

Then understand can the water percolation  
into the soil fast enough

# Max Depth of Basin?

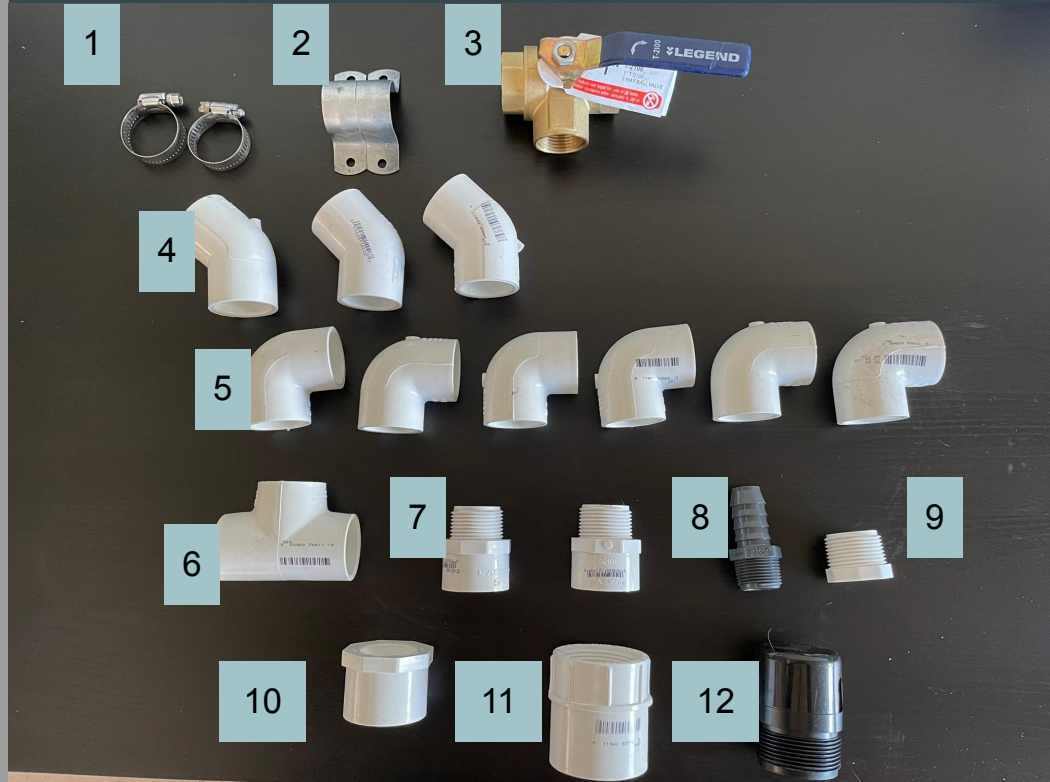




# Additional Information

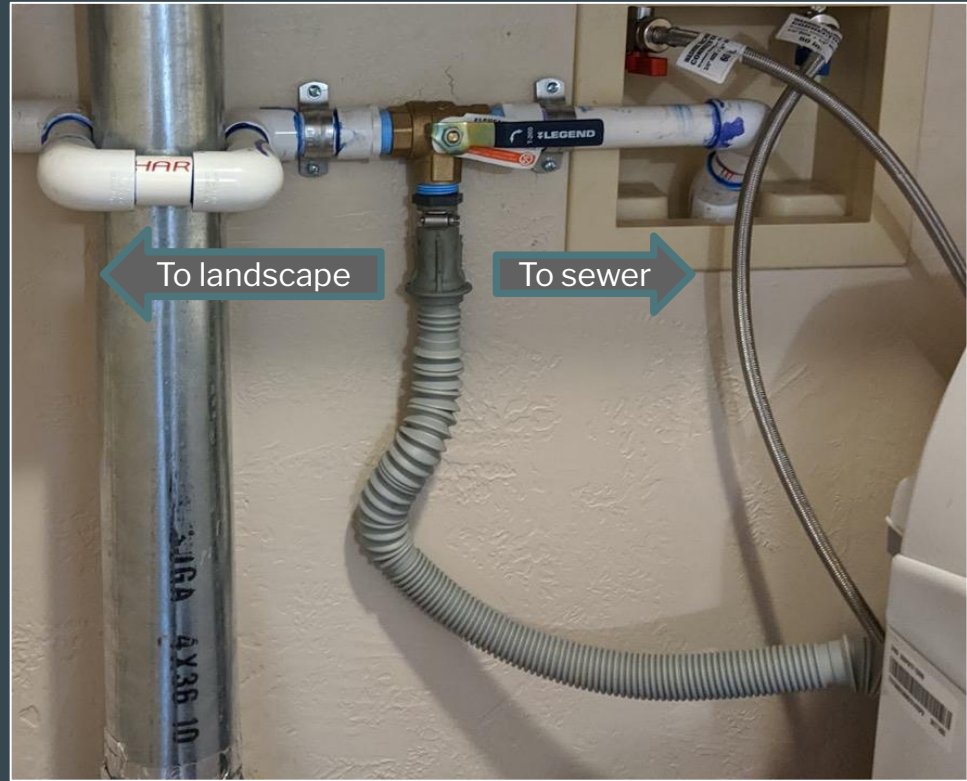
# Indoor/Diversion Kit Parts

1. 1 1/2in hose clamps
2. 1in two whole straps
3. 1in 3-way Brass Diversion Valve
4. 1in PVC 45s
5. 1in PVC 90s
6. 1in PVC Tee
7. 1in SxT Male Adaptor
8. 3/4in Sch 80 Male Barbed Insert Adaptor(Inst x MPT)
9. 3/4in TxT Adaptor
10. 1 1/2in x 1in SxS PVC Bushing
11. 1 1/2in SxT Female Adaptor
12. 1 1/2in Air Admittance Valve



# Indoor Plumbing Connections

- Barbed fittings have hose clamps
- Threaded parts have Teflon tape
- PVC to PVC connections have primer and PVC glue
- 2 hole straps placed close to 3-way valve for anchoring



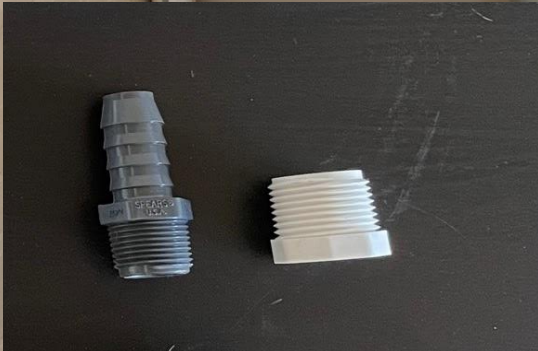


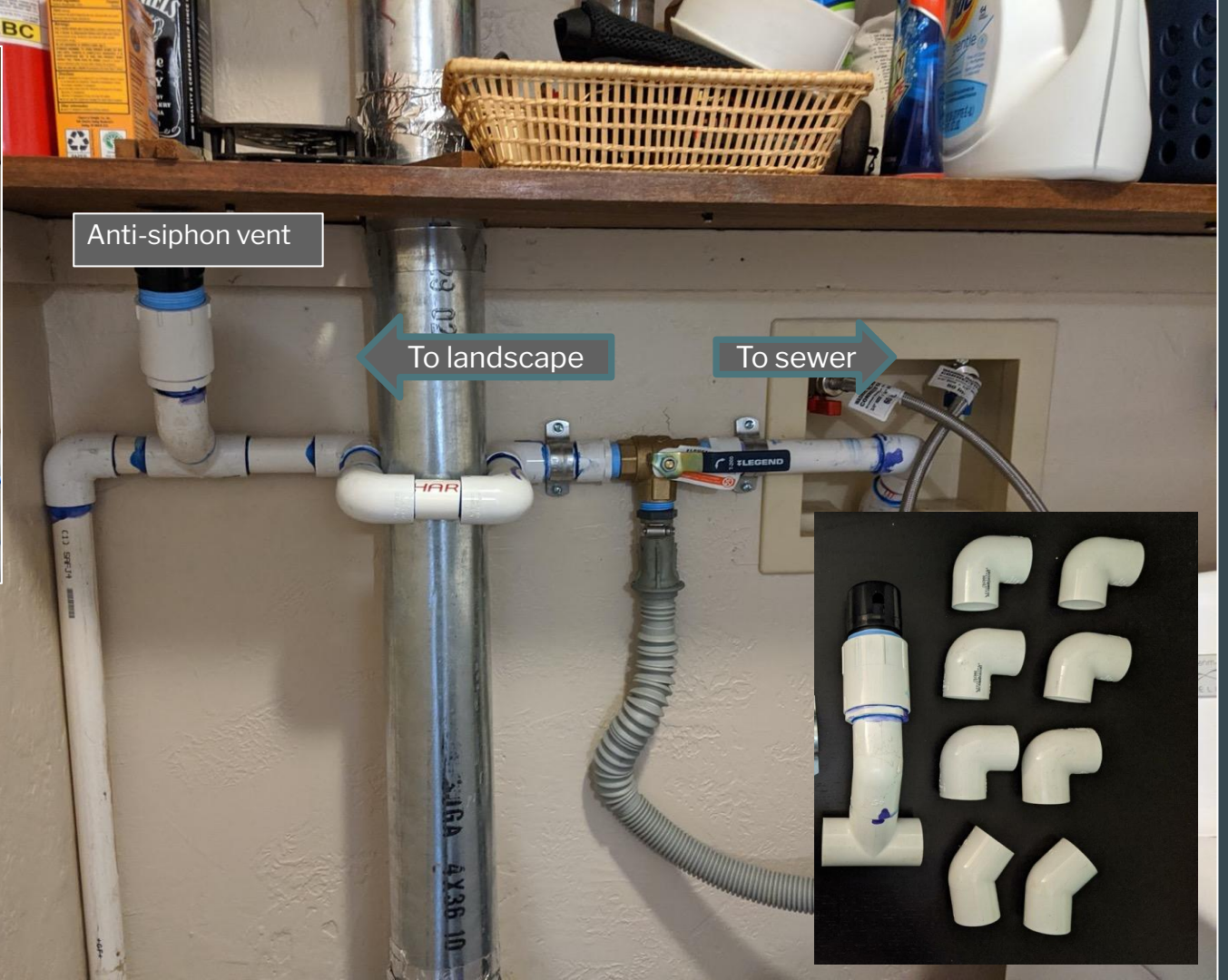
To landscape

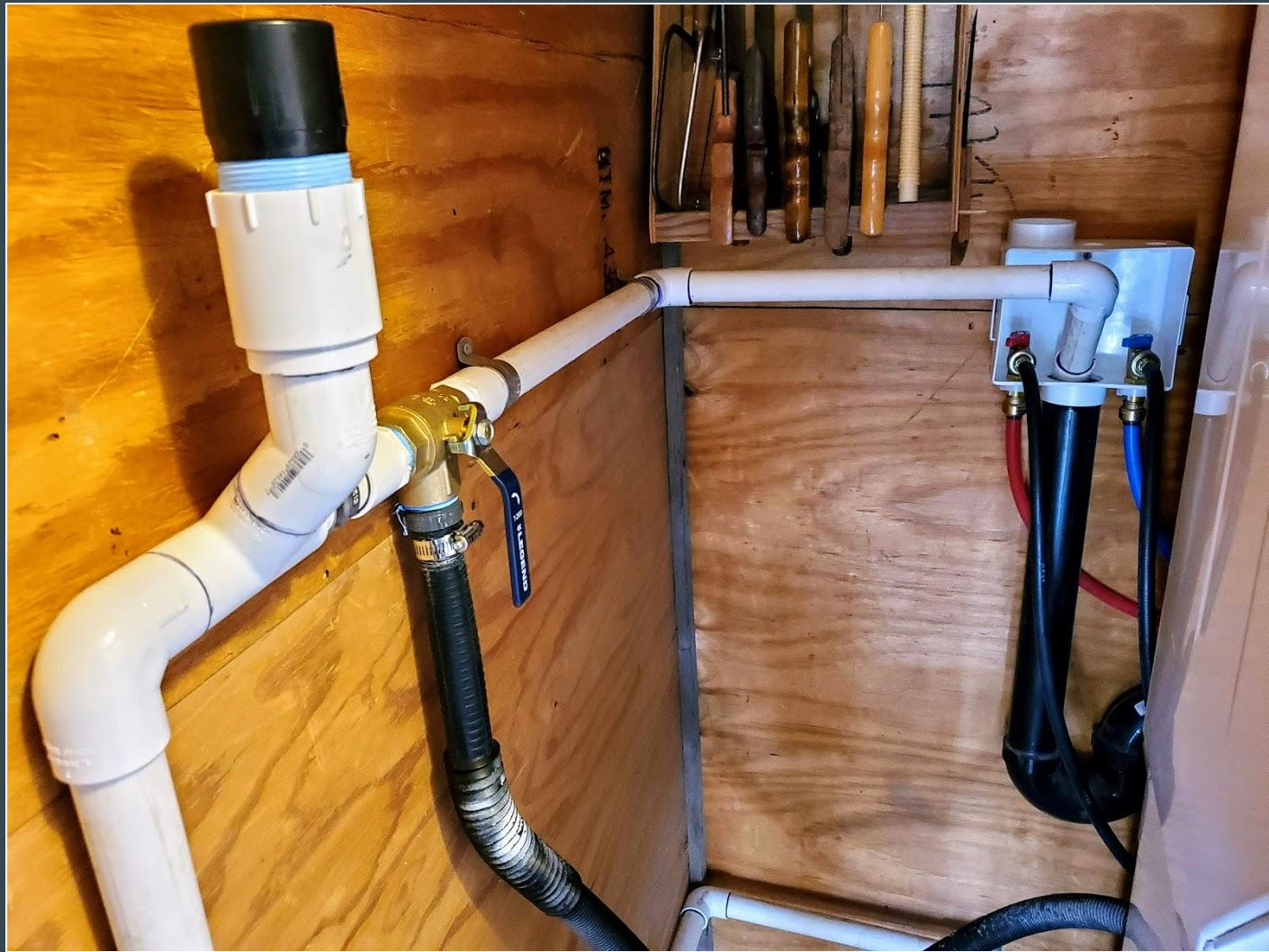
To sewer

1" 3-way Brass Valve

Hose connection







# Laundry to Landscape





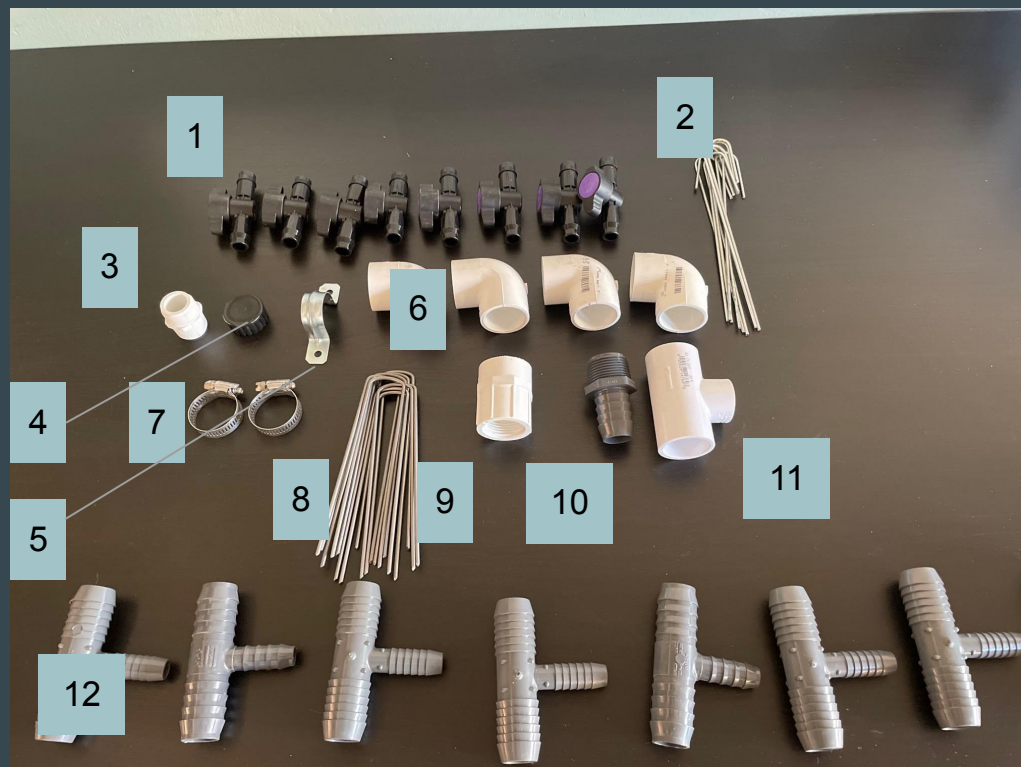


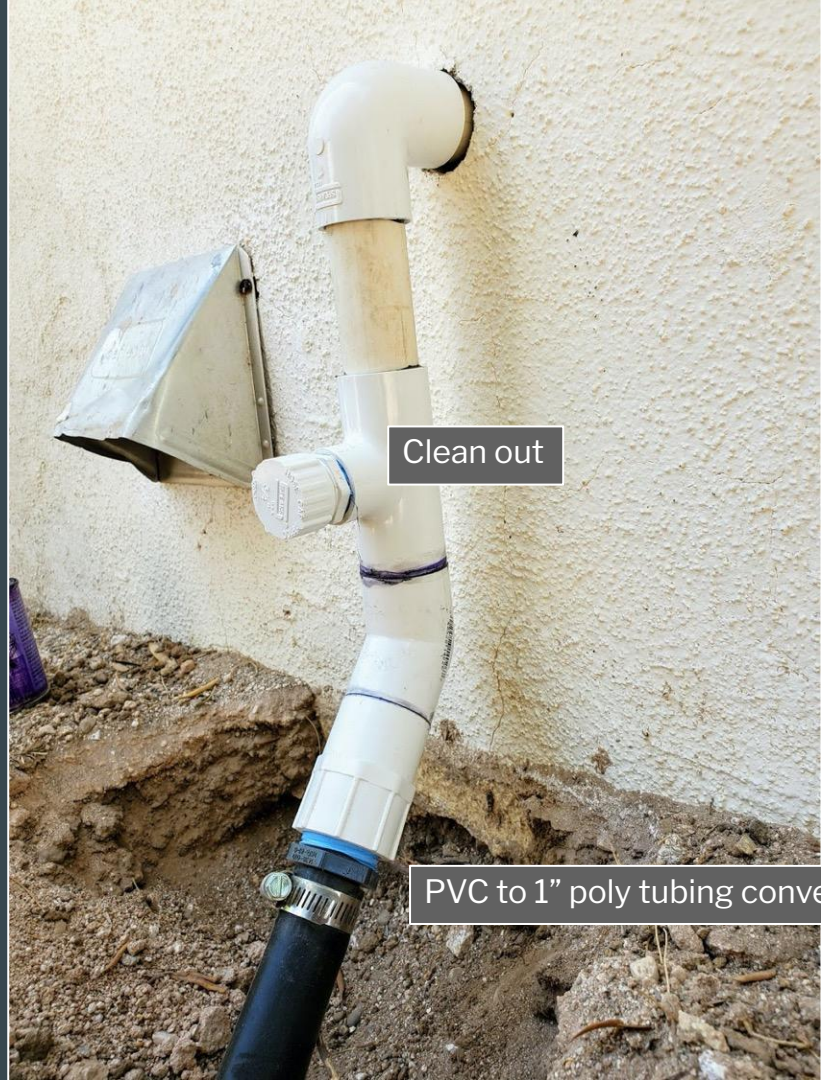
# Jam Board



# Outdoor Kit Parts

1. 1/2in Purpleback Valve
2. 1/2in Stake
3. 3/4in PVC HTxIPT Male Adaptor
4. 3/4in PVC Hose Cap
5. 1in 2-Hole Strap
6. 1in PVC 90
7. 1in Stainless Hose Clamp
8. 1in Stake
9. 1in SxT Female Adaptor
10. 1" Sch 80 Male Barbed Insert Adaptor (Inst x MPT)
11. 1in x 1in x 3/4in PVC SxSxT Tee
12. 1in x 1in x 1/2in Barbed Tee





Clean out

PVC to 1" poly tubing conversion

# PVC Union





1x1/2" barbed tee



bavhydro707

1/2" ball valve




1" poly tubing as main branch

1/2" poly as emitter branches





A man in a light-colored shirt and khaki pants is bent over, working on a drip irrigation system in a backyard. He is surrounded by black plastic tubing and a yellow pump. In the background, several other people are standing near a house with a covered patio. The ground is dirt, and there are some plants and a wheelbarrow visible.

What happens  
if I close all  
these?







Questions?

# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS



# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS

EDIBLE PLANTS



# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS

EDIBLE PLANTS

CONSIDERING PLANT DEMAND



# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS

EDIBLE PLANTS

CONSIDERING PLANT DEMAND

- CALCULATING PLANT DEMAND
- CALCULATING WATER SUPPLY



# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS

EDIBLE PLANTS

CONSIDERING PLANT DEMAND

- CALCULATING PLANT  
DEMAND
- CALCULATING WATER SUPPLY

CONSIDERING SEASONALITY



# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS

EDIBLE PLANTS

CALCULATING PLANT DEMAND

CALCULATING WATER SUPPLY

CONSIDERING SEASONALITY FOR  
HUMANS TOO!



Why would you  
wash your pants  
daily?

I told you we needed a  
bigger basin

# Plant pairing

HIGH WATER USE / HIGH VALUE  
PLANTS

EDIBLE PLANTS

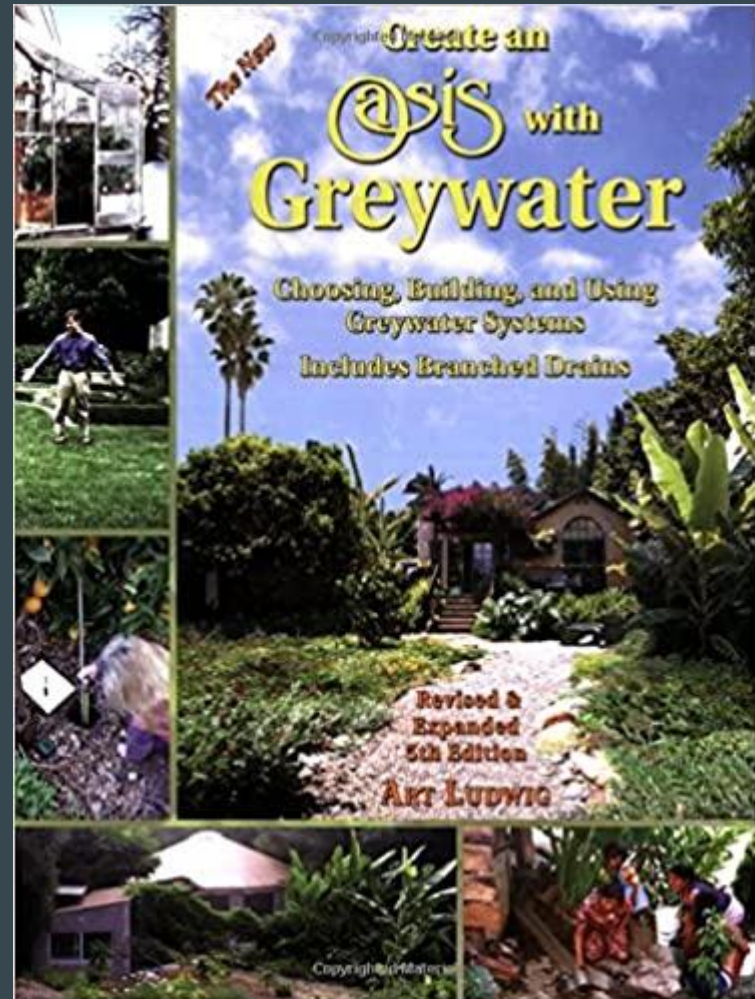
CALCULATING PLANT DEMAND

CALCULATING WATER SUPPLY

CONSIDERING SEASONALITY

SOIL PERCOLATION RATES

CALCULATING BASIN SIZING





A photograph of a tree with a black irrigation pipe and a blue valve on the ground in front of it. The tree has large, green, lobed leaves and a light-colored trunk. The ground is covered in wood chips and mulch. The background shows a clear blue sky and some other greenery.

Questions?

# Upkeep

CHECK EMITTERS FOR  
CLOGS/BURYING

CHECK FOR LEAKS



# Upkeep

CHECK EMITTERS FOR CLOGS

CHECK FOR LEAKS

MONITOR PLANT HEALTH

REPLENISH MULCH IN BASINS



# Upkeep

CHECK EMITTERS FOR CLOGS

CHECK FOR LEAKS

MONITOR PLANT HEALTH

REPLENISH MULCH IN BASINS

REMOVE OR INCORPORATE LINT

MOVE EMITTERS WITH PLANT  
GROWTH



# Questions?



# Thank you!

Self report your attendance to  
Tucson Water here:

<https://docs.tucsonaz.gov/Forms/Water-Rebate-Workshop-Attendance>