

INSTRUCTIONS

1) Confirm Laundry to Landscape System is appropriate for site

2) Draw to scale a plot plan in the space provided labeled "PLOT PLAN"

Suggest to show:

- a) lot lines and structures
- b) direction and approximate slope of surface
- c) location of retaining walls, drainage channels, water supply lines, wells
- d) location of paved areas
- e) location of any septic tank, leachfield and 100% expansion area

3) Complete Calculations

Determine design graywater flow and required area:

Bedrooms	GPD	Min sq. ft. mulch basin	Suggested	Min number zones
1	30	36		1
2	45	54		1
3	60	72		1
4	75	90		2
5	90	108		2
6	105	126		2

4) Valves and Piping

- Do not alter washer standpipe trap that leads to septic/sewer
- Mark Pipe "DANGER—INSAFE WATER"
- Make diverter valve readily accessible
- Mark stub-out plumbing permanently
- Release point of graywater covered in 2" mulch, rocks, soil, or solid shield

5) Permitting

See the City of Santa Barbara's, "A Guide to Permitting a Single Family Graywater System" to determine if permit required. No permit is required for a clotheswasher only graywater system for single or two family residential buildings.

Laundry to Landscape System

The Laundry to Landscape System design is subject to yearly review for safety & effectiveness by the City "Water Resources & Building & Safety Divisions". People commonly attach garden hoses to their washers, or run the laundry water to trash cans and then out garden hoses. There are convenience and effectiveness issues with this practice, which the Laundry to Landscape system addresses. It uses 1" polyethylene (the most ecological plastic) to accommodate the rush of water from the washer, without a surge tank or stressing the pump. Thus, the washer itself pumps water a large distance horizontally, or a short distance vertically, to multiple outlets, without having to move a hose.

Technical Notes

1. For a laundry-only system it is not necessary or desirable to change the laundry standpipe (house drain plumbing). The diversion is upstream from this point.
2. Washing machine-pressurized graywater lines must have an inside diameter of 1", and must be covered by 2" of wood chips and/or earth.
3. The minimum number of outlets is six, the maximum per zone 18. (Figure 3) These may be split amongst multiple zones. Note that a horizontal axis washer will be able to supply 3-6 outlets at once, a vertical axis machine 5-10 outlets.
4. Multiple zones are recommended for high use systems or low perk soil (diverting laundry water to the sewer is an alternative to diverting it to a different zone, so multiple zones are not required).

Figure 1 Notes:

A) Washer Pump Performance and Distribution Plumbing Limitations

Laundry to Mulch Basins systems use the washing machine pump (A, in Figure 1) to distribute the water. Without stressing the pump, you can irrigate any distance downhill, or pump up to an elevation 2' below the top of the washer 100' away (100' of horizontal 1" tubing offers the same resistance as 20' of vertical rise). The resistance the pump has to overcome should ideally be about the same as in a standard installation, where the hose discharges at the height of the top of the machine. For example, if a washing machine empties through 100' of 1" pipe that ends 18' lower than its lid, the effective resistance is the same as if it discharged 2' above its lid. At considerably greater risk to the pump, and chance that the washer will not drain completely, people have irrigated up to 3' above the top of the washer. The variables that affect pump life are:

- Pump model—Higher-quality pumps perform better. Unfortunately, every washer pump is different. The way to determine if the pump is adequate is to try it and see if it burns up.
- Height differential—The less rise, the easier on the pump. Don't go more than 6' up.
- Pipe flow resistance—The main line should not be less than 1" diameter, and should not kink. Notes: Overcoming the inertia of standing water in the tubing takes extra pressure initially, so minimizing standing water minimizes pump load.
- 3/4" tubing may work for efficient washers that generate less than 2-3 gpm of peak flow.

B) Diversion

The laundry diverter valve is usually mounted on the wall behind the washer, or where it is easily visible and convenient to turn. It should be solidly screwed to the wall using copper pipe brackets or plumber's tape, so that it does not move when the handle is torqued. A 1" brass valve is ideal. It is the hardest part to find, but can be ordered through better stocked plumbing supply houses or the internet (search for "three way diverter valve"). One side of the valve diverts water into the standpipe through an air gap, the other through the wall or window to the outside. The graywater destinations should be clearly labeled, eg. "Sewer" and "Orchard."

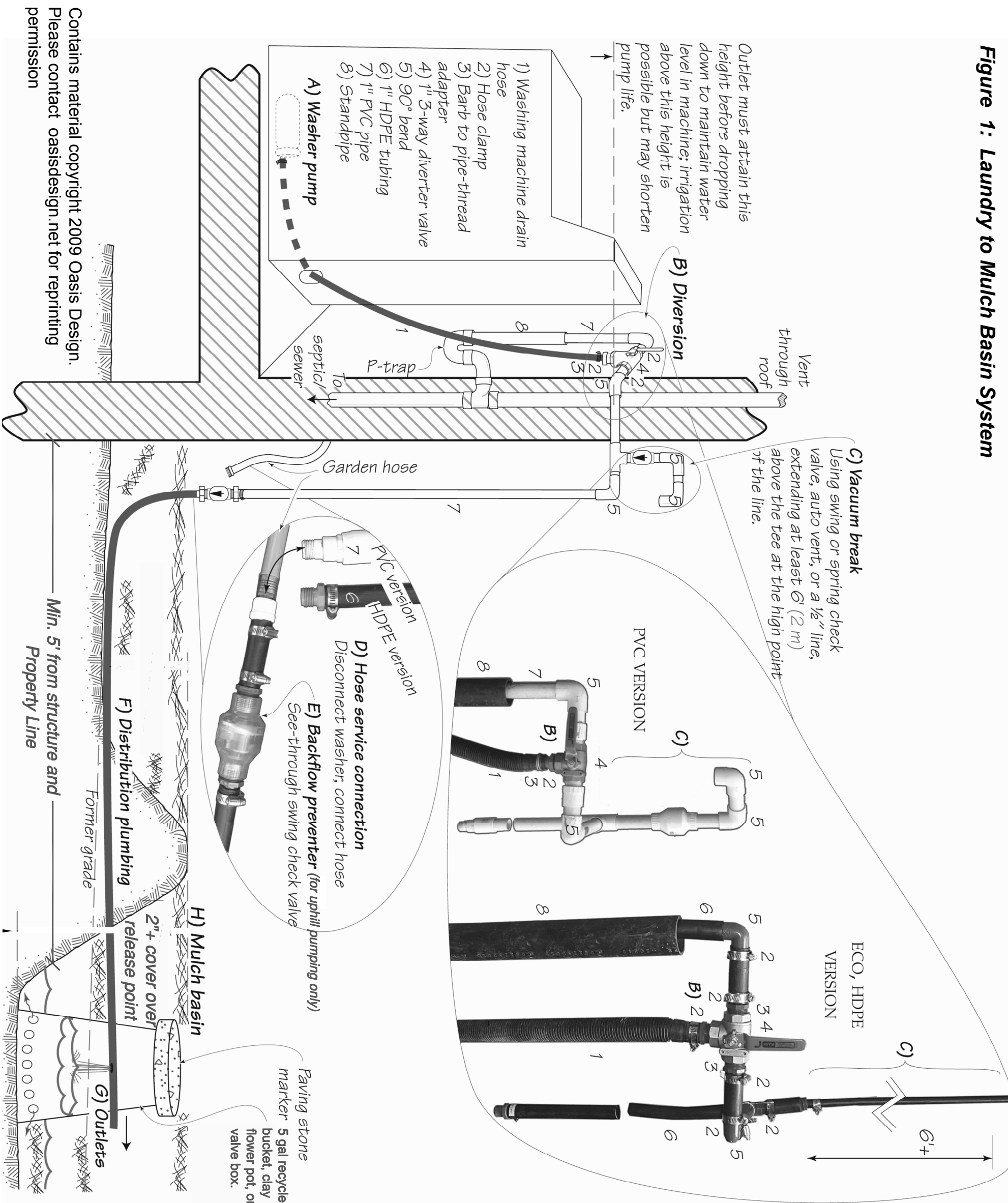
C) Vacuum Breaker

If the first outlet is lower than the level of water in the washer, a vacuum breaker is necessary to keep the drain line from continuously siphoning water out of the machine as it tries to fill itself, not a problem with every machine or load, but, easier to just add it). The loose fit of the washing machine drain hose into the standpipe in conventional plumbing creates an air gap, which serves as a vacuum breaker. The vacuum breaker must connect to the main drain line at its high point to be effective. This is typically close to the washer, just outside the house. If the drain line must dip down before leaving the house, it could siphon even with a vacuum breaker outside. In this case, mount an auto vent as a vacuum breaker inside. Or to avoid the possibility of spillage indoors, you can route a 1/2" tube from the top of the vacuum breaker outlet back into the septic/sewer drain standpipe. If you're irrigating uphill, the first outlet is above the top of the washer, it will serve as the vacuum breaker.

D) Hose Service Connection Point

A hose service connection makes turning the outlets easier. You won't have to keep doing load after load of laundry to check and tune outlet flows). It is also good for blowing out lint if needed (be careful to not pressurize the system too much as the irrigation

Figure 1: Laundry to Mulch Basin System



tubing connectors cannot handle more than about 20 psi (140 kpa). The hose service connection must be properly installed so there is no chance of graywater backflowing into the freshwater lines. The layers of protection against this are: 1) The hose is only connected temporarily, during service, and to connect the hose, the washer must be disconnected; 2) the swing check valve, if present (uphill pumping only, see below); 3) a backflow prevention device at the hose bib. To lure the outlets perfectly, check the flow from the washer by timing how long it takes to fill a bucket. Then adjust the hose to the same flow. Do not leave the hose connected unless testing or cleaning the lines.

E) Backflow Prevention Valve (for uphill pumping only)

If the drain line runs (or can be lifted) above the height of the top of the washer, a swing check valve should be included as close as possible to the washer, to keep water in the line from rushing back into the machine when it shuts off. Get a clear one with 1" pipe thread—a clean installation and you can watch what is happening inside. If you have a hose service connection, a swing check valve adds backflow protection.

F) Distribution Plumbing

To get the pressurized graywater to plants, 1" polyethylene tubing is the preferred distribution plumbing. This is the same material commonly used for drip irrigation, just in a bigger size. Use the kind with a purple stripe (if you can find it) to indicate non-potable water. Smaller tubing gives too much resistance. Bigger tubing traps more septic water and solids. PVC pipe is more toxic and less attractive. You can run a single or multi-trunk line, with or without valves or branches. Branches can be 1", 3/4", or 1/2" drip tubing. With lots of graywater and/or low-peak soil, use two or more valved zones (Figure 2). Be sure to note the location of hidden plumbing on a drawing or photographs for your house files. It is best for freezing, smells, and the pump if the line slopes downhill continuously. Second best: a U-shaped line with an outlet at the low point to drain the U. However, because the line is pressurized, it can dip up and down. The consequence is some trapped water in the line between uses. Unless the line might freeze, this is acceptable. The water can go septic if it sits for more than a few days. However, the quantity in even a long run of 1" pipe is so small that any objectionable smell is only detectable for the first moment of discharge. In an installation that includes both some rise and a long horizontal run, the quantity of trapped water is minimized by sending the pipe up to the maximum height as quickly as possible, then running the pipe down from there. This way, most of the run drains dry after each use. This same geometry works to get the water up from a basement washer to the yard.

G) Outlets

There are several options for outlets (Figure 3). The capacity of all the outlets should be enough that the pump is not strained trying to push too much water through too small or too few holes. On the other hand, too many or too large holes will result in pressure loss that may leave some outlets high and dry. The total cross-sectional area of all the outlets in a zone should be between one and two inches squared (the free Laundry to Landscape calculator at www.oasisdesign.net/graywater/laundry can be used to find the total cross-sectional area from a variety of outlets. Outlet flow can be lowered by having a smaller opening or a longer tube for the outlet. Lengths of 3/8 tubing can be used to lower outlet flow. Note that outlet flow in this pressurized system, unlike a gravity flow system, depends on the height, the size, and the number of outlets, as well as the length and diameter of the tubing. You can tune the flow by making the outlets different sizes, or adjusting the outlet ball valves. If you are irrigating uphill, the first outlet will get way more water than the last outlet. To avoid this, run a solid line to the high point, then do a U-turn and put all the outlets in the downhill run.

H) Recycling Landscape

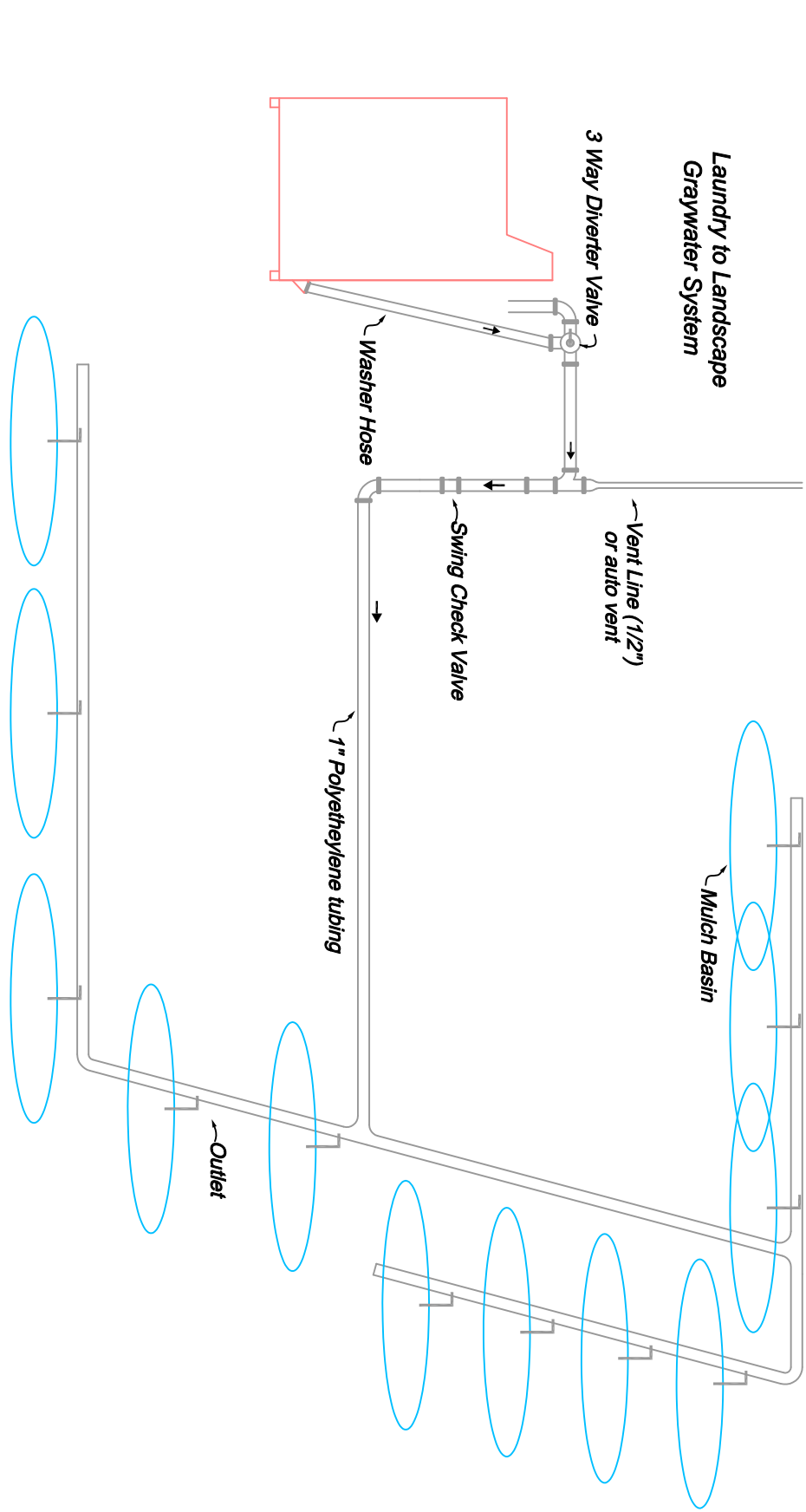
Mulch basins are the preferred way to receive graywater into the landscape. Mulch basins increase soil percolation, reduce rain runoff, reduce water use, increase soil fertility, and ease stress on landfills. Mulch is organic waste material including leaves, prunings, straw, pulled weeds, and wood chips. It is recommended to put woody mulch near the bottom of mulch basin because it is more durable and permeable cover. Release point of graywater to be covered with minimum of 2" of mulch.

Not every installation may require a vacuum breaker, check valve, or hose service connection. But, if you include the applicable components, and leave out the inapplicable ones, the chance of having trouble with your system is much smaller.

Figure 2: Outlet Options



Figure 3: Sample System in Plan View



CITY OF SANTA BARBARA

Laundry to Landscape System

Graywater Collection System - Version 1.5 July 2015

Purpose

The City of Santa Barbara encourages the use of graywater in accordance with the California Plumbing Code, Chapter 16A. For specific details, see City of Santa Barbara, "Graywater Fact Sheet" and "A Guide to Permitting a Single Family Graywater System."

Scope

This design sheet provides a model installation plan to help design and install a laundry-only graywater system in accordance with the State of California Graywater Standards.

