

# What is a Sponge Garden?

1. You may have heard of Rain Gardens – they are areas of native shrubs, perennials, and flowers planted in small depressions above engineered soils surrounding drainage pipes that lead to storm drains.
2. They enhance a yard’s ability to retain rainwater during a rain event to *slow* the rain’s travel to the bayous to keep the water level lower and reduce flooding threats.
3. Paving actually speeds up this rainwater travel, and turf lawns are better than paving, but not great.

## RAIN GARDEN

Rain Gardens are engineered and permitted by the City and serve as a technique of Green Stormwater Infrastructure (GSI) .

## SPONGE GARDEN

Sponge Gardens are a smaller version of a Rain Garden (without the \$\$ engineering and permitting of the underground piping) and can be accomplished by homeowners.



## BENEFITS

Sponge Gardens are effective in removing up to 90% of nutrients and chemicals and up to 80% of sediments from the rainwater runoff that they receive, improving stormwater *quality*, which means less fertilizers causing fewer algae blooms in the bay.

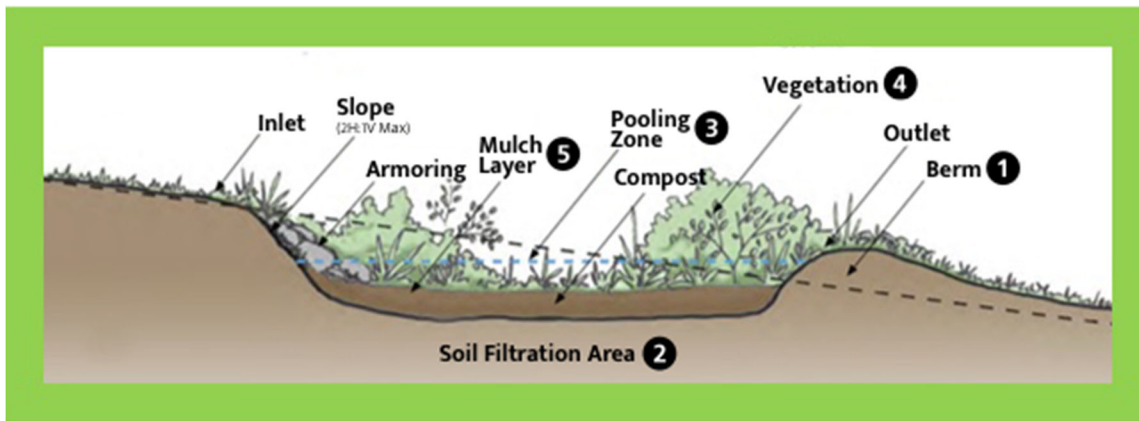
Compared to a conventional lawn, sponge gardens detain water and allow for 30% more water to soak into the ground, improving the stormwater *quantity*.

Interestingly, sponge gardens are dry most of the time. They typically only hold water during and following a rainfall event (they are *not* a pond or permanent water feature) and because sponge gardens will drain within 12-48 hours, they prevent the breeding of mosquitoes.

## INSTRUCTIONS

Throughout these instructions, we have also included the optional steps to create a more heavy-duty version of a sponge garden. Both versions will retain water and allow you to contribute to improving stormwater management in your community, but the heavy-duty version will retain more.

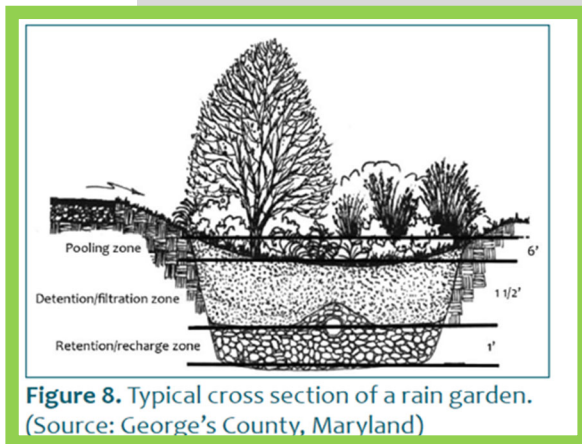




1. **Berm:** A barrier on the low end of the garden farthest away from the home, which prevents the

## Components of Sponge Gardens

- rainwater from sheet draining past the rain garden. This does the most for stormwater *quantity*.
2. **Soil Filtration** area: The bulk space of the garden
    - a. Soil is optimized for drainage and support of plants.
    - b. For optional heavy-duty—Gravel Layer below the Soil.
  3. **Pooling Zone:** The area at the top of the garden where the vegetation resides and where the water collects until it fully drains.
  4. **Vegetation:** Plants will act as the filter for the rainwater passing through your garden. The healthy soil and the plant roots do the most for stormwater *quality*. They can also serve as a pollinator garden if you select certain plant varieties.
  5. **Mulch Layer:** covers the soil and bases of the vegetation to promote system health
    - a. It suppresses weed growth,
    - b. resists soil compaction, and
    - c. retains moisture.



**Figure 8.** Typical cross section of a rain garden. (Source: George's County, Maryland)

Rain Gardens have underground drainage pipes.

## Preparations

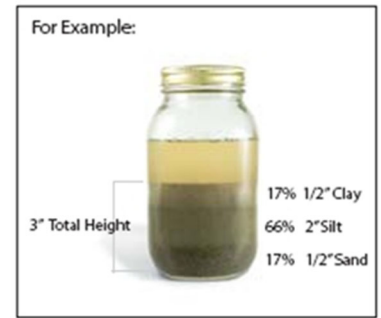
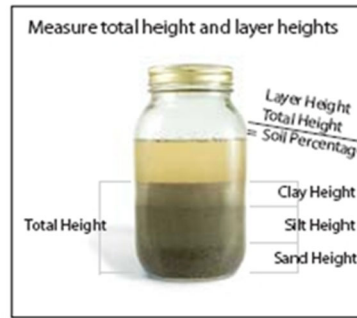
First, plan **where** you will be placing the garden. Keep in mind the following considerations:

1. Does rainfall collect anywhere in the your yard?
2. If not, consider putting in a swale leading to your sponge garden.
3. The garden needs to be *at least* 10 feet away from your home.
  - a. Any closer risks water affecting the foundation & creating problems
  - b. The ideal distance is 30 feet
4. Confirm underground utilities
  - a. Texas 811 can help
  - b. This is especially important for the optional heavy-duty (deeper) version

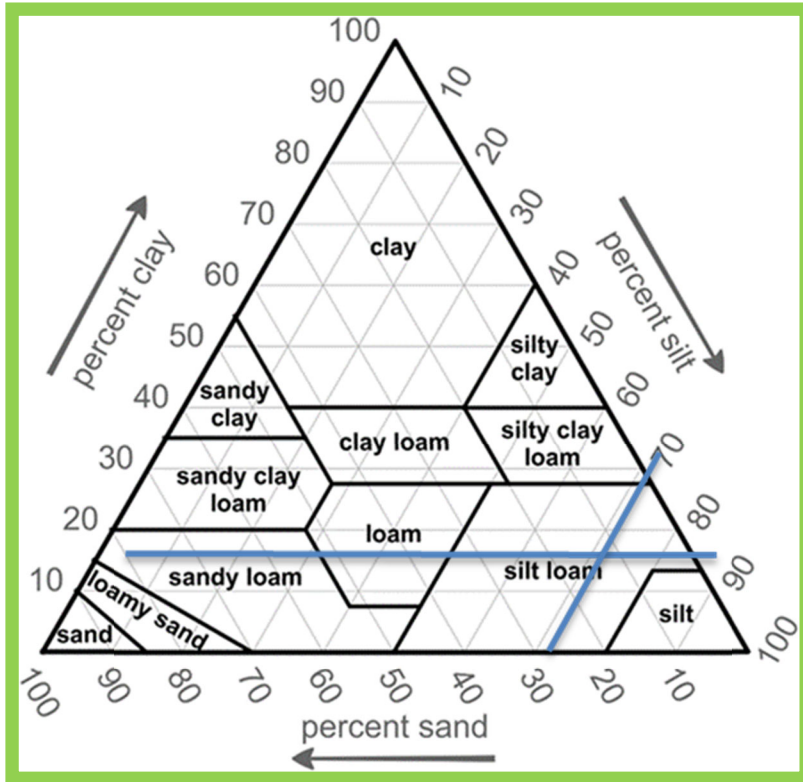
Second, check your soil composition using the easy, DIY **Jar Test**. Or you can pay a service provider. You can follow the following instructions or [this YouTube video](#).

1. Dig out a small section of soil about 8 inches deep and remove any organic materials like grass
2. Put your soil in a jar till you fill about a third of it, add water to your jar leaving some room at the top, and add a teaspoon of detergent.
3. Cover and shake to mix everything, let it settle for about a day, you should then see four distinct layers
4. The topmost layer is of no concern, the second layer is the clay content of the soil, the third is

- The topmost layer is of no concern, the second layer is the clay content of the soil, the third is the silt, and the bottom layer is the sand.
- Measure the thickness of each layer to determine the percentages of each .
- Using the table, you can determine what kind of soil you have.



Jar Test Illustration Photo [Source](#)



This classification will give you an idea of how quickly water will drain out of your sponge garden as the higher the sand percentage and lower the clay percentage the faster the water will drain.

- Make a mark on the clay side at the clay percentage you calculated and do the same for each side. Draw a horizontal line from the clay point on the left, and draw a sloped line from the silt point on the right parallel to the sloped lines towards the sand side. Note the soil classification area where the two lines intersect, in this case Silt Loam.
- A Sponge Garden is meant to drain and so you do not want soil that is overly clayey or silty (like this example is) as these hold water more than sand. But you can amend your soil to help, and compost is the best amendment, but some sand in this case would also help.

In Houston, you will likely have clayey soil which means when you fill in the garden *soil filtration area* you will want to mix the native soil with some compost, which you can buy if you do not make it yourself.

## Sizing

To determine the size of the Garden you will need to know two things:

- What is the soil composition? Which is described above.
- How deep do you want the garden to be?
  - The depth is important as it determines the amount of surface area the garden will occupy. The deeper the garden the less surface space it will take up.

- Any slope the garden would intercept, the deeper the garden should be. Steep hills are recommended to install 8 inches deep gardens and flatter hills would call for 3-5inch deep gardens. Be aware if you have a deep garden on a flat hill it may take longer to fully drain.
- (Optional) If you want to build a heavy-duty Sponge Garden you will be digging about 2 feet into the ground, and the depth here will refer to the top of the soil layer.

Once you know how deep you want your garden and know your soil composition you can use the table to the right to find your sizing factor.

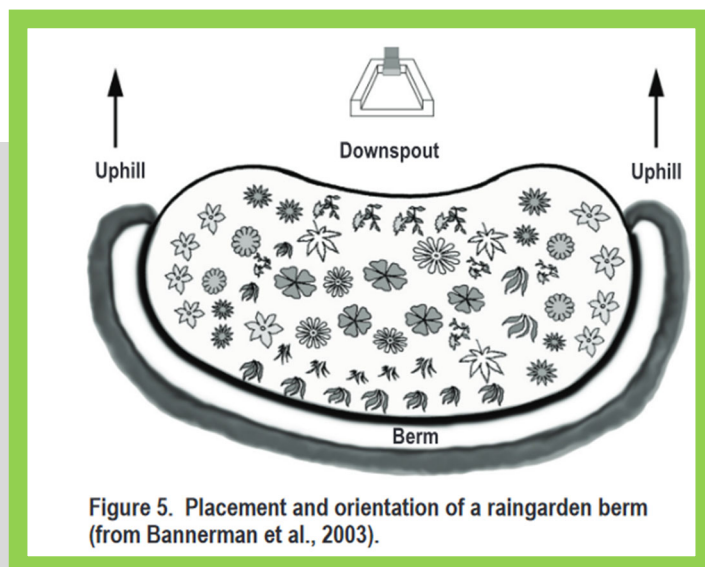
**Table 4. Size factors for raingardens less than 30 feet from a downspout (Bannerman et al, 2003).**

	3 to 5 inches deep	6 to 7 inches deep	8 inches deep
<b>Sandy soil</b>	0.19	0.15	0.08
<b>Silty soil</b>	0.34	0.25	0.16
<b>Clayey soil</b>	0.43	0.32	0.20

- Take your sizing factor and multiply it by the area of your roof. This will determine how big your garden should be in square feet to handle a good rainfall.
- If your calculations prove to be larger than 300 sq feet, it is recommended to instead have a couple of smaller gardens instead of one big one. If you do this, repeat the previous steps for location and soil composition, and when determining size, divide the roof area by how many gardens you plan to have.
- Sponge Gardens tend to work best with a 2 to 1 width to depth ratio. The depth will be

from the closest point of the garden to the opposite lowest side.

- Sponge Garden width should go with the contour of the hill so there is no definitive shape though the bean shape below is a good average configuration, but complete-



**Figure 5. Placement and orientation of a raingarden berm (from Bannerman et al., 2003).**

## Construction

Now that you have the layout planned, outline it on the ground, and begin digging! Dig around your planned area until the ground within your outline is all flat and down to your desired depth. (Optional) For the heavy-duty Version, you will be digging about 3 feet down.

### BERM

- The first section you will be constructing will be the berm. The Berm will act as a barrier to the water flowing out of the sponge garden further down the hill.
- The berm will be located on the far side of the garden away from the house.
- Along this edge, you will pile up soil and compact it giving the soil a slight slope into the garden and make the outside of the berm slightly higher than the perimeter.
- Use most of the native soil dug up to construct the berm, and this soil will *not* be draining water so there is no need to mix with compost.

- Dig 12" deeper for the Optional Heavy-Duty version.

For an idea of what this looks like see the image below:



Photo: [Source](#)

## Construction (continued)

### GRAVEL LAYER FOR OPTIONAL HEAVY-DUTY VERSION

- a. At the bottom of the hole, you will spread out a 1-foot thick layer of Gravel
- b. Place a sheet of engineered fabric over the gravel. This keeps the soil that will reside above from filling up the spaces between the gravel.

### SOIL FILTRATION LAYER

- a) The center of the garden area should be slightly lower than the rest of the garden or you can flatten it below the berm.
- b) If you have clay-heavy soil, till the soil with compost to help break it up - maybe 30% compost.
- c) Do not compact the center area, and if it is, aerate it with a tiller or other tool.

### VEGETATION

- a) Place plants that can deal both with extended dry periods and be saturated with water for brief periods.
- b) DO NOT use seeds, as they will be washed away after the first rainfall, it is best to use

several-year-old plants.

- c) For information on the kinds of plants see a local horticulturist or check out the list [here](#). This is a great opportunity for pollinator plants to attract butterflies! Check out this



[list!](#) Photo: [Source](#)

### MULCH LAYER

- a) Once your plants are in place put an inch thick layer of mulch over the garden area. Mulch helps with weeds, provides resistance to compaction, absorbs pollutants, and retains moisture for your plants.

## Maintenance

1. These gardens are relatively low maintenance, but they are still gardens! Water if the plants seem water-starved, which will often happen in Houston.
2. Most importantly, don't let weeds get started - be vigilant at first and then pull weeds occasionally as you enjoy your new Sponge Garden!
3. Sprinkle compost occasionally as well.

## Community

1. Register your Sponge Garden with our Sponge Garden Facebook page!
2. Interact with other like-minded individuals who have started theirs!
3. Share photos with your success stories!
4. You might want to obtain a rain barrel to collect rainwater from your roof to water your plants during those dry spells Houston has occasionally.