



Rain Garden Workshop

Tennessee Environmental Council

Why Build a Rain Garden?

Rain Gardens are a natural and beautiful way to reduce and clean storm water. These shallow, depressed gardens are designed to collect rain water and allow it time to filter into the ground. This results in cleaner water, less water entering our storm systems, and more water refilling the underground water table that keeps small streams flowing during the dry months. Rain Gardens are also lovely, lively, colorful, low maintenance habitats for insects and animals.

Our Mission

Educating for the conservation and improvement of Tennessee's environment, communities, and public health since 1970.

Step-by-Step Guide



Overview

Before you begin

Planning

Design

Installation

Estimating Costs

After Installation

Maintenance

This step-by-step guide will provide you with the information needed to install a rain garden. If you have any further questions, please contact the Council by visiting our website www.tectn.org



Location

Call TN One Call (811) before you begin to make sure you are not building a rain garden above a septic system or shallow underground utilities. Your rain garden should be at least 10 feet downhill from surrounding houses to avoid water getting in the foundation.

Make sure the slope of your site is less than 12%. Place two stakes into the ground; one at the uphill side of your rain garden and one at the downhill side. Tie a string to the uphill stake at ground level. Ensure that the string is level and tie the other end of the string to the downhill side. Measure the width (in) between the two stakes (a). Measure the height (in) from the ground to the string on the downhill side (b). Divide the height by the length (a) and multiply by 100 to calculate the percentage of slope.

Tennessee is known for its shallow bedrock, so make sure the soil is at least 24 inches deep in your garden location for proper drainage. See below for steps on a drainage test.

Drainage Test

Once you have picked a potential location for your rain garden, you will need to test the soil to determine if it will drain properly. A low infiltration rate may lead to water ponding in your garden, breeding mosquitoes and killing your plants.

1. Dig a hole 12 inches deep and fill it with water. Allow the water to fully saturate the surround soil.
2. Refill the hole and time how long it takes to drain. A drainage time less than 24 hours means your infiltration rate is good. If it takes between 24 and 48 hours to drain, your soil should be amended with a mixture of 20-30% of the existing soil, 20-30% compost, and 40-60% sand to a depth of 6 inches. If the water takes over 48 hours, this is not the best spot for a rain garden.



Sizing Your Rain Garden

Rain gardens typically range from 100-300 square feet to catch most of the runoff from your yard, although smaller garden are sometimes necessary due to lot constraints. Remember that whatever the size of your rain garden, catching and infiltrating runoff will improve our water quality. Below is a simple equation to calculate the best size for your garden.

$$\text{Rain Garden (ft}^2\text{)} = \frac{\text{Rain Depth (in)} \times \text{Drainage Area (ft}^2\text{)}}{\text{Garden Depth (in)}}$$

Keep in mind that most of the rainfall events in Nashville are 1 inch or less and your rain garden should be about 6 inches deep. For example, if the roof area draining to your rain garden is 1,000 square feet, then your rain garden will be:

$$\text{Rain Garden} = \frac{1 \text{ in} \times 1,000 \text{ ft}^2}{6 \text{ in}} = 167 \text{ ft}^2$$



Installation

Getting Started

- Rent machinery in advance such as a tiller, backhoe, or bobcat if needed.
- Check the weather forecast and schedule your work for a dry day. Rain will delay construction and cause sediment to wash into the storm system.
- Gather tools and material close to the site.
- Ask your friends and neighbors to help with the construction. If you don't want to build it yourself, hire a professional landscaper with rain garden experience.

Site Preparation

- Mark the outline of the rain garden on the ground with loose chalk, spray paint, stakes, flags or a garden hose.
- Install appropriate erosion controls such as silt fence or fiber logs if you are creating run off sediment or mud that will enter storm drains or water bodies. Refer to The Tennessee Erosion and Sediment Control Handbook for more information:
http://www.tn.gov/environment/wpc/send_ero_controlhandbook/

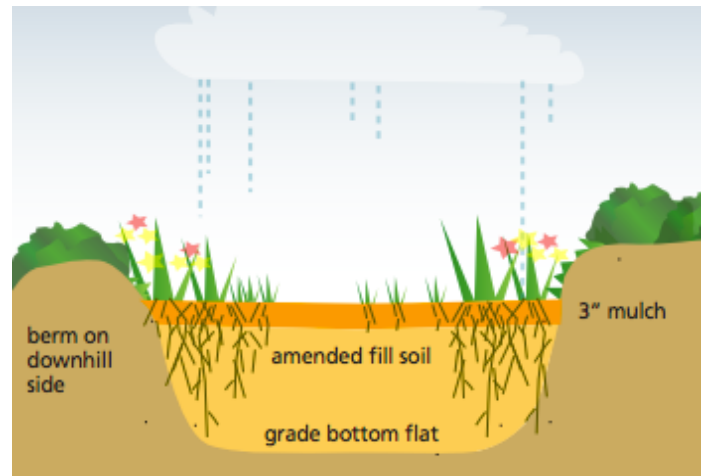
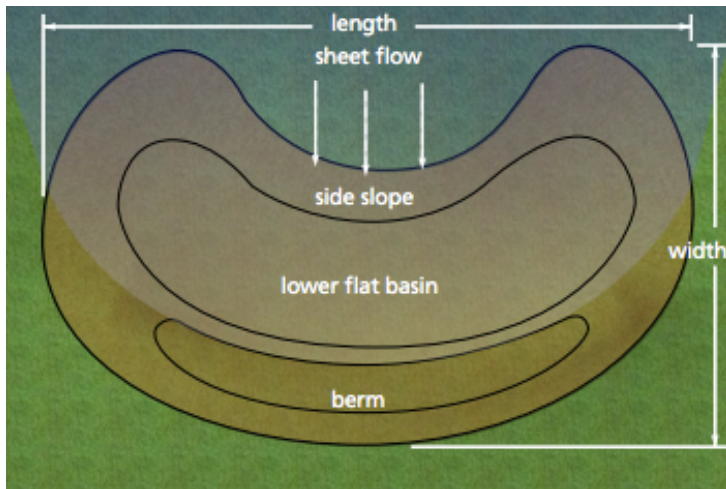
Excavation

- Dig your garden the size, shape and depth that you have determined during planning. Remember to take into account the soil depth (if needed) and the final 3 inch mulch later. Your final rain garden should be around 6 inches deep.
- Do not compact the soil during excavation.
- It is crucial to make the bottom flat and level so water will infiltrate evenly and not pool. Use survey methods or a carpenter's level laid on top of a board to check and correct your work.
- If your rain garden is on a slope, place excavated soil on the downhill side to be used later to form the berm.



Tools You'll Need

- Tape Measure
- Shovels
- Rake
- Trowels
- Wheelbarrow
- Carpenter's level
- Marking paint
- String
- Eye, hand, and foot protection.
- Hard hats if using machinery such as a bobcat.



Installation Continued

Amending the soil

- If your infiltration rate calculation indicated your soil needs amending, backfill the excavated soil mixed to a ratio of 20-30% existing soil or top soil, 20-30% compost and 40-60% coarse sand.
- Mix small portions at a time by hand or with machinery. Allow it to settle overnight and add additional soil if needed. Keep the soil level.

The Berm

- If the garden is located on a slope, use the remaining excavated soil to construct a berm on the downhill side of the rain garden.
- The berm should be rounded and gradually taper on the sides until it meets the existing lawn. Once the berm is shaped, compact it with your feet or a tamping bar. The berm will act as a dam to hold more water in the garden.
- To prevent erosion the berm will need to be planted with grass or incorporated into the planting design.

Planting

- Carefully choose native plants that are quality, established nursery stock.
- Store plants in protected shady area until ready to plant.
- Do not allow plants to dry out during storage or installation.
- Lay out your plants and dig holes twice as wide as the root ball.
- Plant the crown of the plant level with the existing soil.
- Water immediately after installation.

Edging and Mulching

- A strong edge for your rain garden has multiple benefits. Using trenches, metal or plastic edging, stone, brick, or even a thick border of native grasses creates a strong visual line and prevents weeds from creeping into your rain garden. Make sure your edge is buried low enough for runoff to flow over it into the garden.
- Mulch is used to retain moisture, prevent erosion, control weeds and nourish the soil.
- Spread 3 inches of pine straw or shredded wood mulch over the rain garden.



Native Plants

A list of native plants can also be found online. Be sure to pick plants that can withstand the amount of sun and moisture that your rain garden will be getting.

Rain Garden Maintenance

During the first several years your plants are getting established and will need maintenance and watering. After establishment maintenance is low. Water is required during droughts.

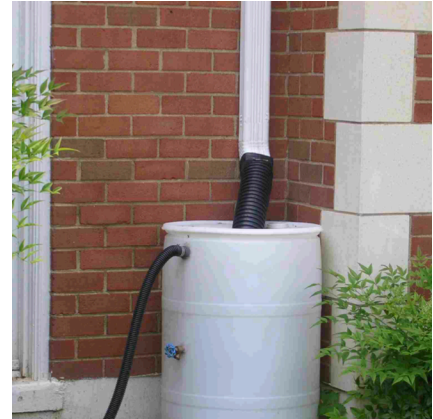
Check plants for signs of distress such as wilting, yellow/brown leaves etc. Relocate or amend soil as needed. Remove weeds by hand and limit use of herbicides. Deadhead and clean dead debris from plants in early spring before new growth.

After a heavy rainstorm, check for failure such as water going through the berm. Erosion ridges can lead to failure. Repair as needed.

If areas do not drain, this indicates the soil pores have become compacted. Soil may need to be replaced or loosened. Remove excessive accumulated sediment or debris.

Perform a pH test as needed for excessive acidity or alkalinity. Adjust pH with amendments if needed. The University of Tennessee Soil, Plant and Pest Center in Nashville will perform inexpensive soil tests, recommend amendments and is a great resource for other questions concerning the health of your rain garden.

Check regularly to see that mulch has not washed away. Add a fresh layer of mulch in early spring after clean-up.



Design Template

A list of design templates can be found online, however, remember that rain gardens come in a variety of shapes and sizes.

The best designs are typically longer than they are wide, with the longer side perpendicular to the direction of water flowing into your garden.

You can also get water to your garden by routing a pipe from your gutters and rain barrels or building a stone lined channel to carry the flow.



Additional References

- Tennessee Environmental Council

<http://tectn.org/>

- Rain Garden Network

<http://www.raingardennetwork.com/>

- Rain Garden Design Templates

http://www.lowimpactdevelopment.org/raingarden_design/whatisaraingarden.htm

- Rain Gardens for Nashville

<http://www.raingardensfornashville.com/>

- Three Rivers Rain Garden Alliance

<http://raingardenalliance.org/>

Rain Garden Construction Cost Comparison

Cost for 10' x 6' Do It Yourself Rain Garden - \$200-\$300 includes no rental or delivery costs.

Cost for 20' x 10' Do It Yourself Rain Garden - \$750-\$900 includes no rental or delivery costs.

Cost for 20' x 10' Do It Yourself Rain Garden - \$1,200-\$1,700 includes backhoe rental and material delivery.

Cost for 20' x 10' Rain Garden constructed by Landscape Contractor - \$3,500-\$4,500

Estimating Costs

An important part of planning your rain garden is knowing what it will cost. The information below is on average costs for materials and labor in the Middle Tennessee area for your use. These prices can vary based on individual conditions.

	ITEM	UNIT	AVG. COST
	EQUIPMENT:		
	Backhoe w/operator	per hour	\$50-\$100
	Backhoe only	per day	\$200-\$300
	SOIL AMENDMENTS:		
6" layer of amended soil with 20-30% compost for a 20' x 10' rain garden - 1 cubic yard	Compost	cubic yard	\$30
6" layer of amended soil with 40-60% sand for a 20' x 10' rain garden - 2 tons	Coarse sand w/o delivery	ton	\$20-\$30
	Delivery	each	\$50
Plants with installation- multiply plant cost by 2.5	PLANTS:		
	Trees	caliper inch	\$100/inch
	Shrubs	1 gal.	\$15-\$25
		2 gal.	\$20-\$30
	Perennials, grasses	plugs	\$20/flat
		4" pots	\$4-\$6
		1 gal.	\$7-\$9
2 cubic yards for 20' x 10' rain garden	MULCH:		
3" layer of mulch for 20' x 10' rain garden - 2 cubic yards	Delivered and installed	lump sum	\$250
	Mulch only	cubic yard	\$50-\$70