



A Homeowner's How-To Guide

RAIN GARDENS

for Northwest Ohio



WHAT *is a rain garden?*

A rain garden is a garden built in a natural or man-made depression that is designed to temporarily fill with rain water from downspouts, driveways, or streets, keeping this water on site and out of our storm sewer systems. Rain gardens allow the water to soak back into the

ground and filter pollutants with the help of deep-rooted native plants. Designed in all shapes and sizes, rain gardens may include formally arranged plants, fields of wildflowers, shrubs, stone culverts and paths, and other beautiful landscape features.



WHY *rain gardens?*

As cities and towns continue to expand and development increases, there are more demands placed on our local environment. Impervious surfaces associated with development, such as rooftops, driveways and roads, are areas that shed rainwater. Construction activity on development sites usually compacts the soil, limiting the ground's capacity to absorb water. Taken together, these factors reduce the ability of our landscape to absorb and filter stormwater.

Impervious surfaces can negatively affect our environment as they increase stormwater runoff. Consequently they increase the chance for pollution to enter our waterways through our storm drainage systems, including sewers and open ditches, which flow untreated to our streams and lakes. Studies by the United States Environmental Protection Agency (USEPA) have shown that a substantial amount of the pollution in our streams, rivers and lakes is carried

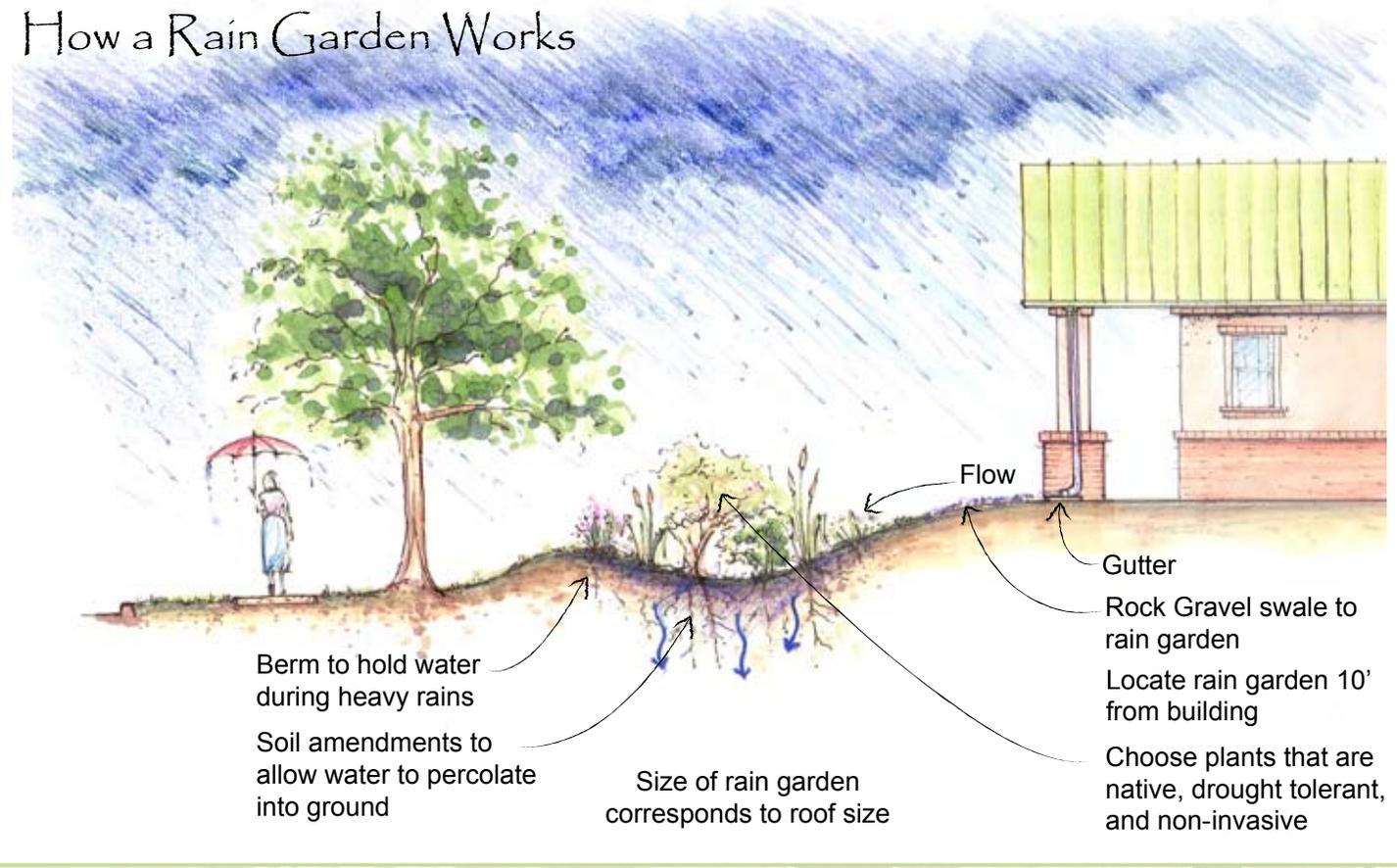


there by rainwater from our yards, driveways, rooftops, and streets. An easy way to keep these pollutants out of our local waterways is through rain gardens. Rain gardens are able to absorb most rainfall events. While one rain garden may seem like a small thing, collectively they produce substantial neighborhood and community environmental benefits. You can make a difference!

Benefits of Rain Gardens

- Help keep water clean by filtering stormwater runoff before it enters local waterways.
- Recharge the groundwater supply.
- Provide beautiful landscaping for yards and neighborhoods.
- Provide valuable habitat for birds, butterflies, and beneficial insects.

How a Rain Garden Works



STEP 1: Location

Before building the rain garden, consider how it will catch water. Runoff will flow out of a downspout and should spread evenly across the entire length of the rain garden.

The rain garden must be as level as possible so water doesn't pool at one end and spill over before it has a chance to infiltrate. The longer side of the rain garden should face upslope; that is, the length of the rain garden should be



perpendicular to the slope and the downspout. This way the garden catches as much water as possible. However, the rain garden should still be wide enough for the water to spread evenly over the whole bottom and to provide the space to plant a variety of plants. A good rule of thumb is that the rain garden should be about twice as long (perpendicular to the slope) as it is wide.

When choosing the width of the garden, think about the slope of the lawn. Wide rain gardens and rain gardens on steep slopes will need to be dug very deep at one end in order to be level. If the rain garden is too wide, it may be necessary to bring in additional soil to fill up the downhill half.



Experience shows that making a rain garden about 10 feet wide is a good compromise between the effect of slope and how deep the rain garden should be. A rain garden should have a maximum width of about 15 feet, especially for lawns with more than about an 8 percent slope.

Rain gardens can be placed near your home to catch runoff from your roof, driveway and other impervious areas. Rain gardens can also be placed farther out in your lawn to collect surface water draining across your property. Find out where runoff flows and locate areas where water collects. Typically, the largest sources of runoff are rooftops, paved surfaces, slopes, and compacted soils.



Some helpful tips to determine the best location for your rain garden:



Rain gardens should be a minimum of ten (10) feet from your home and your neighbors' homes, to prevent damage to basements and foundations from water infiltration.

Rain gardens should not be placed over or near the drain field of a septic system.

Rain gardens should not be placed where water stands in your lawn. This shows low permeability of the soils and will not accept the rain garden infiltration.

Rain gardens should not be placed within existing drainage ways such as swales and ditches.

Sunny or partly sunny locations are best for rain gardens, but shade gardens are possible.

Rain gardens should not be installed under large trees. Trees have extensive root systems that may be damaged in the rain garden excavation process. In addition, they may not be able to adapt to the extra moisture being held by your rain garden.

You may want to check with your local building department before installing your rain garden as some of the installation requirements may conflict with local ordinances or zoning regulations.

Make yourself aware of underground service lines or utilities.

Remember to "Call before you dig"! 1-800-362-2764 for underground utilities and 1-800-925-0988 for oil and gas lines.

A Simple Soil Test

Once you select your location, perform this simple soil test to determine if the soils are suitable to soak in rainwater:

Dig a hole about 6 inches deep where the rain garden is going to go, fill the hole with water and let it soak in, once the water has soaked in fill the hole with water a second time. This time watch to see if the water soaks into the ground in less than 24 hours. If the water has not soaked into the ground in 24 hours, consider adding soil amendments* or re-locating your rain garden to a more suitable spot.

In general, if your soil profile is sandy (coarse textured soils), you may be able to simply loosen the soil and improve it with some yard waste compost to prepare your rain garden for planting. Silty soils (intermediate textured soil) drain better than clayey soils (fine textured soils), but both types may need help to function properly. If you are unsure of your soil type you can contact your local Soil and Water Conservation District (SWCD).

**see page 8 for soil ammendment information*

STEP 2: *Sizing*

Your rain garden can be almost any size. Be sure that you can handle the budget and labor of the size before starting construction. Any reasonably sized rain garden will provide some stormwater runoff control. A typical residential rain garden ranges from 100 to 300 square feet. Rain gardens can be smaller than 100 square feet, but very small gardens have little plant variety. If a rain garden is larger than 300 square feet it takes a lot more time to dig, is more difficult to make level, and could be hard on your budget.

The size of the rain garden will depend on:

- how deep the garden will be,
- what type of soils the garden will be planted in, and
- how much roof and/or lawn will drain to the garden.

FIND the SLOPE

1. Pound one stake in at the uphill end of your rain garden site and pound the other stake in at the downhill end. The stakes should be about 15 feet apart.
2. Tie a string to the bottom of the uphill stake and run the string to the downhill stake.
3. Using a string level or the carpenter's level, make the string horizontal and tie the string to the downhill stake at that height.
4. Measure the width (in inches) between the two stakes.
5. Now measure the height (in inches) on the downhill stake between the ground and string.
6. Divide the height by the width and multiply the result by 100 to find the lawn's percent slope. If the slope is more than 12%, it's best to find another site or talk to a professional landscaper.



This portion of the roof is 250 sq. ft; divide by 3 to determine the proper size of the rain garden.

$$250 \text{ sq. ft.} / 3 = 83 \text{ sq. ft. garden}$$

250 sq. ft.

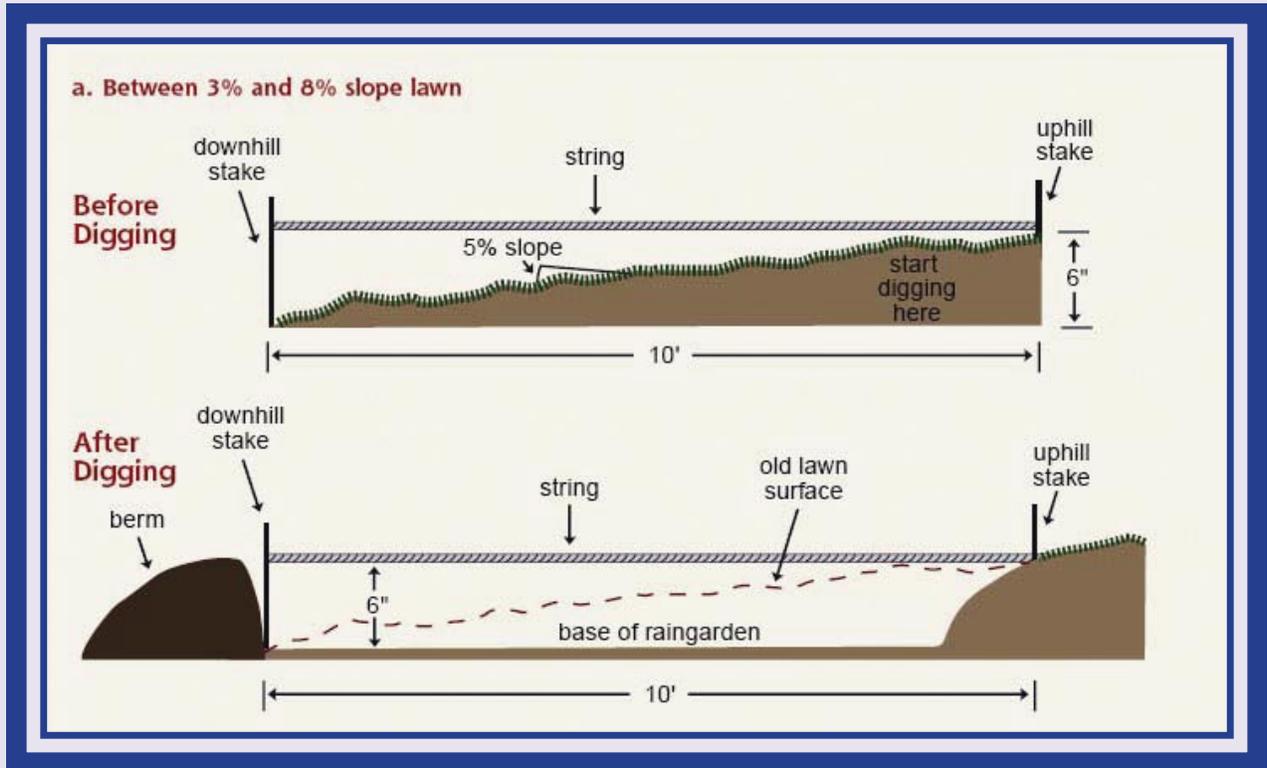


Install the rain garden 10 or more feet from the house and neighboring structures. Rain garden should be downslope from building and filled with native plants.

Depth

Using the slope of the lawn, select the depth of the rain garden from the following options:

- If the slope is less than 4%, it is easiest to build a 3 to 5-inch deep rain garden.
- If the slope is between 5 and 7%, it is easiest to build one 6 to 7 inches deep.
- If the slope is between 8 and 12%, it is easiest to build one about 8 inches deep.



A typical rain garden is between four and eight inches deep. A rain garden more than eight inches deep might pond water too long, look like a hole in the ground, and present a tripping hazard for somebody stepping into it. A rain garden much less than four inches deep will need an excessive amount of surface area to provide enough water storage to infiltrate the larger storms. No matter what the depth of the rain garden, the goal is to keep the garden level. Digging a very shallow rain garden on a steep lawn will require bringing in extra topsoil to bring the down slope part of the garden up to the same height as the up-slope part of the garden. As the slope gets steeper, it is easier to dig the rain garden a little deeper to make it level. The slope of the lawn should determine the depth of the rain garden.

Determining Drainage Area

In order to estimate the size of your impervious surface, you will need to measure the footprint, or the outside dimension of your building or driveway. A building's footprint will be relatively equal to the area of its roof, which can be determined by multiplying the width of the building (in feet) by its length (in feet). The area of your impervious surfaces is your drainage area that will be directed to your rain garden.

Having estimated the drainage area, soil type, and depth for your rain garden, use Table 1 or Table 2 to determine the rain garden's size factor. Use Table 1 if the rain garden is less than 30 feet from the downspout, and use Table 2 if it is more than 30 feet from the downspout.

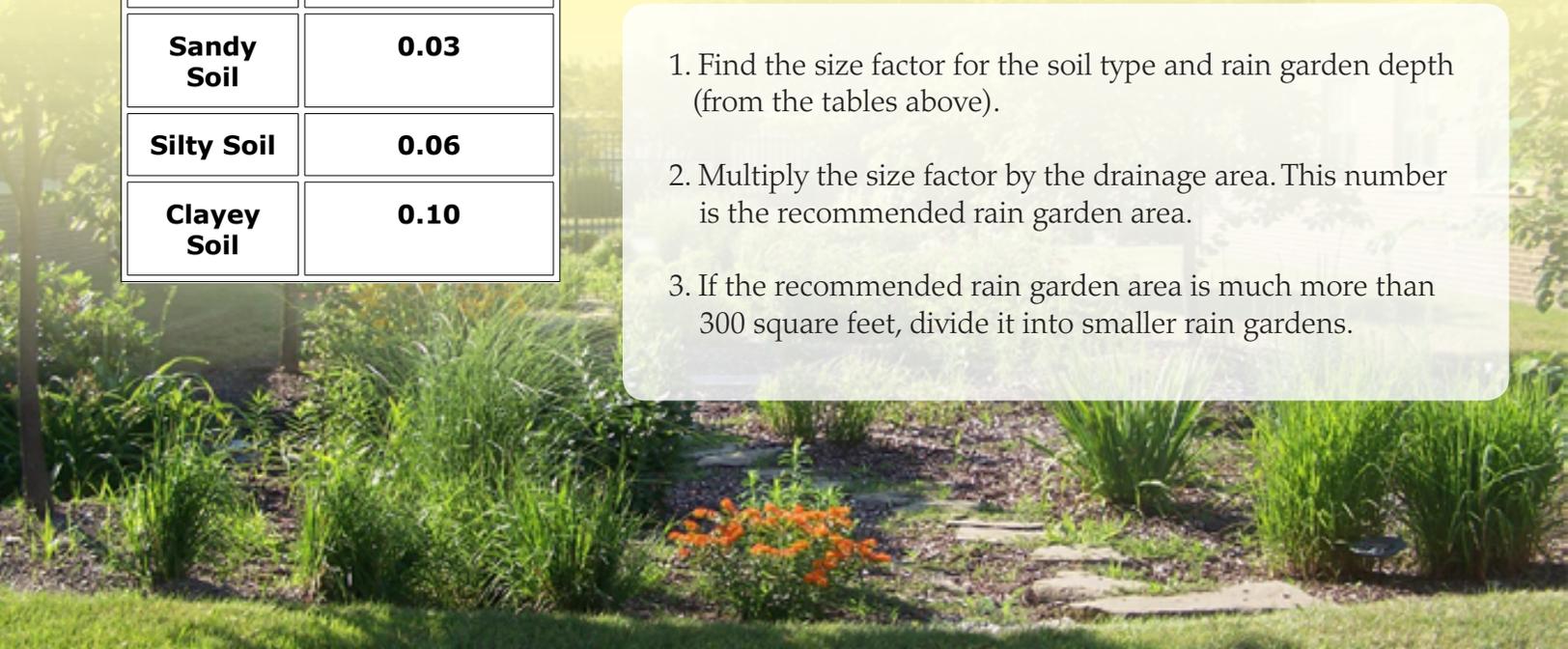
**Table 1 Size Factors
for rain gardens less than 30 feet from downspout.**

	3-5 inches deep	6-7 inches deep	8 inches deep
Sandy Soil	0.19	0.15	0.08
Silty Soil	0.34	0.25	0.16
Clayey Soil	0.43	0.32	0.20

**Table 2 Size Factors
for rain gardens more than 30 feet from downspout.**

	All Depths
Sandy Soil	0.03
Silty Soil	0.06
Clayey Soil	0.10

1. Find the size factor for the soil type and rain garden depth (from the tables above).
2. Multiply the size factor by the drainage area. This number is the recommended rain garden area.
3. If the recommended rain garden area is much more than 300 square feet, divide it into smaller rain gardens.



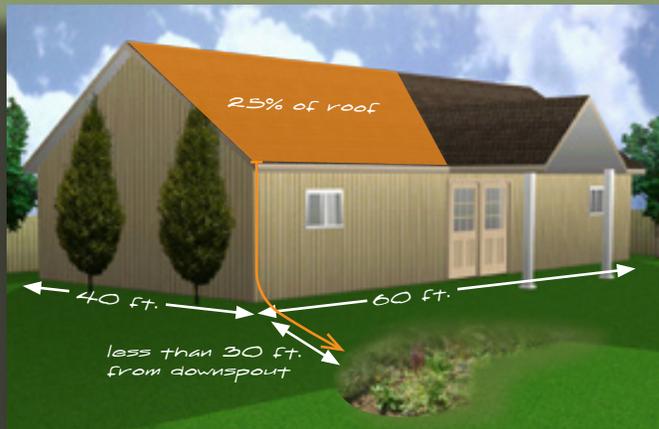
Calculations

EXAMPLE

Tom's house is 60 feet by 40 feet, so the roof area is 2,400 square feet. He estimates the downspout collect water from 25% of the roof, so he multiplies 2,400 by 0.25 to get a downspout drainage area of 600 square feet.

Roof Area: 60 ft. by 40 ft. = 2,400 sq. ft.
 Drainage Area: 2,400 sq. ft. x .25 (25%) = 600 sq.ft.

I only want the garden to be 10 ft. from front to back.



String is level from bottom of high stake to low stake.

it's 180 inches long and 9" off ground at the low stake.

EXAMPLE

Tom measures the length of the string between the high and low stakes; it is 180 inches long. It is at the bottom of the high stake and runs level to the low stake. The height from the ground to the string on the low stake is 9 inches. He divides the height by the length of string to find his lawn's percent of slope.

$$\frac{\text{height}}{\text{width}} \times 100 = \% \text{ slope} \quad \frac{9 \text{ inches}}{180 \text{ inches}} \times 100 = 5 \%$$

With a 5% slope, Tom should build a 6 inch deep rain garden.

EXAMPLE

Tom's rain garden is less than 30 feet from the downspout, and his lawn has a 5% slope, so he will have a 6-inch deep rain garden. His lawn is silty, so Table 1 recommends a size factor of .25. He multiplies the drainage area (600 sq. ft.) by 0.25 to find the recommended rain garden area of 150 square feet.

$$600 \text{ sq.ft. by } 0.25 = 150 \text{ sq. ft.}$$

EXAMPLE

Tom wants a 10-foot wide rain garden, so he divides the rain garden area (150 sq. ft.) by 10 to find the rain garden length, 15 feet.

$$\frac{\text{rain garden area}}{\text{width}} = \text{length} \quad \frac{150 \text{ sq. ft.}}{10 \text{ ft.}} = 15 \text{ ft.}$$

DIMENSIONS OF YOUR HOUSE

$$L \text{ ___ } \times W \text{ ___ } \times \% \text{ of roof to downspout ___ } =$$

TOTAL DRAINAGE AREA

SLOPE FROM STAKE TO STAKE

$$\text{Length of string ___ } \text{ div. by Height of string ___ } \times 100 =$$

% Slope

*4% = 3 TO 5" DEEP • 5-7% = 6 TO 7" DEEP
 8-12% = 8" DEEP*

RAIN GARDEN AREA (using tables at left • based on your garden depth and soil type)

$$\text{Drainage Area ___ } \times \text{ Factor from Tables at Left ___ } =$$

TOTAL RAIN GARDEN AREA

DIMENSIONS OF RAIN GARDEN

$$\text{rain garden area ___ } \text{ divided by desired width ___ } =$$

LENGTH OF RAIN GARDEN

STEP 3: *installation*

As mentioned earlier, rain gardens can take a variety of shapes. Crescents, ovals, teardrops and kidney shapes, but the shape of your garden will be determined by the space you have available, the location, and your preferences. Once you have determined the appropriate size for your garden, you should choose a shape that best fits your yard and the existing landscape.



To help you shape the garden, mark the perimeter by placing stakes, flags or even a garden hose along the edge of where you want the rain garden to be. Doing this will provide a defined area that you will dig and it will also allow you to better visualize the final size and shape of the rain garden. This is the time to make changes, before you start digging.



ROUTING WATER

If your rain garden will be located more than 30 feet from the home, you may need to plan and construct an arrangement to route water from a downspout to the garden. Although it sounds elementary, remember that water flows downhill, so plan your garden downhill from the water source.

Keeping this principle in mind, there are several options for routing runoff from its source to your rain garden:

Water can be routed to your rain garden through a grassy swale (or a flat grassy channel) that will slow down the water and spread it out as it travels to the garden. This allows for some additional infiltration of the water.



Another option is to create a creek bed feature or a small waterfall using a rock-lined channel. This can create an attractive “babbling brook” when it rains and can slow down the water going into the garden, dissipating some of its force. A rocky channel requires little maintenance.

Another option is to use a plastic downspout extender to connect a downspout to the rain garden. If this kind of direct connection is made, almost all of the water coming from the downspout will go directly into the garden, so the garden must be sized correctly. A 4-inch plastic downspout extender can be used effectively and can either be placed on top of the lawn or be buried.

Regardless of how the water is routed, some kind of diffuser should be used at the point where the water enters the garden so that plants in the immediate area will not be washed out by the force of the water and to prevent erosion. River rocks make an attractive diffusion structure.



REMOVING the Turf...



Many rain gardens are constructed in existing lawns. The time and effort it takes to dig out the garden can be reduced by removing the sod first. Sod removal machines are available for rent at some nurseries and tool rental facilities, but a shovel and some hard work can be just as effective. If removed carefully, the turf grass could be reused for patching bare spots around the lawn. Killing the turf first with a chemical application may also be used to reduce the effort in digging your garden.

As an alternative, you can cover the lawn where the rain garden will be located with black plastic, several layers of newspaper or any disposable material that will block sunlight. Over a period of about a week or more, the grass will die and it can then be tilled and mulched into the rain garden soil. This can even be done in the fall so that the area is ready for garden preparation in the spring.

Now it's time to start digging! Smaller gardens can be dug by hand with a shovel, or equipment can be rented for larger gardens. Most gardens for average sized homes can be dug by hand if you are in good health, or have some extra help.



Amending the SOIL

Now that the garden is dug, you should decide if you need to amend the soil. As indicated earlier, the type of soil you have affects how fast water will soak into your rain garden. It is recommended to add compost to enhance the organic content of almost any soil type to ensure good health for your plants. Compost is often commercially available but you can also compost your own garden debris. If you are amending with compost to increase organic matter content, over-excavate the site by 2 inches. Then place 2 inches of compost and incorporate into the soil.



PLANTS



When choosing plants for your rain garden it is important to select plants that can grow in various moisture levels. This is because rain gardens can be either dry or filled with water depending on the season and frequency of rain events. Be sure to place plants that can handle a lot of water towards the lowest part of the garden and plants that prefer drier areas towards the highest part of the garden.

It is also recommended that you use plants that are native to the area because these perennial plants are naturally adapted to the local climate conditions. For this reason, they will be better at handling various water levels. Native plants also have deep root systems that are good at absorbing water and filtering pollutants.

WHY *native plants?*

Native grasses, flowers, and shrubs have adapted to the local climate of the region. They are, by evolution, tolerant of extreme heat, bitter cold, and fierce winds of the Midwest. After they are established, they need no extra protection from the drought in summer or the harsh elements in winter, thereby reducing gardening labor. An area of lawn that has been converted to a native plant garden does not require routine fertilizers, watering, or mowing.



WHAT *are native plants?*

We define a native or indigenous plant as a species that has been recorded at the time of early settlement in this area, about 300 years ago. Commonly, stores and nurseries use the term "wildflower" to describe those plants that can be found along roadsides and old fields. This term may be confusing and apply to plants that have been naturalized in the area, but their origins may be from Europe or Asia. "Cultivars" are plants that most nurseries carry that have been specifically selected to produce plants with larger blooms, unique foliage or a specific, preferred size. Native plants possess plenty of nectar and wildlife habitat characteristics that are adapted to the local climate. Native plants just make sense!

STEP 4: Maintenance

Maintaining your rain garden is much like maintaining any other new component of your landscaping. A properly maintained garden is not only more attractive but also will function better in your landscape. First, learn to identify unwelcome weeds that need to be removed and leave desirable plants to develop. Next, keep a [2-3"] layer of aged, shredded hardwood mulch to maintain optimum soil moisture and reduce weeds. Develop a regular schedule to monitor the garden and provide additional water when there is insufficient rainfall during the first year.

Watering

Plants in the rain garden will be more susceptible to stress when they are young. You will need to water the rain garden plants regularly until the plants are established. This usually takes one or two months. If you do not get consistent rains, a slow trickle of water from the hose for 30 minutes each week is usually sufficient. After the plants are established, you should not have to water them except during prolonged dry periods. Large, mature plants can also tolerate being saturated better than young, small plants.





Commonly Made Mistakes

- Installing a rain garden on soils that lack adequate infiltration.
- Poor maintenance – mostly insufficient weeding the first year after installation.
- Annual weeds that are not pulled will re-seed rapidly, creating an unkempt looking rain garden.
- Planting species that are too tall for the area. Carefully note the height ranges for the recommended species – if you have a small bed do not plant the taller species.
- Use of fertilizer. Native species do not need fertilizing, and often will grow too tall and flop over if they encounter rich conditions.
- Improper plant placement – put drought tolerant species on the sides of the rain garden and more water tolerant plants in the wetter areas of the rain garden.
- Improper location of the rain garden – water does not naturally flow to the site, or outflows are directed toward the building foundation.
- Not removing or turning off irrigation to the new rain garden – once established rain gardens are designed to require only rainfall for the moisture needs of the plants.



OTHER STORMWATER OPTIONS



There are many other stormwater solutions besides rain gardens that you can use to reduce the amount of runoff from your home. These alternatives include the use of rain barrels, vegetated swales, green roofs, permeable pavement, and rain chains.

Rain barrels are a rather inexpensive way to collect roof runoff. Essentially any watertight barrel can be installed under a gutter downspout where water can be funneled into it and collected. The benefits of rain barrels are that it stores water to be used to water lawns and gardens during dry periods and lowers water bills. Manufactured barrels with lids and spigots are available through websites, catalogues and hardware stores and typically cost between \$40 and \$260.

Vegetated swales are shallow vegetated depressions that are strategically placed to receive stormwater flow from surrounding areas and direct it away from a site, while holding the water and allowing it to soak into the soil to a limited degree. When designed properly, swales slow stormwater flows, reducing peak discharges while providing an aesthetic addition to a developed landscape. They can be used in neighborhoods and are especially useful when used in parking lots or along roadways.

Green roofs, also known as vegetated rooftops or eco-roofs, are essentially rooftop areas that have been installed with living vegetation. There are a variety of different types of green roofs, ranging from small gardens and planters to roofs that are completely covered by sod and plants. Green roofs can only be used on flat roofs or on roofs with gentle slopes. While weight is generally not an issue, as most green roof vegetation is actually lighter than a standard gravel and tar roof, consideration must still be given to soil selection and building structure to assure structural stability. The soil collects and holds rainwater and filters out contaminants, while plants soak up the water and provide evapotranspiration.



Green roofs should only be done by licensed professional contractors.

Permeable pavements can take many different forms, but the term refers to pavement surfaces that allow water to pass through them. The four main types of permeable pavements are porous asphalt, pervious concrete, grid pavers and grass pavers. Porous asphalt and pervious concrete look much like normal asphalt and concrete but are manufactured to have gaps through which water can flow into the gravel basin beneath. Grid pavers are similar to block pavers but use plastic material rather than blocks. This makes them more flexible and they can be used on uneven surfaces. Grass pavers are interlocking blocks shaped in a symmetrical way to fit together and leave spaces for grass to grow through.



Rain chains are a beautiful and functional alternative to traditional, closed gutter downspouts. Guiding rain water visibly down chains or cups from the roof to the ground, rain chains transform a plain gutter downspout into a pleasing water feature. From the soft tinkling of individual droplets to the soothing rush of white water, they are a treat to listen to.



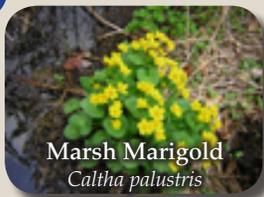
Plants for rain gardens...

SUNNY



Plants for rain gardens...

SHADE



Before you start you will want these tools handy!

- String
- Marking flags
- Tape measure
- Shovel
- Garden rake
- Edger
- Tarp
- Wheelbarrows
- Tiller
- Level or string & ruler



Do-it-Yourself Rain Garden Budget Calculation:

Your rain garden will cost approximately the same as any other new garden installation in your yard. Use this sheet to estimate your garden budget.

Description of Work	Materials & Equipment Rental Cost	Total
Remove turf grass	Sod Cutter Rental (if needed)	\$
	Tiller Rental (if needed)	\$
Prepare garden with 2" - 3" of compost	Compost @ \$___ CY* (Sq. Ft. ___/4) divided by 27 = ___total CY	\$
Plants	___ Plants @ \$___ ea.	\$
Apply 2" - 3" of aged, shredded mulch	Same total CY as compost @ \$___ CY	\$
*CY=Cubic Yard	GRAND TOTAL	\$



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Toledo - Lucas County

