RAIN GARDEN MANUAL for HOMEOWNERS

Protecting our water, one yard at a time

What is a Rain Garden?

A rain garden is an attractive, landscaped area planted with perennial native plants which don't mind getting "wet feet." They are beautiful gardens, built in depressions, which are designed to capture and filter storm water runoff from impervious surfaces around the home, such as rooftops and driveways.

The benefits of rain gardens are multiple and include their ability to perform the following functions:

- Help keep water clean by filtering storm water runoff before it enters local waterways.
- Help alleviate problems associated with flooding and drainage.
- Enhance the beauty of individual yards and communities.
- Provide habitat and food for wildlife including birds and butterflies.
- Recharge the ground water supply.

Why Do We Need Rain Gardens?

As 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 storm water.

Impervious surfaces can negatively affect our environment as they increase storm water 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. The type of pollution that results from storm water runoff is called nonpoint source pollution. 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 runoff from our own yards and gardens. Some of the more common nonpoint source pollutants include fertilizers, pesticides, pet wastes, grass clippings and yard debris. An easy way to help keep these pollutants out of our local waterways is to install a rain garden!

Installing Your Own Rain Garden

Installing a rain garden can be a fairly simple process, involving a shovel and a bit of physical energy. This manual will guide you through the process of building a rain garden on your property.

The size and style of your garden will depend on a number of factors including: the size of your yard, whether you are trying to create a formal or informal looking garden, and the amount of money you want to spend. *Remember, you can never have a rain garden that is too large or too small!* Any size rain garden can contribute to solving local water quality problems and will be a beautiful addition to your property!

Milkweed is a popular rain garden plant species because of its ability to tolerate wet soil conditions. Here, one is visited by a female monarch butterfly.

RAIN GARDEN Q & A

Is a rain garden a pond?
Rain gardens are not ponds. If properly designed, they should hold water for a maximum of 48 hours.

Will a rain garden attract mosquitos?
No! A common misconception of any water feature near the house is that it will attract mosquitos. Mosquitos need standing water for 7-12 days to complete their life cycle. A properly installed rain garden should not hold water long enough for mosquito larvae to complete their life cycle. Rain gardens also have the advantage of attracting dragonflies, which are predators of mosquitos. In short, a rain garden will not make a mosquito problem worse, and could possibly improve it by helping to eliminate standing water.

Are rain gardens hard to maintain?
No! That is the beauty of using native plants in your rain garden! Native plants are well adapted to their natural surroundings and do not require fertilizers or pesticides.

Is a rain garden expensive?
It doesn't have to be. If you purchase plants, and do the work yourself, the cost will be about $3 to $5 per square foot. If you hire a landscape consultant to design, construct, select and install plants, the cost will increase to about $10 to $15 per square foot.

Placing and Sizing Your Rain Garden

This section of the manual covers rain garden planning basics -- where to put the garden and how large it should be based on your soil type, slope, and drainage area. Following the instructions in this section will help ensure your rain garden is successful. There is a rain garden worksheet on page 18 where you can perform and record your calculations.

Finding the Right Location for Your Rain Garden

Rain gardens can be placed near your home to catch runoff from your roof, or farther out in your lawn to collect surface water draining across your property. Do a bit of rainy day sleuthing to discover the drainage pattern on 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 are listed below to help you 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 from water seepage.
- Rain gardens should not be placed over or near the drain field of a septic system.
- Because these areas are already poorly drained, rain gardens should not be placed in an area of your yard where water collects. They should be placed up-slope of these areas to reduce the amount of water that flows into them.
- 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 be integrated with your landscape. They can have a formal or informal look based on your preference.
- 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.
- 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.

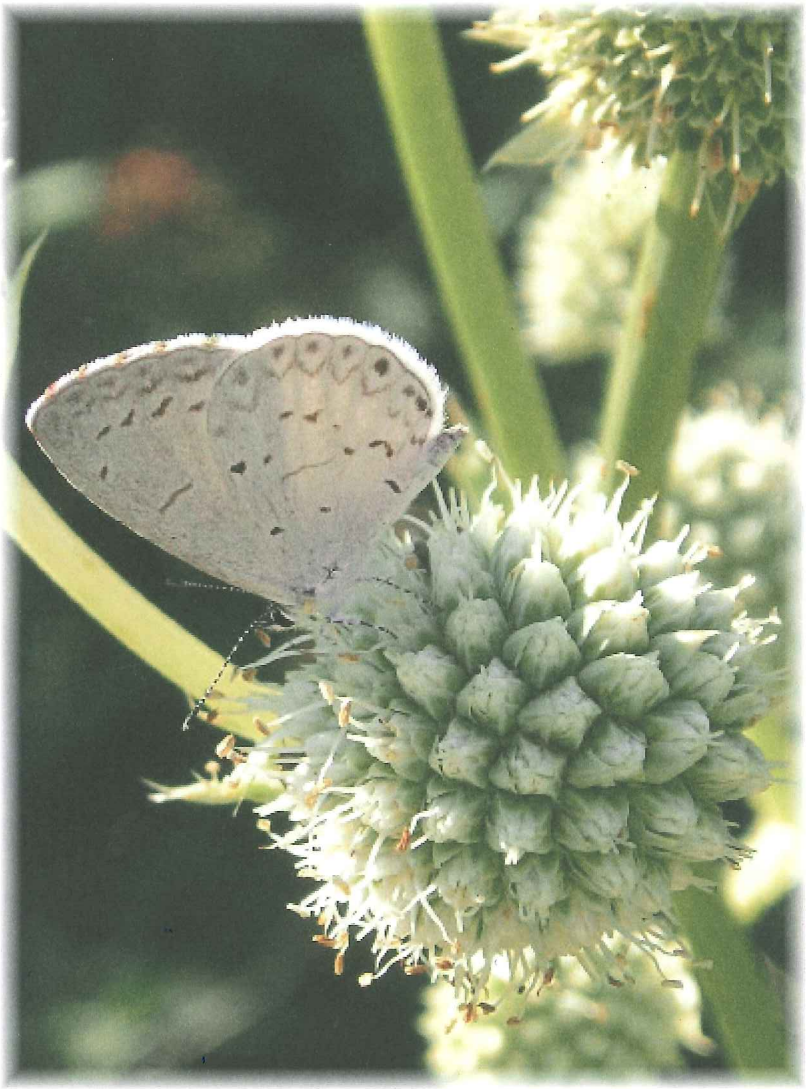
How Large Should Your Rain Garden Be?

Your rain garden can be any size. The *ideal* situation is to create a rain garden that will absorb all the rain that would normally flow away from your home. However, a typical residential rain garden is usually between 100 and 300 square feet.

The size of your rain garden will depend on the factors listed below:

- The depth of the garden
- The amount of runoff from the roof and/or lawn that will drain to the garden
- The type of soil in the garden

This information, along with the size factor from the tables on page 8 will help you determine the surface area of your rain garden.



Rattlesnake Master is a unique plant species for your rain garden because of its ability to attract a variety of pollinators. Here, it is visited by a Summer Azure.

HISTORY OF THE RAIN GARDEN

Rain gardens were first used in Maryland in the early 1990s to address nonpoint source pollution threatening the Chesapeake Bay. The rain garden was developed based on the idea of the bioretention basin. Initially designed as a Best Management Practice (BMP) to minimize the impacts of development and storm water runoff, bioretention basins are depressions which collect and hold storm water runoff. Slowing the flow of surface runoff allows time for pollution to settle out of the water before it continues to the nearest river or lake.

While bioretention basins are primarily used to contain water from a substantial drainage area, rain gardens are designed for use on smaller, residential lots. This gives home owners the ability to reduce the amount of storm water runoff that flows from their yards.

DETERMINING THE DEPTH OF YOUR RAIN GARDEN

1. Set one stake at the uphill side of your rain garden and another stake at the downhill side.
2. Tie a string at ground level to the uphill stake.
3. Secure the other end of the string to the downhill stake, ensuring that the string is level.
4. Measure the width (in inches) between the two stakes. Next, measure the height (in inches) between the ground and the string of the downhill stake.
5. Divide the height by the width and multiply the result by 100. This will give you the percentage slope of the area where you wish to build your rain garden.
6. Record your percentage slope on line 1 of the worksheet, p. 18.
7. Find your percentage slope in the box below and determine the depth of your rain garden. Record that depth on line 2 of the worksheet, p. 18.

Slope	Depth
≤ 4%	3 to 5 inches
5% - 7%	6 to 7 inches
8% - 12%	8 inches maximum

Rain Garden Depth and Slope

The slope of your land will greatly influence the depth of your rain garden. The ideal depth of a rain garden is between four (4) and eight (8) inches deep. A rain garden that is less than four inches deep will need to be larger in size to provide enough capacity to store water from heavy rains. However, a rain garden that is deeper than eight inches might hold water for too long. In general, slopes over 12% are not suitable for rain gardens. Installing a rain garden in a flatter part of your yard will reduce the amount of preparation needed to build your rain garden. To determine the depth of your rain garden, use the guidelines in the sidebar to the left.

Directing Water to Your Rain Garden

There are several options for directing roof water to your rain garden. You can simply disconnect a downspout near the ground and reroute it to your rain garden. Rerouting the water from your downspout can be accomplished by creating a grassy swale, a rock-lined channel, or by extending the downspout across your lawn. Another option is to run a PVC pipe underground from your downspout to the rain garden. To slow the velocity of the routed rain water and prevent erosion, you may need to install landscape fabric, rocks or bricks at the outlet of the pipe.

Additionally, you may also want to install a rain barrel at your downspout to capture roof runoff for use in your rain garden or other parts of your yard. The overflow from the rain barrel can be directed into your rain garden by way of a grassy swale, rock lined channel or a drip hose.

Rain barrels can also be used to collect roof runoff. Water from the barrel can be used to water plants throughout your yard and overflow can be directed into your rain garden.

Determining the Drainage Area of Your Rain Garden

Since you have determined the depth of your rain garden, the next step will be to calculate the area draining into your garden. The guidelines listed below will help you make the best possible estimate of your drainage area. (If you know the area of the roof that will be draining into your rain garden, disregard the guidelines below and enter your roof drainage area on line 5 of the worksheet, p. 18.)

For all Rain Gardens

- In order to estimate the size of your roof, you will need to measure the footprint, or the outside dimension of your home. Your home's footprint will be relatively equal to the area of your roof which can be determined by multiplying the width of your home (in feet) by its length (in feet). Record your home's footprint on line 3 of the worksheet, p. 18.

- Count the number of downspouts on your home. Record the number of downpouts on line 4 of the worksheet, p. 18.

- To estimate the roof drainage area, divide your home footprint (line 3 of the rain garden worksheet) by the number of downspouts (line 4 of the rain garden worksheet). Next, multiply this result by the number of downspouts directed to your garden. Record your answer on line 5 of the worksheet, p. 18.

- If your rain garden is within 30 feet of your downspout, enter 0 on line 6 of your worksheet, p. 18. If your rain garden is greater than 30 feet from your downspout, you will need to perform the additional calculations listed below.

Rain Gardens more than 30 feet from a downspout

- To find the area of lawn that will drain to your garden, stand where your rain garden will be and determine how much of your lawn will drain into your rain garden.

- Measure the length (in feet) and width (in feet) of the lawn that will be draining into your rain garden, and multiply them together to find the lawn area. Record your lawn area on line 6 of the worksheet, page 18.

- Add the lawn area to the roof drainage area to determine the total drainage area and record your answer on line 7 of the rain garden worksheet, page 18.

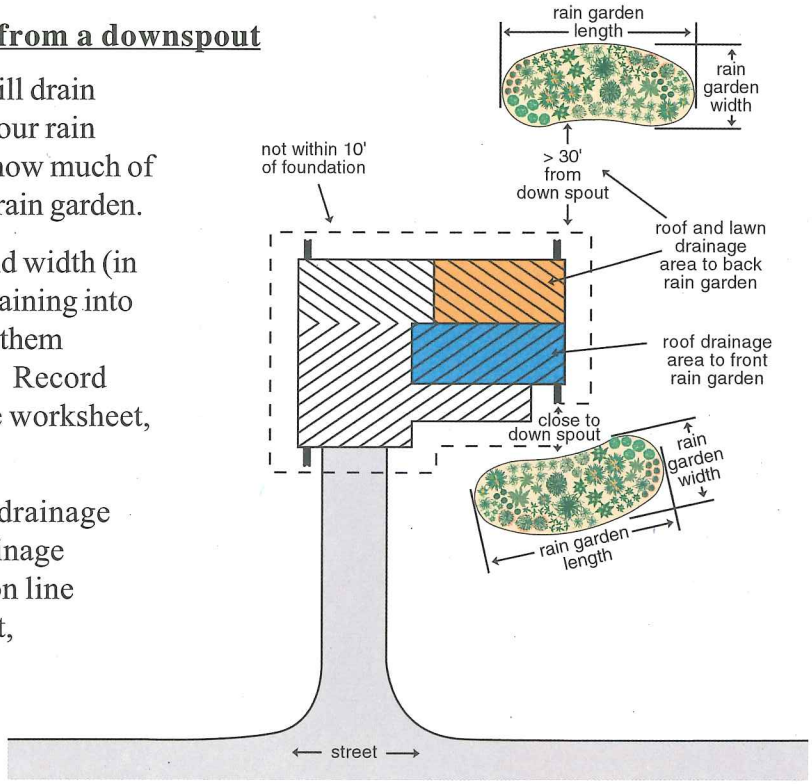


Figure 1 - *Rain gardens can be placed near your home or further out in your yard.*

FURTHER RESEARCHING YOUR SOIL TYPE

The best place to begin researching your soil is to contact your local Soil and Water Conservation District (SWCD). Your local SWCD can provide you with the Natural Resources Conservation Service (NRCS) "Soil Interpretation Table." This table summarizes soil attributes related to the official soil survey such as: how acidic a soil is (pH), how fast water moves through the soil (saturated hydraulic conductivity), depth to bedrock, clay and any other restrictive layers, and high water tables. Your local SWCD can also provide you with soil survey maps.

If you find more than one type of soil on your property, choose your soil type based on the actual location of your rain garden. Unfortunately, especially in urban areas, not all soils are fully mapped. If your property is in one of these areas and you are unable to determine what type of soil you have, refer to the *Basic Soil Tests* section and perform the feel, ribbon, and dry tests. If you are still unsure or uncomfortable with the results of your soil tests you may want to have your soil tested professionally. Contact your local SWCD for advice.

Keep in mind that while it is always best to build your rain garden in a sandy or silty soil versus clayey soil, conditions don't always allow this. The soil mix mentioned in the *Soil Type and Garden Size* section may provide you with the best possible alternative to overcome any soil limitations present in your yard.

Soil Type and Garden Size

Now that you have determined how deep your rain garden should be, you will need to figure out what type of soil you have in order to determine its appropriate size.

The type of soil you have will affect the movement of water through the soil profile. Therefore, the size of your rain garden will be determined by how quickly water is able to percolate or move through the soil profile. There may be restrictive soil features below your rain garden that prevent it from functioning properly. Reference the *Further Researching Your Soil Type* sidebar to the left to find out where to obtain more information about your soil.

In general, soil textures in Northeastern Ohio range from clayey to sandy. 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 soils) drain better than clayey soils (fine textured soils), but both types may need help to function properly.

There may be extra considerations in planning and building rain gardens containing silty, clayey or compacted soils. These soils reduce the ability of rain water to percolate. Consequently, an increase in the size of your rain garden and/or the complete replacement of soil can help combat the slow percolation problem. A recommended soil mix is 50-60% sand, 30-40% loamy topsoil (which can be purchased from local garden stores or landscape suppliers) and 5-10% organic matter derived from yard waste compost. If you would like a more exact soil mix, contact your local SWCD for a list of local suppliers who will be able to provide you with an appropriate soil mix.

Basic Soil Tests

There are simple tests you can perform to figure out what type of soil you have. Detailed information on these soil tests is available through your local SWCD. Once you've determined your soil type, (sandy, silty, or clayey) enter it on line 8 of the rain garden worksheet, p. 18.

Feel Test - Rub moist soil between your finger tips. Sandy soil feels gritty, silty soil feels smooth, and clayey soils feel sticky.

Ribbon Test - Moisten soil to a putty like consistency. Make a soil ribbon by squeezing the moist soil between your thumb and forefinger. Sandy soils will not form a ribbon. Silty soils will make a short, weak ribbon. Clayey soils will form a long, strong ribbon.

Dry Test - Mold soil into a ball and allow it to air dry for several hours. Once the soil is dry, crush it between your thumb and forefinger. Sandy soils will crumble easily while silty soils will be moderately resistant and firm. Clayey soils will be very difficult, if not impossible, to crush.

Determining the Size of Your Rain Garden

The general ratio of drainage area to rain garden area is 5:1 for a well drained, sandy soil profile. For example, if you had 500 square feet of drainage area, you would build a 100 square foot rain garden. Tables 1 and 2 below will give you a rain garden size factor which will help you determine the appropriate size of your rain garden. If you already know that you have compacted, clayey or otherwise poorly draining soils, a drainage area to rain garden area of 3:1 or 2:1 for building your rain garden will result in better success.

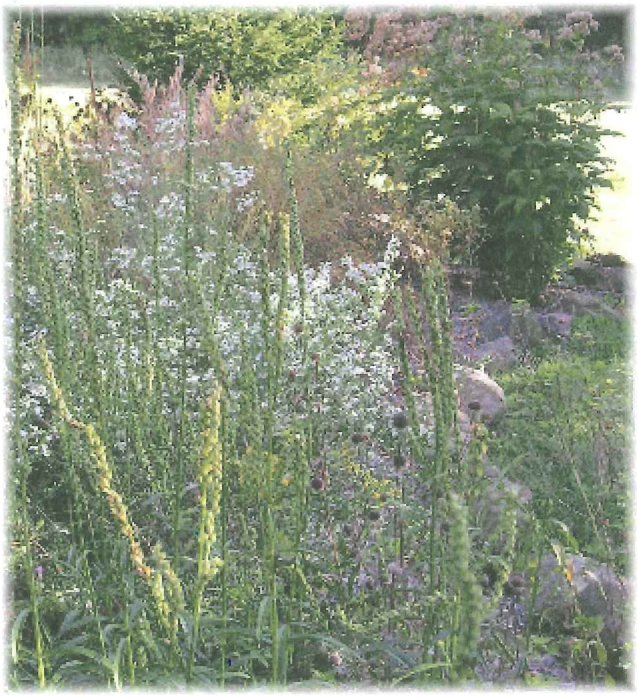
- Select the appropriate size factor table for your existing soil. Table 1 is for rain gardens less than 30 feet from your downspout. Table 2 is for rain gardens more than 30 feet from your downspout.
- Use your soil type (line 8 of the rain garden worksheet) and rain garden depth (line 2 of the rain garden worksheet) to select the appropriate size factor. Record your answer on line 9 of the worksheet, p. 18.
- Next, multiply the size factor by your total drainage area (line 7). This gives you the recommended area of your rain garden. Record this number on line 10 of the worksheet, p. 18.
- If the recommended rain garden area is more than 300 square feet, it is recommended that you divide your rain garden into a couple of smaller gardens.

Rain Garden Size Factor Table 1
(less than 30 feet from downspout)

	3-5 in.	5-7 in.	8 in.
Sandy Soil	.19	.15	.08
Silty Soil	.34	.25	.16
Clayey Soil	.43	.32	.20

Rain Garden Size Factor Table 2
(more than 30 feet from downspout)

	Size factor for all depths
Sandy Soil	0.03
Silty Soil	0.06
Clayey Soil	0.10



This rain garden features the following fall species: Wild Bergamot, Brown-eyed Susan, Aster, Beardtongue, and Obedient Plant.

Determining the Shape of Your Rain Garden

After you have determined the general size of your rain garden, you will need to choose a shape that will best integrate with your landscape.

There are a few things to keep in mind when determining the shape of your rain garden. *The longer side of the garden should run perpendicular to the flow of water (along the contour).* This will maximize the amount of water your garden will be able to intercept.

In addition, the garden needs to be wide enough for the water to spread evenly over the whole garden. A good rule of thumb is that your rain garden should be twice as long as wide. See Figure 4 on page 12 for further clarification.

RAIN GARDEN TOOLBOX

Before you start you may want to have these basic tools handy!

- Tape measure
- Shovel

- Rake
- Carpenter's level
- Wooden stakes or marking flags
- String
- Trowel

- Hand tamp
- Flat board, at least six feet long (optional)
- Small backhoe (optional)

Building Your Rain Garden

By now you should have determined where to build your rain garden and how big it will be, so it's time to start digging! This section of the manual will guide you through the process of properly excavating and leveling your rain garden.

Remember to "Call before you Dig!" 1-800-362-2764 and 1-800-925-0988

Preparing the Site

Are you building your rain garden in your existing lawn? Your digging time can be reduced by killing the grass first. There are a variety of herbicides available that can be used. However, covering the lawn with black plastic, several layers of newpaper, or carpet squares to block sunlight is just as effective at killing grass and is much more environmentally friendly.

Digging In!

Start by determining the perimeter of your garden. This can be done by placing stakes, flags, or a garden hose along the edge of where your rain garden will be. Doing this will give you a defined area in which to excavate.

Once you have defined the perimeter of your rain garden, you can start digging! Remove the sod from the whole area, including the berm. Also, make sure that your rain garden has a flat, level bottom.

If the lawn is almost flat, dig to approximately the same depth throughout the rain garden. If the lawn has a slope, the high end of the rain garden will need to be dug out. The excavated soil can then be used to build up the low end. Continue digging until your rain garden is nearly level and at the appropriate depth. See Figures 3a and 3b on page 11 for clarification.

While digging the rain garden to the right depth, place the excavated soil at the downhill edge to construct a berm. A berm is a low earthen mound surrounding three sides of the rain garden which helps hold water during a storm.

You can dig your rain garden by hand or use a backhoe. If you use a backhoe to dig your garden, avoid driving it on the garden site to minimize soil compaction.

LEVELING YOUR RAIN GARDEN

Rain gardens have a flat, level bottom so that water is evenly distributed throughout the garden allowing for maximum percolation. If rain gardens are bowl shaped, too much water will concentrate in one place and it will not function as intended.

One way to check if your rain garden is level is to visually assess it. To take a more accurate approach to leveling your rain garden, follow the steps listed below.

- **When your rain garden is dug out to the appropriate depth, lay a board in the rain garden with the carpenter's level on it. Correct the spots that aren't level by adding soil to the low places and removing soil from the high places.**
- **Move the board to different places throughout the rain garden, filling and digging as necessary to level the surface.**

Where to Dig and Where to Put the Soil You've Dug

Figure 3a - Between 3% and 8% slope lawn

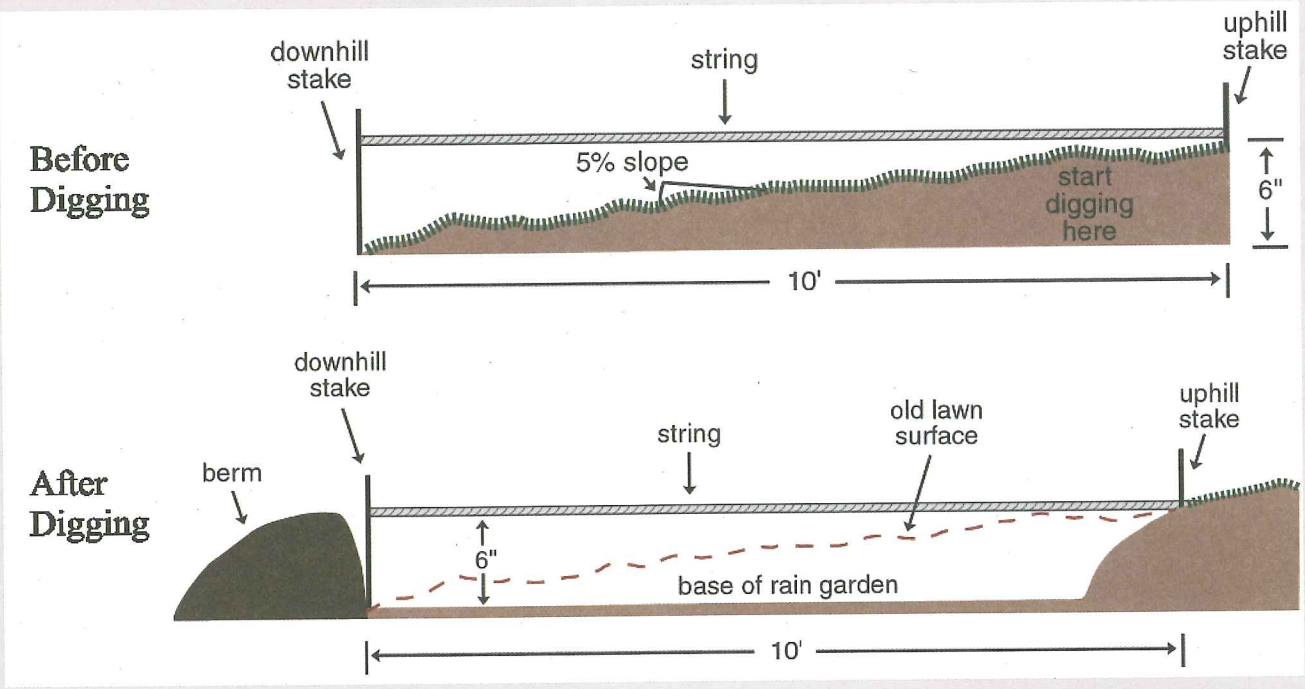
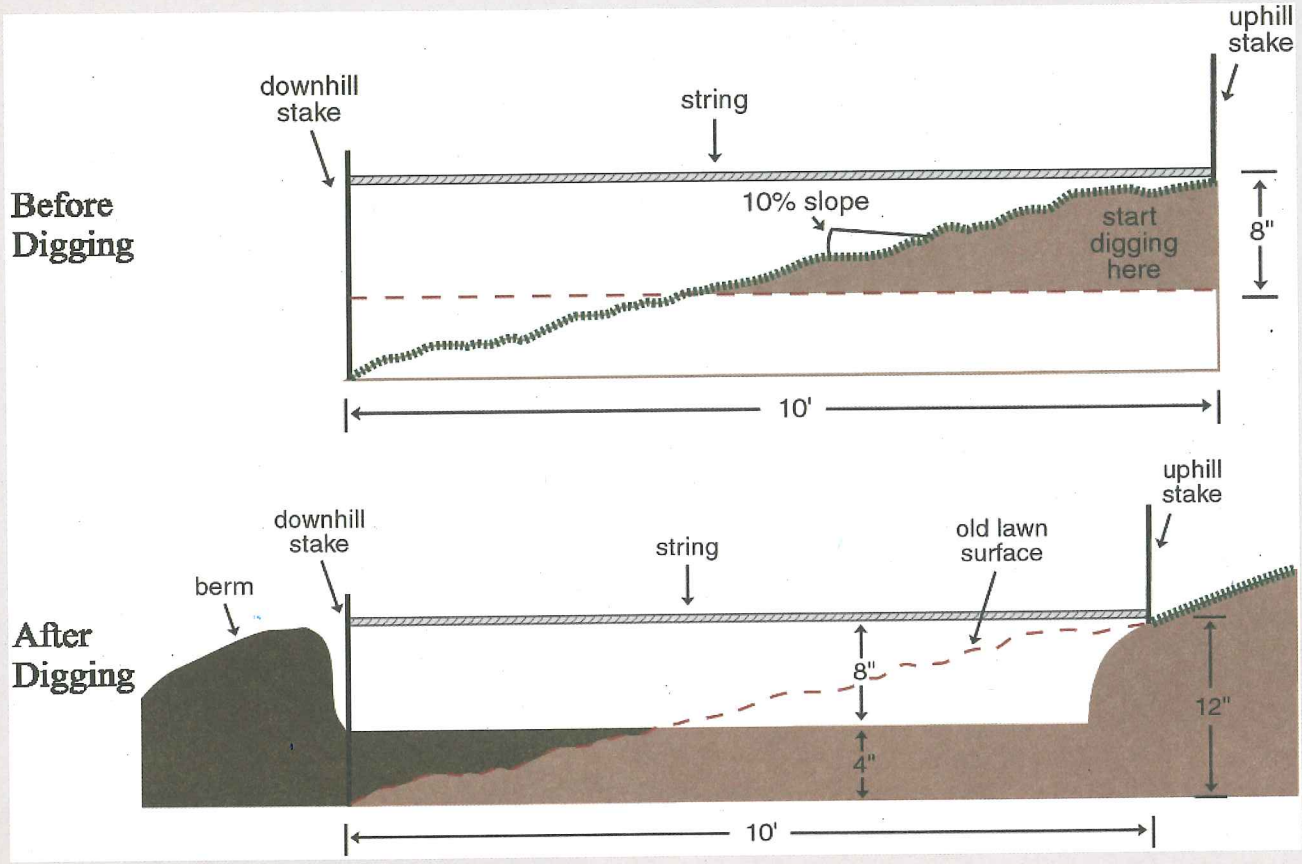


Figure 3b - Between 8% and 12% slope lawn



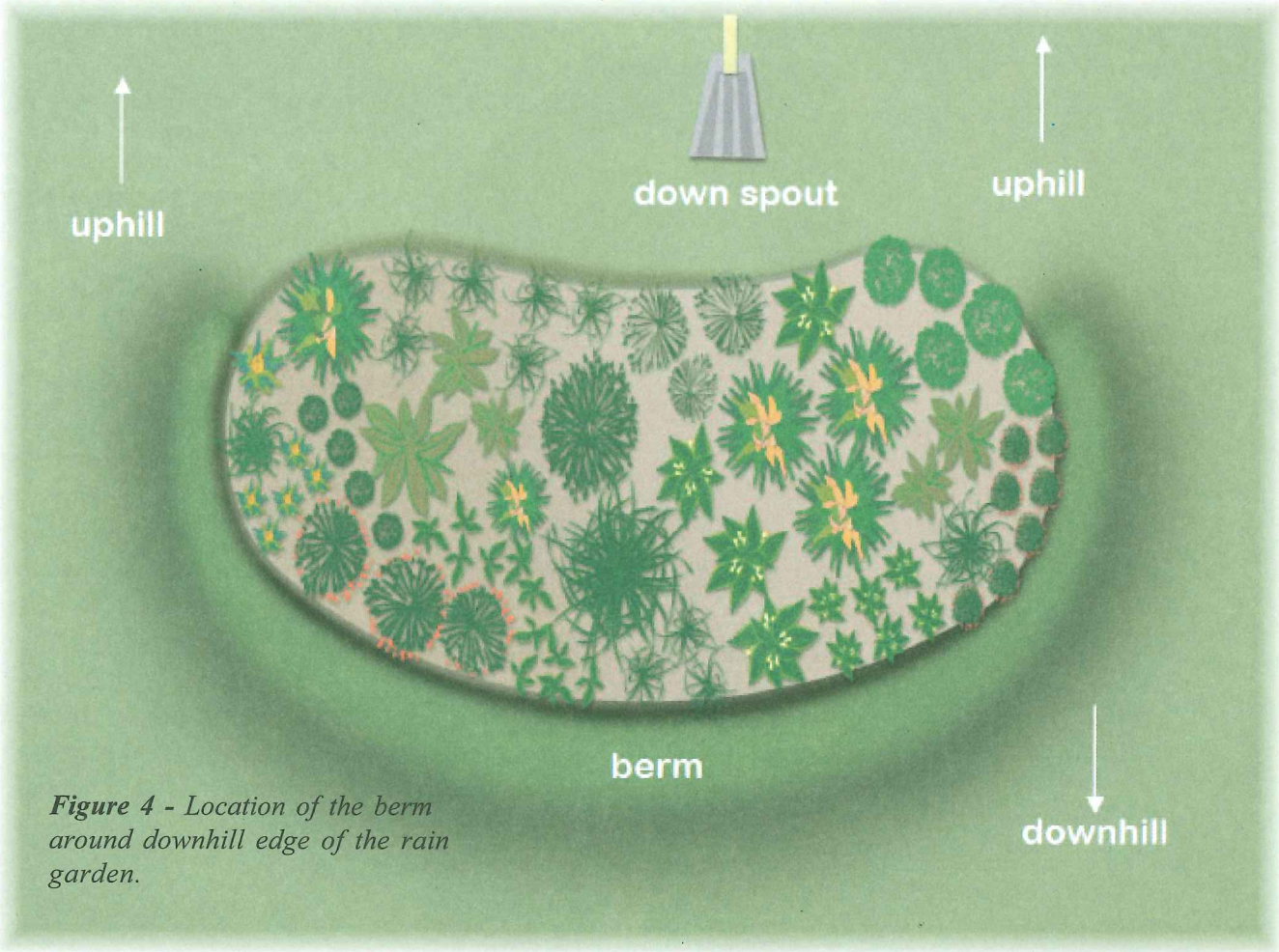


Figure 4 *- Location of the berm around downhill edge of the rain garden.*

Making the Berm

Water flowing into a rain garden will naturally escape from the downhill edge. A berm, which is a gentle rise along the bottom and sides of the rain garden, will help keep the water in the garden. The berm needs to be highest at the downhill side and gradually taper off around the sides.

There should be plenty of soil from digging out the rain garden to use for a berm. Roughen the existing soil surface before building the berm to strengthen and maximize contact between soil layers. Shape the gentle rise into a smooth, level ridge about a foot across and six inches high. Ensure that it is well constructed by using a hand tamp to compact the soil. The berm should have very gentle side slopes so that the rain garden smoothly integrates into the surrounding lawn.

To prevent erosion, cover the berm with mulch or grass. For the best protection, use straw or erosion control matting to protect the berm while grass is taking root. If you do not want grass on the berm, you can also plant native species that are dry-tolerant.

In some areas, local permits may be required to build a berm or change the grade of your property. Please check with your community to ensure that your rain garden will comply with local regulations.

Erosion control matting made of coconut fiber is carefully placed along the berm to prevent erosion on the downhill side of the rain garden.

DESIGNING AN ATTRACTIVE RAIN GARDEN

While rain gardens are a highly functional way to help protect water quality, they should also enhance the beauty of your yard. The suggestions below will help you design an attractive rain garden.

When choosing native plants for the garden, consider the height of each plant, the bloom time and color, and overall plant texture. Use plants that bloom at different times to create a long flowering season. Mix heights and shapes to give the garden both depth and dimension. This will keep the garden looking beautiful even when few flowers are in bloom.

When laying out plants, randomly clump individual species in groups of 3 to 7 to provide a bolder statement of color. In addition, repeat these groupings to create a cohesive look. Try to incorporate a diverse mixture of sedges, rushes, and grasses with your flowering species. A diversity of plant types not only adds beauty, but also creates a thick underground root matrix that keeps the entire plant community in balance.

From "Rain Gardens: A How to Manual for Homeowners"

Planting and Maintaining Your Rain Garden

Anyone who has ever gardened will have no problem planting a rain garden, but a few basic reminders are listed below.

Planting Your Rain Garden

A rain garden is planted much as any other garden would be with the exception of choosing plants that are tolerant of both wet and dry conditions. They can be planted in a diverse array to give the appearance of a wildflower garden, or planted more formally with arranged clusters and mulched spaces. Diversity of species will create visual interest and healthier plants. If you are planning a more formal garden and would like to add mulch, keep in mind that the garden will occasionally be under water. Many wood mulches float and can form a 'bathtub ring' after a heavy rain. Hardwood mulches will be more likely to stay in place.

Once your plants are installed, you may want to label them so that you can distinguish them from weeds. A suggested native plant list for use in your rain garden can be found on page 17.

Plants featured in the rain garden above: Blazing Star, Wild Bergamot, Purple Coneflower and Joe-Pye Weed.

Milkweed, shown on the right, provides another decorative choice.

Lynn Betts, USDA Natural Resources Conservation Service

Maintaining Your Rain Garden

For the first year or two, maintenance will include weeding and watering the plants in your rain garden until they are established. Dead plants can be removed in the fall or left until spring as a seed source for wildlife. In a small rain garden, they can be cut by hand, but if your rain garden is larger, you might consider a string trimmer. Exceptionally large rain gardens can be mowed and the dead material can be left to decompose on site or composted nearby for future soil amending.

Long term maintence will include mulching, adding organic material, and stabilizing the berm. Maintaining adequate mulch will add to overall aesthetics of your garden as well as prohibit weed growth and prevent erosion. You may also want to replenish organic material by adding yard waste compost. The organic material in yard waste compost will increase water retention and water availability to plants. This keeps plants from becoming droughty in the summer and early autumn. Compost also holds and releases nutrients for plants to use. Berms will need to be inspected for soil erosion and animal damage. Areas damaged by either of these will need to be repaired by replacing lost soil.

You can also continue to expand and enhance your rain garden. Simple additions may include providing shelter for local wildlife such as bird nesting boxes, and toad and butterfly houses!

Want your rain garden to look like this? The flowering plants featured in this garden are Purple Coneflower, Wild Bergamot, and Blazing Star.

Native Plants

Milkweed with Viceroy butterfly (bottom) and Red Spotted Purple butterfly (top)

Wild Bergamot with Great Spangled Fritillary

Milkweed with Swallowtail butterfly

Go Native!

Using native plants in your rain garden is highly recommended. The benefits of using native plants in your rain garden are multiple and include their ability to:

Tough it out

Native plants are adapted to living in our local weather, soil, and ecosystems. They have been working at it for thousands of years! They can live through downpours and droughts, and can survive the winters without any special care. They also do not need fertilizers or pesticides to survive!

Attract beautiful creatures

Native plants have a relationship with local butterflies, birds, and other animals that they have developed by living together for thousands of years. Planting natives helps provide habitat including food and shelter for local wildlife!

Grow deep roots

Many native plants help to protect water quality because their roots are so deep. False Blue Indigo, *Baptisia australis*, grows only 3-5 feet tall but the roots may grow up to 25 feet deep. These roots create deep channels in the soil for rain to soak into which increases the ability of soil to hold water. In addition, some of the roots die each year, and new roots grow. Decomposing roots enrich soil, making it more fertile and absorbent. These root systems also hold soil together and help prevent erosion.

From "Rain Gardens of Western Michigan"

Invasive Plants

THE NATURE CONSERVANCY

Glossy Buckthorn

THE NATURE CONSERVANCY

Purple Loosestrife

THE NATURE CONSERVANCY

Amur Honeysuckle

Plants to Avoid!

You should definitely avoid planting invasive exotic plants in your rain garden. While these plants grow everywhere and may seem like they belong here, they do not. There are several definitions that exist for invasive exotic plants. However, they all encompass the same general notion: invasive exotic plants are plants that have been introduced to a habitat, in which they did not evolve and they persistently encroach upon native flora.

There are several problems associated with invasive exotic plant infestations. Most importantly, they threaten biodiversity as they out-compete native plant species and replace natural communities with a monoculture.

The following is a list of the top invasive exotic plants to avoid purchasing or transplanting into your rain garden:

Glossy buckthorn, *Rhamnus frangula*
Common buckthorn, *Rhamnus cathartica*
Japanese honeysuckle, *Lonicera japonica*
Amur honeysuckle, *Lonicera maackii*
Tartarian honeysuckle, *Lonicera tatarica*
Morrow honeysuckle, *Lonicera morrowii*
Multiflora rose, *Rosa multiflora*
Garlic mustard, *Allaria petiolata*
Purple loosestrife, *Lythrum salicaria*
Reed canary grass, *Phalaris arundinacea*
Reed grass, *Phragmites australis*
Japanese knotweed, *Polygonum cuspidatum*
Autumn-olive, *Elaeagnus umbellata*
Canadian thistle, *Cirsium arvense*
Crown-vetch, *Coronilla varia*
Orange day lily, *Hemerocallis fulva*
European cranberry-bush, *Viburnum opulus*

Invasive plant list from The Nature Conservancy

Suggested Plant List For Your Rain Garden

Botanical Name	Common Name	Light Preference	Bloom Time	Bloom Color	Height
Flowering plants					
Aster novae-angliae	New England Aster	Full Sun	Aug - Oct	purple	2-5'
Baptisia lactea	White False Indigo	Full Sun, Part Shade	May - July	blue	2-4'
Chelone glabra	Turtlehead	Full Sun, Part Shade	July - Sept	white	2-3'
Echinacea purpurea	Purple Coneflower	Full Sun, Part Shade	July - Sept	purple	3-4'
Eryngium aquaticum	Rattlesnake Master	Full Sun, Part Sun	May - Sept	white	3-6'
Eupatorium purpureum	Joe Pye Weed	Full Sun, Part Shade	Aug - Sept	purple, pink	3-6'
Filipendula rubra	Queen of the Prairie	Full Sun, Part Shade	June - July	pink	4-5'
Iris versicolor	Northern Blue Flag	Full Sun, Part Shade	May - July	purple	2-3'
Liatris pycnostachya	Prairie Blazing Star	Full Sun	July - Oct	purple	2-3'
Liatris spicata	Dense Blazing Star	Full Sun	Aug - Sept	pink, purple	3-6'
Lobelia siphilitica	Great Lobelia	Full Sun, Part Shade	July - Sept	blue	1-4'
Monarda didyma	Bee Balm	Full Sun, Part Shade	July - Sept	lavender	2-5'
Penstemon digitalis	Foxglove Beardtongue	Full Sun, Part Shade	June - July	white	2-4'
Physostegia virginiana	Obedient Plant	Full Sun	Aug - Sept	pink, purple	2-4'
Polemonium reptans	Jacob's-ladder	Part Shade, Shade	May - June	blue	1.5-2'
Potentilla norvegica	Cinquefoil	All	June - Aug	yellow	1.5-2'
Rudbeckia triloba	Brown-eyed Susan	Full Sun, Part Shade	July - Sept	yellow	2-4'
Silphium perfoliatum	Cup Plant	Full Sun, Part Shade	July - Sept	yellow	3-8'
Solidago flexicaulis	Zig Zag Goldenrod	Part Shade, Shade	June - Aug	yellow	1-2'
Solidago ohioensis	Ohio Goldenrod	Full Sun, Part Shade	June - Sept	yellow	2-3'
Stylophorum diphyllum	Celandine Poppy	Part Shade, Shade	May - June	yellow	1.5-2'
Thalictrum pubescens	Tall Meadow Rue	Full Sun	June - July	white	5-8'
Verbena hastata	Blue Vervain	Full Sun, Part Shade	July - Sept	blue, purple	2-6'
Vernonia sp.	Ironweed	Full Sun, Part Shade	Aug - Sept	purple, red	4-8'
Grasses and Grass-like plants					
Andropogon gerardii	Big Bluestem	Full Sun	Sept blue,	green, red, gold	4-8'
Carex sp.	Wet-tolerant Sedges	Full Sun, Part Shade	June - July	green, beige	1-2'
Elymus virginicus	Virginia Wild Rye	Full Sun, Part Shade	July - Sept	green, straw	2-3'
Glyceria striata	Fowl Manna Grass	Full Sun	June - July	green	1-5'
Juncus torreyi	Torrey's Rush	Full Sun	June - July	orange	2-3'
Panicum virgatum	Switch Grass	Full Sun	Aug - Sept	green, straw	3-6'
Ferns					
Matteuccia struthiopteris	Ostrich Fern	Part Shade, Shade	non-flowering	non-flowering	1.5-4'
Onoclea sensibilis	Sensitive Fern	Part Shade, Shade	non-flowering	non-flowering	1.5-5'
Osmunda cinnamomea	Cinnamon Fern	Part Shade, Shade	non-flowering	non-flowering	1.5-4'
Shrubs and Trees					
Acer rubrum	Red Maple	All	Mar - Apr	Red	90'
Aronia melanocarpa	Chokecherry	Full Sun, Part Shade	Apr-May	white	3-6'
Betula nigra	River Birch	Full Sun, Part Shade	June - July	brown	70'
Clethra alnifolia	Summer Sweet	Full Sun	July - Aug	white	7-8'
Cornus amomum	Silky Dogwood	All	May - July	green	7'
Ilex verticillata	Winterberry	Part Shade, Shade	June - July	white	6'
Quercus palustris	Pin Oak	Full Sun, Part Shade	Apr - May	inconspicuous	70-90'
Sambucus canadensis	Elderberry	Full Sun, Part Shade	June - Aug	white	4-12'
Vaccinium corymbosum	Highbush Blueberry	Full Sun	Feb - June	white, pink	6-12'
Viburnum dentatum	Arrowwood Viburnum	Full Sun, Part Shade	June - Aug	white	8'

Rain Garden Worksheet

1) Slope: $\frac{\text{Height of string (in inches)}}{\text{Distance between stakes (in inches)}}$ x 100	1) %
2) Rain garden depth: From Chart on page 5	2) **in.**
3) Home footprint: Length of house x width of house	3) **sq. ft.**
4) Number of downspouts: Total number of downspouts on home	4)
5) Roof area draining to garden: (Line 3 ÷ Line 4) x number of downspouts directed to the rain garden	5) **sq. ft.**
6) Lawn area (if more than 30 ft from downspout): Length of uphill lawn area x width of uphill lawn area	6) **sq. ft.**
7) Total drainage area: Line 5 + line 6	7) **sq. ft.**
8) Soil type: Enter sandy, silty or clayey from results on page 7	8)
9) Rain garden size factor: Results from table 1 or table 2 on page 8	9)
10) Rain garden size: Line 7 X Line 9	10) **sq. ft.**

Lines 2 and 10 give you the dimensions of your rain garden. This is based on capturing 100% of the runoff. If you do not wish to build a rain garden of this size, a smaller rain garden will still help control runoff and filter pollutants.

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