Protect Your Local Lakes and Streams

#### Plant a Plant

**Hello!** Are you interested in learning more about how you can help protect water quality by planting a special type of garden? If so, you have found the right publication!

This brochure is for homeowners who want step-by-step instructions on how to design and install a rain garden. With a little bit of planning, digging, planting, and care, you and your neighbors will soon be admiring your rain garden while it does its job of keeping harmful pollutants out of our lakes and streams.

# What is a Rain Garden?

A rain garden is a simple solution to stormwater pollution.

Illustration by Doug Adamson, RDG Planning & Design provided by USDA-NRCS in Des Moines, Iowa.



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#### SIZE

A rain garden is typically 10-30% the size of the impervious surface that generates runoff.

On the surface, a rain garden looks like a regular garden. However, a rain garden provides a unique function. It may support habitat for birds and butterflies, it may be a formal landscape amenity, or it may be incorporated into a larger garden as a border or as an entry feature. What makes it a rain garden is how it gets its water and what happens to that water once it arrives in the garden. Rain gardens are depressions in the ground that collect rainwater from roofs, driveways, parking areas, or other hard surfaces, this reducing the amount of polluted runoff entering local waterways.

Also known as bioretention areas ("bio" referring to the use of plants and "retention" because stormwater is temporarily stored before it soaks into the ground), rain gardens are just one example of what is known as green infrastructure.

### A rain garden is not a water garden. Nor

is it a pond or a wetland. Rain gardens are dry most of the time. Therefore, they are NOT good breeding areas for mosquitoes. Mosquitoes need 7-12 days to develop from egg to adult.

#### **PLANT CHOICES**

Choose native plants based on need for light, moisture, and soil. Vary plant structure, height, and flower color for seasonal appeal.

#### LOCATION

Rain gardens are often located at the end of a down spout or near a driveway or other impervious surface.

#### **BASIN DEPTH**

A typical rain garden is between four to eight inches deep. This depth, proportionate to the surface area, helps assure water will infiltrate quickly and not pond.

#### SOIL AMENDMENTS

Soil amendment recommendations vary based on site conditions. In general, a good soil mix for rain gardens is 60% sand, 15% topsoil, and 25% compost.

### What is stormwater?

Stormwater is the rain and snowmelt that runs off rooftops, sidewalks, roads and other surfaces that are impervious, or unable to absorb water. As it drains, stormwater picks up pollutants, such as lawn fertilizers, sediments, heavy metals, pesticides, litter, and pet waste, and eventually flows into surface waters. In more developed areas with storm sewers, this pollutant runoff is discharged into nearby lakes or streams with little or no treatment.

The cumulative effect of stormwater on our water resources can be far-reaching. Oftentimes, water quality is diminished, wildlife and fish habitat is damaged, and public health, safety, and recreation are compromised. Stormwater can also pose problems with water quantity. Flooding and soil erosion can also result as stormwater volume and velocity increases.



Take a look at your property. Where does your stormwater go? Observe these areas to see if you are contributing to polluted stormwater runoff.



### **Storm Drain**

The neighborhood's stormwater is directed into curb inlets where it then enters the storm sewer system before discharging to a lake or stream.



### Walkways, Patios, and Other Hardscapes

Impervious surfaces used for walkways and other site elements further contribute to the stormwater footprint.



### **Turf Grass**

Although better than hard (or impervious surfaces), turf grass does not slow down or absorb stormwater as well as deeper-rooting native plants.



**Gutters and Downspouts** <u>Roof runoff</u> is directed onto the driveway.



#### Driveway

Expansive areas of impervious asphalt or concrete generate large volumes of stormwater that drains to the street.

### How to choose the right location



Choose the location of your rain garden carefully and follow these guidelines:

 Rain gardens can be planted in either sun, shade, or somewhere in between. Select plants that will thrive with the amount of sunlight available. Ş

- Keep at least 10 feet between the rain garden and any buildings to protect their foundations.
- Never locate your rain garden on top of a septic tank, drain field, wellhead, or utilities.
- Make sure the water table is at least two feet below the bottom of the rain garden and the site has good drainage. Don't be tempted to put your rain garden in a part of the yard where water already ponds because the goal of a rain garden is to encourage infiltration, and soggy areas indicate where infiltration is slow.

Never plant a rain garden on top – of a septic tank, drain field, wellhead, or utilities.

> Select a site with few or no trees to avoid disturbing their roots.

Avoid steep slopes and allow for overflow.

The water table is at least two feet below the bottom of the rain garden.

Check your local zoning for any restrictions.

- Avoid steep slopes. Rain gardens can be installed using a retaining wall design on moderate slopes, but the construction of this type of garden is more complicated. Rain gardens are easiest to install in flat or slightly sloped areas.
- Plan for overflow. Although your rain garden will be sized to contain the most frequent storms, it may not be able to handle larger volumes of water from bigger storms. This is OK, but you will need to be aware of where the water will go if it overflows from the garden. In most cases this will just be on your lawn, but you want to make sure the overflow is not directed towards any building foundations.
- Select a site with few or no trees to avoid interfering with their established roots. If there are trees in the immediate area, make sure they can handle wet soil conditions for lengthy periods.

### **Check for Adequate Drainage**



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To be sure the selected site has adequate drainage, conduct this simple infiltration test:

Dig a hole about 6-12 inches deep and at least 4 inches in diameter in the rain garden site (roughly the size of a coffee can).



Fill the hole with water and let it sit for an hour or two to pre-wet the soils for your test.

Then refill the hole with water and push a popsicle stick into the side of the hole to mark the water level.

3 hrs

After an hour, measure and record the depth of the water again. You may want to continue taking measurements at hourly increments for a few more hours. If the water level dropped one-half inch or more, this is a good site for a rain garden. If the water level dropped less than onequarter of an inch, you will have to amend your soils or try another site.

### Safety First!

SS DIG

#### DON'T START RAIN GARDEN CONSTRUCTION until you've checked for underground utility lines!

If you're not sure, call MISS DIG, a statewide, one-call notification system at **800-482-7171** in Michigan, or the national one call number 811. Visit **www.missdig.net** for more information and remember to please allow for 3 full working days before you dig.

MISS DIG will send your work request to member facility owners who will mark the approximate location of their underground utility lines <u>at no charge</u>.

## Rain Garden Size

Your rain garden should have an area equalling about 10-30% of the surface area draining into it. A typical rain garden for a residential home or small building is between 100 and 400 square feet. Regardless of the size, big or small, each rain garden can make an impact.

Use the following guidelines to determine the size of your rain garden:

**Step 1:** Calculate the area of surfaces you wish to capture in your rain garden. If you wish to direct roof runoff to the rain garden via downspouts, prioritize the downspouts that drain most directly to the stormwater system. The roof usually drains to a gutter and the gutter will run to downspouts. If you have two downspouts at either end of the gutter, you can assume half of the roof runoff goes to one and half to the other. Using the example on the next page, half the roof drains to the front yard, and half of that drains to each downspout. We will direct runoff from one downspout to a rain garden.

The total roof area of a home is approximately the same square footage of a one-story home, or the first floor of a multi-story home. To calculate square footage, multiply length x width. Our example home has one peak in the middle of the house so half the roof drains to the front and half drains to the back. Divide the entire roof area by two. Now you have the amount of water which will drain down the front of your house. Because you have a downspout on each end, divide that number by 2 to get the area that will flow to one of the downspouts. **Step 2:** Calculate the area of any concrete or other impervious surfaces - driveway, walkways, outbuilding roofs, etc. that contribute to runoff leading to your rain garden. Measure length x width of each and add them all together.

**Step 3:** Add these two areas together. Area of the roof (Step 1) + area of all the other impervious surfaces (Step 2). This will give you the area in square feet that will contribute runoff to your rain garden.

**Step 4:** Convert the area from Step 3 into rain garden size.

Most rain gardens are designed for a 1-inch rain storm. This means the rain garden should be sized to store and treat 1 inch of rain falling on the impervious areas leading to the rain garden. The depth of the rain garden can vary, but typical depths range from as little as three to twelve inches. The deeper it is, the smaller the area needs to be to hold the same amount of water. The simplest way to determine the final area of a rain garden is to divide the area to be treated by the depth of the final garden.

### Area of rain garden (Sq. Ft.) =

Area to be treated (Sq. Ft.) /Depth of Rain Garden (in.)



## Rain Garden Shapes

A rain garden can be any shape, but if it is longer than it is wide, like an oval or kidney-shape, you can position it perpendicular to the slope of the land in order to maximize the amount of runoff.

While rain gardens are very effective at helping to protect water quality, they should also be an attractive part of your yard and neighborhood. Whether you hire a professional or do it yourself, keep in mind there are endless possibilities when it comes to designing a rain garden.

- The basin can vary in shape: from oval to kidney-shaped, crescent to square, and everything in between.
- For added interest, be sure to incorporate plants that range in color, texture, height, and bloom period.
- Consider adding other landscape elements, such as a birdbath, trellis, edging, or small decorative fence to enhance the rain garden's overall appearance.
- Choose plant species that also provide habitat for wildlife, including pollinators and songbirds.

### **General Rain Garden Planting Zones**

Select plants according to their water needs.

Bottom: For plants that can tolerate wetter conditions. Since: Provide a can tolerate occasional tanding water. Top: For plants that prefer drier conditions. Cross-section of Rain Garden Top Slope Bottom Slope Top

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### **Construction Steps**

You've found a location, checked the drainage, called MISS DIG, and selected plants. Now it's time to start construction!

### Lay out the garden

Outline the shape and boundary of the rain garden with marking paint, flags, or stakes.

### Dig the rain garden

If the area is currently covered in grass or other ground cover, it is best to kill it by placing plastic, newspaper or any opaque material over it. This will make excavation easier. Use the excavated soil to build a berm around the garden edges if necessary.

#### Prepare the soil

For very sandy soils, incorporate compost to boost soil fertility and help with moisture retention. If soils have a high clay content, add sand and compost to increase permeability. To amend the soils, return a portion of the native soils to the excavated basin, and work in the amount of sand and compost needed for good drainage and plant growth. The surface of the rain garden should be at least several inches below the surrounding grade. Be careful not to compact the soils.

Where soil drainage is adequate but slow, install a perforated drain pipe within a layer of pea gravel in the bottom of the rain garden to assist with infiltration.

### Now you're ready to plant

Install the plants working from the center outward, or from one side to the other to prevent trampling plants and to minimize soil compaction. Base the spacing of the plants on the species. A general rule of thumb for most perennials is to allow 2 square feet per plant. Most nursery-purchased plants come with recommended spacing.

### Mulch for moisture and to reduce weeds

Apply about 2-3 inches of shredded mulch throughout the rain garden. Leave a gap between plant stems and mulch to provide air circulation and prevent stem rot.

### Water your rain garden

Water the rain garden thoroughly and consistently for the first couple of weeks. This will help get the plants established and your rain garden off to a great start!

### **Native Plants**

Many plant species are suitable for rain gardens; however, native plants are best. Here in Northern Michigan native plants are considered those species that occurred here prior to European settlement.

Native plants don't require fertilizer, have good root systems, and are better at utilizing the water and nutrients available in their native soils than non-native species.



Native plants have several characteristics that make them appealing as garden and landscaping plants:

- They are naturally adapted to the soils and weather conditions of the area, so they need little care once they've become established.
- They provide food and cover for wildlife, especially valuable pollinators.

Native plants can be used for every type of environment, from dry and sunny to soggy and shady. With their variety of colors, heights, foliage, and bloom times, they can add beauty and interest to any landscape.

Keep in mind that the side slopes of the rain garden will be drier, while the bottom of the rain garden will be wetter. Therefore, the plants you choose should match these conditions.

For information on where to buy Michigan native plants, refer to the Michigan Native Plant Producers Association **(www.mnppa.org)** 



Native plants have deeper root systems that substantially increase the ability of soil to absorb and retain water. As natural vegetation is replaced with popular turf grasses, less stormwater is absorbed into the ground, leading to more stormwater runoff and water pollution.

### **Choose Wisely!**

Choosing native over non-native plants also means you are helping prevent the spread of invasive species, such as baby's breath, dame's rocket, and Japanese barberry. Many invasive species are still available for sale at nurseries, so be sure to learn what to avoid when purchasing plants for your rain garden. The Michigan Natural Features Inventory website has a listing of invasive plants to watch for at http://mnfi.anr.msu.edu/invasive-species/index.cfm.

### There are dozens

### Best for... *Average*



Blue Flag Iris Iris versicolor



Meadowsweet Spiraea alba



False Sunflower Heliopsis helianthoides



Cardinal Flower Lobelia cardinalis

### of native species to choose from, here are just a few to consider.

### to Wet Conditions



**Green-Headed Coneflower** *Rudbeckia laciniata* 



Swamp Milkweed Asclepias incarnata



**Cinnamon Fern** Osmunda cinnamomea



Blazing Star Liatris spicata

### Best for ... Average to Dry Conditions



Little Blue Stem Schizachyrium scoparium



**Beardtongue** Penstemon digitalis



Butterfly Weed Asclepias tuberosa



Black-Eyed Susan Rudbeckia hirta



Sand Coreopsis Coreopsis lanceolata



Wild Lupine Lupinus perennis



Switchgrass Panicum virgatum



**Spiderwort** Tradescantia ohiensis

### Maintenance

Rain gardens require similar maintenance to other landscaped gardens. Most of the effort will go into the first year, when it is important to nurture the garden with regular watering, weeding, and mulching. Once the rain garden is established, these tasks will not need to be performed as often.

Other maintenance guidelines include:

- Do water regularly during the first year so the plants become established. After the first year, watering should only be necessary during periods of drought.
- Do not apply fertilizers. Fertilizing will decrease the rain garden's capacity to remove nutrients from the runoff.
- Monitor the inflow areas to be sure any erosion is stabilized and to remove any buildup of sediment, trash, and other debris that may block runoff.
- Inspect you rain garden for dead or dying vegetation and replace with other plants. Depending on why the plant is not thriving, you may need to plant some other species that is better suited for the site.
- Add more shredded hardwood mulch every couple of years to suppress weeds and to retain soil moisture.

### Resources

#### For more information about rain gardens:

- Michigan State University Extension www.msue.anr.msu.edu (Search for "Rain Gardens")
- U.S. Environmental Protection Agency www.epa.gov/soakuptherain/soak-rain-rain-gardens
- Rain Garden Network www.raingardennetwork.com

### For more information about where to purchase Michigan native plants:

- Michigan Native Plant Producers Association www.mnppa.org
- Otsego Conservation District
  www.otsegocd.org/native-plant-nursery.html



Tip of the Mitt Watershed Council 426 Bay Street,Petoskey, MI 49770 **www.watershedcouncil.org**