

Rain Gardens

A How-To Guide for Homeowners



Image Courtesy of Rain Dog Designs

Hello!

Welcome to the world of rain gardens!

If you're curious about how to protect streams, water health, and land while gardening, you've come to the right place!

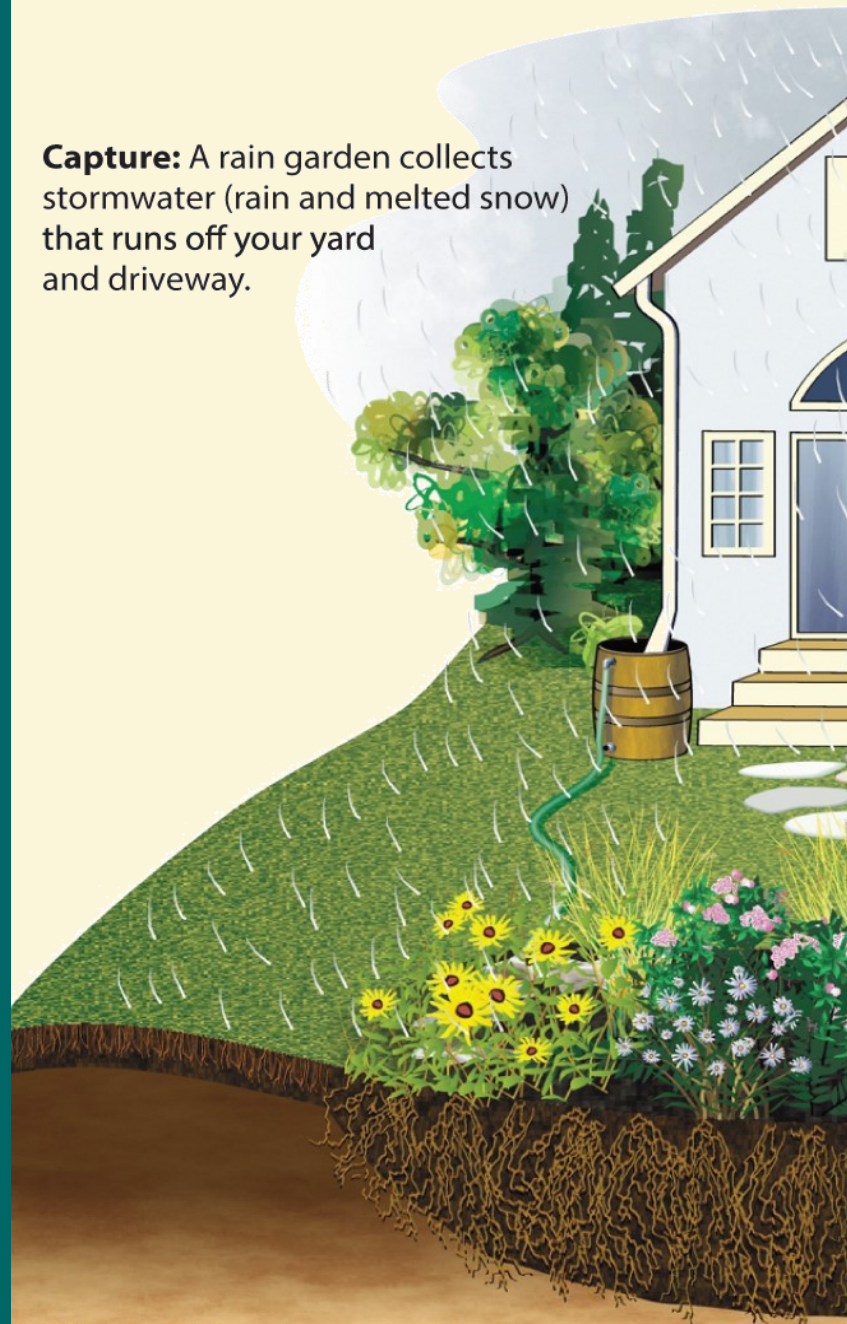
This brochure is an introduction to rain gardens with step-by-step instructions and helpful worksheets to guide you through the process of planning, sizing, digging, and planting your very own rain garden.

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What is a Rain Garden?

Capture: A rain garden collects stormwater (rain and melted snow) that runs off your yard and driveway.

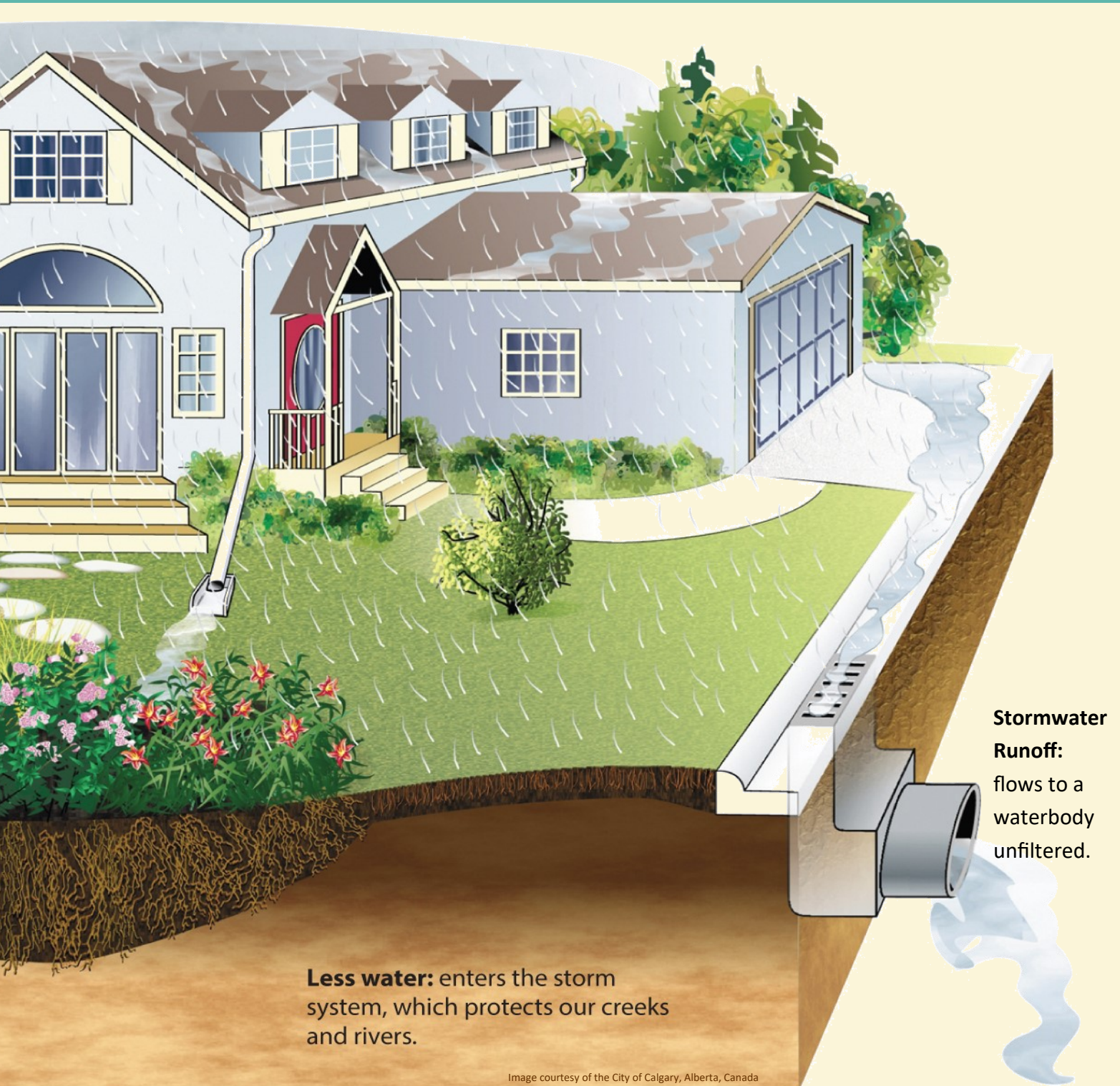


Filter: shallow depression has loose, deep soil that absorbs and naturally filters the runoff.

On the surface, a rain garden looks like any other flower bed. However, it is designed with a very specific purpose: to capture stormwater and allow it to soak into the ground at a natural rate.

This shallow saucer-shaped garden collects rain that falls on it along with rainwater that runs off a nearby surface like a roof, a driveway, or yard. This reduces the amount of polluted runoff that would otherwise flow into local bodies of water unfiltered.

In Summary: A rain garden captures, filters, and lessens the amount of stormwater runoff.



What is Stormwater?

Why do we want to capture it?

STORMWATER is water that comes from rain, snow, or other precipitation. In Ohio, there is an abundance of stormwater, which means that it sometimes can become a problem, especially if it hits impervious surfaces.

IMPERVIOUS SURFACES are areas where water cannot soak through, such as roofs, driveways, streets, and parking lots. When stormwater hits these areas, it becomes runoff.

RUNOFF is the water that can't soak into the ground, and it instead runs across surfaces, picks up pollutants, and carries them into local waterways. This is where problems arise!

By capturing stormwater, we can prevent runoff from mixing with pollutants, which protects our waterways and wildlife.

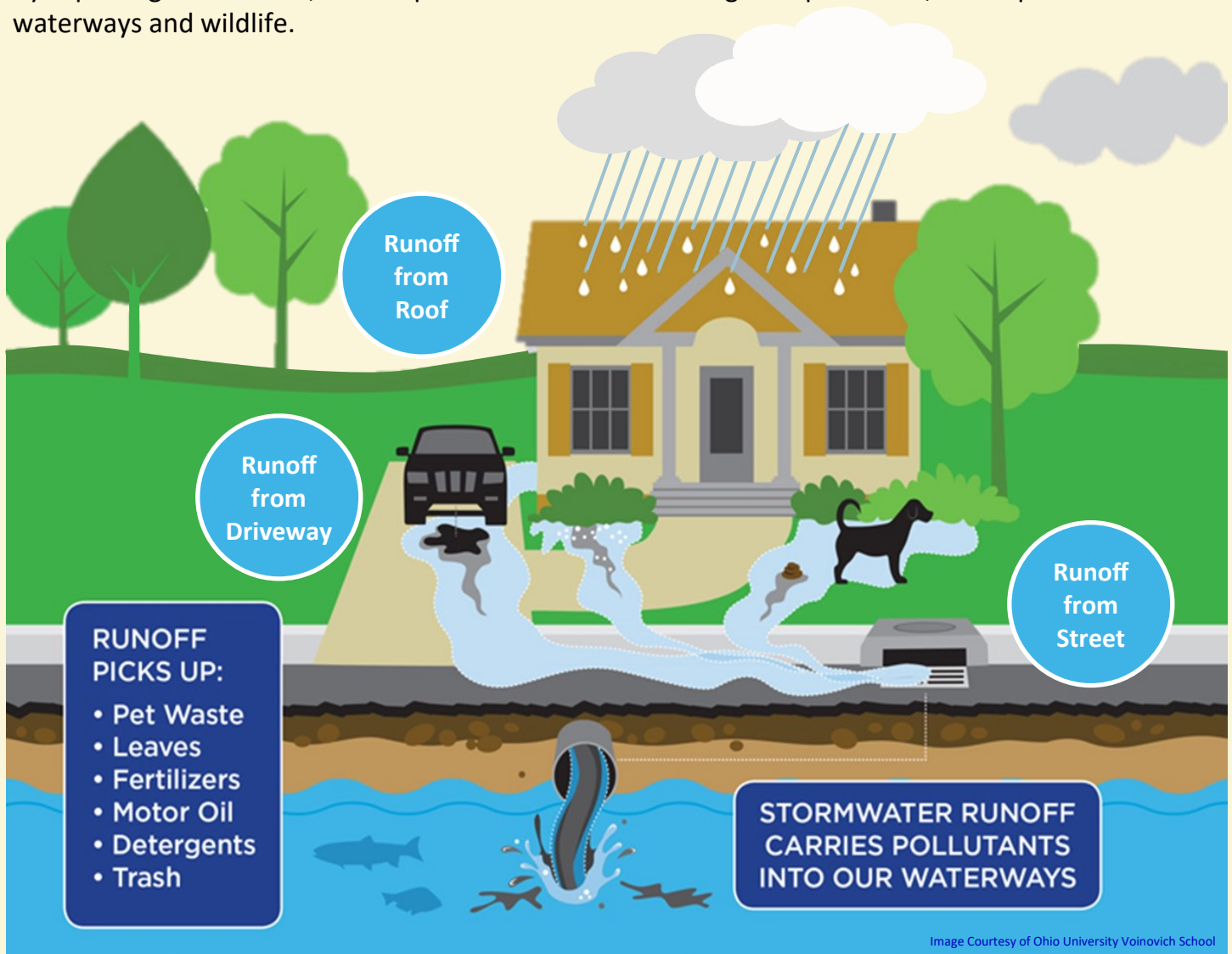


Image Courtesy of Ohio University Voinovich School

How do Rain Gardens protect water?

RAIN GARDENS capture stormwater from roofs, parking lots, other impervious surfaces, or sometimes yards before it can mix with pollutants. They are designed to accept this runoff and soak it into the ground at a natural rate, usually within three days.

WATER GARDENS hold water in pools and grow aquatic plants, never allowing water to fully soak into the ground.

RAIN GARDENS ARE NOT WATER GARDENS. They do not hold water for long periods. Rain gardens help replenish our ground water by soaking in stormwater.

Benefits of Rain Gardens

By capturing runoff, rain gardens stop stormwater from becoming polluted and rushing quickly into local streams. This helps protect streams from flooding, pollution, erosion, excess nutrients, and so much more!

Now that you know the benefits, let's look at a rain garden's anatomy to understand how it works and what it is before we look at where and how to build one.



The Anatomy of a Rain Garden

By first understanding the anatomy or parts of a rain garden, it makes the planning process easier. Trying to plan a rain garden in a specific place without knowing how they work or what they require can lead to a lot of wasted work, labor, and energy.

1. **INFLOW:** the source of water. This is where stormwater runoff enters into the rain garden. This can be an elongated downspout, a driveway, or a swale.
2. **BASIN:** the depressed bowl where water loving native plants grow. This area catches the stormwater and is amended to allow it to soak into the ground.
3. **BERM:** the raised edge around the basin that prevents water from exiting the garden.
4. **OVERFLOW:** the exit point of the basin. If too much water enters a rain garden, it needs to have an area where it can exit.

NATIVE PLANTS are an important part of any rain garden. Their roots run deep and can handle the ebb and flow of a rain garden's water levels. These plants thrive in their local climates. Some are even able to withstand extreme droughts. In addition, they provide better food sources and nectar for local pollinators than ornamental plants do.

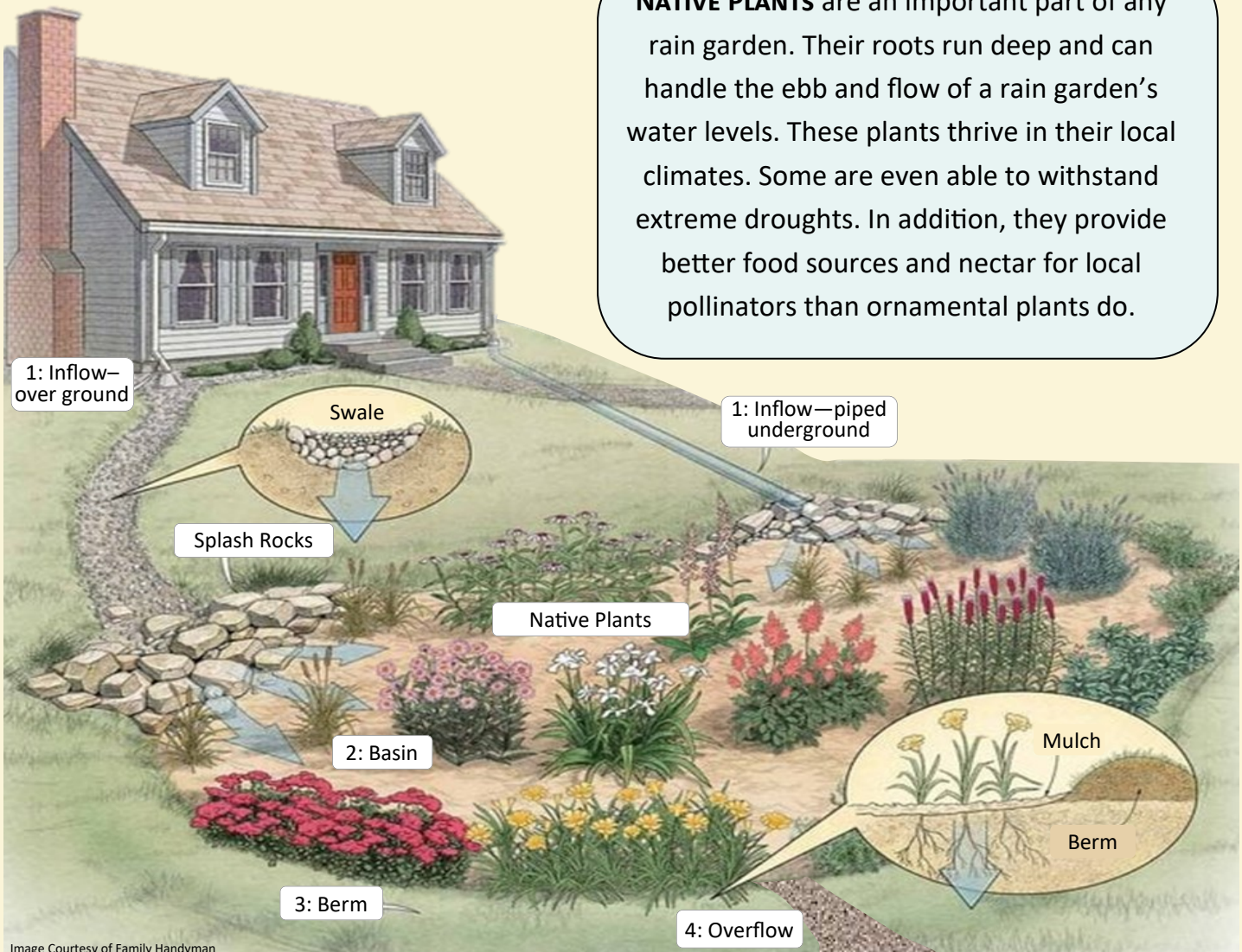


Image Courtesy of Family Handyman

A Side View

ROUNDED EDGES & A FLAT BOTTOM

Different views of a rain garden showcase features in different ways. From the side, you can see that the basin's bottom is not rounded. The flat, level bottom allows water to soak in evenly across the width of the basin.

ORIGINAL SOIL VS AMENDED SOILS

Even though the basin isn't terribly deep (only 3"-6" deep), the basin may need to be dug 2"-6" deeper to remove original soil and then backfilled with soil amended (mixed) with high organic material content. This allows better water infiltration and plant growth.

Riddle: How is a Rain Garden like a Bathtub?

Not only are both designed specially to hold water, they have several other similarities:

- A rounded berm (edge) that keeps water in
- A flat, level bottom
- A designated overflow to protect the area around it

Just like a bathtub, a raingarden needs a place where excess water can exit to a designated location instead of an undesirable one.

A well placed overflow can protect a yard, sidewalk, or other surface from receiving unwanted water flow or from icing in the winter.



What to Expect Beforehand

Before starting a project, it's always good to have a quick overview of what to expect. This manual will walk you through each step, but before you decide to continue reading here is a very short summary of what building a rain garden requires.

A quick overview:

BUILDING A RAIN GARDEN WILL REQUIRE:

- Reading
- Planning
- Calling 811/OUPS (to have utilities marked)
- Digging a hole, filling it with water
- A small bit of math
- Possibly extending a downspout
- Digging the whole garden:
Roughly 6"-12" deep if ground is level
- Supplies like:
Downspout piping, tools, a bit of gravel,
soil amendments like compost or
organic material, mulch, plants,
and other materials
- Mixing soil with amendments
- Mulching
- Planting
- Watering plants the first season
- Weeding the garden
- Seasonal maintenance
- Inspiring others to build one



Call the Ohio Utilities Protection Service

Before starting a project, it's always good to avoid catastrophe. Avoid potential injury, property damage, and utility disruption by following the law and digging safely.

Knowing where gas, electric, and other utilities cross your property will help protect your life, your property, and your wallet.

THIS IS A REQUIRED STEP. CALL 811/OUPS



Avoiding Obstacles

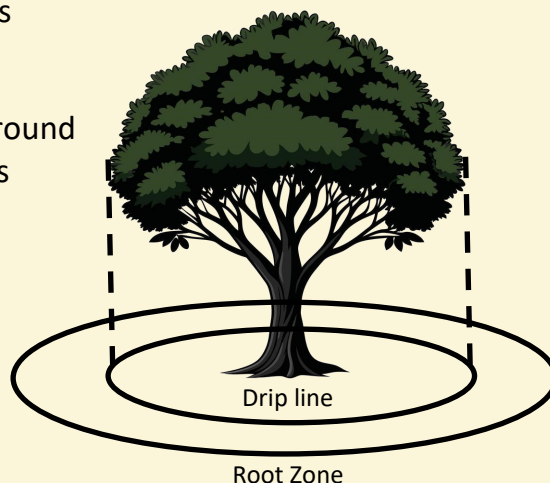
Checking for obstacles

Obstacles can limit locations for building a rain garden. Here are common obstacles that people can encounter.

EXAMPLES:

- Trees
- Roots
- Utilities
- Sidewalks
- Foundations
- Septic systems
- Leach fields
- Floodplains around streams/ivers

Having these obstacles doesn't mean you can't have a rain garden. You may need to plan a bit more carefully, though.



This sidewalk was cut to connect a downspout to a rain garden. This is an option to consider.



Digging around roots can be a hassle. It is recommended to avoid this scenario.

Choosing a Location

Finding the right location

TIPS TO CONSIDER

1. Rain gardens should be a minimum of 10' from a building's foundation (and neighboring buildings).
2. Rain gardens should not be near a septic system.
3. **Call OUPS/811 before planning to dig.**
4. Rain gardens can thrive and function in any light condition, but sunny and partly-sunny locations have the largest plant selection.
5. Plan around your water source. Is it easy or hard to get water to where you want your garden?
6. Avoid planning a rain garden by large trees.
 - Root systems may either cause problems or get damaged in excavating.
 - Trees already soak up a lot of water, and an added rain garden may not make much of a difference when it comes to stormwater infiltration in that location.
 - Some trees are upland species and can get damaged by excess water to their roots.

Let's Practice!

LOOK AT THE IMAGE ON PAGE 11. Different tips will apply to Rain Gardens A, B, and C.

Go through the tips above and note the positives and negatives for each rain garden. Also list if you would use downspout 1, 2, 3, or a combination.

Rain Garden A: _____

Rain Garden B: _____

Rain Garden C: _____

LET'S SEE IF WHAT YOU NOTICED:

- A. Despite having good sun, Rain Garden A is too close to septic. It is also far from a water source. Running Downspout 1 to Rain Garden A would be difficult and require a lot of work and material.
- B. Rain Garden B could be fed by both downspout 1 and 3, but it may be too close to the neighbor's foundation, tree roots, and marked electrical lines.
- C. Rain Garden C has no obstructions from trees or buried electrical lines. It is far enough from a foundation and has great sun. It is also close to downspout 3, giving it a great water source.

Does Slope Matter?

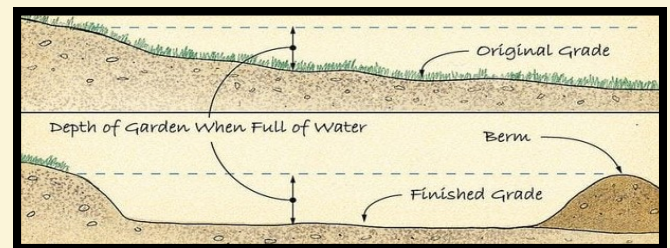
Installing a rain garden on a steep slope can result in much more work, since the bottom of a rain garden should be level and flat.

- Rain garden installation will be easiest on slopes of 8% or less.
 - Making a steep area flat requires more earth moving.
- Rain gardens on slopes between 8-12% are possible with terracing.
 - Do you want to dig one rain garden or many?
- Rain gardens are not recommended on slopes greater than 12%.

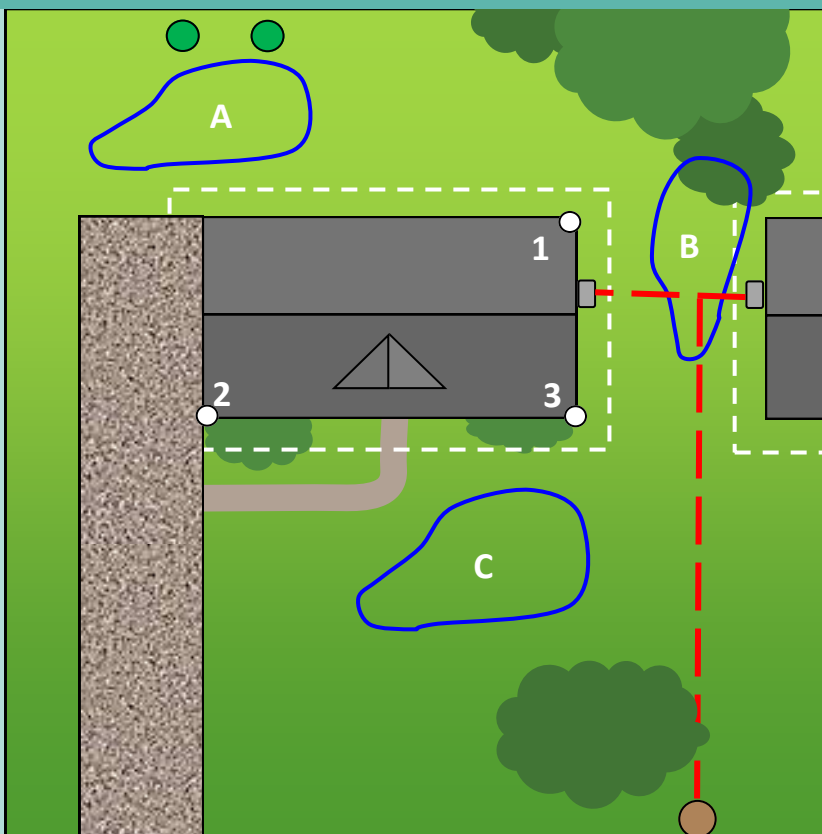


This steep slope requires many levels, resulting in a lot of extra work than a more shallow area. Choosing a different location would be easier.

If your rain garden plan requires a retaining wall greater than 2ft in height, it is recommended to consider professional installation. Choosing a location based on slope can make a world of a difference when it comes to construction.



A gentle slope requires less work to create a level area.



Key:

- Rain Garden
- Downspout
- Septic tops
- Tree
- Buried Electric Line
- 10' from foundations

What Option do you think is the best place for a Rain Garden? _____

If you didn't choose rain gardens A or B but instead chose C for the best placement option, Congratulations!!

Assessing your property

Let's Dive into the Details of Your Property!

On the graph on the next page, draw a map of your property. This can be as specific and detailed or as loose and free as you feel comfortable with.

DRAW:

- Your house and mark where its downspouts are.
- A rough 10' boundary around your house's foundation.
- Trees or other obstructions like fences, driveways, sidewalks, etc.
- Where your buried lines are: **Call 811/OUPS to find out where they are.**
- Any septic mounds, leach fields, or other such obstacles.
- Any other noteworthy features: streams, ditches, walking path, vegetable gardens, etc.

MAKE NOTES ON THE PAGE:

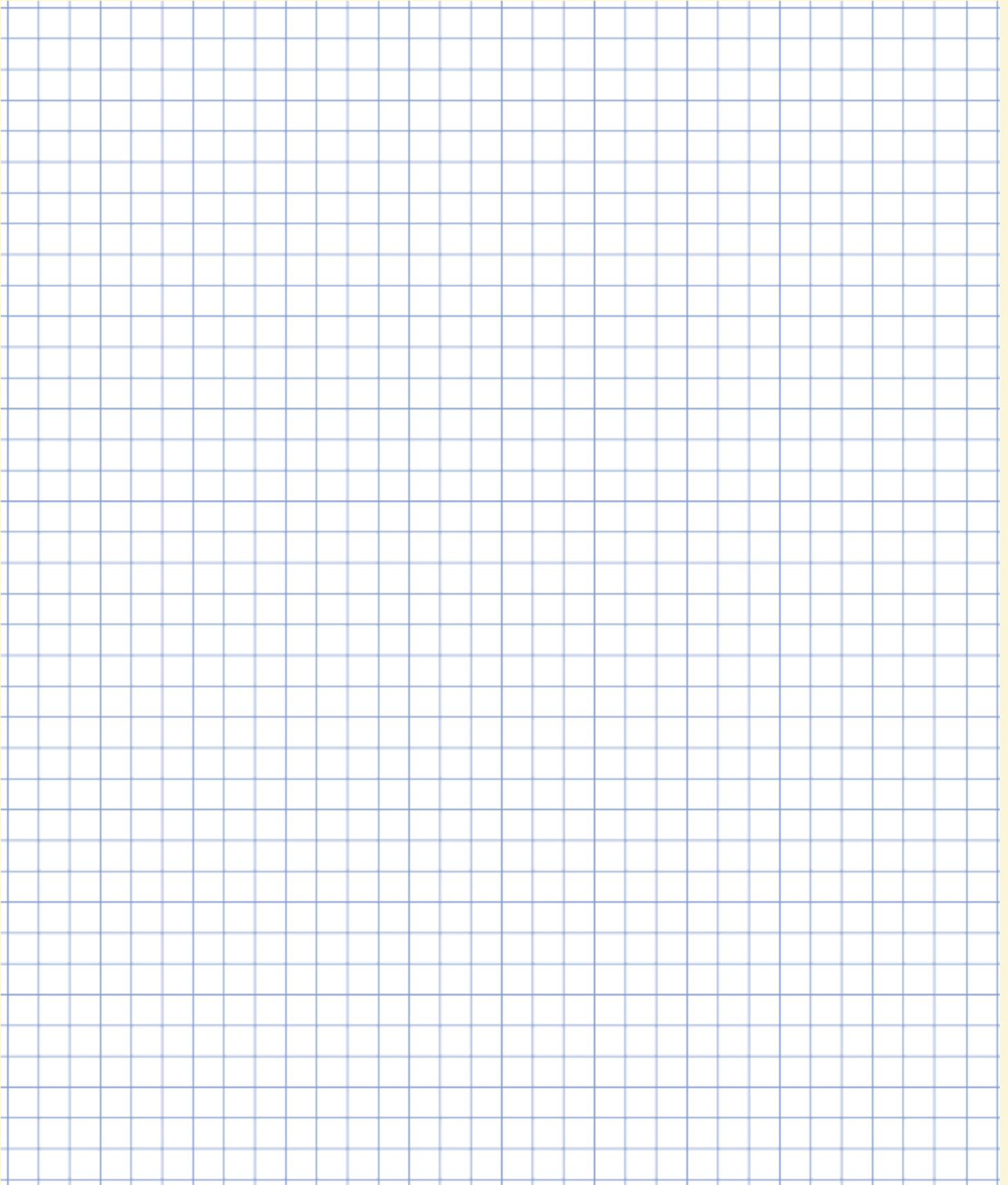
- Where is the highest part of your property?
- Is there a steep sloping area?
- Where are sunny areas? Shady areas?
- What else stands out as an obstruction for digging roughly up to 12" deep?

Assess:

- Does one spot stand out as your best option?
 - If there are a few spots you are considering, wait to make a decision after you assess your soils. (Coming on page 14)
 - Don't worry about the rain garden size or shape yet.
- What questions still remain?
 - If you still have questions, now is a great time to reach out to your local Soil and Water Conservation District for expert advise and help with problem solving. You do not have to plan it alone.

NOTES:

Sketching your property



Assessing your soils

Why do Soils Matter?

TYPES:

Different soils affect how to install a rain garden. If the soils are clay, loamy, or sandy, they may need to be addressed when you dig and plant your rain garden. But no worries! This page will make it an easy to figure out what you need to do to have a successful rain garden.



INFILTRATION RATES:

Not all soils handle water the same. If you've ever lived with clay soils, you know that water may stand for days after a storm. Since rain gardens are designed to drain within 1-2 days, soils types impact how deep you will dig. The longer it takes for your soil to soak in water, the shallower your rain garden will be.

ORIGINAL SOIL VS AMENDED SOILS

Even though the basin isn't terribly deep (only 3"-6" deep), the basin can be dug 2"-6" deeper to remove original soil and then backfilled with your soil once it's amended with quality organic material. This will allow for better water infiltration and plant growth.

Testing your Soil with a Percolation Test

In the area(s) you chose on page 13 for possible rain garden(s), you will perform a percolation test. This test shows what your soils are capable of when it comes to drainage. You will want to do this on a day when it is not actively raining, if possible.

PERFORMING THE PERCOLATION TEST:

1. Dig a hole 18" deep, roughly the width of a shovel.
2. Fill it completely with water and let it drain overnight. If it doesn't drain, you can still move onto the next step.
3. Refill the hole and check it in 24 hours.

MAKE NOTE!

Did it drain under or over 24 hours?

Circle one:

UNDER 24 hrs OVER 24 hrs



Photo credit: Master Rain Gardeners of Washtenaw County , MI

Assessing your water source

Why do Water Sources matter?

Just like soils, water sources affect how a rain garden is installed.

If water is piped from a hard surface, the majority of the stormwater that falls on that impervious surface will make its way to the rain garden.

If water is running off a surface that can soak some of it in (like a yard), less of it will make its way to the rain garden. Depending on which of the below rain garden types you have, this will affect your calculations on the next pages.



Traditional Rain Gardens

Traditional rain gardens have water directed to them from a hard impervious surface via a pipe, downspout, or direct source. This surface usually has clearly defined edges and a clear path to the rain garden. Use page 16 for calculations.

WATER SOURCE EXAMPLES:

- Roof and downspouts
- A driveway with a French drain that can be piped



Image courtesy of PrincetonHydro.com

Non-traditional Rain Gardens

Non-traditional rain gardens have water directed to them from other surfaces or from over-ground runoff. This surface usually has undefined or natural edges and a less clear path to the rain garden. Use page 17 for calculations.

WATER SOURCE EXAMPLES:

- A yard that drains via a swale
- A steep hill with a soggy bottom
- Part of a parking lot that:
 - flows into a grassy swale
 - has a curb cut into a rain garden

Non-traditional rain gardens still serve the purpose of slowing down and capturing runoff and allowing it to soak in at a more natural rate.

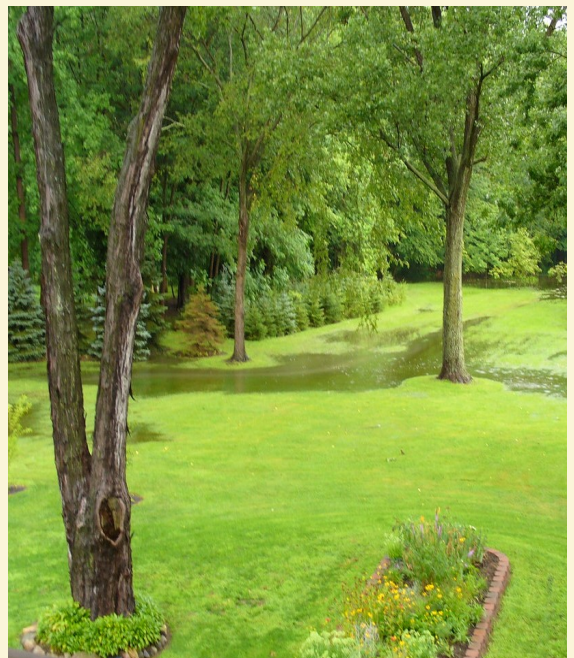


Image courtesy of Kayla Sawyer (Flicker)

Sizing your Rain Garden

Traditional or hard drainage area (roof, sidewalk, driveway)*

* If you have a non-traditional rain garden, skip this page.

1. Identify which downspout will drain into your garden.
2. See what part of the roof drains to that gutter/downspout.
3. Measure the size of the roof in **feet: Length x Width** and write it down: _____ x _____
4. Did your Percolation Test drain **UNDER** 24 hrs or **OVER** 24 hrs (see bottom of page 14)?
Check the box below that matches your test. Only use that equation.

☐ **Under 24 hrs:**

$$\begin{array}{ccccccc} \text{_____} & \times & \text{_____} & \times & \frac{0.20}{20\%} & = & \text{_____} \\ \text{Length} & & \text{Width} & & & & \text{Area} \end{array}$$

This will be your **Rain Garden** in **square feet**. It will be **6"** deep.

☐ **Over 24 hrs:**

$$\begin{array}{ccccccc} \text{_____} & \times & \text{_____} & \times & \frac{0.30}{30\%} & = & \text{_____} \\ \text{Length} & & \text{Width} & & & & \text{Area} \end{array}$$

This will be your **Rain Garden** in **square feet**. It will be **3"** deep.

BUT WAIT!

If your rain garden is fed by both hard surfaces and yard, measure them separately and add the totals. If the calculated size doesn't work for you, do whatever size you can, but keep the proper rain garden depth. If you have to go smaller, make sure you have a good outlet for the overflow.

For example:

Roof = 16' x 25'

Percolation test **under** 24 hrs:

Size = 20% (or 0.20) of **roof**

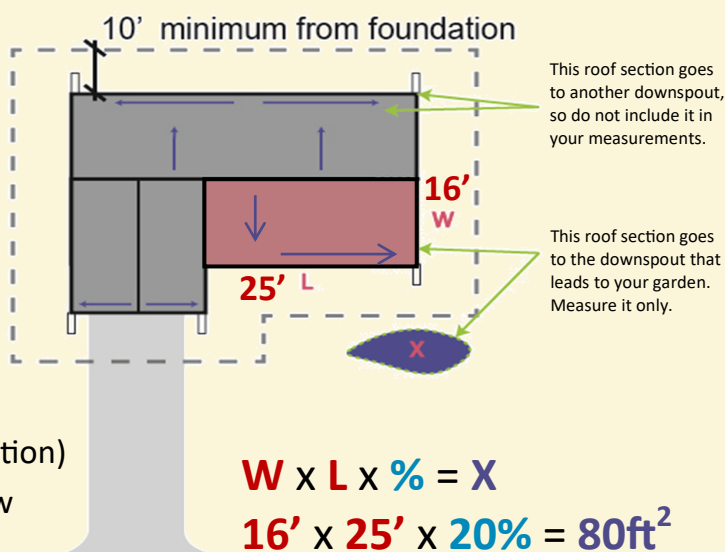
Rain garden depth = 6"

16' x 25' x 0.20 = 80ft² rain garden

A 80ft² rain garden could be a:

- 8' x 10' rain garden
- 5' x 16' rain garden
- 4' x 20' rain garden (Not the best. A narrow option)

OR any smaller size with a well-placed overflow



Sizing your Rain Garden

Non-traditional drainage (slightly porous area: yard, gravel path)*

* If you have a traditional rain garden, skip this page.

1. Identify where you're going to build your rain garden.
2. Identify what area drains into that location.
3. Measure the edge of that area in **feet**: **Length x Width**. Write it down: _____ x _____
4. Did your Percolation Test drain **UNDER** 24 hrs or **OVER** 24 hrs (see bottom of page 14)?
Check the box below that matches your test. Only use that equation.

☐ **Under 24 hrs:**

$$\begin{array}{ccccccc} \text{_____} & \times & \text{_____} & \times & \underline{0.10} & = & \text{_____} \\ \text{Length} & & \text{Width} & & 10\% & & \text{Area} \end{array}$$

This will be your **Rain Garden** in **square feet**. It will be **6"** deep.

☐ **Over 24 hrs:**

$$\begin{array}{ccccccc} \text{_____} & \times & \text{_____} & \times & \underline{0.05} & = & \text{_____} \\ \text{Length} & & \text{Width} & & 5\% & & \text{Area} \end{array}$$

This will be your **Rain Garden** in **square feet**. It will be **3"** deep.

BUT WAIT!

If your rain garden is fed by both hard surfaces and yard, measure them separately and add the totals. If the calculated size doesn't work for you, do whatever size you can, but keep the proper rain garden depth. If you have to go smaller, make sure you have a good outlet for the overflow.

For example:

Yard = 32' x 50'

Percolation test **over** 24 hr:

Size= 5% (or 0.05) of **yard**

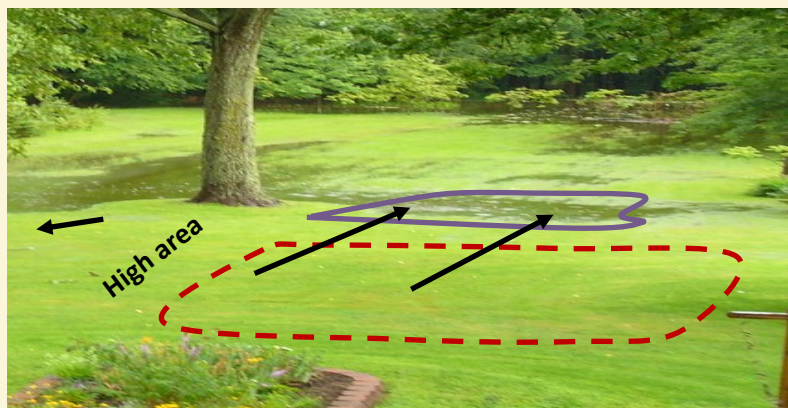
Rain garden depth= 3"

32' x 50' x 0.05 = 80ft² rain garden

A 80ft² rain garden could be a:

- 8' x 10' rain garden
- 6' x 13½' rain garden
- 4' x 20' rain garden (Not the best. A narrow option)

OR any smaller size with a well-placed overflow



$$\begin{array}{l} \mathbf{W \times L \times \% = X} \\ \mathbf{32' \times 50' \times 5\% = 80ft^2} \end{array}$$

Planning your Rain Garden:

Shape

Gathering our Numbers: (page 16/17)

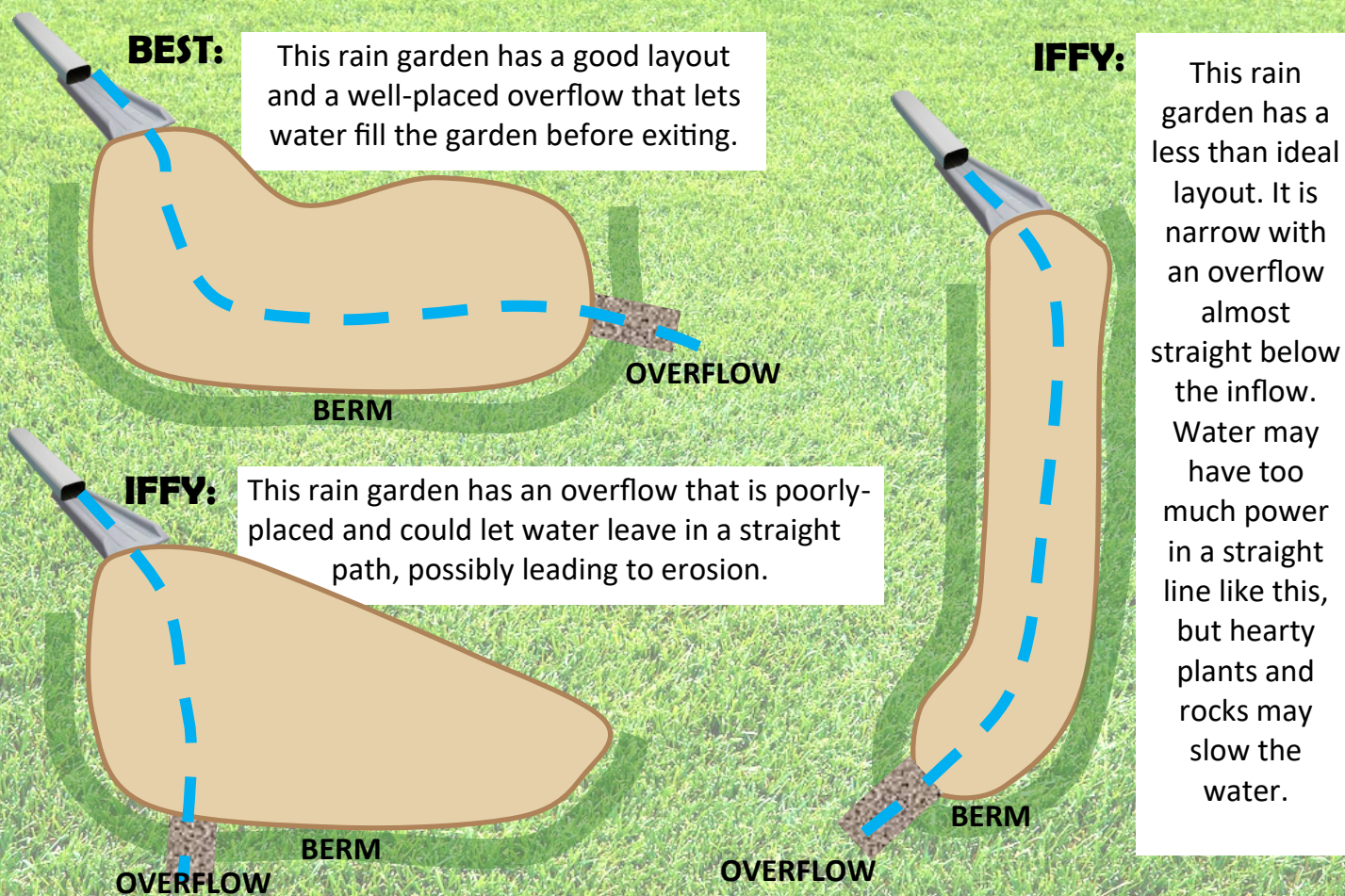
SIZE: _____ DEPTH: _____

Planning the Shape:

Now that you have the size, what shape do you want your rain garden to be? Look back on page 13 to see what shapes may work with your landscape.

A COMMON ISSUE:

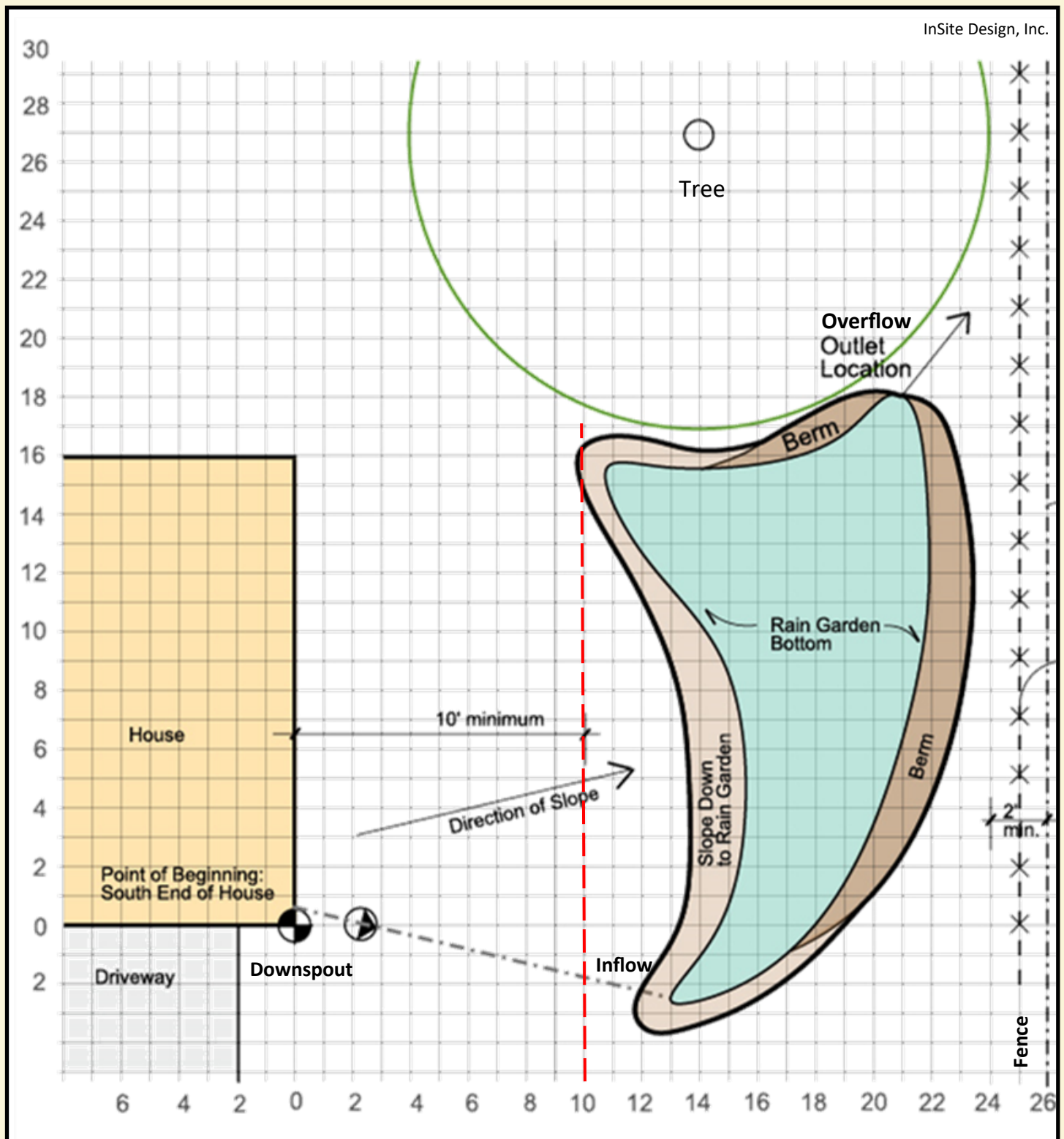
- The shape can be any shape you want, but consider how the water will move through the garden.
 - The overflow should not allow water to flow straight out of the rain garden. Water has a lot of power, and if it enters the garden with no gravel to slow the flow, it can cause erosion issues, especially if it has a straight path.
 - If the berm is secure, the bottom is level, and there is some gravel to prevent erosion at the inflow (if necessary), and it is appropriately sized, then shape doesn't really matter.



Sketching A Rain Garden

Example

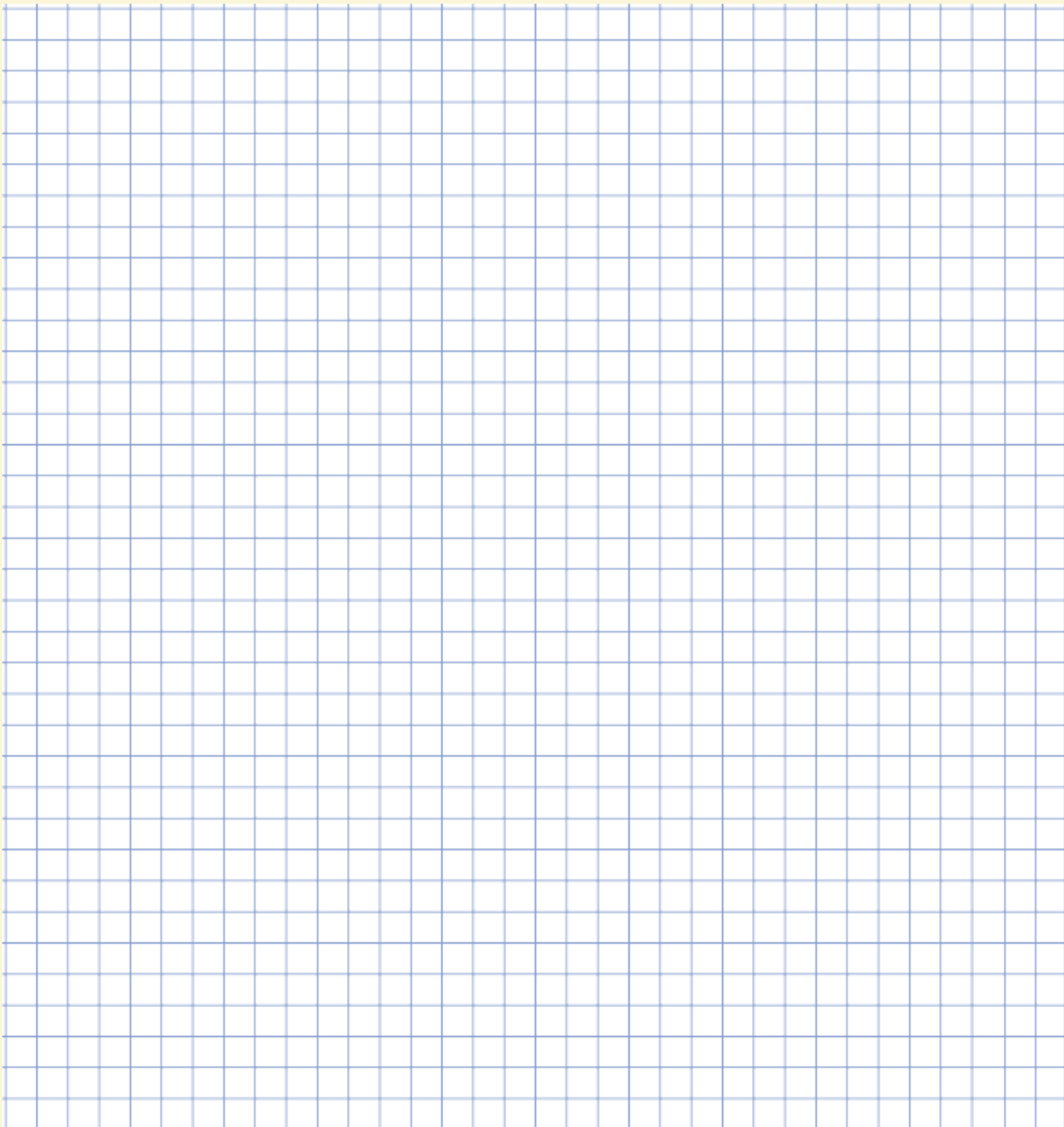
Here is an example sketch of a rain garden. Within are marked obstacles, the house, the 10' foundation setback, the direction of the slope, inflow, outflow, and property lines.



Sketching Your Rain Garden:

It is time to draw your rain garden’s layout. Like the example on page 19, include:

- ☐ 10’ from foundation
- ☐ Direction of slope
- ☐ Berm
- SIZE: _____
- ☐ Any obstructions
- ☐ Inflow
- ☐ Overflow
- DEPTH: _____



Choosing Plants

Why do plant types and plant diversity matter?

Plants play an important part in every part of life. **ROOTS** interact with and protect soil and water. **LEAVES** act as egg laying stations and food for growing insects and wildlife. **FLOWERS** provide nectar and pollen to feed adult pollinators. **STEMS** act as food storage or housing for insects overwintering. This is why it's important to choose plants for your rain garden carefully. Plant diversity and native plants best support all of the stages of a pollinator's life.



Milkweed is a host plant to Monarch butterflies, meaning without it, the butterfly would perish. Usually only eggs laid on milkweed leaves will survive, since the caterpillar can only eat milkweed leaves.
Photo by Monika Maeckle: Monarch egg and caterpillar on common milkweed



Having diverse flower types provide pollen and nectar for a wider range of pollinators. Pollinators are better equipped to acquire food from native plants than non-native plants.
Photo by Kellie Docherty: Hummingbird moth on wild bergamot



Here are holes made by native bees in native plant stems. Inside, eggs can develop into larva and overwinter. Leaving stems help bee populations.
Photo by Kellie Docherty: Holes in native stems

Types of Plants:

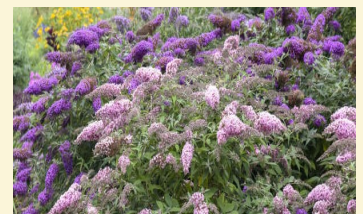
- **NATIVE PLANTS** are plant species that have evolved and occur naturally in a particular region, ecosystem, and habitat. In Ohio, native plants can survive the cold winters, the warm summers, and fluctuating water levels throughout the seasons. They support Ohio's wildlife and pollinators through every stage of their lives. Their pollen is nutrient dense for pollinators.
- **CULTIVARS** are plants cultivated and bred by humans for specific traits, such as taste, color, or resistance to pests or diseases. Some may have had traits bred for them that can be less beneficial at serving all stages of life for pollinators. See picture to the right. If providing for pollinators and wildlife is important to you, avoid cultivars of native species that dramatically change leaf color, flower color, or flower shape.
- **NON-NATIVE PLANTS** are plants that have been introduced to an area by humans, either intentionally or accidentally. These plants are unfamiliar to a region's climate, wildlife, and ecosystems. Their pollen and leaves may not have the same benefits/nutrition as native plants.
- **INVASIVE PLANTS** are a non-native species that can cause environmental harm, economic damage, or harm to human health. These plants are often brought to an area accidentally or for a purpose. Due to the lack of predation, rapid growth, and high seed dispersal, they escape into wild areas and damage ecosystems and wildlife. Some can be illegal to buy, sell, or plant in the state of Ohio.



A native Ninebark with green leaves serves insects at all stages of their lives.



A Ninebark cultivar with purple leaves. Its leaves are often not edible to young insects. So it mostly serves only adult insects with its pollen.



The butterfly bush is under evaluation as an invasive plant in Ohio. It is a threat to butterfly populations and native ecosystems.

Choosing Plants

Tips for Success. Considerations:

Plant Considerations



- **SUN/SHADE LEVELS:** How much sun does your chosen rain garden location get?
 - Shade is < 4 hours of direct sunlight, partly sunny is 4-6 hours of direct sunlight, and full sun is greater than 6 hours of direct sun.



- **SOIL MOISTURE LEVELS:** The moistest area will be in the middle. The driest on the edge.



- **PLANT HEIGHT:** What is the tallest height and shortest height of the plants you want? How do you want them laid out visually? Tallest in the back or along a certain edge? Don't lose your shorter plants within the mix.



- **BLOOM TIME:** Different plants will bloom at different times. Try to choose a variety of plants so there will be flowers in every season. This provides pollen/food for wildlife throughout the year.



- **BLOOM COLOR:** A variety of colors can create a beautiful garden. Does color matter to you? If so, keep that in mind during your selection.



- **PLANTS WILL FILL IN:** Even if things look a bit sparse in the beginning, native plants are often perennial and will fill in over time.
- **CONSIDER THE OFFSEASON:** Consider what they will look like dead standing in late fall, winter and early spring. Dormant perennials in different textures and shades of brown and trees and shrubs with interesting colored or textured bark can make for a beautiful garden even in those dark and cold months.

For a short list of common native plants, see page 24. For more native plant recommendations or for lists of nurseries that carry them, reach out to your local Soil & Water Conservation District.

Other Considerations



- **KEEPING IT SIMPLE** can make it easier to succeed and weed in the following seasons.
- **LIFESTYLE:** Make your garden fit your lifestyle. If you are busy or don't like to garden, consider limiting species to 3-5 plants, a statement tree or shrub, and a groundcover.



- **NEIGHBORHOOD AESTHETIC:** If your neighborhood values or requires a level of tidiness or conformity, choose some plants that your neighbors are familiar with. Familiar native plants like purple coneflowers and black-eyed Susans can signal the garden's intentionality and therefore are less likely to trigger neighbor complaints. Never underestimate the power of a well-placed non-native, non-invasive plant like a hosta.



- **GARDEN SIZE:** Choose smaller plants for smaller gardens. You may love the look of a ground cover like Canada anemone, but it can quickly overwhelm a small garden. Choose plants with smaller heights and spreads.

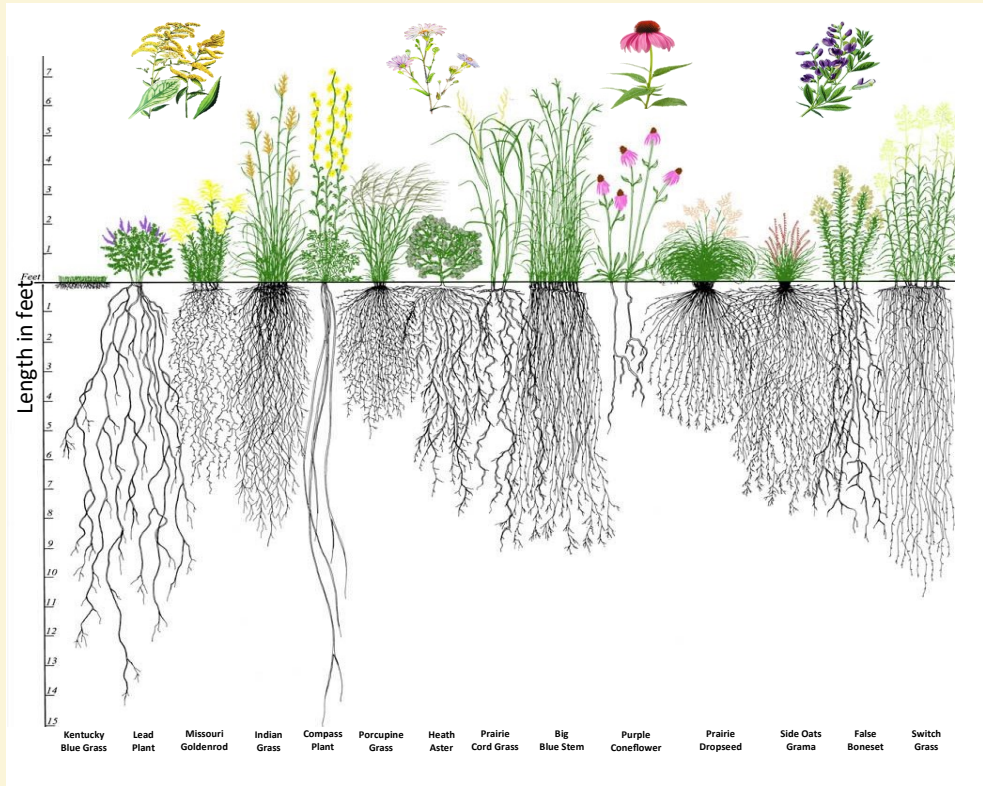


Choosing Plants

Roots and Stormwater

Native roots serve the purpose of a rain garden better than non-native roots. They grow deeper, allowing them to make a rain garden more successful. They increase water infiltration, hold soils together, filter out more pollutants, and tap into ground water which can help them survive drier spells between rain.

Here you can see how Kentucky blue grass roots (on the left) compare to the roots of native grasses and flowers.



Add your plants to your design:

Think about the considerations on the last page and look at the list on page 24. Choose what seems to work for your garden. Return to your design on page 20, and add your choices to the sketch. You can make your design as simple or detailed as you wish, to fit your comfort level.

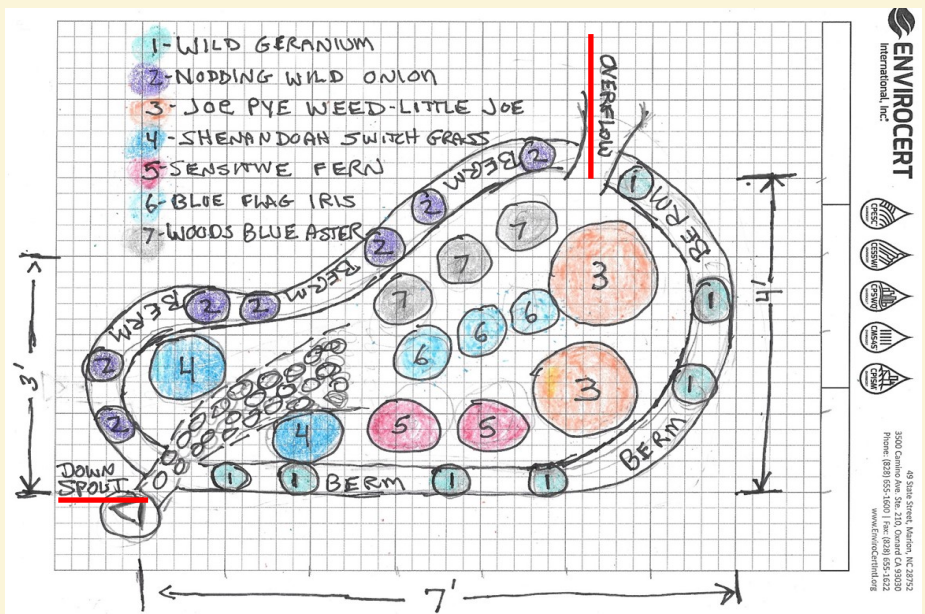
Example design:

Here is an example of how a design can look. More examples can be found on the next pages.

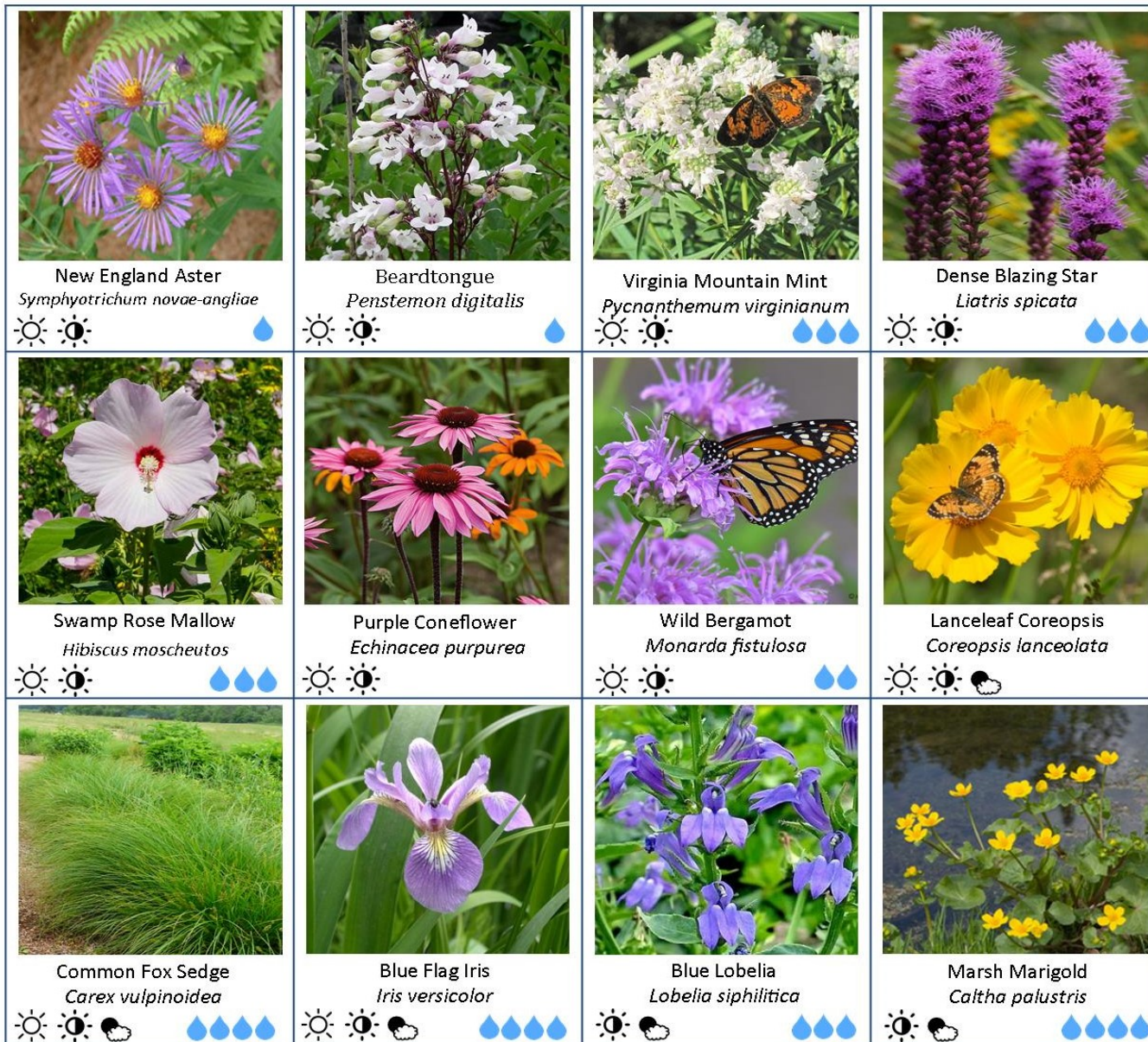
This design includes the downspout, berm, and overflow. These are all important elements to plan around.

Color coding can help bring some life into the design.

Sometimes a simple, well thought out design is easier to execute and will be more successful.



Recommended Native Plants



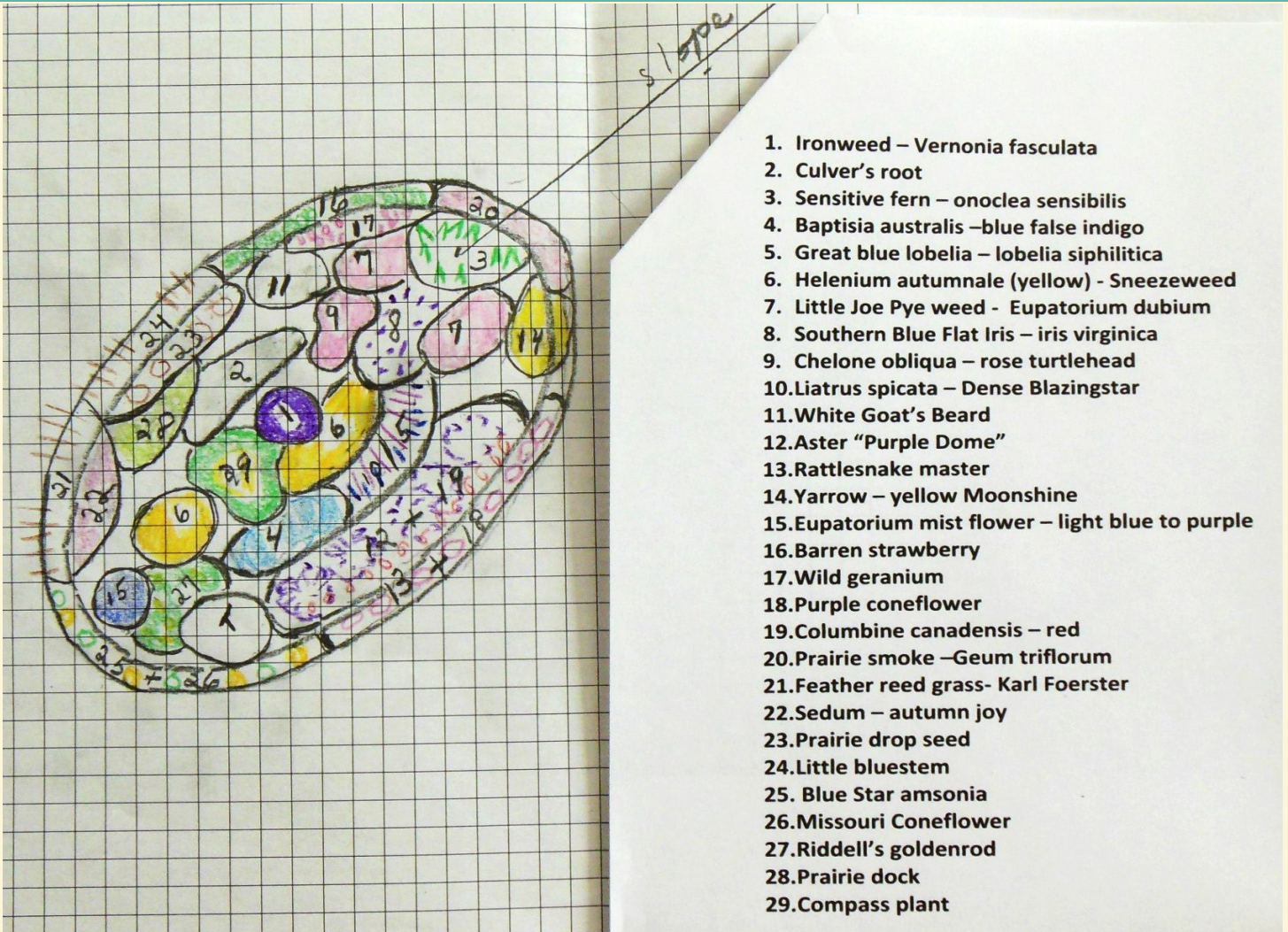
Bloom Times & Colors

Common Name	Scientific Name	Hght	Light	Clay	April	May	June	July	Aug	Sept	Oct	Moisture*	RG Location
New England Aster	<i>Symphyotrichum novae-angliae</i>	5'	Sn, P									M	
Beardtongue	<i>Penstemon digitalis</i>	3-4'	SN, P									D,M,Ms	
VA Mt Mint	<i>Pycnanthemum virginianum</i>	3'	Sn, P									M, Ms, W	
Dense Blazing star	<i>Liatris spicata</i>	3-5'	Sn, P	y								M, Ms	
Swamp Rose Mallow	<i>Hibiscus moscheutos</i>	5'	Sn, P									Ms, W	
Purple Coneflower	<i>Echinacea purpurea</i>	2-5'	Sn, P									D	Edge
Wild Bergamot	<i>Monarda fistulosa</i>	4'	Sn, P									D, M	
lanceleaf Coreopsis	<i>Coreopsis lanceolata</i>	2-3'	Sn, P, Sh	y								D	Edge
Common Fox Sedge	<i>Carex vulpinoidea</i>	2'	Sn, P, Sh									M, Ms, W	Wettest part
Blue Flag iris	<i>Iris versicolor</i>	2'-3'	Sn, P, Sh									M, Ms, W	Wettest part
Blue Lobelia	<i>Lobelia siphilitica</i>	2'-3'	P, Sh									M, Ms	
Marsh Marigold	<i>Caltha palustris</i>	1-2'	P, Sh									Ms, W	Wettest part

* Moisture: Dry (D) likes the edge of a rain garden, Medium (M) likes to be wet for short periods, Moist (MS) can handle being wet often, Wet (W) can handle standing water

Full Sun: at least 6 hrs of direct sun daily
 Partial Sun: 3-6 hrs of direct sun daily
 Shade: less than 3 hrs of direct sun daily
 Dry soils
 Medium soils
 Moist soils
 Wet soils

Example Design: Full Sun



Master Rain Gardener, Helen Prussian's design and plant list.

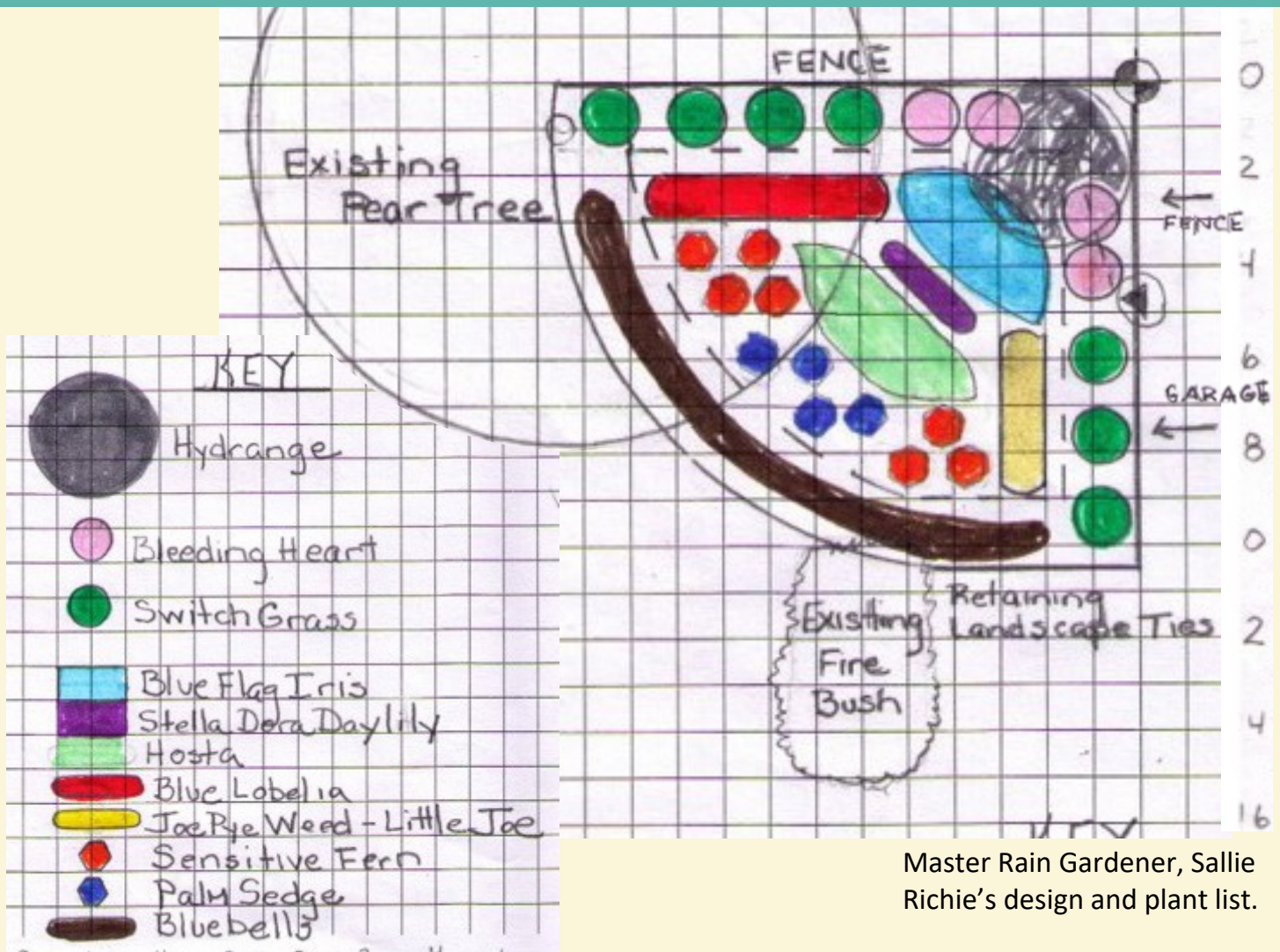


Yard before rain garden construction.
Footprints in the snow outline rain garden border. Photo credit: Helen Prussian



Completed rain garden with Master Rain Gardener, Helen Prussian. Photo credit: Susan Bryan

Example Design: Partial Sun



Master Rain Gardener, Sallie Richie's design and plant list.

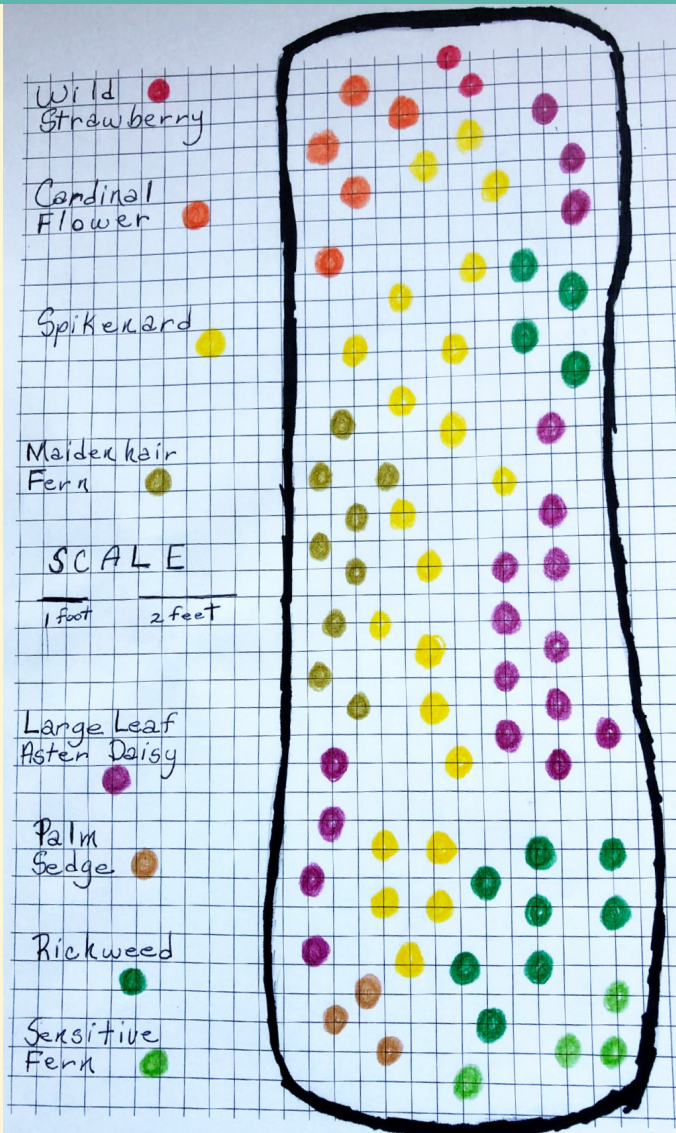


Yard before rain garden construction.
Photo credit: Sallie Richie



Completed rain garden with Master Rain Gardener, Sallie Richie. Photo credit: Susan Bryan

Example Design: Full Shade



Master Rain Gardener, Judy Nikolai's design and plant list.



Completed rain garden with Master Rain Gardener, Judy Nikolai and her neighbors.

Photo credit: Kari Paine



Example rain gardens photos on pages 25-27 are from the Master Rain Gardener Handbook from Washtenaw County Water Resources Commissioner's Office.



Richweed and Spikenard thrive in this full shade garden. Photo credit: Kari Paine

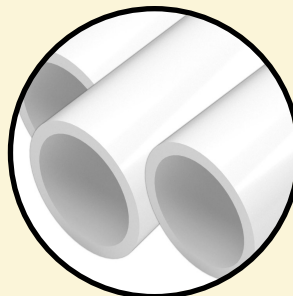
Construction: Materials Needed



Tools are listed in blue boxes on construction pages.

MUST HAVES: measuring tape, shovel, level/line level.

OPTIONAL: flags, spray paint, tarp, rototiller, gloves, rake.



Piping

If you are connecting your downspout to your garden, you'll need PVC pipe. **Cost saving tip:** Thin-walled (schedule 20) PVC works.



Soil Amendments

Optional but recommended. Adding compost, top soil mixes, or organic material into your soil can improve your rain garden's function. Sand is not recommended.



Rock/Gravel

Optional around the inflow and outflow. Needed if a gravel swale connects the downspouts to the rain garden.



Native Plants

A must have! See list on page 24 for ideas and reach out to your local Soil & Water Conservation District for recommendations.



Mulch

The last material needed when finishing up a rain garden. Protects the new soil mix and native plants.

You have called OUPS / 811, right?



This step has been mentioned on several pages, because it is terribly important! If you haven't called to have your utilities located, do **NOT** start construction.



Construction:

Step 1: Transferring Your Design

Needed Tools

- ☐ Measuring tape (or equivalent)
- ☐ Marking tools:
flags, rocks, sticks, a garden hose, or
anything to mark the edge of your
rain garden.
- ☐ Spray paint or a way to draw
an edge

The fun has begun!

It's time to transfer your design (pg 20) to your yard.

1. **TRANSLATE THE DIMENSIONS** of your rain garden to the ground by laying out tape measures or strings to act as the graph paper. Eyeballing is fine.
2. **MARK THE EDGE** of the rain garden shape by using flags, rocks, sticks, or anything that can act as a place holder. Some people use a garden hose as a way to get smooth curves.
3. **STEP BACK AND ASSESS** if you want to make any changes now that you see it in your landscape. If so, move your markers.
4. **DRAW THE EDGE** by connecting the dots. You can use spray paint, flour, lime, or string.

Remember, if the size isn't exact, that is okay! It will still be a great rain garden that will be doing an important job.

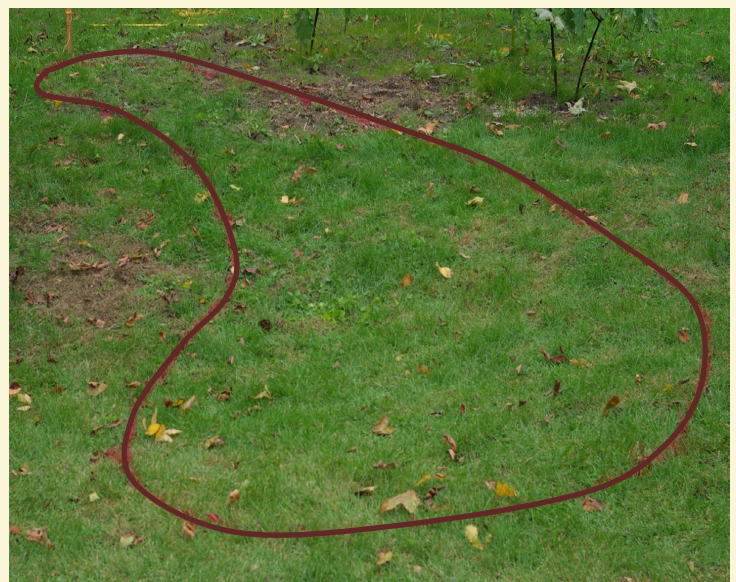


Photo credits: Harry Sheehan

Construction

Step 2: Planning drainage

Optional Tools

- ☐ Measuring tape
- ☐ A line level

Check Downhill Flow:

Go outside when it's raining and see if the water is flowing the way you thought it would, or use a garden hose either on the ground or in your gutter to check the flow.

Overland Drainage:

If you want the water from your downspout to flow overland, make sure it doesn't settle at your foundation. Using a splash block can safely direct water away from your foundation.

Your drainage channel can be made of stones, native plants, or simply be a lowered grassy pathway. Check to make sure there is good slope.

Good Slope:

Directing water to a rain garden can be done openly overland or with a pipe. No matter how you direct water to a rain garden, make sure you are always directing your water **downhill**.

Whether you're using an above-ground pipe, a buried pipe, or an above-ground swale, try to make sure there is at least a 1 inch drop for every 4 feet from the water source. If there isn't adequate drop, water may back-up.

If it's hard to judge your slope, set up your level and check.

If the slope to the rain garden is steep, make sure to use gravel at your inflow to protect your rain garden against erosion.



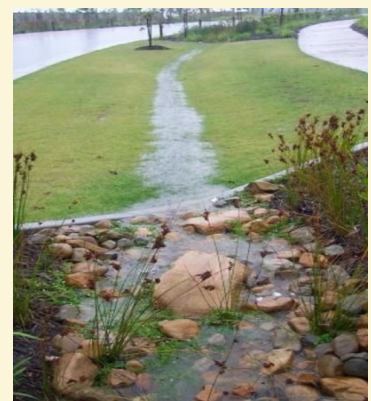
A splash block can also lead water away from a foundation.
Photo credit: GreyDock



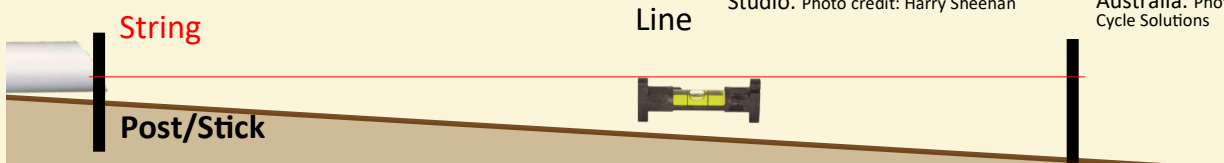
Downspout on the left is cut too close to the foundation, which could lead to damage. The one on the right is better. Photo: Medina County SWCD



Rain garden in Washtenaw County, MI. InSite Design Studio. Photo credit: Harry Sheehan



Grass swale leading to a runoff garden in Heritage Mews, Sydney, Australia. Photo credit: Urban Water Cycle Solutions



Needed Tools/Supplies

- ☐ Measuring tape
- ☐ A level
- ☐ Shovel
- ☐ Gravel: where the inflow enters rain garden
- ☐ Pipe (not needed for overland drainage)

Buried Pipe Drainage:

Connecting your downspout to your rain garden through a buried pipe allows the yard above to be mowed, but it also leads to an increased velocity of water compared to overland drainage.

• TYPE OF PIPE:

Use a non-perforated, 4" diameter pipe. Either corrugated black plastic or PVC piping works. PVC is better for long runs (>20'). It is stronger but more expensive.

• **COST SAVING TIP:**

Most PVC pipe is 40 schedule, but a 20 schedule thin wall PVC pipe will work just fine.

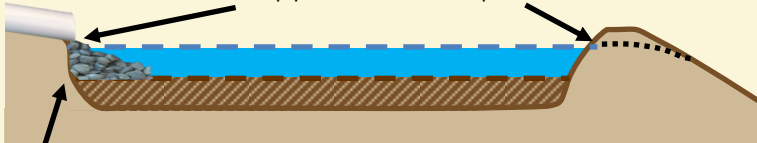
- Do not drive heavy equipment over your buried pipe.

• PLACEMENT:

The pipe should run downhill with its outlet above where the water will pool in the rain garden.

- **PRO TIP:** The overflow will need to be below the elevation of the bottom of the pipe to prevent water from backing up or sitting in the pipe.

EXAMPLE: bottom of pipe top of overflow



• PREVENTING EROSION:

Adding some gravel where the inflow pipe meets the edge of the rain garden will prevent erosion. Monitor this area as part of your regular maintenance.



Buried drainage to a rain garden. Photo credit: Aunt Spray/Shutterstock



Buried downspout drainage. Photo credit: YellowBrickHome.com



Rocks at inflow: Dexter, Michigan. Photo credit: Susan Bryan

Construction

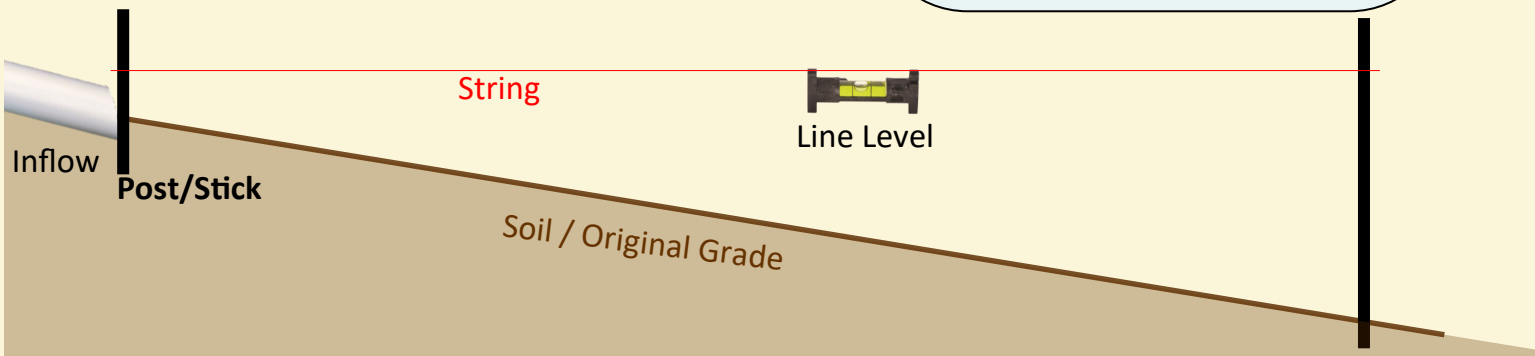
Step 3: Digging the garden

Step by Step Digging Guide:

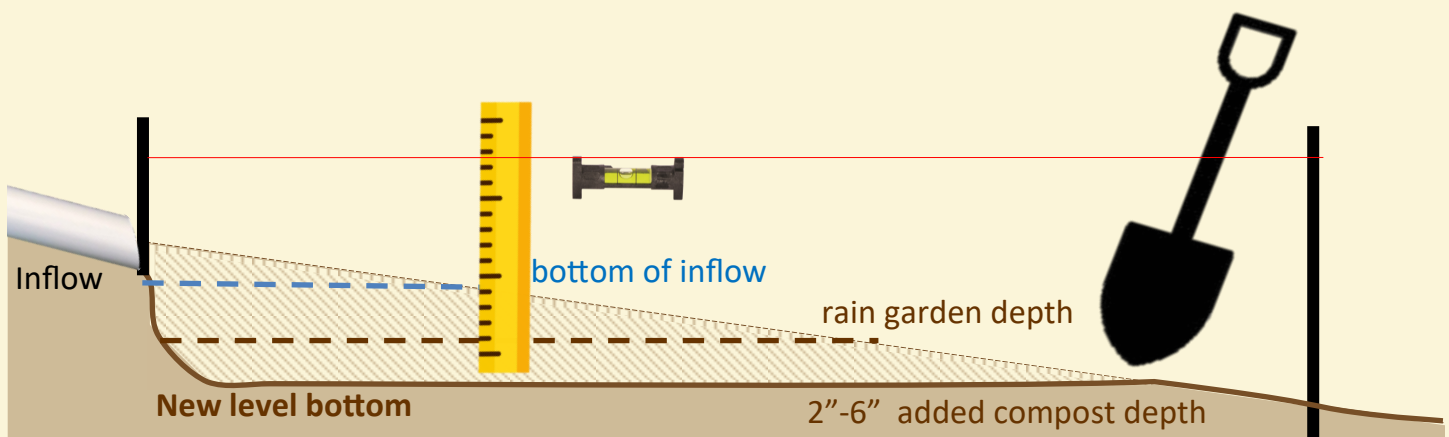
1. Within the outline of your rain garden, rototill the turf, use a sod-cutter, or remove turf with a shovel.
2. Set up your line level by staking a post/stick by the inflow and one by the overflow.
 - String a line from the posts and attach your line level. Adjust the string until the line level is level.

Needed Tools/Supplies

- ☐ Measuring Tape/Ruler
 - ☐ A line level, two posts/sticks
 - ☐ String
 - ☐ Shovel
- OPTIONAL:**
- ☐ Tarp (for easy clean up)
 - ☐ Rototiller/Sod cutter
 - ☐ Gravel for inflow and overflow
 - ☐ Friends (to make light work)



3. Start digging at the bottom of your inflow.
 - Whatever your rain garden depth is from page 18, dig that many inches below the bottom of your inflow.
 - If your soil is poor or clay, it will need to be amended with compost or other amendments. Dig at least 2" deeper or at most 6" so you can add 2"-6" of amended soil to the finished rain garden.
3. Set soil aside on your tarp. It can be used to build the berm or to mix with compost.
4. Measure down from the string to make sure the garden bottom is level.



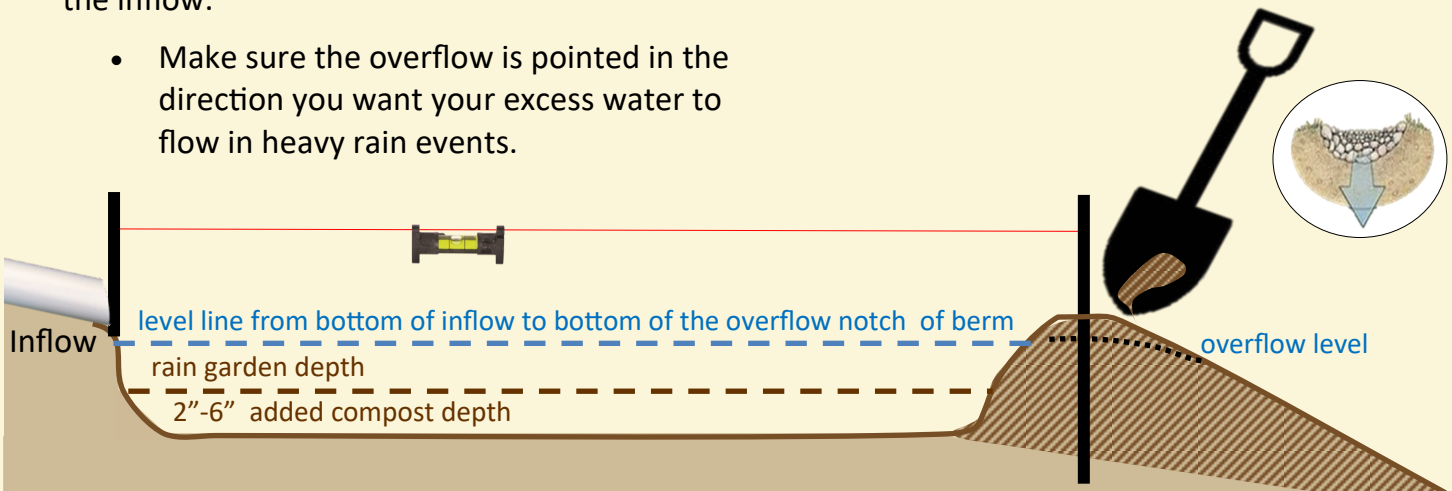
Construction

Step 3: Digging the garden. The Berm & Overflow

5. With the soil you dug out, build a berm on the downhill side to hold the water in the garden like a bowl. The berm will be taller than the bottom of the inflow by a tiny bit, roughly an inch.
6. Add a depression to the berm for overflow water to go to a desired location. The top of this notch should be level with the bottom of the inflow.
 - Make sure the overflow is pointed in the direction you want your excess water to flow in heavy rain events.



A dug rain garden basin with berm to the right.



Example Overflow:

It may be hard to tell, but the overflow is lower than the top of the berm. This allows heavy rains to exit the rain garden in the direction you want, instead of flowing in every direction across your yard.

The bottom of the notch should be level with the bottom of the inflow, whether the inflow is a pipe or a swale.

Consider adding gravel to the inflow area and overflow, to protect from erosion.



Image Courtesy of Rain Dog Designs, WA

Construction

Step 4: Amending the soil

Amending Guide:

SOIL TEST: Finding the right amendments depends greatly on the soils that are in the yard. Getting a soil test is optional, but it helps clarify what is missing from the existing soil.

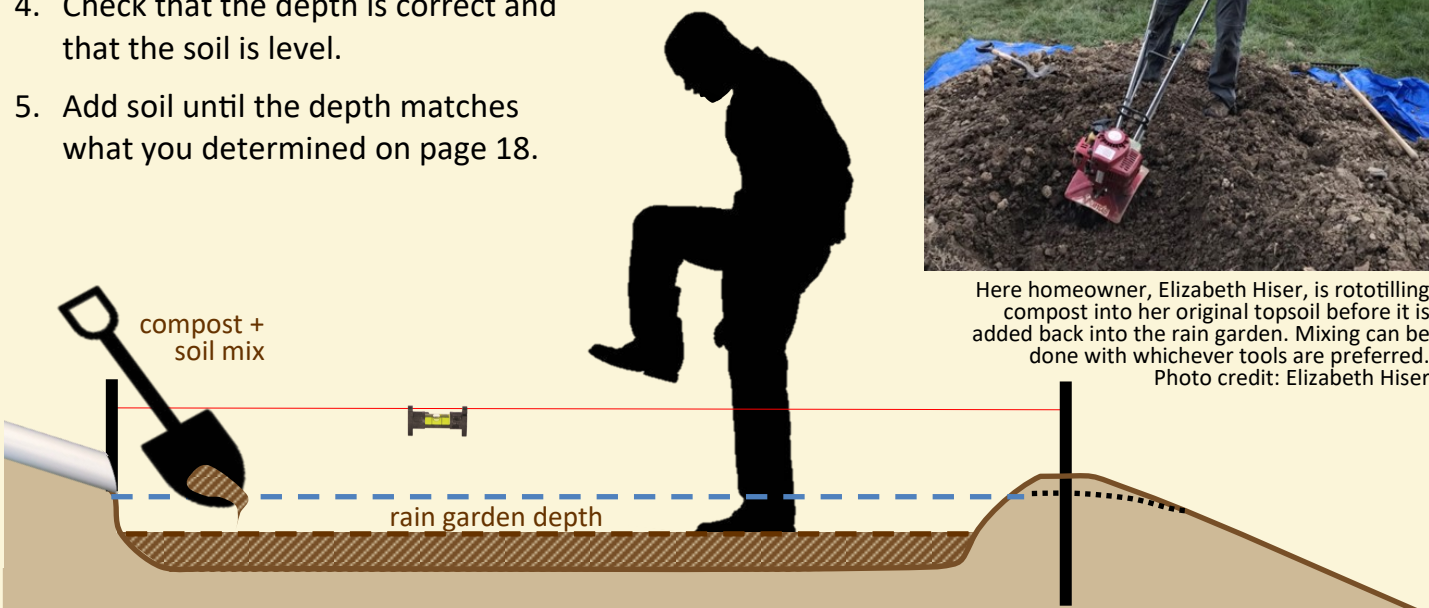
ORGANIC MATERIAL: Mixing high quality compost, organic material, or top soil mixes to the existing soil can improve growing conditions.

SAND: While it might seem like sand would be a good soil amendment, it is not recommended. Organic matter is far more effective at increasing the water holding capacity and the infiltration rate of your garden's soil, once your plants are established.

MANURE: Do not mix in fresh manure. As it decomposes, the manure gets hot and can burn or kill the plants that will be added to the rain garden.

Adding the Soil:

1. Once the soil is thoroughly mixed with amendments, shovel it back into the rain garden.
2. Level it out with a garden rake.
3. Compress the soil by foot.
4. Check that the depth is correct and that the soil is level.
5. Add soil until the depth matches what you determined on page 18.



Needed Tools/Supplies

- ☐ A line level
- ☐ Shovel
- ☐ Boots/Shoes for stomping
- ☐ Soil Amendments

OPTIONAL: Garden rake



A pile of quality compost for amending the soil for a large rain garden. Photo credit: Elizabeth Hiser



Here homeowner, Elizabeth Hiser, is rototilling compost into her original topsoil before it is added back into the rain garden. Mixing can be done with whichever tools are preferred. Photo credit: Elizabeth Hiser

Construction

Step 5: Planting & Mulching

Tips for Consideration:

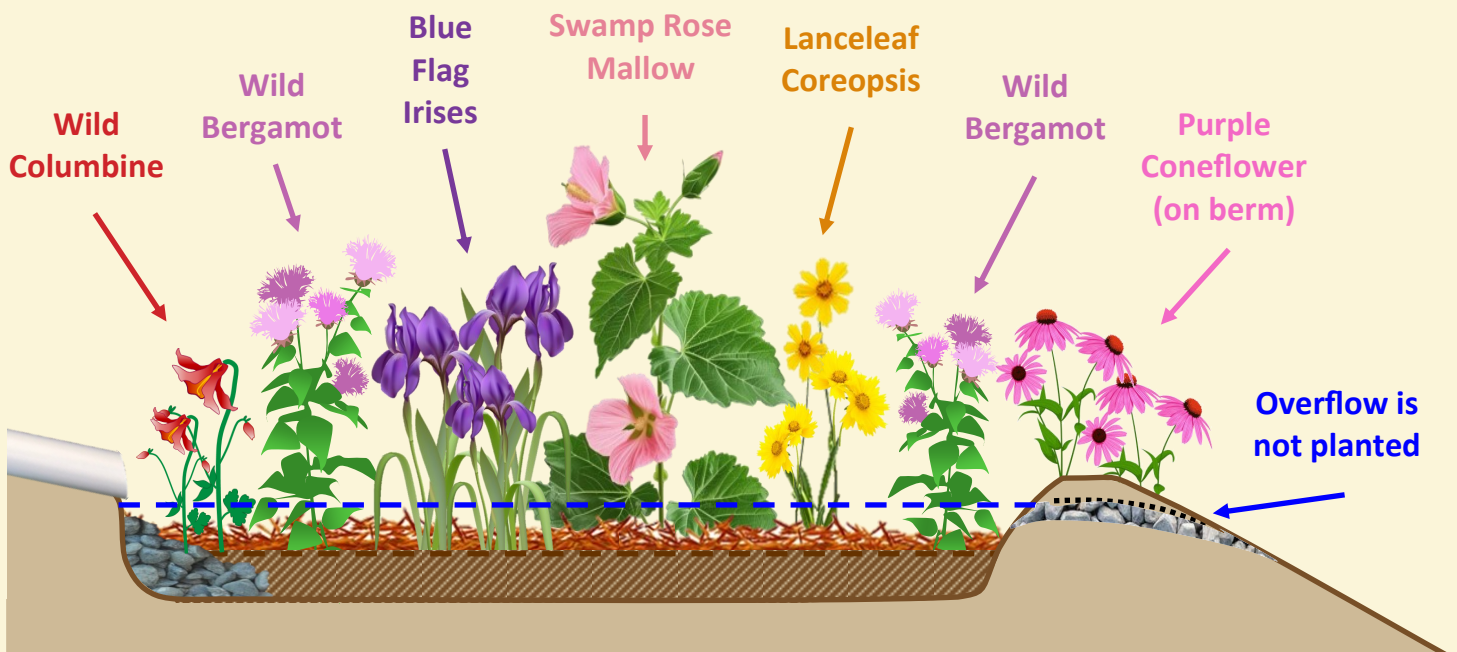
- **SUN/SHADE LEVELS:** How much sun do the plants need?
- **SOIL MOISTURE LEVELS:** The moistest area will be in the middle. Make sure that the plants that love moisture are in the middle. Plants that like drier roots can be planted on the edges or the berm.
- **PLANTS WILL FILL IN:** Even if things look a bit sparse in the beginning, native plants are often perennial and will fill in over time.
- **WATERING:** Plants will need watered the first season until they get established.

Planting and Mulching:

1. Gather your native plants and start digging.
2. Plant them firmly into the soil. Make sure there are no air pockets and gaps around the roots.
3. Water the plants, and check to make sure the soil is still at the proper depth.
4. Mulch below the bottom of the inflow and overflow notch.

PRO TIP: For fast and easy mulching around your plants, place the nursery pots upside down over the plants after planting. Apply mulch, then remove the pots. This ensures your plants don't get covered or over mulched.

You've successfully planted your rain garden!



Needed Tools/Supplies

- ☐ Plants
- ☐ Spade
- ☐ Gloves
- ☐ Mulch
- ☐ Hose/Water

OPTIONAL: Kneeling Pad

Maintenance



**MASTER
RAIN
GARDENER**

Based on
suggestions
from the
Master Rain
Gardener
Program.

Maintaining a rain garden is important for it to function properly. A bit of regular maintenance will allow it to look good and last for a long time. Here is an example maintenance plan:

Monthly:

- Clear and remove debris or sediment from the inflow and overflow.
- Pick up any trash or debris.
- Trim encroaching plants as needed.
- Monitor for erosion. If there is erosion, add rocks to dissipate the water.
- Remove invasive/unwanted plants (especially before they set seed).



An inflow pipe with debris.
Photo credit: Aqua Cleaning

Spring (April – May):

To avoid disturbing any over-wintering pollinators, do NOT clean-up leaves until temperatures are consistently above 50°F in May. Early warm spells are enticing, but avoid the temptation.

- Leave standing dead stalks or cut them back to 8"-12" tall for pollinators
- Reapply mulch as needed (aim for only 2"-3" of mulch consistently).
- Thin or prune overgrown or overcrowded plants as needed.



Native bees using dead stalks.
Photo credit: Kellie Docherty

Summer (June – August):

- Remove any dead (not dormant) vegetation and replace as necessary.
- Water any newly planted plants.
- Collect seeds from spring bloomers to prevent unwanted spread.
- Optional: Prune plants as needed before they produce buds. This will briefly delay flowering, but it will result in more blooms and help manage the height of overly tall plants.

Fall (September – November):

- Collect seeds from summer/fall bloomers to prevent unwanted spread.
- Install new plants, and transplant existing plants as needed.
- Leave fallen leaves.



Firefly larva on leaf litter.
Photo credit: Azrie Aliamat.

Winter (December – March):

- Prune trees and shrubs as needed.
- Scatter seeds as needed.
- Leave standing dead as habitat and food sources for wildlife if possible. If you can't leave them standing, trim back to 8"-12" tall.



Final Thoughts & Resources



Ohio Federation of Soil and Water Conservation Districts

Ohio's Soil & Water Conservation Districts (SWCDs):

Every county in Ohio has a SWCD office. These offices assist their county's residents in a wide range of soil, water, and conservation topics.

For help with choosing native plants, preventing runoff, protecting waterways, improving soil health, addressing drainage concerns, and so much more, call your county's SWCD office.

Consider a sign

Rain gardens are catching on, but many people still don't know what they exactly are. Inspiring others with a well maintained garden or expressing intentionality can make a lasting impression. Consider signing your rain garden so your neighbors or community can learn by your example. Signing a lovely garden can help inspire lasting change. Ask your local Soil and Water Conservation District about signs, or look online for your own personalized sign.



Medina SWCD rain garden sign



Master Rain Gardener sign



Friends of the Rouge RainSmart rain garden sign

Expanding your native plant selection

Ohio Native Plant Month has an online list of Ohio's nurseries that sell native plants.

If having native plants is your goal, check a plant's Latin name and search online for its native range. Avoid plants with a range outside of the USA, west of the Rocky Mountains, or even those that aren't historically found in Ohio.

Some people also consider specific ecoregions, but it is up to you to figure out your own planting goals. Resources like Ohio Native Plant Month can help you find what direction you want to grow.



Stormwater Resources



NEOPIPE is a regional consortium of Soil & Water Conservation Districts, conservation organizations, and other government agencies committed to improving water quality in Northeast Ohio.

Since 2002, NEOPIPE has been collaborating to effectively

develop and provide regional resources to increase public awareness of stormwater issues and opportunities to protect our shared waters.

NEOPIPE represents dozens of communities in 10 contiguous counties and covers several major watersheds listed below:

- Black River
- Chagrin River
- Cuyahoga River
- Rocky River
- Euclid Creek
- Portions of the Tuscarawas, Mahoning, and Grand Rivers
- Lake Erie

Publications and Presentation Topics include:

- Rain Garden Manual for Homeowners (past publication)
- Stormwater: Slow it down, Spread it out, Soak it in
- Replacing Invasive Plants with Native Plants
- Protecting Trees: Don't Volcano Mulch
- Household Habits for Healthy Waters
- Green Yards and Healthy Homes
- Taking Root for Clean Water
- Sensible Salting Workshops
- Homegrown Conservation
- Where Rivers Begin
- And more!

For more information, events, publications, and ways to contact members, visit:

LakeErieStartsHere.org

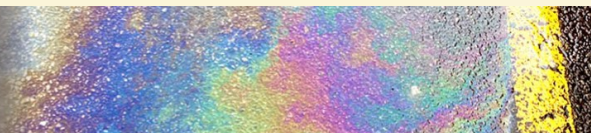


BEAUTIFUL DAY AT THE BEACH?



DON'T DRIP & DRIVE

All those little drips and dribbles add up to a big problem.



SHAKE THE HABIT!

More salt doesn't equal more melting. One 12-oz coffee mug is enough for 10 sidewalk squares or 250 sq ft!



Stormwater Resources

Other Actions to Take

Stormwater runoff is a threat to healthy streams, ecosystems, and drinking water. There are many actions we can take to improve the situation. Below are quick examples, but feel free to reach out to your local SWCD, to NEO PIPE members, or to local watershed groups for more tips!

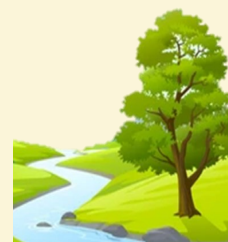
Rain Barrels

Collecting water in a rain barrel can prevent it from turning into runoff. There are many styles and hook ups that can make a rain barrel work in almost any setting. Some communities require approval while others offer stormwater tax credits. Reaching out to your local SWCD is a great place to start!



Riparian Buffers

Trees are an important addition to any landscape. However, trees located around streams play a vital role. Having a buffer of trees, shrubs, and native plants a minimum of 30'-50' from a stream's bank protects land and water from erosion, pollution, flooding, and more. Planting buffers and addressing riparian set backs in local zoning help protect a watershed.



Soil Tests & the 4R Practices

Knowing what is going on in soil can seem tricky, but a soil sample reveals what the soil and plants truly need, and what nutrients and rates are appropriate. Following the 4R Practices keeps excess nutrients out of water. Use the Right Source, at the Right Time, at the Right Rate, and only apply in the Right Place.



Sensible Salting

Salt is a common winter pollutant to our water. We need to keep our streets safe, but we also need to protect our water. So in winter, remember: S.A.L.T.

Suff: The right stuff when it's above 15° F is rock salt, but not below 15° F.

Amount: A 12 oz mug can salt 250 sq ft or 10 sidewalk squares. More is not better.

Location: Use only on hard surfaces and away from storm drains.

Time: Only apply before snow, after shoveling, and never with rain in the forecast.



Green Infrastructure

Other infrastructure includes bioswales, pervious pavement, pervious pavers, green living roofs, wetland restoration, rain chains, cisterns, and more. Find out more at your local SWCD!

Joining a Local Watershed Group

Getting involved in the community through a watershed group can help support you while you support your local area. Together, actions add up and large changes are possible!

Rain Gardens

are gardens with a purpose!

They are built to capture stormwater, ***SLOW*** it down, ***SPREAD*** it out, and ***SOAK*** it in.

If you've ever been curious about how they work or how to install one, [this is the booklet for you!](#)

This How-To Guide for Homeowners is a straight-forward, step-by-step guide that covers how to find a good location, plan your garden, build one, and find extra resources along the way.

Planting a rain garden has a big impact on your local waterways, protecting them from polluted runoff and runoff floodwaters.

Join in the movement! Plant a rain garden and protect your local streams, rivers, and lakes.



This rain garden can be toured at Medina SWCD, 6090 Wedgwood Rd, Medina, Ohio. Reach out to your local SWCD to learn more about or to visit a rain garden.



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partially sponsored by:**



**Northeast Ohio
Regional Sewer District**

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