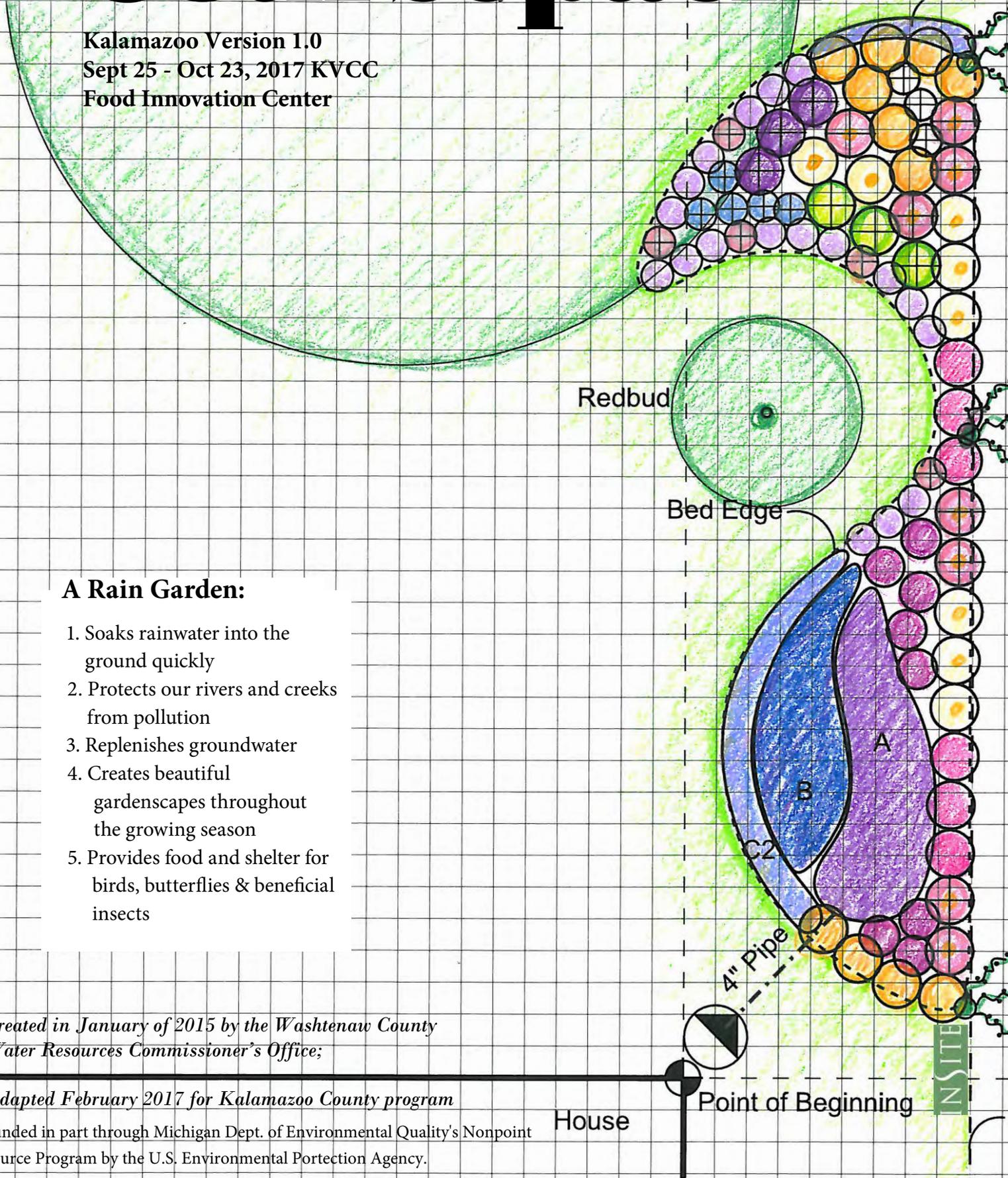




Master Rain Gardener Coursepack

Kalamazoo Version 1.0
Sept 25 - Oct 23, 2017 KVCC
Food Innovation Center



A Rain Garden:

1. Soaks rainwater into the ground quickly
2. Protects our rivers and creeks from pollution
3. Replenishes groundwater
4. Creates beautiful gardenscapes throughout the growing season
5. Provides food and shelter for birds, butterflies & beneficial insects

Created in January of 2015 by the Washtenaw County Water Resources Commissioner's Office;

Adapted February 2017 for Kalamazoo County program

Funded in part through Michigan Dept. of Environmental Quality's Nonpoint Source Program by the U.S. Environmental Protection Agency.

House



Point of Beginning

N
SITE

TABLE OF CONTENTS

TOPIC	PAGE NUMBER
Introduction	
Background	3
Program Description.	4
Syllabus	5-8
Watershed Information	10
Public Rain Gardens	11
Rain Garden Essentials	
Rain Garden Description, Tools & Construction.	12
Locating & Measuring the Rain Garden.	13
Sizing	14
Design	15
Sample Designs	16-20
Transfer Your Drawing to Your Site	21
Drainage	22
Digging on a Slope	23
Soil Preparation & Planting	24
Recommended Native Plants.	25
Common Invasives	26
Resources to Build a Rain Garden	
Local Native Plant Producers	27
Free Plants	28
Compost Vendors	29
Additional Information	
Rain Barrels	30
Rain Garden Design Checklist.	31
Additional Resource Guides	32

INTRODUCTION

Background

In most towns and cities, rainfall and snow melt are whisked away into an engineered stormwater system of pipes and basins that funnel water, unfiltered, directly into local streams & rivers.

After its trip through the pipes, stormwater is no longer just rainwater. It is hot - stormwater is warmed as it flows over hot pavement. It is polluted - dirt, phosphorous, *E. coli*, and trash are washed off the streets and carried to the creek. And it is huge - a small creek can flow like a river after a rainfall, eroding banks and muddying the water.

In the stream or river, the polluted runoff harms fish, plants and other species that depend on clean water, including us.

Most communities get their drinking water from a combination of water drawn from the river, and from wells. In Kalamazoo County, all drinking water comes from wells. Well water is only available if rainwater soaks into the ground and recharges the ground water.

Woods and prairies historically soaked in almost all the rain that fell on them. Concrete soaks in none.

People play, boat and fish in the river. If contamination levels are too high, restrictions can be placed on recreational activities such as swimming and eating fish. Today stormwater is the number one source of pollution in streams and rivers.

There is a simple way to do your part to keep pollution out of streams and rivers, reduce flooding, recharge the ground water and revitalize your yard:

Rain Gardens

Rain gardens help protect our nearby water bodies by filtering and soaking water back into the ground. For a modest 1,500 square foot home, almost 1,000 gallons of water run off during a 1-inch rain storm, often going into storm drains untreated.

A simple, low-maintenance rain garden can capture much of that runoff, similar to how the natural environment would function. Learn how you can mimic nature's effects by following this guide to rain gardens.



Program description

Class Details

5:30 - 7:30 PM, September 25 - October 23

KVCC Food Innovation Center

Class website: KalamazooRiver.org/MRGclass

Class Facebook page will be used for additional feedback

Instructors

- Anna Kornoelje, Ecological Restoration Director

Kalamazoo Nature Center

akornoelje@naturecenter.org

269-381-1574

- Jamie McCarthy, Watershed Coordinator

Kalamazoo River Watershed Council

krwc@kalamazooriver.org

269-447-1580

VIDEO Instructors: Susan Bryan, Washtenaw Co.,

Shannan Gibb-Randall, InSite Design Studio

Purpose

We would like all of you to become ambassadors of rain gardens. Plant one yourself. Tell your neighbors. Be the person on your street that everyone knows to ask about rain gardens. Have fun with it. Experiment. Show your neighborhood how beautiful a rain garden is by growing a spectacular one.

History of MRG Program

Since 2011, Washtenaw County Water Resources Commissioner's Office, City of Ann Arbor, and MSU have collaborated to train Master Rain Gardeners (MRG). In 2017, Kalamazoo Nature Center, Kalamazoo River Watershed Council, and Kalamazoo Valley Community College brought the class to Kalamazoo. By completing the Master Rain Gardener course, you will become a resource to your friends and neighbors. To maintain your MRG Certification, you can either help others build rain gardens or educate the community through public outreach activities.

We believe, "Each one, Teach one" is the best way to spread the word about rain gardens, especially in these days of shrinking municipal budgets. By volunteering to share your knowledge, you will be helping to solve one of the most vexing environmental problems we face today. More information about rain gardens can be found at <http://kalamazooriver.org>.

Requirements to earn your "Master Rain Gardener" certificate

- 1) Attend all five rain garden classes. They will be taped, so you can view/review later.
- 2) Design a rain garden for a specific location
- 3) Present your rain garden design & maintenance plan
- 4) Build, dig, and plant the rain garden sometime during the next growing season
- 5) Post pics of the finished garden on the forum - and send Jamie an e-mail so she can verify your garden
- 6) Receive your Master Rain Gardener decal, sign for your rain garden if you want one, and a certificate of completion. If you are a Master Gardener, you will also receive a Blue Droplet to attach to your nametag. If you are a landscaper, your name goes on our certified contractors list.
- 7) To keep your certification current, each year you must complete either of the following options:

a. Help someone else build a rain garden. Next year, find a friend who would like to plant one, and help them out. Send Jamie the design plan and photo of the completed garden. For each new garden, we'll give you another Blue Droplet to add to your collection, if you are a Master Gardener. Make your chain of droplets as long as you like!

OR

b. Share your knowledge about rain gardens with the public. Give a talk about rain gardens to your local garden club. Lead a volunteer education/weeding day at a public rain garden. Host a garden tour at your rain garden. Volunteer in a greenhouse with native plants. Your choice! Send Jamie the form describing 4 hours of volunteer work and you'll be re-certified.

Quizzes

We will have a quiz before class. It is a closed book quiz. The questions are included on the class website, so feel free to read ahead. After the quiz we will go over the answers in class. Plant names can be either latin or common names.

Students need to design and build a garden to receive the Master Rain Gardener certificate.

Final Rain Garden Plan Assignment

- 1) Direct a water source to the rain garden (like a roof downspout, or a trench drain in the driveway)
- 2) Dig the rain garden.
- 3) Mix in compost and spread mulch.
- 4) Install plants.
- 5) Add a sign (provided by the Watershed Council).
- 6) Give it a personal touch (garden art, stone border, edging . . . your choice).
- 7) Follow up with Jamie to be awarded your Master Rain Gardener certification.

Skills Checklist:

- The Big Picture
 - Why?
 - How? In general terms.
- Site Evaluation
 - What criteria make a suitable site? For example:
 - Is there enough space?
 - Is your site 10' away from house foundation?
 - Is your site downhill from the water source?
 - Are there any trees, sidewalks, etc. in the way?
 - Are the slopes appropriate?
 - Hazards: stay away from basements, retaining walls, utilities, wells & septic fields. Make sure tall plants don't obscure sight lines from a driveway.
- Drawing up a Plan on Paper
 - Measuring
 - Drawing to scale
- Water
 - What size of roof equals what size garden?
 - How to get the water there: pipe vs. overland flow
 - Required depth of water and how to achieve it
- Plants
 - Wetness zones
 - Types of plants that do well in rain gardens
 - 5 plants you know do well "in your back pocket"
- Layout and Construction
 - Laying out the footprint of the plan
 - Setting up a level line, then figuring the appropriate depth

Syllabus

CLASS 1: INTRODUCTION

Announcements & Introduction

Introduction to Rain Gardens Lecture -- VIDEO

- What is a rain garden?
- What are the benefits?
- How does it function?
- How big does it have to be?
- Story of a rain garden

Rain Garden Plants of the Week - The Most Flexible

<i>Iris virginica</i>	Southern Blue Flag Iris
<i>Carex vulpinoidea</i>	Fox Sedge
<i>Geranium maculatum</i>	Wild Geranium
<i>Saururus cernuus</i>	Lizard's Tail
<i>Cornus sericea / alba</i>	Red Twig Dogwood

Quiz Prep

Explain to a family member what a rain garden is, and what some of the benefits are. Answer their questions.

Homework Assignment

Step 1 of Build Your Own Rain Garden:

Start thinking where you will build your own rain garden. It can be in your own yard, or in a willing friend's, or a park where you have permission, etc.

Come to class with an idea where you will be designing this rain garden. Get permission from the owner, if it is not on your property. Working in a group is ok. If you need help, we have sites available for rain gardens.

- Take photos of the area (or potential areas).
- Introduce yourself on the class facebook Rain Garden forum (link will be provided during class).
- Start a new thread on the forum and post the photos of your site there. Describe the site, your ideas and constraints.
- Not into facebook? Bring a photo or description of your idea to class next week to discuss in-person with the instructors.
- Read pages 3-5 and 9-11 of this coursepack.
- Prep for Quiz #1 (see questions on the next page).

CLASS 2: MOVING DIRT TO MOVE WATER & SITE SELECTION

Individual Feedback

Post photos and a description on the forum for individual feedback on your rain garden.

Quiz on last class

1. What is a rain garden?
2. How does it function?
3. What are the benefits?
4. Name two plants that will grow in rain gardens in almost all light conditions.
5. Name a grass-like texture plant that will grow in almost all light conditions.
6. Name a shrub that will grown in a rain garden.

Elements of a rain garden -- VIDEO

- Sizing 20-30% impervious area
- Depth 3"-6" water depth
- Conveyance pipe or swale
- Basin flat
- Berm the side of the "bathtub"
- Soils clay - loam - sand
- Amendments compost

A few definitions

Grade = To sculpt the soil, i.e. move soil around (v).
The way the land lies (n)

Positive Drainage = when the ground slopes so water flows away from a building (instead of toward it. Toward a building is Negative Drainage.)

Rain Garden Plants of the Week - Shade

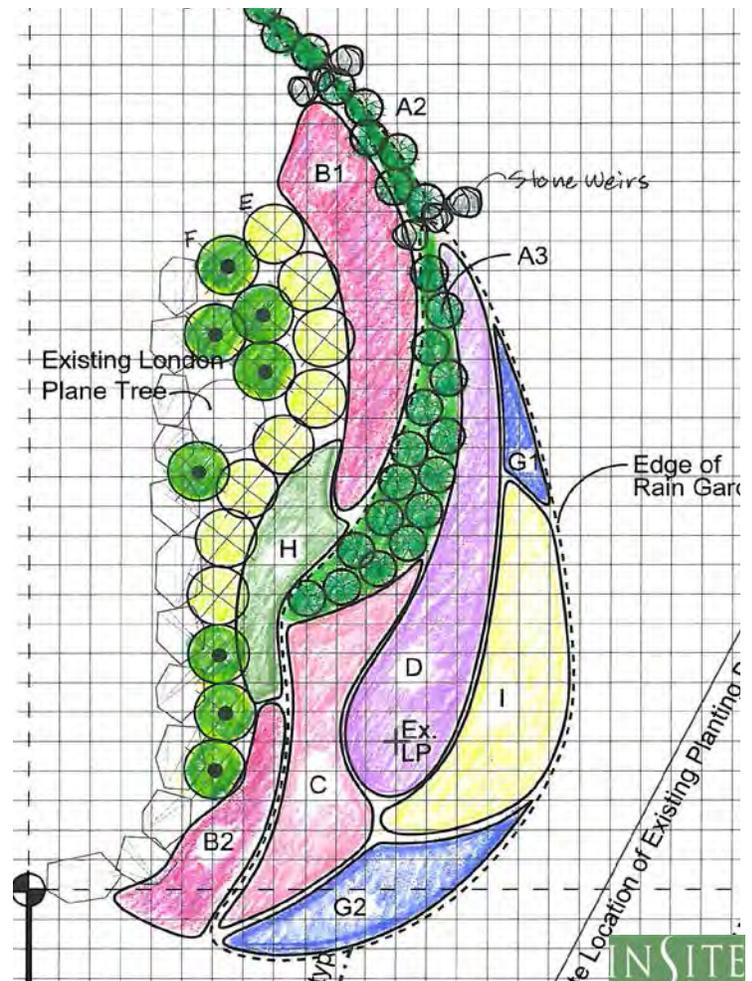
<i>Onoclea sensibilis</i>	Sensitive Fern
<i>Lobelia siphilitica</i>	Great Blue Lobelia
<i>Asarum canadense</i>	Wild Ginger
<i>Thalictrum dioicum</i>	Early Meadow Rue
<i>Aconitum napellus</i>	Monkshood
<i>Aralia cordata</i> 'Sun King'	Aralia 'Sun King'

Site Selection: What makes a good site for a rain garden? Or, where not to plant a rain garden.

Homework Assignment

Step 2 of Build your Own Rain Garden: Do a site evaluation on your selected property. What spots would not work? What are the spots that meet the criteria? Where would be a good location? Decide where the rain garden will go. Does it fit all of the "Do No Harm" criteria?

- Take another picture of your site, if necessary, and post it on the forum, in the thread you started or be prepared to ask questions in class next week.
- Read pages 12-13 and 24-29 of the coursepack.
- Do a percolation test in the spot where you are planning the rain garden: Dig a 18" deep hole and fill it with water. Wait for it to infiltrate and then fill it again. Note time it takes to percolate into the ground the second time.
- Figure the approximate roof area that will feed the garden. Bring that number to class. (XX square feet) Bring a tape measure and a compass (to draw circles), if you have one, to class next week.
- Watch [THIS VIDEO](#) on digging a rain garden.
- Prep for the quiz.



CLASS 3: HOW TO: MEASURING, PLANNING, DIGGING, SCULPTING

Individual Feedback

Post photos and a description on the forum for individual feedback on your rain garden.

Quiz

Slide quiz on what might be a good spot for a rain garden, and what might be a bad location.

1. What is the Hippocratic Oath of Master Rain Gardeners?
2. How big will a rain garden be for a 500ft² roof with loam or sand soils? (hint: 20%)
3. What was your site's percolation rate?
4. Name one grass and one shrub that are appropriate for rain gardens (review plants from last week).

Discussion on Percolation Rates -- VIDEO

- What was your bucket test result?
- Clay gardens should hold no deeper than 3" of water while sand can hold 6" of water
- Clay gardens must be bigger than sand gardens to infiltrate the same amount of water
- Clay gardens can use 30% of roof as a multiplier, instead of 20%.

Rain Garden Plants of the Week - Part Shade

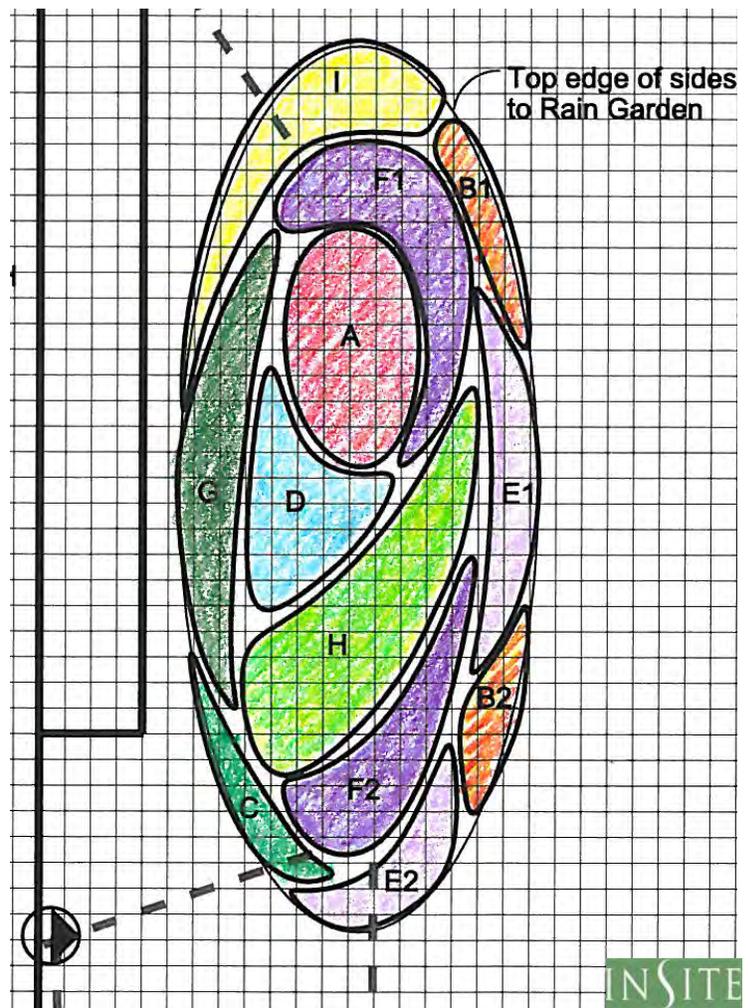
<i>Anemone canadensis</i>	Canada Anemone
<i>Asclepias incarnata</i>	Swamp Milkweed
<i>Allium cernuus</i>	Nodding Wild Onion
<i>Cimicifuga racemosa</i> / <i>Actaea racemosa</i>	Bugbane / Cohosh
<i>Senna hebecarpa</i>	Wild Senna
<i>Sambucus racemosa</i>	Elderberry 'Lemony Lace'

Measuring The Space -- VIDEO

How to measure the world, so you can make a base map on which to draw your design.

Drawing up a Plan on Paper -- VIDEO

Step by step directions on how to draw up a plan on graph paper or computer



Homework Assignment

Step 3 of Build your Own Rain Garden: Create a base map for your garden plan.

- Measure your space using the methods outlined in class and described on page 13, and read pages 14-21.
- Draw up a base sheet to scale, mapping the house location, and any fences, trees, etc., that are relevant.
- Start thinking about what size and shape the rain garden will be. Draw a few tentative shapes.
- Think of some plants that you grow in your own garden, or that you are familiar with and that you would like to try in the rain garden.
- The best rain garden plants are those that are adaptable to a wide variety of conditions & can grow in extremes. Bring two names of plants to try in your design.
- Review the quiz questions (next page or online).

Post your base sheet on the forum by Monday morning!

CLASS 4: PLANT DESIGNS

Quiz

1. What is the approximate roof area that will feed the rain garden?
2. How big will the rain garden be for that size of roof (using the 5:1 ratio Rule of Thumb)?
3. What could the dimensions of the rain garden be? (for example, 10'x5')
4. What are two ferns, and one spring flowering native, appropriate for a shady rain garden?
5. What are two other plants that you would like to try in your rain garden?

Plants for Rain Gardens

<i>Silphium terebinthinaceum</i>	Prairie Dock
<i>Panicum virgatum</i>	Switch Grass
<i>Penstemon digitalis</i>	Beardstongue
<i>Baptisia australis & alba</i>	False Indigo
<i>Eryngium yuccifolium</i>	Rattlesnake Master
<i>Potentilla fruticosa</i>	Shrubby Cinquefoil

Class Discussion: Share ideas of plants you have in your garden, or that you have grown that might be good candidates for a rain garden. We'll give you feedback, but this also is an opportunity to try new things.

We'll also discuss the benefits of local genotypes of native plants. Not sure what a genotype is? No worries, we'll talk with local experts to figure it out!

Homework Assignment

- Step 4 of Build your Own Rain Garden: See pages 16-35 for sample designs, plant ideas and additional info.
- Draw your rain garden design on your base sheet.
- Draw the outline of the garden: the bottom, the berm, the cut edge.
- Draw the water conveyance (pipe, or overland flow).
 - Draw in individual, or areas for specific plants. List the plant palette you will be using.
 - Post your plan, plant list and photo of site on the forum. Post your plan on the forum by Monday morning!
 - Read pages 22-23 and 30-31 of the coursepack.

CLASS 5: PRESENT YOUR PLAN

Class Presentations

Everyone will get feedback on their plans from your instructors. Everyone will create a poster or other presentation for a class "openhouse". We will split into two groups so everyone can display their plan -- and then go around and check out others. Get feedback from classmates before you get out your shovel!

Follow Up

We'll cover all the forms and follow up needed to gain your certification.

Happy Digging!

Use the Rain Garden Essentials and Resources sections of this coursepack as you build your rain garden. Keep us updated on how your garden grows. We'd love to hear how it is going, and give you a hand if you need it. (And by a "hand," we mean advice. Don't make us wield a shovel!)

Then map your finished rain garden at:

www.networkedneighbors.org

Going Forward

When you post photos of your finished garden, (and drop Jamie an email so she knows to send you SWAG), we will send you a Master Rain Gardener sign! You will be a certified Master Rain Gardener, and can use that title anytime you like. You will receive:

- Master Rain Gardener decal
- Rain garden sign
- Certificate of completion
- Droplet to affix to your Master Gardener nametag
- Listed on our Certified Contractors list, if you are a landscaper

Volunteers Needed!

From time to time, I need help with giving presentations on rain gardens, serving on an advisory committee, maintaining a public rain garden, leading a rain garden workday, helping with a survey, or other various rain garden tasks. I might ask you to serve!

Watersheds

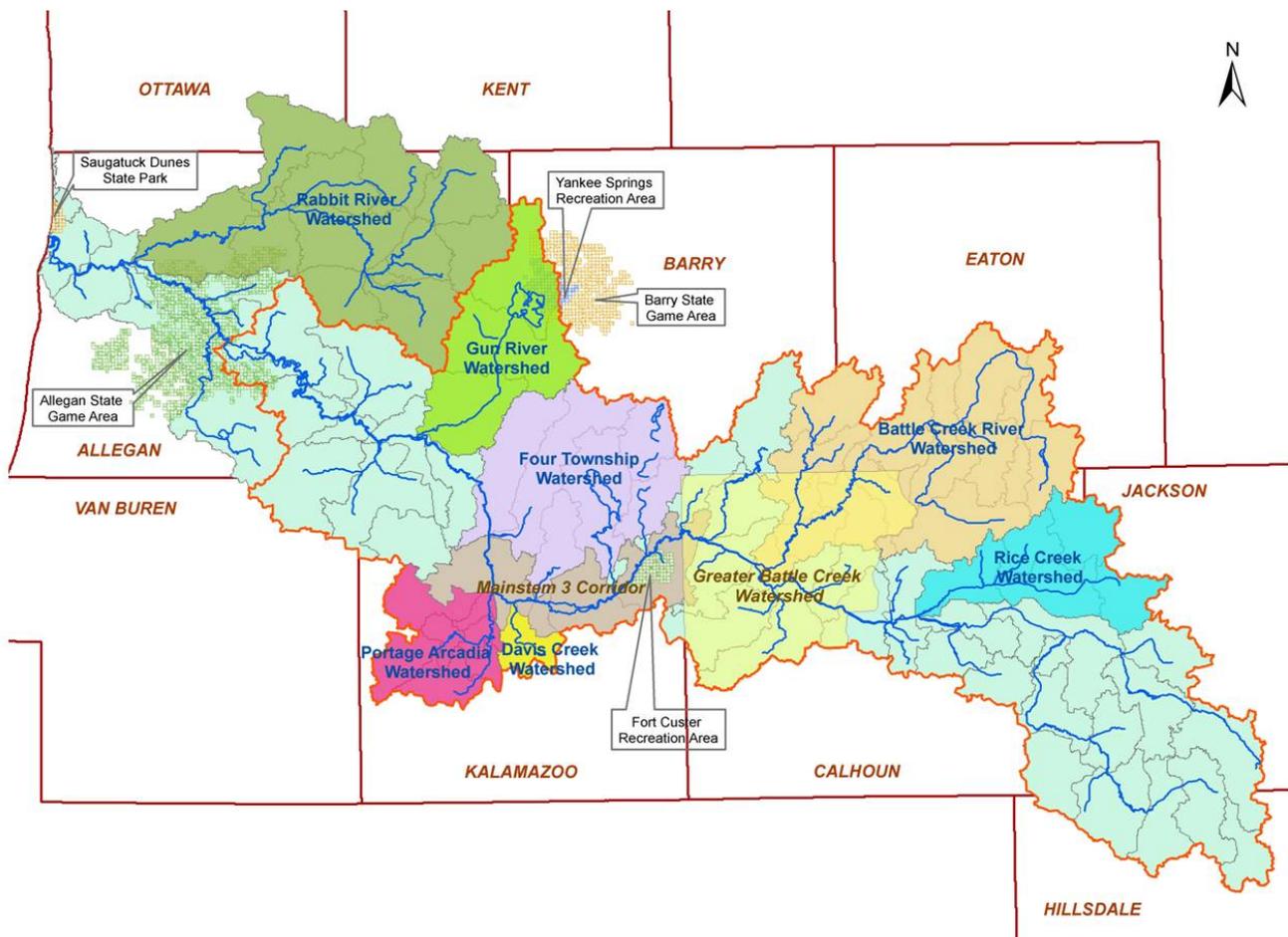
What's a watershed? It's an area of land that all drains to a common point, such as a river, lake or stream. The City of Kalamazoo is in the Kalamazoo River Watershed, which eventually drains into Lake Michigan at Saugatuck. The southern half of Kalamazoo County drains to the St. Joseph River Watershed.

Which watershed are you in?

- Look at the map to see in what watershed your property lies.
- Get involved! There are many non-profits that work on conservation efforts for that protect the river and its watershed. You can participate in stream clean ups and work days, insect monitoring, run in a 5K fundraiser, or take a class on naturalizing your landscape.



Kalamazoo River Watershed



Public Rain Gardens

Are you excited to become a certified Master Rain Gardener but do not have a location at your home or a friend's home that will work? No worries. Students can choose to design a rain garden for a public space, "adopt" an existing rain garden at a school, church, or other public location, or help with native plant projects to meet the certification requirement.

We have included a few options here, but send Jamie an email with other ideas and we will help you find the perfect project to meet the certification requirements. Ongoing maintenance is a constant problem with public rain gardens, so adopting an existing garden and spending time bringing it back to full function and beauty is time well spent! You'll noticed neglected rain gardens often need lots of weeding, some new plants, and even splitting plants.



Public Rain Garden Ideas

RIVERVIEW LAUNCH

1523 Riverview Drive, Kalamazoo 49004

Riverview Launch was renovated by the Kalamazoo County Land Bank in 2015. There are two large rain gardens that capture rain runoff from the roof. Both of these gardens would be great candidates to "adopt". These gardens are in the early stages where supplemental watering and periodic weeding. Additional native plants should be filled in where a few did not make it.

KVCC FOOD INNOVATION CENTER

224 E. Crosstown Pkwy, Kalamazoo 49007

A wet spot on the lawn at the new campus would be the ideal setting for a rain garden. This project would provide an opportunity to work with Kalamazoo Valley Community College and the greenhouses at the food hub as a source of native plants.

KALAMAZOO VALLEY MUSEUM

230 N. Rose Street, Kalamazoo 49007

A new rain garden exhibit is being built at the museum this year. Staff at the museum and college will be looking for volunteers to help tend to the rain garden during the first critical years of establishment. The rain gardens will be highly visible from the new Kalamazoo River Valley Trail downtown connector, as well as museum visitors and college students.

KALAMAZOO NATURE CENTER

7000 N. Westnedge Ave., Kalamazoo 49009

The Kalamazoo Nature Center has long been using rain gardens to protect the environment. Adopt one of several rain gardens on Kalamazoo Nature Center's properties and help them evaluate the existing plants, suggest new ones, and help with some weeding.

OTHER IDEAS

There are many other public rain gardens that could use your help! Find a garden near your home or ask us for more ideas.

RAIN GARDEN ESSENTIALS

A rain garden is a simple shallow saucer-shaped garden that soaks rainwater into the ground. It fills with the rain that falls on it – plus rainwater that runs off a hard surface like a roof or a driveway. It is a simple solution, but it has a big effect.

The runoff water has picked up pollutants that the rain garden can filter out: phosphorus and nitrogen from fertilizers; bacteria from animal waste; oil, grease and heavy metals from cars, and just plain old “dirt” called sediment.

Studies have shown rain gardens are effective at removing pollutants harmful to human health. [How?](#) Sunlight destroys bacteria and viruses harmful to humans. Petroleum is eliminated by bacteria in the soil. [Heavy metals](#) are adsorbed by soil and mulch particles. This is in addition to those substances which are bad for the environment like nitrogen-containing compounds and phosphorous, at rates of over 90%.

Plants in rain gardens require less watering during hot summer months. Because they capture water from the roof, a rain garden gets enough water that it doesn't need water from the tap. Your water bill can be reduced by using free water from the sky.



Photo of Roger Moon's Rain Garden. Designed & Installed by Roger Moon. Photo credit: Susan Bryan.

Construction Steps

Each site is different but in general, follow these five steps.

- 1) Pick a location at least 10 feet from the house and downhill from the downspout. Call Miss Digg (811) to check for underground utilities three days before you dig. Dig a garden bed that will hold water 3-6" deep. The area of the depression should be 20-30% the size of the contributing roof or driveway. More information on sizing can be found on page 14.
- 2) Rototill in compost, spread mulch and plant the native plants recommended in this guide, on page 25.
- 3) Direct the water from your downspout or sump pump to your depression, either overland or through a buried, non-perforated black plastic drain pipe, available at most home centers, see page 22.
- 4) Water your garden if it doesn't rain, until it is well established.
- 5) Once your plants are established, they'll thrive without additional watering. Fertilizers aren't necessary but weeding is, especially at the beginning.

TOOLS

- Tape Measure
- Shovels
- Rakes
- Trowels
- Line Level
- String
- Wood stakes
at least 2' tall
- Small backhoe
or rototiller
optional



Sizing

1) Measure the length and width of the impervious surfaces (roof or driveway) that will flow to your rain garden. Multiply length time width to find the area in square feet.

2) Design the garden to be 3-6” deep and 20-40% the size of the impervious surfaces.

3) To figure out the exact size of your rain garden, first test your soil permeability by digging a hole that is the width of your shovel and 18” deep. Fill with water, wait until dry. Fill the hole again with water and time the rate of infiltration.

4) If your hole drains within 24 hours, then you will want your rain garden to be 20% the size of your hard surfaces and the depth to be between 4 and 6 inches. If the hole takes longer than 24 hours to drain, size it at 30% your impermeable surface area and a depth of 3”.

Time to Drain	Impermeable Multiplier	Depth in inches
within 24 hours	0.2	4-6
longer than 24 hours	0.3	3

5) Multiply the total area of impervious surfaces by 0.2 to find the area needed for a rain garden. If your hole takes longer than 24 hours to drain, then multiply by 0.3 to find the area needed for your rain garden.

Example

If the impermeable surface draining into my rain garden is 750ft² and my test hole drains within 24 hours

$$750 \times .2 = 150\text{ft}^2$$

Then my rain garden must be at least:
150ft² in size &
4-6” deep*.

The dimensions could be 15’x10’ or 5’x30’.

6) On your base plan, since one grid box equals one foot, you can count the boxes in the outlined garden to see how many square feet your rain garden is. Count up the boxes in your sketched garden to see if you are making it big enough.

If there isn’t enough space on your property for the needed area, or if long term maintenance isn’t possible in such a large garden, it is acceptable to make the rain garden smaller. Every little bit helps!

Design

1) Use the base plan you made to draw in the rain garden outline. Draw in the berm, if you are digging on a slope, on the downslope sides (see page 23 for more information). The berm can take up a surprising amount of room, especially on steeper sites. Make sure you will only be changing the grade of your property, not the grade of your neighbor's property.

2) Make sure there is at least ten feet of distance between any structure with a basement to the rain garden to prevent water damage. Generally, the rain garden should be at least 2 feet away from the property line and shouldn't negatively impact your neighbor's property.

3) Make the garden a pleasing shape that goes with the rest of the garden.

4) Count up the grid boxes in the designed rain garden (not including the berm) to see how many square feet the rain garden is. Are you in the ballpark? If not, revise a bit.

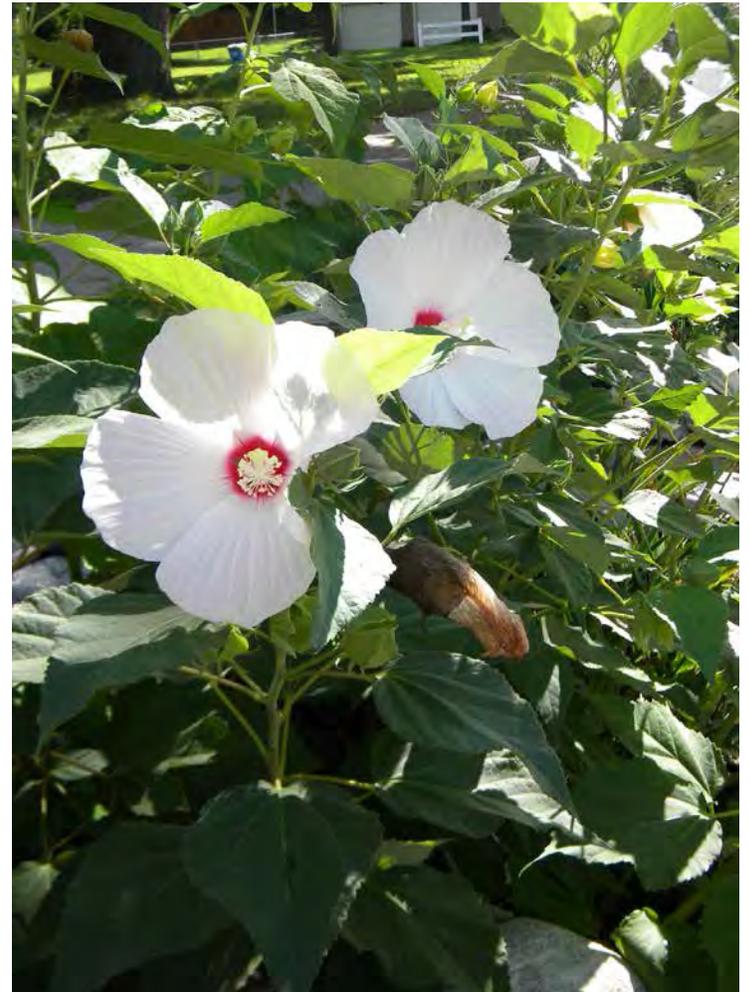
4) Decide the form of water conveyance to the rain garden: overland swale or underground. More information on page 22. Record the path and type of conveyance on the drawing.

5) Select a rainwater overflow outlet location for when the garden fills up and spills over. Make sure it flows away from any buildings and to a safe place.

6) Select plants. Plants for the sides and bottom of the rain garden should include those adapted to the extremes of wet and dry conditions. The berm should include plants adapted to dry conditions. See the suggested plant list on page 25.

7) Incorporate a diverse mix of sedges, rushes and grasses with your flowering plants. Consider the height, bloom time, sun requirements and color to create a varied garden.

8) Include some details that make the whole. A defined border can make a naturalized area look more deliberate. Include stepping stones/stumps for kids to play on, and to weed from. Label the new plants to ease identification during weeding.



Miller Ave Rain Gardens in Ann Arbor. Design by Susan Bryan & Chris Carson.

Installed by Hoffman Brothers in 2013. These gardens capture runoff from the street & are maintained by volunteers. Rose Mallow, pictured.

Sample design: part shade

Black-eyed Susan
Rudbeckia hirta
part sun-part shade
height 2-3'
spread 1-1.5'
Blooms July-Sept



- Coral Bells
- Virginia Waterleaf
- Early Meadow Rue
- Blazing Star
- Obedient Plant
- Starry Solomon's Seal
- Black-eyed Susan
- Blue-eyed Grass
- Canada Anemone
- Blue Flag Iris
- Blue Lobelia
- Blue Lobelia
- Gray's Sedge
- Spiderwort
- Wild Geranium
- Slender Mountain Mint
- Wild Geranium
- Celandine Poppy
- Nodding Wild Onion

Sample design: full shade

Wild Geranium
Geranium maculatum
full sun-part shade
height 1.5-2'
spread 1-1.5'
Blooms April-July

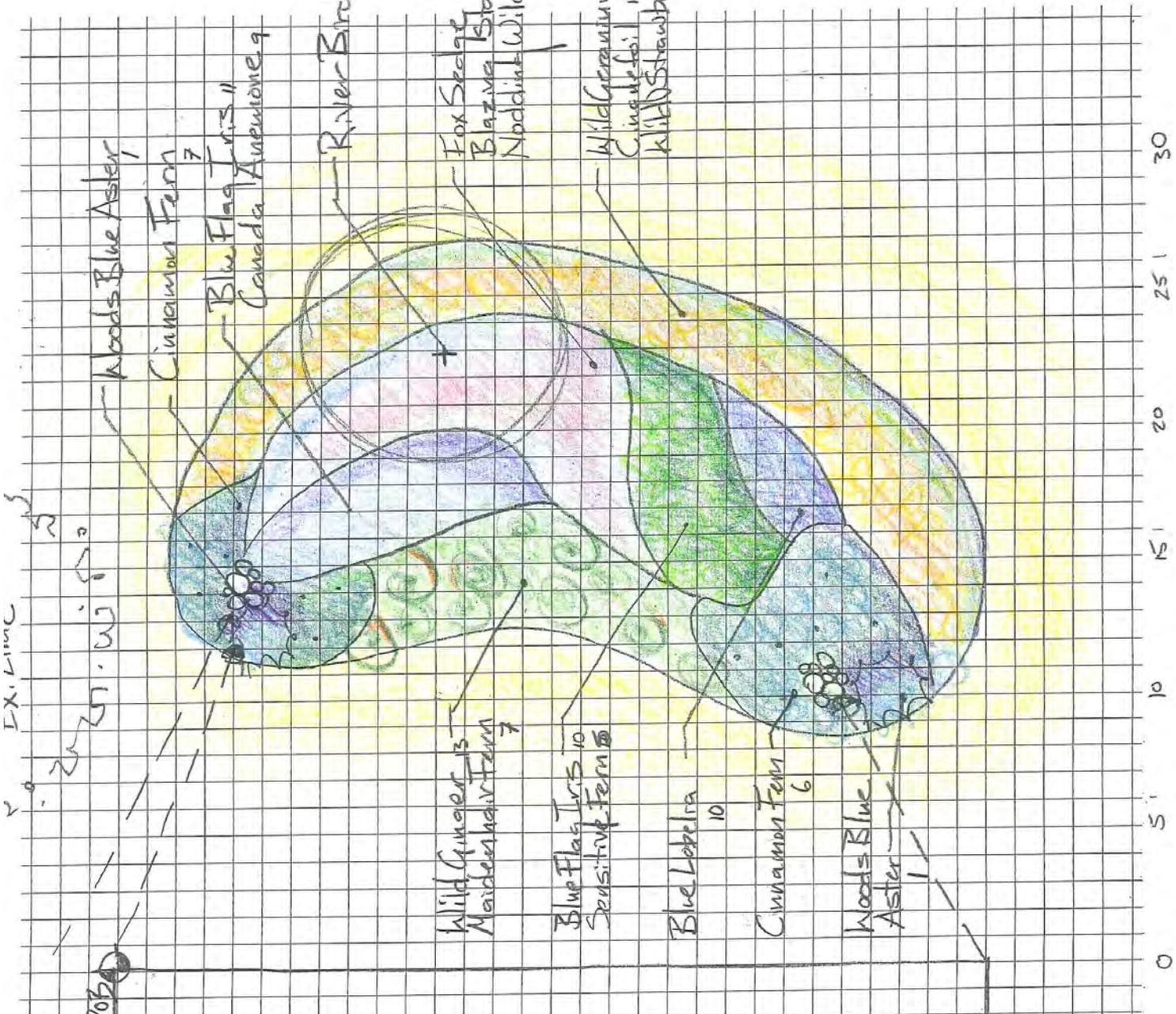


- Pennsylvania sedge
- Common Lilac
- Blue Flag Iris
- Wild Geranium
- Swamp Milkweed
- Prairie Dock

Sample design: part shade

LEGEND

-  Point of Beginning
-  Stormwater Conveyance from Roof



NOTES

1. Drawing is completed to the accuracy of the base information. Slight modifications may be necessary during installation.
2. Plants are subject to nursery availability. Substitutions may be made.



11 1000'S
BEFORE YOU DIG
CALL MISS DIG
800-482-7171
Miss. Rec.

OWNER is responsible to field verify location of all underground utilities prior to any work

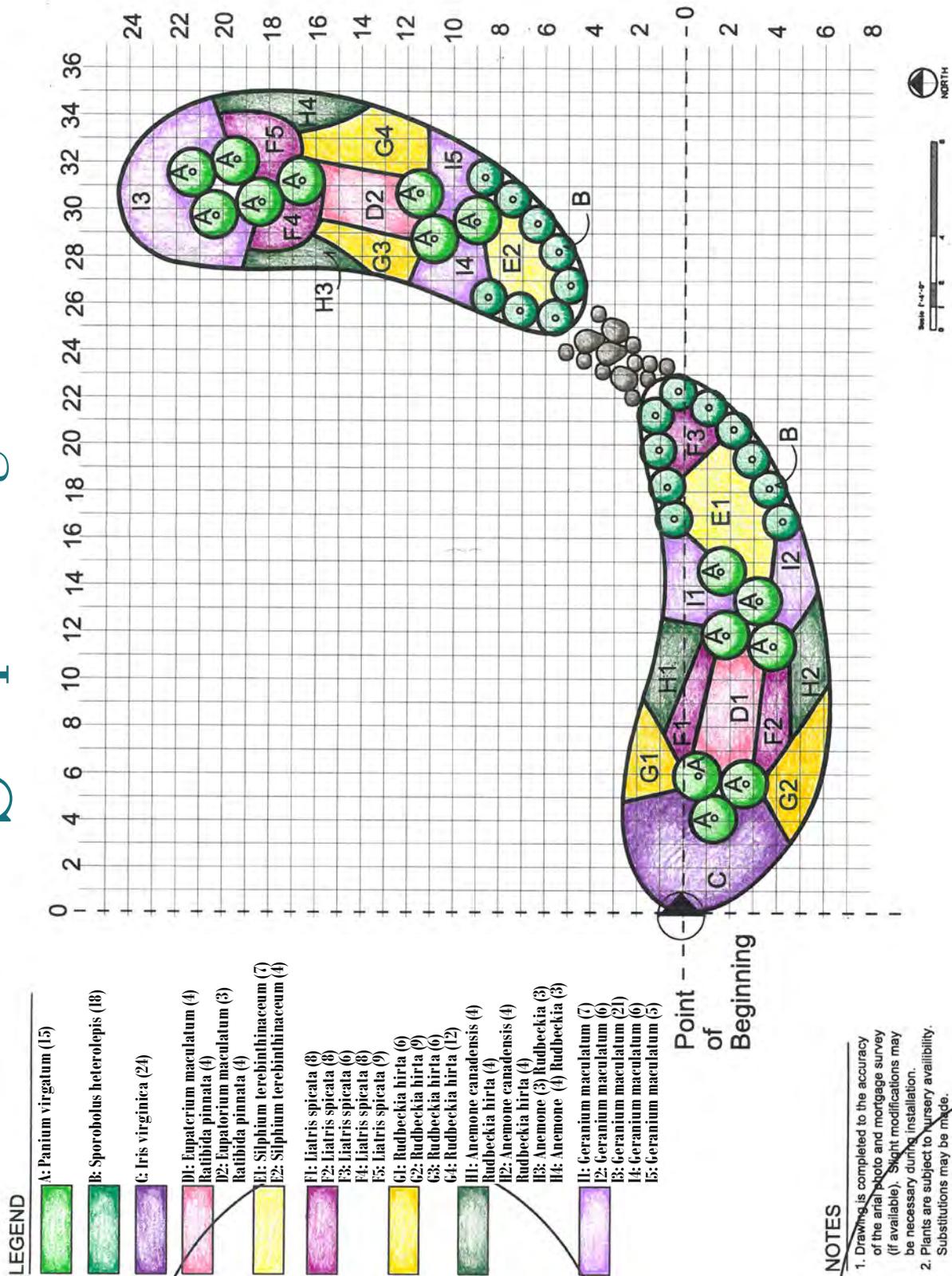


Design by Susan Bryan for Kim Wheeler

Sample design: full sun

IN SITE

Project:
Washtenaw County
Rain Gardens
Geddes Lake
3000 Lakehaven Dr.
Ann Arbor, MI



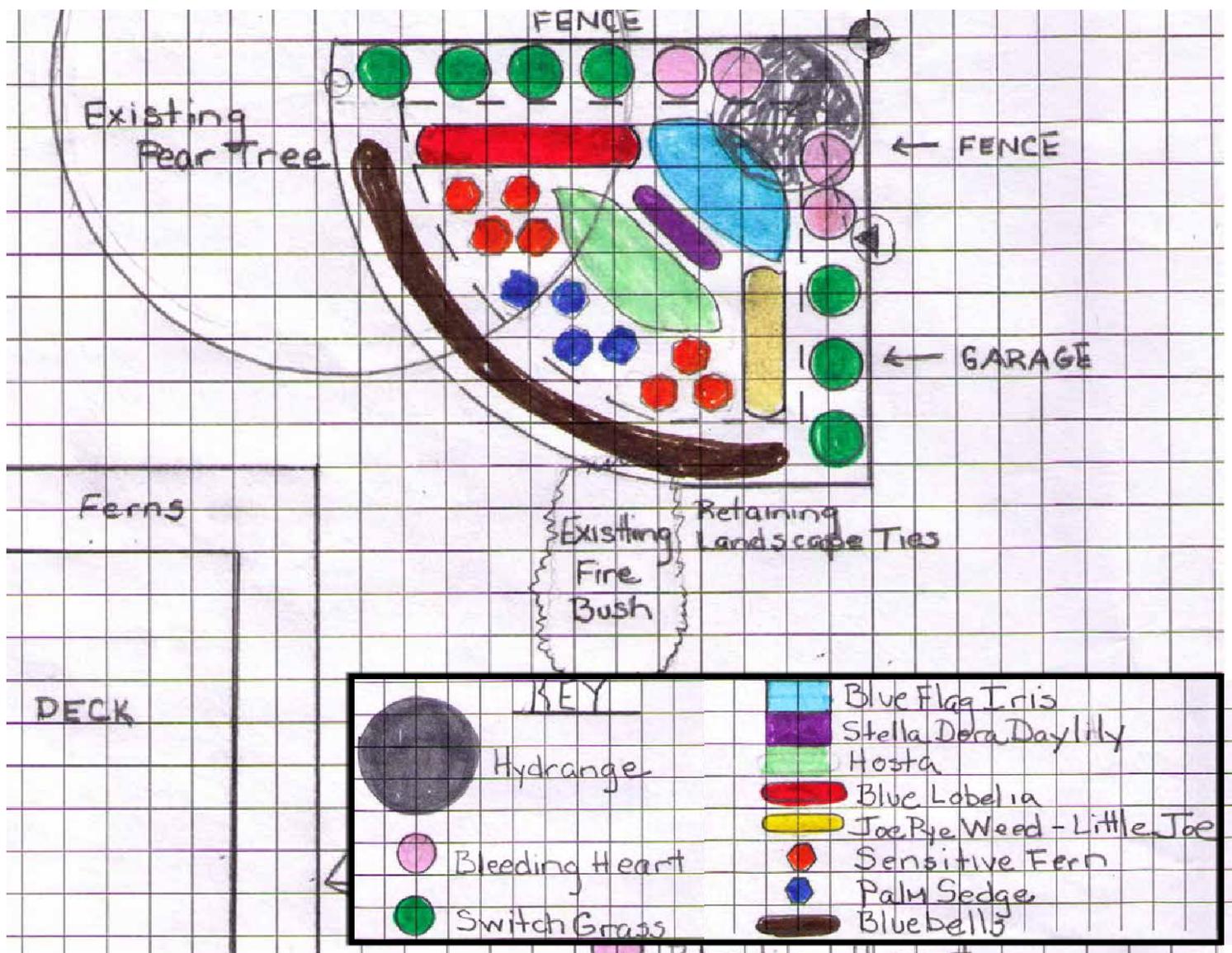


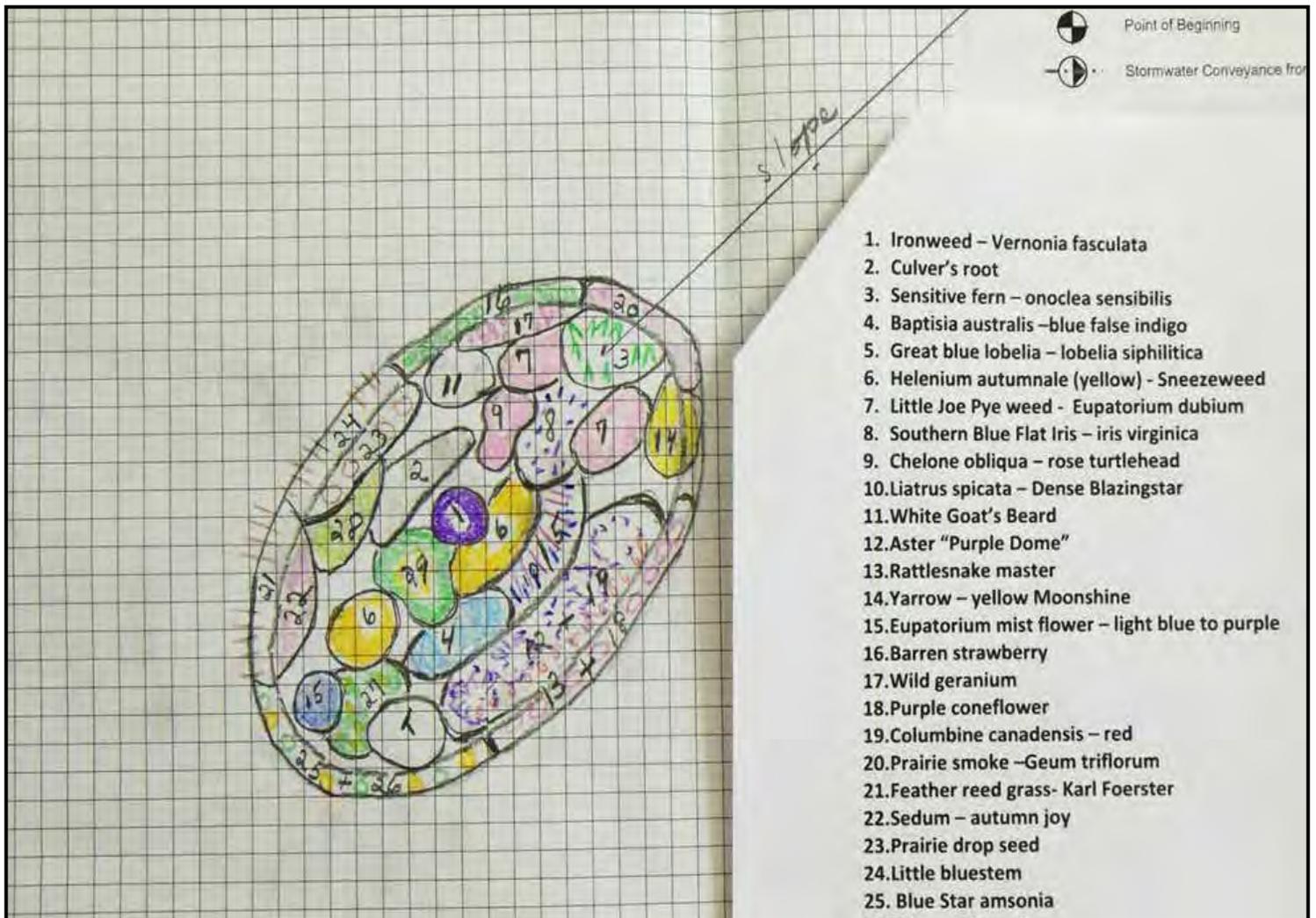
Photo credit: Sallie Richie

Sample design: part shade

Top: Master Rain Gardener, Sallie Richie's design

Left: Yard before rain garden construction

Right: Completed rain garden with Master Rain Gardener, Sallie Richie



Sample design: full sun

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

Bottom Left: Yard before rain garden construction. Footprints in snow outline rain garden border.

Bottom Right: Completed rain garden with Master Rain Gardener, Helen Prussian



Photo credit: Helen Prussian



Photo credit: Susan Bryan

1



Transfer your drawing to your site

1) Translate the dimensions of your rain garden onto the ground by first laying out tape measures that act like the grid paper.

2) Add a flag garden border into the ground in the measured locations from your 'point of beginning'.

3) Define the border with string or spray paint.

4) Rototill sod, use a sod-cutter, or kill the grass by laying down cardboard and mulch.

5) Dig a shallow depression with a level bottom.

6) With the soil dug out to create the depression, build a berm on the downhill side to hold the water within the garden like a bowl. Add a notch to the downslope berm for overflow water to go to a safe location. The notch will determine the water depth within the rain garden.

2



3



Photo credits: Harry Sheehan

Drainage

With an Underground Pipe

- 1) Sometimes it is necessary to direct water to the rain garden underground with a pipe. The pipe will need to run downhill to the rain garden.
- 2) It should outlet above where the water will pool. Make sure to place the outlet of the pipe at an elevation at or above the elevation of the emergency overflow notch. This way water won't sit in the pipe.
- 3) Use a non-perforated pipe with a 4" diameter. Either corrugated black plastic or PVC works. Don't use perforated pipe near the house. PVC is better for long runs (>20'), but is more expensive.
- 4) The end of the pipe can end with a grate (shown) or with a pop-up.
- 5) Place a few stones where the pipe outlets in the garden to reduce erosion.

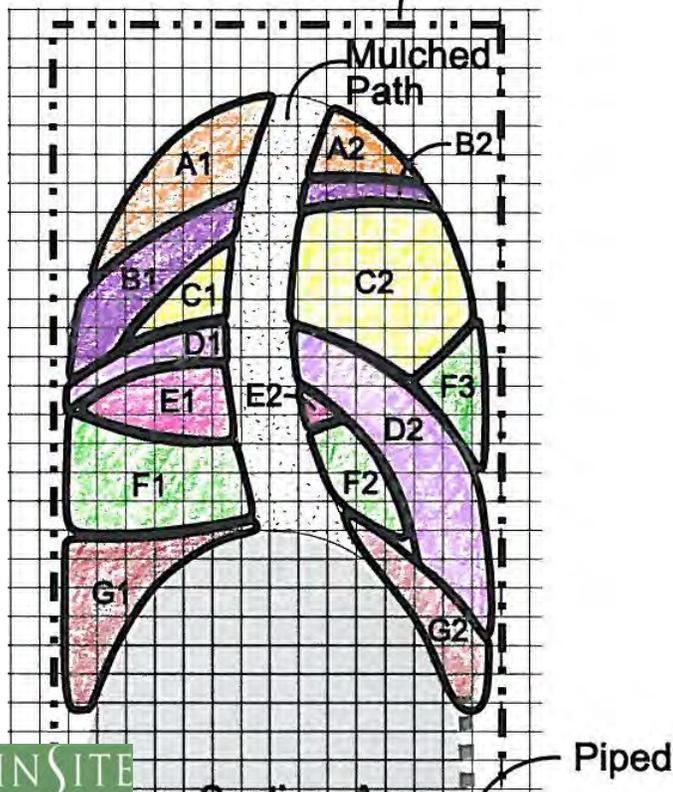


Rain garden in Dexter, Michigan. Photo credit: Susan Bryan

Drainage

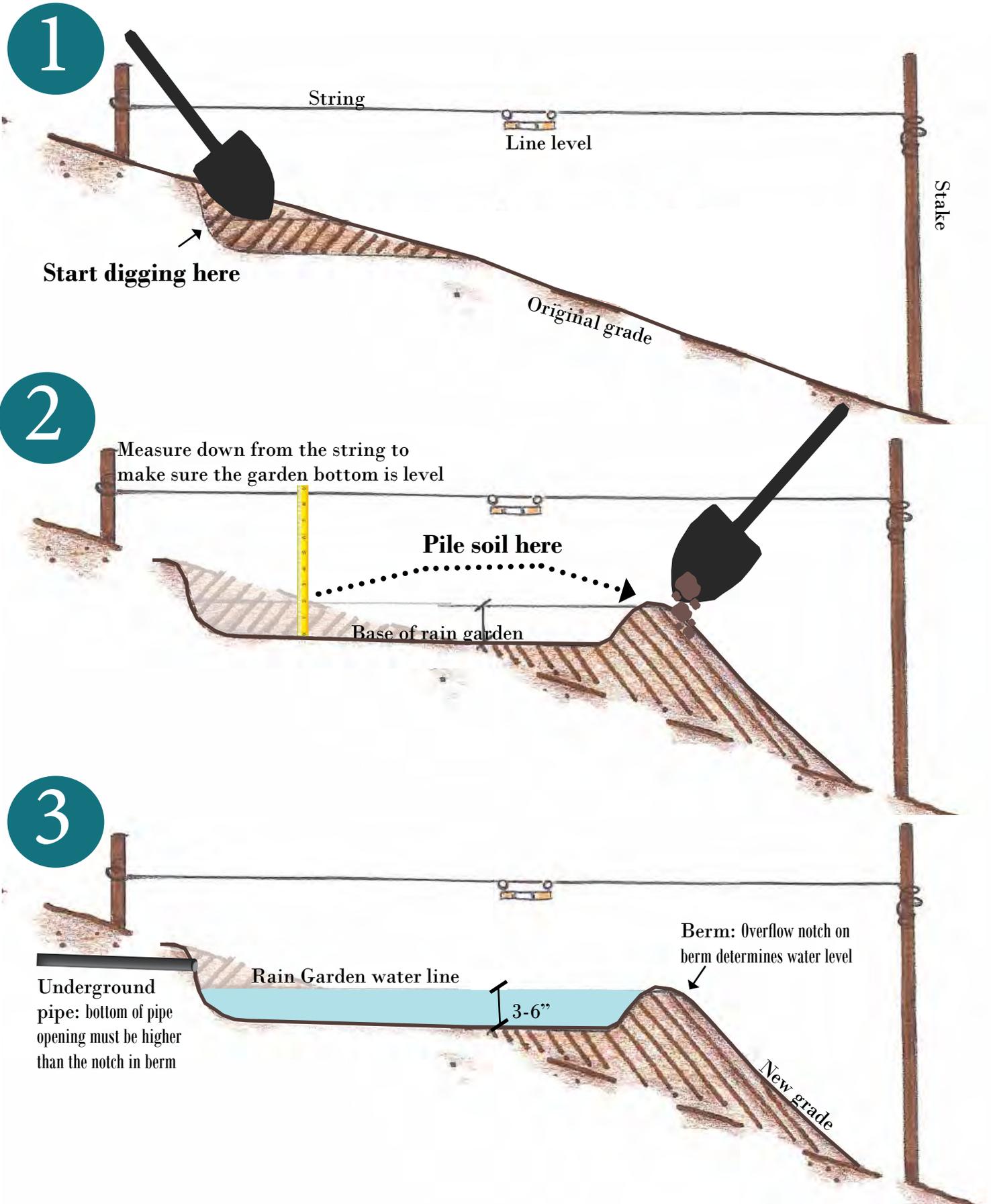
Over Land

- 1) Water will run overland to your rain garden if a downhill channel has been created from your downspout to your rain garden.
- 2) Often water will infiltrate into the ground while moving along the channel.
- 3) Your drainage channel can be made of stones, native plants or simply be a lowered grassy pathway.



Rain garden in Washtenaw County. Design by Shannan Gibb Randall. Photo credit: Harry Sheehan

Digging on a slope



Soil preparation

1) Dig the rain garden 2 inches deeper than the final intended depth, reserving the topsoil on a tarp. Is there any topsoil left in the hole? If not, dig another 6" and replace with the reserved topsoil. Leave it 2" deeper than final depth, to make room for the compost.

2) Lay 2 inches of compost down in the rain garden bottom & sides. Till compost into soil and then cover with 2 inches of hardwood shredded mulch.

3) How many cubic yards of mulch do you need? Determine how much compost and mulch is required to cover the garden with the following calculation:

$$(A * 0.00617) = \text{material in cubic yards}$$

where A = area in square feet of garden. This can be calculated by counting the squares on your base plan drawing

Calculation can be used for either compost or mulch material and is for depths of 2".

Planting

If you have perennials in your garden that are adapted to both wet & dry conditions, you can transplant them into the rain garden. If you are buying plants, it is recommended to buy plants in pots because seeds are often washed away. Plants in pots have root systems that can resist the movement of water.

To Plant: dig a hole deep enough that the roots can hang vertically. If the roots are root-bound, break them up. Place the plant deep enough so that the entire root ball is covered but the base of the stem is above the soil. Fill the hole and pat firmly to remove any air space.

Watering: Keep soil around plants moist for a few weeks and in times of drought. When to water? Test the soil by sticking your finger fully into the soil. If your fingertip touches moist, but not soaked soil, you are watering the correct amount.



Rain garden at Eastern Michigan University housing. Design by SGR. Photo credit: Shannan Gibb-Randall.

RECOMMENDED NATIVE PLANTS

These are the top twenty native Michigan plants used successfully in Washtenaw County rain gardens. The first two rows (in blue) should be planted on the sides of your rain garden, where it is the most dry. The bottom three rows (in green) should be planted on the bottom of your rain garden, where it is the most wet.

New england aster <i>Aster novae-angliae</i>  LBJ wildflower center Blooms: September - October	Canada anemone <i>Anemone canadensis</i>  Bransford, W.D. and Dolphia Blooms: May - June	Wild geranium <i>Geranium maculatum</i>  LBJ wildflower center Blooms: May - June	Goldstrum black-eyed susan <i>Rudbeckia fulgida</i>  LBJ wildflower center Blooms: July - September
Ninebark <i>Physocarpus opulifolius</i>  Bloodworth, Stefan Blooms: May - July	Redbud <i>Cercis canadensis</i>  LBJ wildflower center Blooms: May	Wild strawberry <i>Fragaria virginiana</i>  LBJ wildflower center Blooms: May - June	Kobold blazing star <i>Liatris spicata</i>  Julie Makin Blooms: July
Purple coneflower <i>Echinacea purpurea</i>  LBJ wildflower center Blooms: July - August	Switch grass <i>Panicum virgatum</i>  LBJ wildflower center Blooms: September - October	Nodding wild onion <i>Allium cernuum</i>  LBJ wildflower center Blooms: September - October	Ostrich fern <i>Metteuccia struthiopteris</i>  LBJ wildflower center Blooms: September - October
Goldfinger potentilla <i>Potentilla fruticosa</i>  LBJ wildflower center Blooms: June - July	Fox sedge <i>Carex vulpinoidea</i>  LBJ wildflower center Blooms: May - June	Red-osier dogwood <i>Geranium maculatum</i>  Garden Photos Blooms: May - June	Rose Mallow <i>Hibiscus moscheutos</i>  LBJ wildflower center Blooms: August - September
Pink turtlehead <i>Chelone lyonii</i>  LBJ wildflower center Blooms: August - September	Sensitive fern <i>Onoclea sensibilis</i>  LBJ wildflower center Blooms: July - September	Blue lobelia <i>Lobelia siphilitica</i>  LBJ wildflower center Blooms: July - September	Blue flag iris <i>Iris virginica</i>  Mahoneys Garden Blooms: May - June

Legend ☀ full sun ☀ part sun ● aggressive spreader

Common invasives

Refrain from buying, planting or allowing these common invasives to grow. Weed them out!



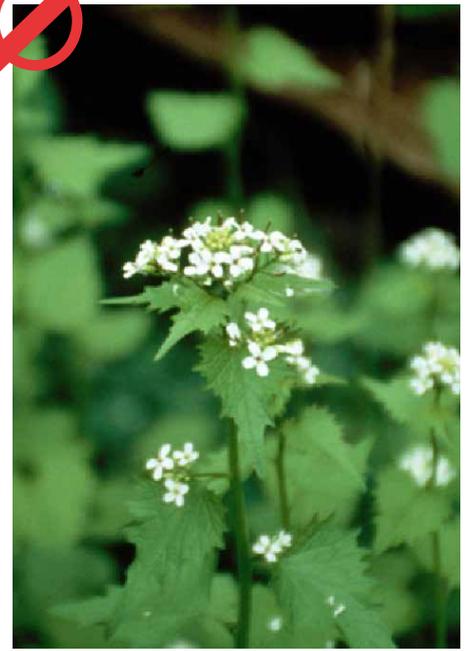
Yellow Iris
Iris pseudacorus



Restricted in Michigan



Purple Loosestrife
Lythrum salicaria



Garlic Mustard
Alliaria petiolata



Restricted in Michigan



Autumn-Olive
Eleagnus umbellata



Dames Rocket
Hesperis matronalis



Restricted in Michigan



Phragmites
Phragmites australis

Map invasive species using the MISIN app

from the Midwest Invasive Species Information Network at www.misin.msu.edu

Invasive species

An invasive species is one that is not native and whose introduction **causes harm**, or is likely to cause harm to Michigan's economy, environment, or human health.

Many non-native species in Michigan, including fruits, vegetables, field crops, livestock and domestic animals, are important to our economy and lifestyles. Most non-native species are not harmful and may provide economic benefits. Invasive species cause harm when they out-compete native species by reproducing and spreading rapidly in areas where they have no natural predators and change the balance of the ecosystems we rely on.

Prohibited vs. Restricted Species

Some invasive species are legally designated by the State of Michigan as either "prohibited" or "restricted". If a species is prohibited or restricted, it is unlawful to possess, introduce, import, sell or offer that species for sale as a live organism, except under certain circumstances.

The term "prohibited" is used for species that are not widely distributed in the state. Often, management or control techniques for prohibited species are not available.

The term "restricted" is applied to species that are established in the state. Just having these species on your property isn't a violation of the law if they are naturally occurring. However, you should take steps to control them and you cannot intentionally propagate or spread these species on your property or through sales or free distribution. Management and control practices are usually available for restricted species.

Michigan's Natural Resources Environmental Protection Act (Part 413 of Act 451) established the list of prohibited and restricted species, which is regularly amended by Invasive Species Orders.

Additional Information about Invasive Species

Additional information, including species profiles and reporting information, tips for preventing the spread of invasive species, laws, and outreach materials is available online at:

www.michigan.gov/invasivespecies

Useful information about invasive plants and landscape alternatives is available at:

www.mipn.org

Prohibited in Michigan



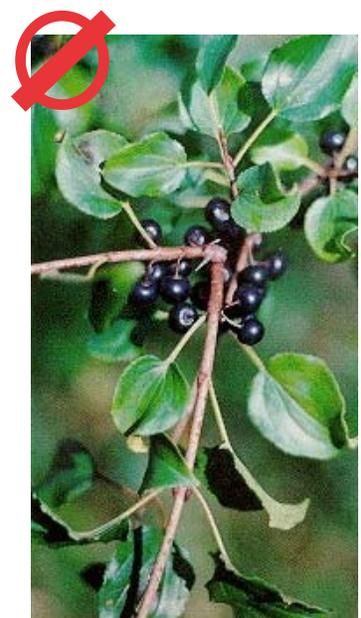
Japanese Knotweed
Fallopia japonica



Multiflora Rose
Rosa multiflora



Japanese Barberry
Berberis thunbergii



Common Buckthorn
Rhamnus carthartica

RESOURCES TO BUILD A RAIN GARDEN

Local native plant producers

Michigan Native Plant Producer's Association members adhere to strict sourcing and ethical guidelines. They provide nursery-grown native plants and seed from Michigan genotypes. <http://mnppa.org>

Native Connections

Jerry Stewart
17080 Hoshel Road
Three Rivers, MI 49093
Phone: (269) 580-4765
Email: jerry@nativeconnections.net
Website: www.nativeconnections.net

The Native Plant Nursery LLC

Greg Vaclavek
PO Box 7841
Ann Arbor, MI 48107
Phone: (734) 677-3260
Email: plants@nativeplant.com
Website: www.nativeplant.com

Oakland Wildflower Farm

Ruth Vrbensky
520 North Hurd Rd.
Ortonville, MI 48462
Phone: (248) 969-6904
Email: oaklandwildflowerfarm@gmail.com
Website: www.oaklandwildflowerfarm.com

American Roots

Trish A. Hacker Hennig
1958 Hidden Lake Trail
Ortonville, MI 48462
Phone: (248) 627-8525
Email: americanrootsnat@aol.com
Website: americanrootswildflowers.com

Borealis Seed Company

Suzanne Rabitaille
Judy Keast
529 W. Bluff Street
Marquette, MI 49855
Phone: (906) 226-8507 office
Phone: (906) 345-9636 nursery
Email: srborealis@peoplepc.com

Hidden Savanna Nursery

Chad Hughson
18 N. Van Kal Street
Kalamazoo, MI 49009
Phone: (269) 352-3876
Email: info@hiddensavann.com
Website: www.hiddensavanna.com

Michigan Wildflower Farm

Esther Durnwald
11770 Cutler Rd.
Portland, MI 48875-9452
Phone: (517) 647-6010
Email: wildflowers@voyager.net
Website: www.michiganwildflowerfarm.com

Provenance Wildflower Farm

Tania Hanline
16791 210th Street
LeRoy, MI 48655
Phone: (231) 768-4603
Email: provenancewildflowerfarm@yahoo.com
Website: www.provenancewff.com

Sandhill Farm

Cheryl Tolley
11250 10 Mile Road
Rockford, MI 49341-7954
Phone: (616) 691-8214
Email: cherylt747@gmail.com

Wetlands Nursery, Inc

Jewel Richardson
13428 Caberfae Hwy.
Wellston, MI 49689
Email: aquaticplantlady@gmail.com
Phone: (231) 848-4202

WILDTYPE Design Native Plant & Seed, LTD

Bill Schneider
900 North Every Rd.
Mason, MI 48854
Phone: (517) 244-1140
Email: orders@wildtypeplants.com
Website: www.wildtypeplants.com
www.MNPPA.org

Free plants

Every community has plant exchanges - usually hosted by garden clubs, or the local chapter of Wild Ones. Mature gardeners want to give their perennial splits to you - instead of composting them! Find your local exchange - and share it with us!

Kalamazoo Area Wild Ones is an excellent resource for native plants and programs!

www.KalamazooWildOnes.org

Wild Ones Spring Native Plant Exchange

May 2018

Check website for date

Wild Ones Native Plant Sale

Memorial Day weekend at PFC

Wild Ones Fall Native Plant Exchange

August 2018

Check website for date

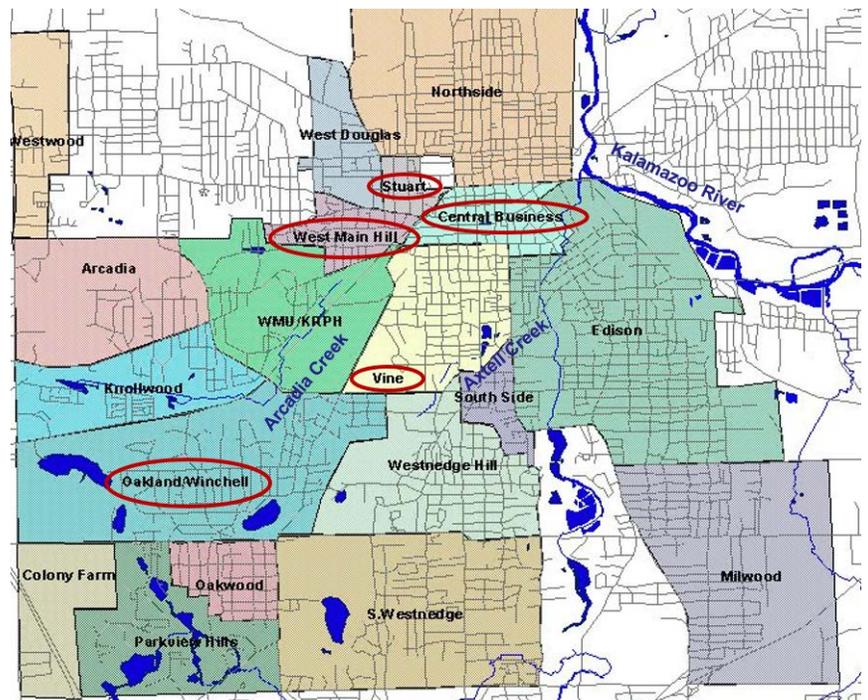
Give and get plants from friends and exchanges! The best way to garden.

Gardening Kalamazoo for Clean Water Project -- Rain Garden Incentive

If you live in select neighborhoods that drain lots of stormwater to Arcadia Creek and Axtell Creek, you could qualify for free native plants compliments of the Kalamazoo County Land Bank, Western Michigan University, and community volunteers.

Qualifying Neighborhoods:

- Oakland Winchell
- Vine
- Stuart
- West Main Hill
- Central Business District



Carex vulpinoidea Fox Sedge. Photo credit: Lady Bird Johnson Wildflower Center



Cornus amomum, Silky dogwood. Courtesy of Ladybird Johnson Wildflower Center

Compost vendors

1 cubic yard of farm compost or topsoil weighs approximately 1 ton

Pickup truck capacities: most 1/2 ton pickup trucks and short bed pickup trucks have a volume capacity to hold 1.5 cubic yards but most don't have the weight capacity to safely haul more than 1 cubic yard.

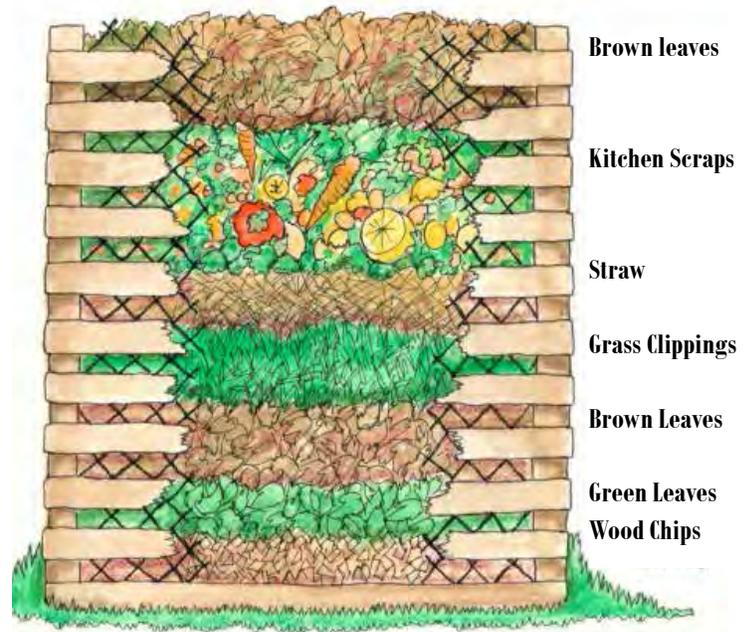
3/4 and 1 ton pickup trucks have the capacity to hold up to 2 cubic yards.

Coverage for spreading compost, topsoil or mulch:

- 1 cubic yard @ 1" depth covers 324 square feet
- 2" depth covers 162 square feet
- 3" depth covers 108 square feet
- 4" depth covers 81 square feet

Or use the calculator on the link below to estimate how many cubic yards you need:

www.landscapecalculator.com/calculators/mulch



Build your own compost with kitchen food scraps and yard waste. Graphic courtesy of landscapeforlife.org

City of Kalamazoo Compost

Bulk municipal compost is available for free during the spring and summer. Call (269) 337-8215 for more information.

2045 E. Michigan Kalamazoo
(SE of Schippers Lane)
Spring-Summer:
Self-serve, open 24 hours

Note: city compost is made of materials collected along streets and contains debris, roots, seeds, and other potentially undesirable materials.

Renewed Earth Compost at KLS

KLS sells high quality compost created by a local compost company, Renewed Earth.

5111 S. 9th Street, Kalamazoo (North of I-94 exit at 9th St.)

April to November:
Monday-Friday from 8am-5pm
Saturday 8am-4pm

December to March:
Monday-Friday from 8am-5pm

ADDITIONAL INFORMATION

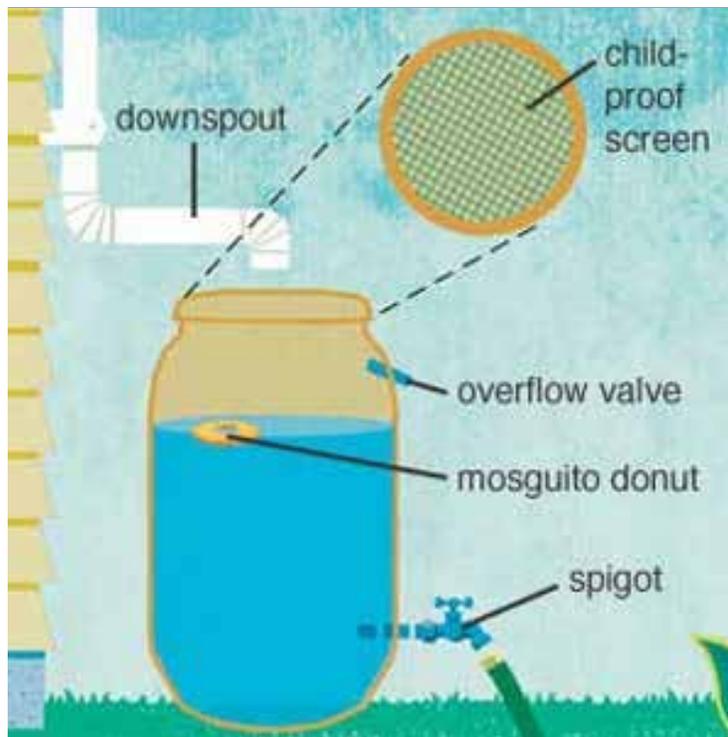
Rain Barrels

What is a Rain Barrel?

A rain barrel collects and stores rainwater from your rooftop to use later for things like lawn and garden watering. Water collected in a rain barrel would normally flow through your downspout, onto a paved surface and eventually into a storm drain.

Why use a Rain Barrel?

Rain barrels help lower water costs by storing approximately 1,300 gallons of water during peak summer months. Using stored rainwater on your garden or lawn instead of directing rooftop runoff to the storm drain network helps recharge groundwater naturally. Rain barrels reduce water pollution by limiting stormwater runoff, which can contain pollutants like sediment, oil, grease, bacteria and nutrients. Rain barrels are inexpensive and easy to install.



Graphic courtesy of mtwatercourse.com



Automatic diverter. Courtesy of rainbarrelsandmore.com

Available through Local Farm, Garden and Home Improvement Stores

- Barrels have a screw-on top with holes for water entry and aluminum screen to keep out leaves, debris and mosquitoes.
- They have a shutoff valve that can connect to a hose or to fill a watering can
- Recommended placement is 12" high using an optional pedestal, cement blocks or other materials.
- Barrels are designed to leave outside all year around.

Automatic Diverters are also available for connecting rain barrels to downspouts. When it rains, some water will flow from the diverter, through the hose to the barrel and some water will also continue to flow down the lower section of the downspout. When the rain barrel is full, then all the water will flow down the downspout. A 55 gal. rain barrel will take about 1 hour to fill with a Diverter installed (15-20 minutes without). Using the Diverter eliminates the need for an overflow hose to be connected to the barrel and routed to an overflow location. Sizes are available to fit 2"x 3" or 3"x 4" downspouts and hose is included.

Information courtesy of the Washtenaw County Conservation District. More information available at: <http://www.washtenawcd.org/>

RAIN GARDEN CHECKLIST

Make sure you've answered all of these questions when developing your own rain garden or working on someone else's rain garden

Why do you want a rain garden?

- Want to have the coolest thing in gardening
- Need a new gardening project
- Want to do something good for the environment
- Like to see wildlife in the garden
- Spend time on the river so want to keep it clean

Where do the roof gutters & downspouts drain to? _____

Where do the paved areas drain to? _____

Sketch the paved areas, the roof and where the downspouts go:

Do you have a location(s) in mind?

Describe _____

Whom do you prefer do the work?

- Do it all myself or with family/friends
- Use a rain garden contractor
- A combination - they dig it, I plant it

How tall would you prefer the plants in your garden to be? _____

Do you like grasses? _____

How much do you like to weed?

- Every day
- Once a week
- Twice a year

How long does it take an 18" deep hole, filled with water, to drain? (percolation test): _____

Soil (circle): Sandy, Loamy, Clay, Mixture, Unsure

Yes / No

- Is there a well on the property?

Where is it? _____

- Is there a septic system?

Where is it? _____

- Does runoff drain to street storm sewers?

- Or swales?

Where are the: underground utilities? phone, cable, electric, gas, water, sewer, GeoThermal system, other:

Yes / No

- Did you call Miss Dig?

- Is there a basement?

Does the property currently have any of the following:
Yes / No

- Flooding in basement

Where? _____

- Erosion

Where? _____

- Wet areas after a large storm

Where? _____

Are there any other upcoming projects? Remodeling, gardening, etc? Should this project wait for any of those projects to be completed?

Created by: Roger A. Moon; Washtenaw County Master Rain Gardener '12



Washtenaw County Water Resources Office

705 N. Zeeb Rd., PO Box 8645, Ann Arbor, MI 48103

734-730-9025

Learn more about Rain Gardens: www.ewashtenaw.org/raingardens

Take the Master Rain Gardener class: www.ewashtenaw.org/MRG

Follow the Water Resources Commissioner's Office on Facebook.

Design, all uncredited pictures and diagrams by Catie Wytychak

By Susan Bryan & edited by Heather Rice



Kalamazoo Master Rain Gardener Program was created in partnership with the Washtenaw County Water Resources Office.

Find more information about the Kalamazoo MRG program at:

<http://KalamazooRiver.org/MRG>

Follow the Kalamazoo MRG program on Facebook.

A partnership of Kalamazoo Valley Community College, Kalamazoo Nature Center, and Kalamazoo River Watershed Council.



Support for the Kalamazoo MRG Program and adaptation of this coursepack was funded in part through the Michigan Department of Environmental Quality's Nonpoint Source Program by the United States Environmental Protection Agency under an assistance agreement C-9975474-16 to Kalamazoo Valley Community College for the Gardening Kalamazoo for Clean Water project. The contents of the document do not necessarily reflect the views and policies of the United States Environmental Protection Agency or the Department of Environmental Quality, nor does the mention of trade names of commercial products constitute endorsement or recommendation for use.