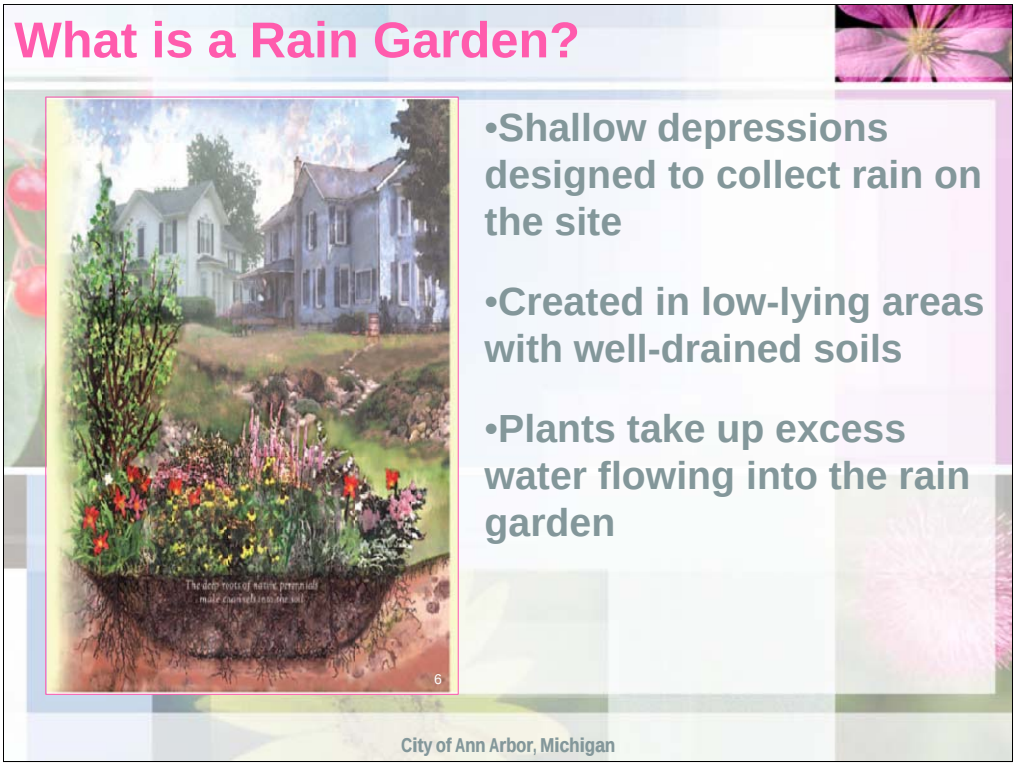
Following is information explaining how to build a rain garden that will help limit runoff into the storm sewers and the Huron River, and qualify for the stormwater credit being offered by the City of Ann Arbor.



What Makes a Rain Garden a Rain Garden?

1. Rain gardens area strategically created in low-lying areas, with specific layers of soil, sand, and organic mulch. These well-drained soils area 3-6” deep and filled with organic mulch and appropriate plant materials, preferably native species. These layers naturally filter the rain as it runs into the rain garden.
2. Rain gardens are shallow depressions designed to collect rain on the site. Rain Gardens have a ponding area, but they are not ponds. There is a bowl-shaped dip in the garden, which holds the rain while it soaks into the soil. Rain gardens are designed to hold water for short periods of time, typically less than 48 hours.
3. Many of the plants in the garden are native to the region, and have extensive deep roots that help the garden absorb rain. The native plants do not need special attention once they are established. (Perennials)

1. The purpose of a garden is to absorb rainwater runoff from impervious surfaces that rain cannot soak into, such as a roof or parking lot, or even a lawn by allowing rainwater to pool in a low spot just long enough to percolate into the ground.
2. During the few days following a storm, the soil absorbs and stores the rainwater and nourishes the garden's grasses, shrubs, and flowers. The garden absorbs and filters rain that would otherwise run off your property and down the storm drain. The plants and soils filter the water; removing nutrients and pollutants. In other words, the plants, bacteria, and soils clean the water as it seeps into the ground.
3. Rain gardens are an excellent method of keeping stormwater on site and out of the sewer system. Stormwater runoff must be directed into the rain garden - A native plant garden that does not have rain directed into it from a hard surface of your property will still be a valuable asset, and will help absorb rain much better than a traditional landscape. But unless stormwater runoff is directed into the garden, it is not a rain garden.

Benefits of Rain Gardens

1. Lovely landscaping features. Enhance the beauty of yards and neighborhoods
2. Save you money. They don't need to be fertilized or sprayed, only weeded and mulched. They reduce the amount of lawn you have to maintain. This makes your yard a healthier place for children and pets.
3. Rain gardens are low maintenance. Once established, they require no fertilizer, watering, or mowing. A once a year cleanup, addition of shredded hardwood mulch to keep the surface moist and tidy, and removal of weeds and invasive species are all that are required. They require little or no watering to stay green.
4. Rain gardens can contribute to groundwater recharge, a natural process that is interrupted by soil compaction and hard surfaces created during development and building. Increasing the amount of water that filters into the ground, which recharges local and regional aquifers.
5. Stormwater must pass through vegetation where some pollutants, including sediment particles, are “snagged”. Mulch and soil absorb some metals and phosphorus and soil particles and litter debris are removed from by settling into the garden.
6. Runoff is directed away from foundations to the rain gardens and decreases the risk of basement flooding.
7. Create wildlife habitat. Provide valuable habitat for and attract birds, butterflies and many beneficial insects
8. Rain Gardens keep stormwater on site and away from the stormwater system. Therefore, pollutanted runoff is reduced from entering the Huron River and our drinking water remains clean.
9. Residents of Ann Arbor who have a rain garden on their property may be eligible to receive a $2.80/quarter credit on their stormwater bill.

A rain garden is one type of “bioretention”—a system of pond area, soil, plants and mulch that will retain water and soak it up instead of letting it run off of your property (even though your “pond” will be dry most of the time). So the most basic things are the “pond,” or depression into which water will flow, and the soils that will absorb the water.

•This section covers rain garden basics:

- Where to put the rain garden
- How large to dig it
- What kind of soils and slope are best

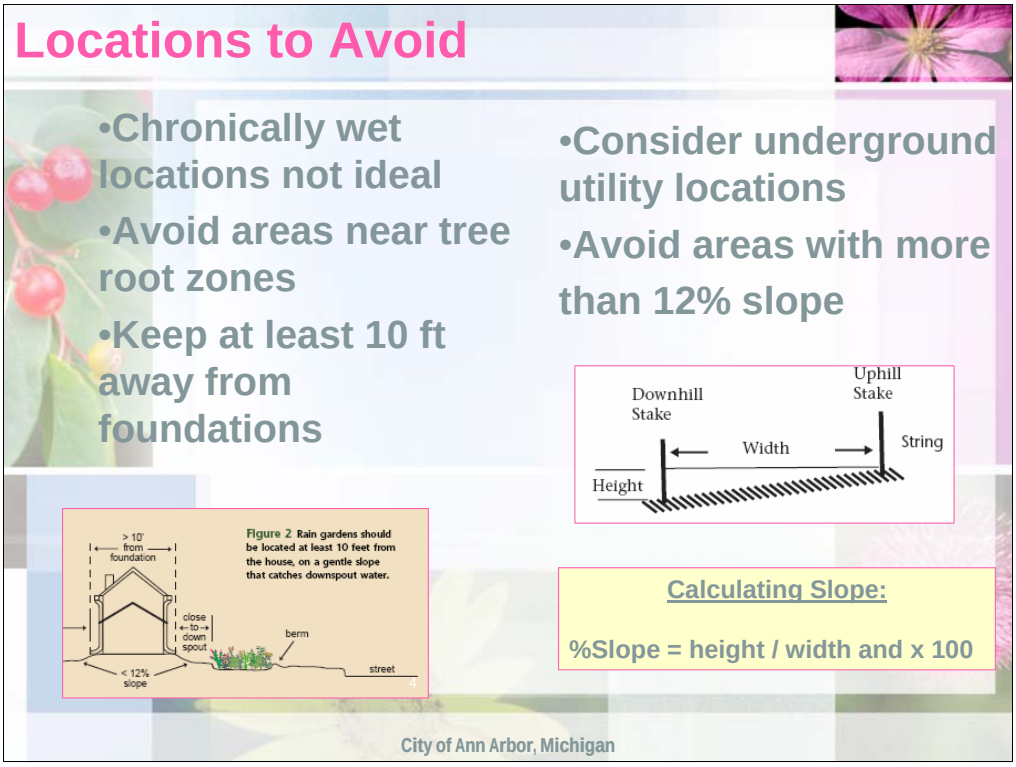
Choose The Right Place for Your Rain Garden

Your property has an existing drainage pattern and it will usually be easiest to take advantage of that. Note the direction of runoff and low spots where water collects. If you are not sure where these are, find them by running hose water on the ground. If these spots are away and downhill from your building foundations, they will be good places for your rain garden.

If you have many low spots, you can choose those that are closest to the downspouts from your roof or nearest to a paved driveway. If the layout of your land is such that you don't like the natural low spots (or they are not very low), you can create your own by excavating earth—anywhere that you can get rainwater to flow, either directly or even by installing piping.

Rain gardens are designed to overflow during heavy rains. Make sure it will spill over to safe location, away from a sidewalk, not too close to a property line or retaining wall.

Re-directing the rain--there are a number of solutions if the rain doesn't flow naturally to your chosen spot. You can install piping underground or send the rain along a constructed channel or swale. You can also incorporate a rain barrel into the feature, and direct the overflow hose into your rain garden. If you direct downspout water to the garden below ground, have it surface above the rain garden so water doesn't get stuck in the pipe.



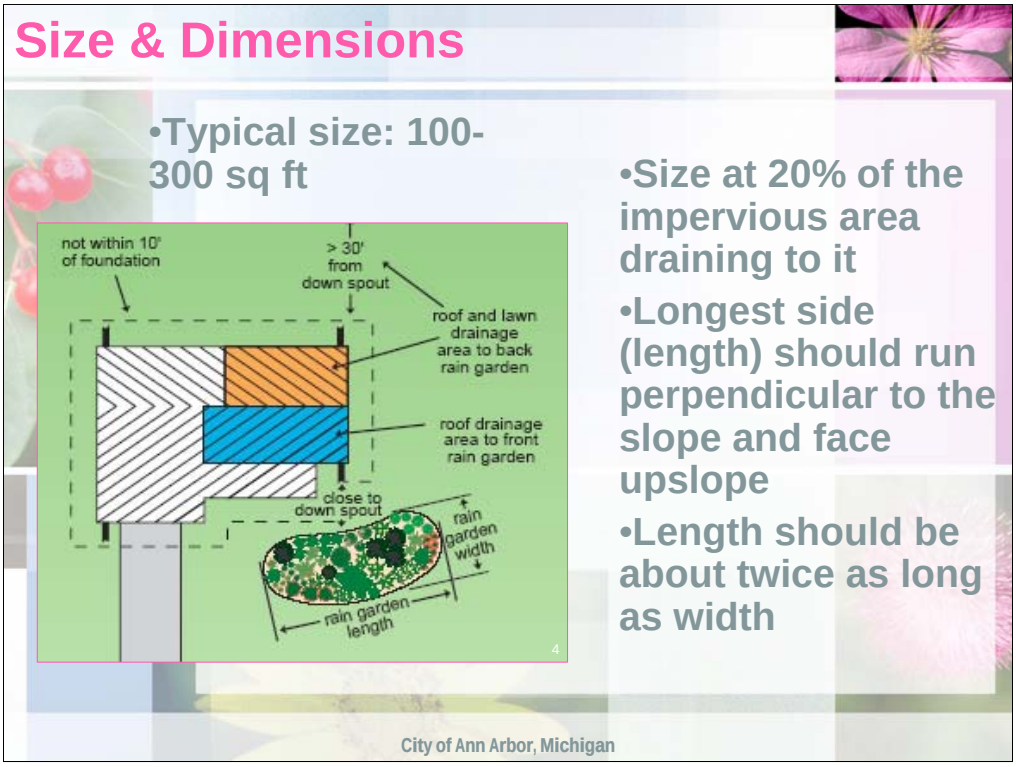
Chronically wet locations make poor sites for rain gardens. They hold water too long. Try planting native wetland plants.

Don't excavate an extensive rain garden under large trees. Trees have root systems that would have to be dug out in the excavation, and the health of the trees may be affected by damaging the roots. If the trees are not species that are adapted to rain garden conditions, directing ponds of water to their roots may also weaken or kill them.

Avoid creating a rain garden too close to building foundations; this may lead to a leaky basement. If you can locate it at least 15 feet and downslope from the building, that should be good. Also, you must stay away from the drainfield if you have a septic system.

Be aware of rights of way and underground service lines or utilities. Before you dig, call "Miss Dig", and have the area flagged. Hint: take pictures of the flagged areas so you have a record of underground utility locations.

If the slope is more than 12%, it is best to find another site.



How big should the rain garden be?

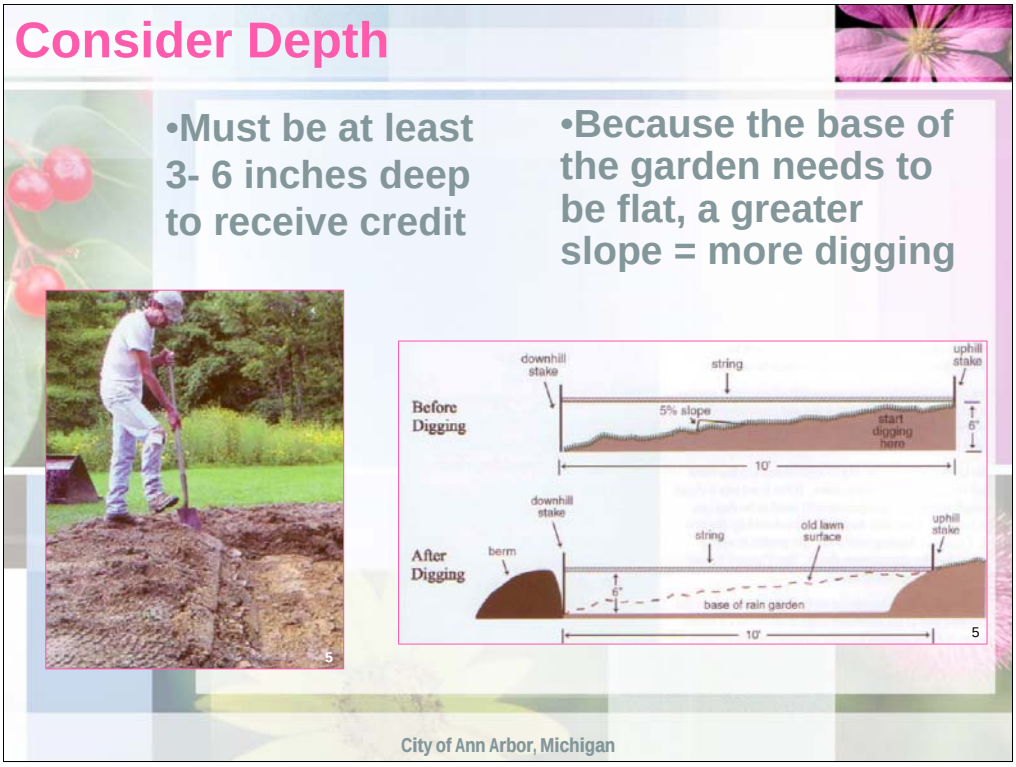
- A typical residential rain garden ranges from 100-300 square ft. But remember; any size rain garden, even a small one, will contribute to solving local water pollution problems.
- The size or the rain garden will depend on:
  - How deep the garden will be
  - What type of soils the garden will be planted in
  - How much roof and or lawn will drain to the garden

Size: The objective of a rain garden is to capture the first ½" of runoff from a rooftop or driveway. A rain garden should be about a fifth of the size of the area draining to it and be deep enough to pool 3" of water. For instance, if you have 500 square feet of rooftop draining to a downspout, the garden should be 100 square feet (10 x10), and 3" deep.

How long and how wide should the rain garden be?

Before building the rain garden, think about how it will catch water. Runoff will flow out of a downspout and should spread evenly across the entire length of the rain garden. The rain garden must be as level as possible so water doesn't pool at one end and spill over before it has a chance to infiltrate.

- The long side of the rain garden should face upslope; that is , the length of the rain garden should be perpendicular to the slope and the downspout. This way the garden catches as much water as possible. However, the rain garden should still be wide enough for the water to spread evenly over the whole bottom and to provide the space to plant a variety of plants. A good rule of thumb is that the rain garden should be about twice as long (perpendicular to the slope) as it is wide.
- When choosing the width of the garden, think about the slope of the lawn. Wide rain gardens and rain gardens on steep slopes will need to be dug very deep at one end in order to be level. If the rain garden is too wide, it may necessary to bring in additional soil to fill up the downhill half. Experience shows that making rain garden about 10ft wide is a good compromise between the effect of slope and how deep the rain garden should be. A rain garden should have a maximum width of about 15 feet, especially for lawns with more than about an 8% slope.



A rain garden must be at least 3-6 inches deep to receive credit

•If the slope is less than 4%, it is easiest to build a 3 to 5 inch deep rain garden

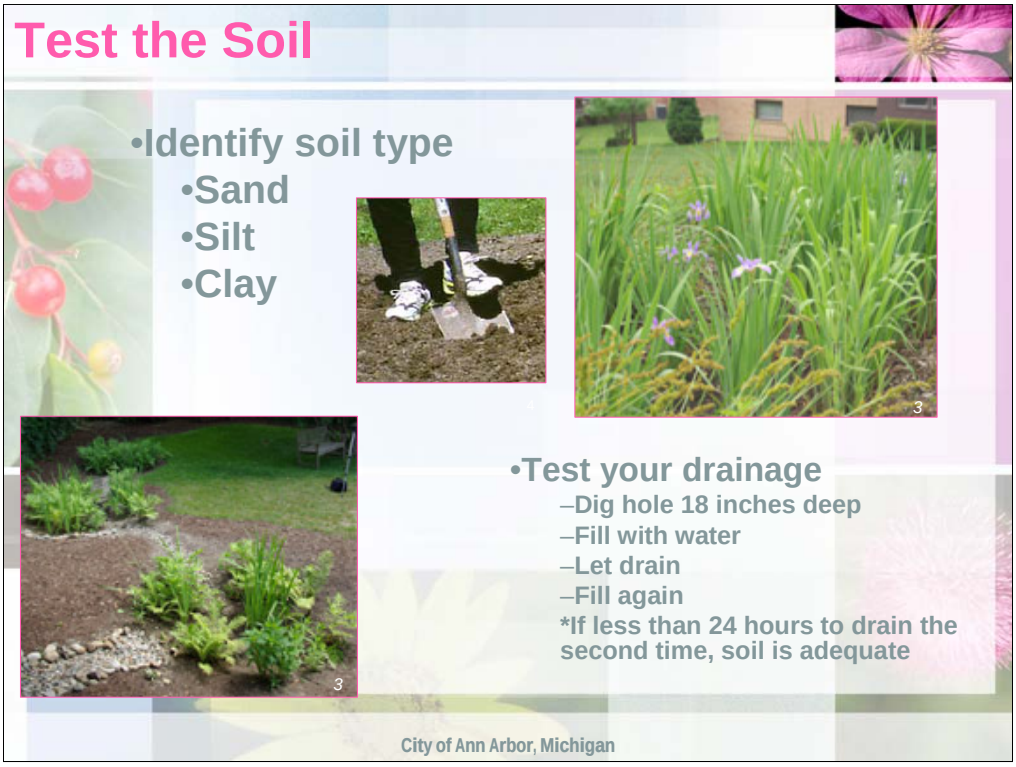
•If the slope is between 5 and 7%, it is easiest to build one 6 to 7 inches deep

•If the slope is between 8 and 12%, it is easiest to build one about 8 inches deep

No matter what the depth of the rain garden, the goal is to keep the garden level. Digging a very shallow rain garden on a steep lawn will require bringing in extra topsoil to bring the down-slope part of the garden up to the same height as the up-slope part of the garden. As the slope gets steeper, it is easier to dig the rain garden a little deeper to make it level.

You might make if deeper if:

- •Soil contains much sand (high infiltration)
- •Lawn is on steep slope (>8%)



Soil Type

Identify the lawn's soil type as sand, silt, or clay. Sand soils have the fastest infiltration; clay soils have the slowest. If the soil feels very gritty and coarse, you probably have sand soil. If your soil is smooth but not sticky, you have silt soil. If it is very sticky and clumpy, you probably have clay soil.

In this area, soils tend to be predominantly sand or clay. Sand soils drain well, while clay soils may become waterlogged. If your soil is sand, you may be able to simply loosen the soil and improve it with some compost to prepare your rain garden for planting. If your soil is clay, you will have more work to do. Even light clay soils may create very soggy problems if a lot of rain is directed to the rain garden. Soil removal and replacement are often needed if your soil is clay. The recommended soil replacement mix is 50-60% sand, 20-30% topsoil, and 20-30% compost. *Be sure no clay is in your replacement soil.*

Test your drainage

You can test your soil's infiltration by digging a hole about 18 inches deep where the rain garden is to go and fill the hole with water. Let it drain down, and then fill it again. If the 2nd time it takes less than 24 hours to drain down, the soils are adequate for the rain garden. If the water takes more than 24 hours to soak in, the soil is not suitable for a rain garden

Building a Rain Garden

City of Ann Arbor, Michigan

Prepare the Site

1. Miss Dig: Before digging in your yard, you must contact “Miss Dig” at least one week in advance at 1-800-482-7171 to identify the location of the underground utilities including cable, electric, gas, fiber optics, and water lines near your proposed garden location. If needed, shift your planting are appropriately to avoid damaging the utility service lines. The Miss Dig service is free.
2. Define the Borders: First, define the borders and shape of your garden at the location you have selected. Outline the area to be dug by spraying with non-toxic soccer-field paint. Another method is to lay a hose along the shape of the garden, then dig along the hose. This gives a nice flowing border to the garden area. Or, you could simply choose a rectangle as the shape of your garden.
3. Remove Turf: If the area is lawn, you will have to remove the turf. You can either use this either in another area of your yard, or it can be composted to help improve your soils. There is a special tool for removing turf that can make this task easier.

Loosen Soil: The soils will need to be dug up and loosened to a depth of two feet, or replaced with rain garden soil mix not only to prepare for planting the garden but so rain can soak in. If you have extra soil left over after this loosening process, use it in another part of your yard.
If you are not replacing your soil, double-digging to a depth of two feet is recommended. Remove the soil from the hole and pile it to the side; then dig and loosen the earth in a new hole, and pile it loosely into the first hole. This is the time to mix compost into the soil, if you are doing soil improvements.

Shape the Ponding Area: When you prepare the garden for planting, you must create a dip in the middle where water will collect as it sinks into the soil. There are various zones in a rain garden (very wet, wet to dry, and dry) and different kinds of plants will thrive at different zones. You may also adjust the depth of the depression to the infiltration rate. The standard depth for the ponding area is six inches. If you have very poor drainage in your existing soils, and your garden preparations still leave you with slow absorption rates, make your depression shallower to reduce the water that gets trapped there. If your soil sucks up water, make your garden deeper to increase its storage capacity. It's generally best to keep the bottom of your rain garden's depression flat; saucer-shaped rather than bowl shaped. That way, the rainwater will always spread out as much as possible.

Build a berm: While digging the rain garden to the correct depth, heap the soil around the edge where the berm will be. (The berm is a low wall around three sides of the rain garden that holds the water during a storm). The top of the downhill part of the berm should come up to the same elevation as the entry to the rain garden at the uphill end. The berm will need to be highest at the downhill side. Up the sides of the rain garden, the berm will become lower and gradually taper off buy the time it reaches the top of the rain garden. On a flat slope there should be plenty of soil from digging out the rain garden to use for a berm. On a steeper slope, most of the soil from the uphill part of the rain garden was probably used to fill in the down-hill half, and the soil will have to be brought in from somewhere else. After shaping the berm into a smooth ridge about a foot across, stomp on it. It is very important to have a well-compacted berm, so stomp hard. The berm should have very gently sloping sides; this helps smoothly integrate the rain garden with the surrounding lawn and also makes the berm less susceptible to erosion. To prevent erosion, cover the berm with mulch or plant grass. Use straw or erosion-control mate to protect the berm from erosion while the grass is taking root. If you don't want to plant grass or mulch over the outside of the berm, you can also plant dry-tolerant prairie species.

Amend soil: To be certain that your rain garden will function properly, simply replace the soil with the recommended rain garden mix: 50-60% sand, 20-30% topsoil (no clay), and 20-30% compost. This will give your new plants a great start, and the soil mix is designed to soak up rain. If your site soils are clay, soil replacement is probably in order.

It is time to plant once your pond area is ready and the soil is nice and loose. You can prepare a rain garden bed and then cover it with mulch until later; then, plant through the mulch. Or, you can plant immediately, then mulch the plants.

Right now there are no specific code standards for construction of rain gardens.

The best time to build a rain garden is in the spring. It will be easier to dig, and plants are more likely to thrive.

Put the right plant in the right place. Choose plants or a design suited to the existing conditions of the site. For example; if a garden is in deep shade then plants that require sun are not going to thrive. Some plants are adaptable as to soils, and some are not.

Native Plants for Rain Gardens

Beautiful native species or a combination of cultivated varieties and natives are recommended. The advantage of using natives is that they will thrive with little care, once established. Natives will grow bigger with fertilizers, but don't require them. They won't require spraying with pesticides.

Placement:

•Plant at a density of about 1 plant per square foot and thin as plants grow.

•Put tallest plants in deepest part of garden. Rain gardens also have three zones; very wet, wet-to-dry, and dry areas at the edges. If a plant is not doing well in one location of the garden, it's a good idea to move it.

•If you use a design with tall plants, think about how this will affect the view. Some prairie plants can grow ten feet tall. This could be a good thing, or it could inconveniently block the view of street traffic from your driveway.

Mulch makes things easier. Plan to mulch your rain garden, which will keep it moist, protect your plants, discourage weeds, and make weeds easy to remove.

Deep Roots Choose plants that have healthy root systems. Larger plants are more costly, but the bigger pot size allows for more roots. Those roots are very important, as the healthier the root system, the sooner the plants will be established.

Why use native plants in rain gardens?

•Native plants can tough it out: Plants that are native to your area are uniquely adapted to thriving in the local weather, soils, and ecosystems. They have been working at it for years (thousands, in fact). They live through droughts and downpours, and survive the winters without special care. They don't require fertilizer or chemical pesticide sprays.

•Native plants attract beautiful creatures. Native plants also have relationships with local butterflies, insects, birds, animals and other plants that they have developed by living together over thousands of years. Planting natives in your landscape helps provide habitat for local wildlife.

•Native plants have deep roots. Native plants are great helpers for protecting water quality in your neighborhood. The deep roots of many established native plants increase the ability of soil to hold water. For example, Blue False Indigo, *Baptisia australis*, grows only 3-5 feet tall, but the roots may go down 25 feet! These fantastic roots create deep channels in the soil for rain to soak into. Some of the roots die each year, and new roots grow. The decomposing roots enrich soil, making it more fertile and absorbant. The root systems also hold soil together and help prevent erosion.

Where can native plants be obtained? Contact certified, inspected professional nurseries that specialize in native species. Wherever you get them, verify that the native plants you purchase are not collected from the wild, reducing local populations, but are instead produced in a sustainable way by the nursery.

Please do not take your plants from the wild. Doing so disturbs local plant ecosystems and is often illegal.

Plan Ahead for Plant Needs It is not possible for suppliers to keep an extensive inventory of native plants and seeds on hand.

The following resources are available from NAP's "Native Plants" webpage:

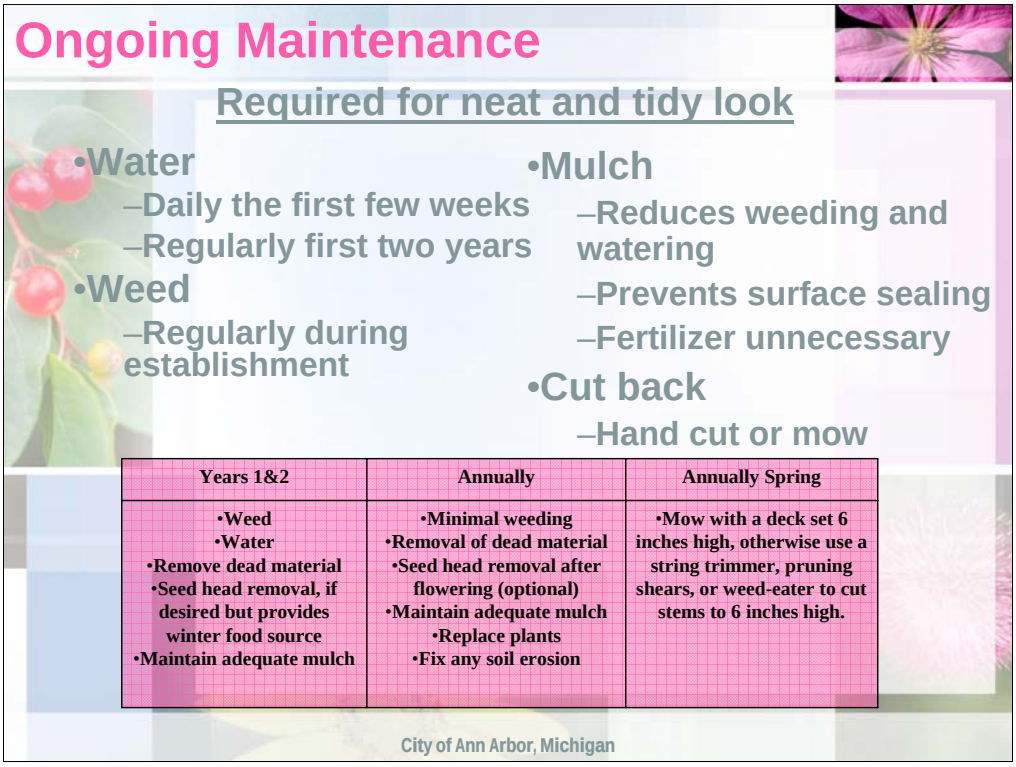
Native Plant Brochures Order Form – NAP offers five *Your Landscape and our Natural Areas* brochures, each has a list of natives with short written descriptions and planting information for each suggested plant, you can purchase all five for $4.00.

MNPPA Source Guide – list of nearly 400 native plants and which Michigan nurseries sell them (MNPPA = Michigan Native Plant Producers Association)

SE Michigan Nurseries and Native Plant Consultants – contact information for retail plant producers and native plant landscapers

Abridged lists of recommended natives: trees, shrubs, vines, perennials, ferns, and grasses, rushes & sedges

Go to www.a2gov.org/nap and click on the Native Plants link



Water daily the first few weeks after planting, then regularly until plants are established. Later, water in a drought if needed. Rain gardens require extra water during the first couple of summers to become established. Water thoroughly, deeply, once weekly to encourage deep roots and vigorous growth.

Weed on a regular basis, especially the first year. The garden requires more weeding during establishment. Weeds decrease considerably as the plants become established. Weeding will be needed the first couple of years. Remove by hand only those plants you are certain are weeds. Try to get out all the roots of the weedy plants. Weeds may not be a problem in the second season, depending on the variety and tenacity of weeds present. In the third year and beyond, the naïve grasses, sedges, rushes, and wildflowers will begin to mature and will out-compete the weeds. Weeding isolated patches might still be needed on occasion.

Mulch reduces weeding and watering and helps establish the plants. It also prevents surface sealing of the garden, and removes specific pollutants from pavement runoff. Fertilizer should *not* be necessary as native plants should thrive in the prepared soil mix.

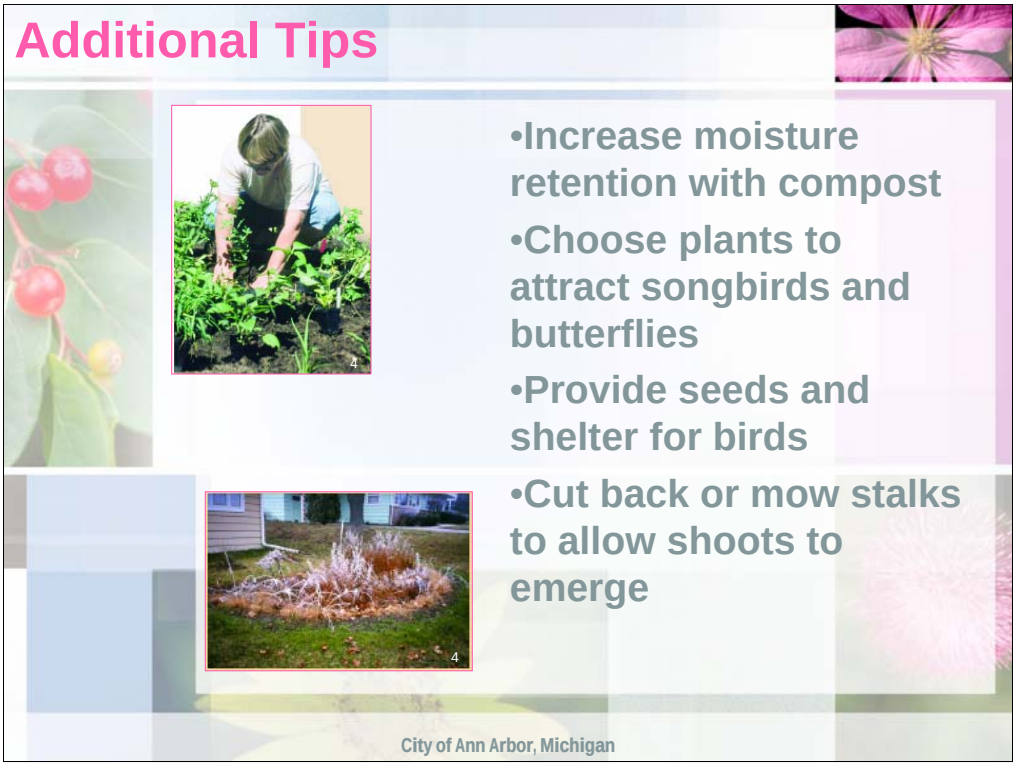
Cut back After each growing season, the stems and seedheads can be left for winter interest, wildlife cover and bird food. Once spring arrives and new growth is 4-6 inches tall, cut all tattered plants back. If the growth is really thick, hand-cut the largest plants and then use a string trimmer to mow the planting back to a height of size of six to eight inches. Dead plant material can also be removed with a string trimmer or weed whacker (scythe) and composted or disposed of as appropriate. If the mower deck won't raise that high, use a string trimmer or weed-eater to cut the stems at a height of 6-8 inches. On thicker stems, a string trimmer may not be strong enough. For these, use hand clippers or pruning shears to cut the individual stems. Rake up and compost or properly dispose of the dead plant material.

***As the rain garden becomes more established, the need for maintenance will decline and you can spend your time enjoying the benefits of your garden.

Year 1&2: Weed, Water, Remove dead material, Seed head removal (if desired but provides winter food source), Maintain adequate mulch

Annually: Minimal weeding, Removal of dead material, Seed head removal after flowering (optional), Maintain adequate mulch, Replace plants, Fix any soil erosion

Annually Spring: Mow with a deck set 6 inches high, otherwise use a string trimmer, pruning shears, or weed-eater to cut stems to 6 inches high.



•You can use finished compost to increase moisture retention.

•In case of a large rain event, it is important to provide a way for excess water to drain out in order to prevent flooding of your garden.

•To increase the visits of songbirds and butterflies, incorporate berry and nectar-producing plants.

•Leave the dead or dormant plants standing over the winter. Many of the plants will provide seeds and shelter for birds.

•In the spring, cut back or mow the stalks to allow new shoots to emerge.

A list of native plants for attracting birds: www.for-wild.org/land/wibirdpl.html and one for butterflies: www.angelfire.com/biz2/earthjoy/butgarden.html

Generally, recreating the food chain by providing a diversity of native plants (trees, shrubs, grasses, forbes, sedges) that provide food and shelter instead of a lawn monoculture will benefit wildlife.

The cost of a rain garden will vary depending on who does the work and where the plants come from.

- Without assistance, rain gardens can be done for as little as $1.50 per square foot. This includes the cost of plants and mulch only. If you grow your own plants or borrow plants from neighbors there can be very little cost.
    - Typically, there are additional costs for soil, compost, equipment, disposal.
- Most gardeners pay $2-3 per square foot.
- If you had a landscaper do the labor, $4-6 per square foot.
- If you had someone do the design, $7-12 per square foot.

Note: It might seem easiest to sow native wildflower seed over the garden, but experience shows that seeding a rain garden has its problems. Protecting the seeds from wind, flooding, weeds, and garden pests is very difficult, and the rain garden will be mostly weeds for the first two years. Growing plugs from seed indoors or dividing a friend's plants is much better. If you grow plugs, start them about four months before moving them to the rain garden. When the roots have filled the pot and the plants are healthy, they may be planted in the rain garden.

The Washtenaw County **Office of the Drain Commissioner** operates a project to help homeowners create a "rain garden" on their property. The program assists by providing one-on-one assistance in creating your garden. They provide full design services by an experienced landscape architect who will meet with you individually to develop your garden.

The labor and material costs (plants, mulch, and topsoil) are the property owner's obligation. Typically, these costs are about $2-3 per square foot. The gardens involve some digging, so if you choose to hire someone else to do the work, the costs are higher.

Drain Office staff time and landscape architect costs are covered by the County. The Drain Office will order the plants from the nursery for you. All other costs (including plants) and labor are up to you.

Currently, they are working on gardens that will be designed and constructed this fall of 2008 and planted in the spring of 2009 and 2010. If you have any questions, please contact Harry Sheehan at 222-6851. If interested, email sheehanh@ewashtenaw.org

Mr. Sheehan makes individual site visits to determine who qualifies for the program and chooses the 10 best each year. Most that are not picked up are due to insufficient space, too much slope (too much digging), unsafe overflow, difficulty in routing water, etc.

•Th Drain Commissioner's office Project Manager Harry Sheehan helped homeowners plan, design and install a number of rain gardens**.**

•Nineteen homeowners in the Allen Creek Watershed took advantage of a similar offer in 2005 and 2006.

•THE RESULT HAS BEEN A WIN-WIN FOR ALL CONCERNED: HOMEOWNERS HAPPY WITH THEIR NEW GARDENS, AND ALLEN CREEK RUNNING WITH FEWER FERTILIZER CHEMICALS AND OTHER HARMFUL RUNOFF.

•THIS INDEPENDENT COLLECTION OF RAIN GARDENS IS CAPABLE OF CAPTURING 25,000 GALLONS OF WATER FROM 1 INCH OF RAINFALL.

Fran Alexander, an avid gardener who has worked with the County on several projects, is also an Allen Creekshed resident on the west side of Ann Arbor. Recently Fran planted a rain garden in her backyard. "The people from the Drain Commissioner's office were great. We wound up selecting a few different ferns and other plants. For me, it was an easy choice. I had an opportunity to experiment with a new way of gardening, and it's a great way to help the environment," she said.

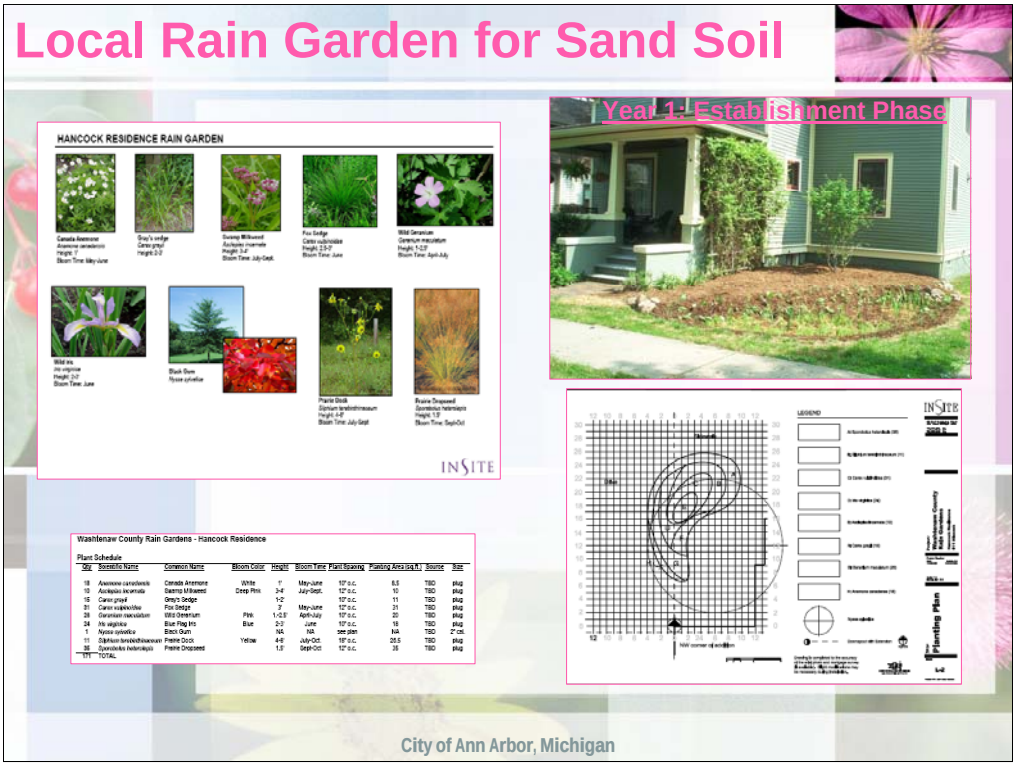
If you're interested in getting help with the design and implementation of a rain garden, or would like to learn more about this effort, contact **Harry Sheehan** at the Drain Commissioner's office.

Local Example

Before

After

City of Ann Arbor, Michigan

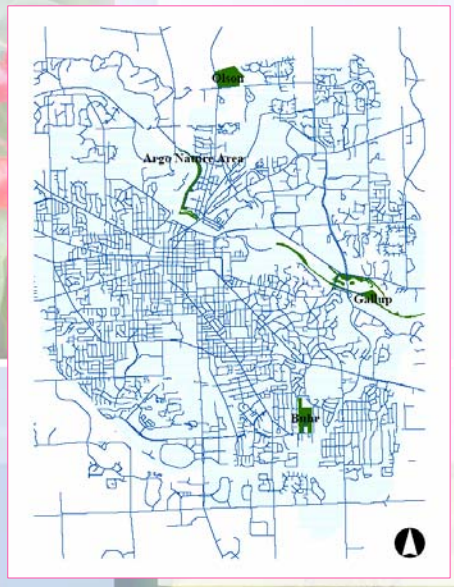


The plants for the above rain garden were chosen based on the sandy soils. The plant selection leans toward a prairie more than a wetland. The plans and plant lists are also above.

Local Rain Garden for Clay Soil

City of Ann Arbor, Michigan

Local Rain Gardens to Visit



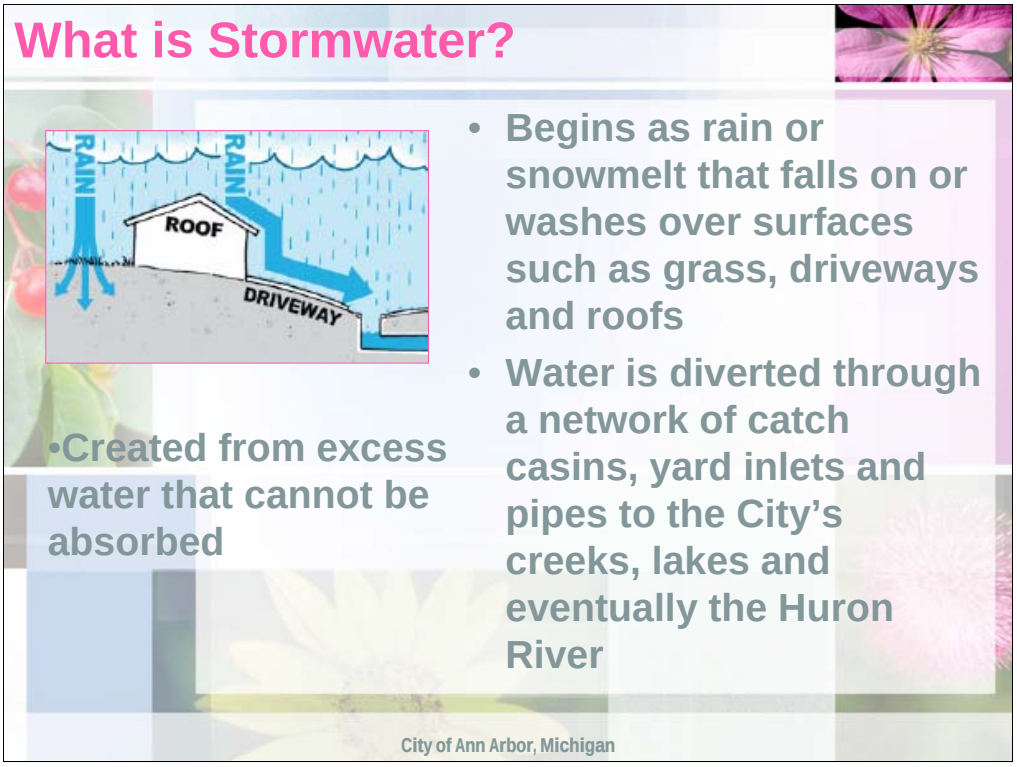
- Gallup Park
- Buhr Park
- Argo Park
- Olson Park

City of Ann Arbor, Michigan

Rain Garden Photos

City of Ann Arbor, Michigan


Rain Gardens &
Stormwater Management
City of Ann Arbor Stormwater Credit
City of Ann Arbor, Michigan

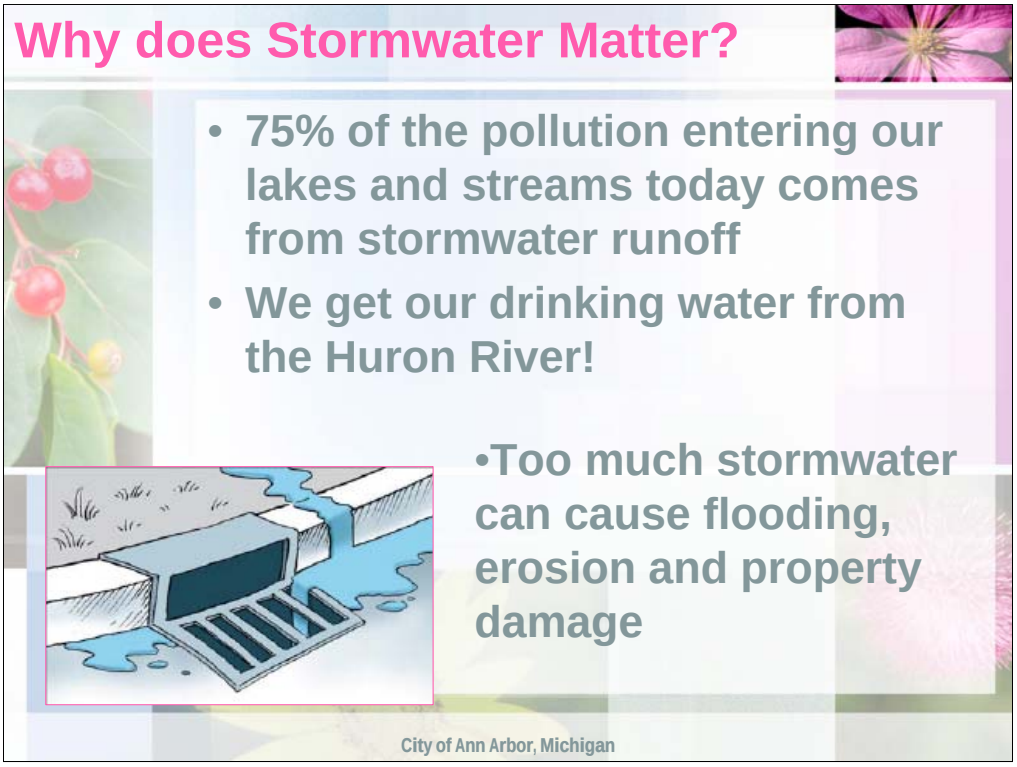


What Is Stormwater?

•Stormwater begins as rain or snowmelt that falls on or washes over both pervious (grass, woodlands, gardens and other undeveloped lands) and impervious surfaces (roofs, driveways, parking lots, streets, and other hard surfaces).

•Stormwater runoff is created from excess water that cannot be absorbed by pervious surfaces or from water flowing off impervious areas. Rather than being absorbed into the ground, rainwater enters the City's Stormwater drainage system, a network of catch basins, yard inlets and pipes that keep water from flooding roads and property. Unlike wastewater, which is treated before it is released back into the environment, stormwater goes directly into a community's ponds, streams and lakes.

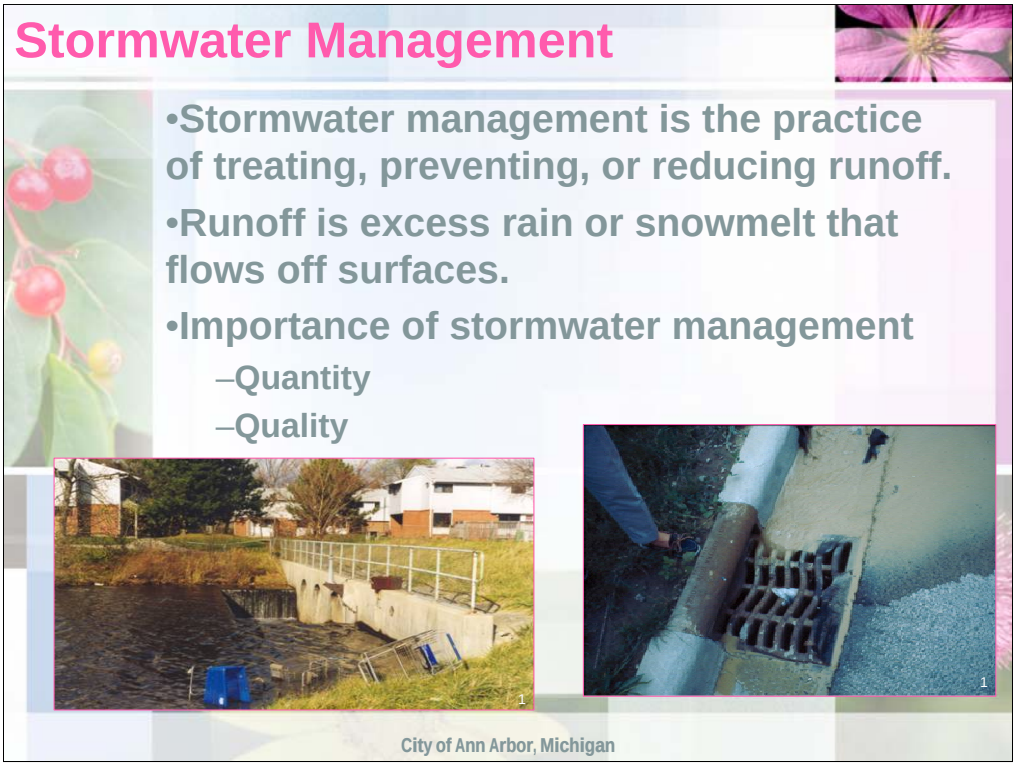
•Water is diverted through the network to the City's creeks, lakes, and eventually the Huron River.



•<u>What Problems Can Stormwater Cause?</u>
Stormwater can cause quality and quantity problems. Stormwater runoff picks up anything in its path and delivers it to our water resources. Pollutants including oil, yard waste, fertilizers, litter, and sediment can create stormwater of poor quality which can harm our waters. The initial half-inch of stormwater tends to carry the most pollution as it washes fertilizers, automotive fluids, animal waste, deicers, and dirt into the street and down the gutter.

•We get our drinking water from the Huron River!

•Too much stormwater is also harmful. Increased runoff can cause flooding, erosion and property damage if not wisely managed



What is Stormwater Management?

Stormwater management is any vegetative, structural or managerial practice used to treat, prevent, or reduce the volume of runoff water that impacts surface or ground water.

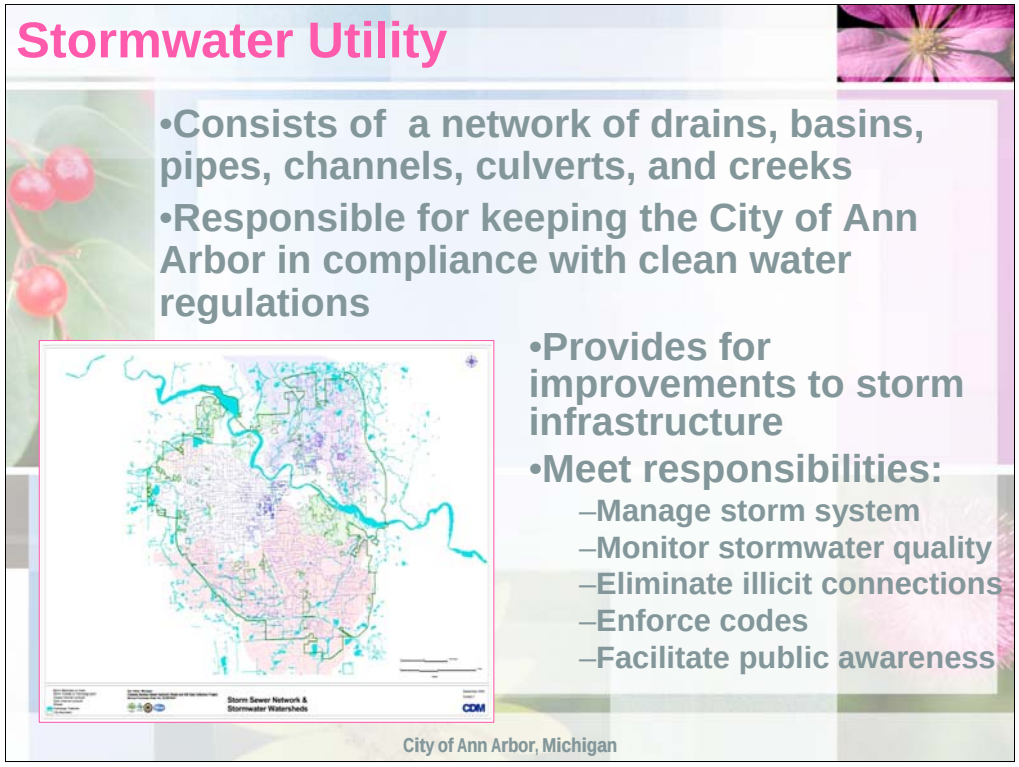
What Is Runoff

Stormwater begins as rain or snowmelt that falls on or washes over both pervious (grass, woodlands, gardens and other undeveloped lands) and impervious surfaces (roofs, driveways, parking lots, streets, and other hard surfaces). Stormwater runoff is created from excess water that cannot be absorbed by pervious surfaces or from water flowing off impervious areas.

Stormwater management is important:

•**Quantity:** Once land is urbanized, very little water is able to infiltrate into the ground, and instead, is rapidly conveyed via storm drains or surface runoff to the nearest water resource. Increased runoff can cause flooding, erosion and property damage if not wisely managed. This results in significant changes in stream flow and wetland hydrology, which can cause stream bank erosion and loss of aquatic habitat.

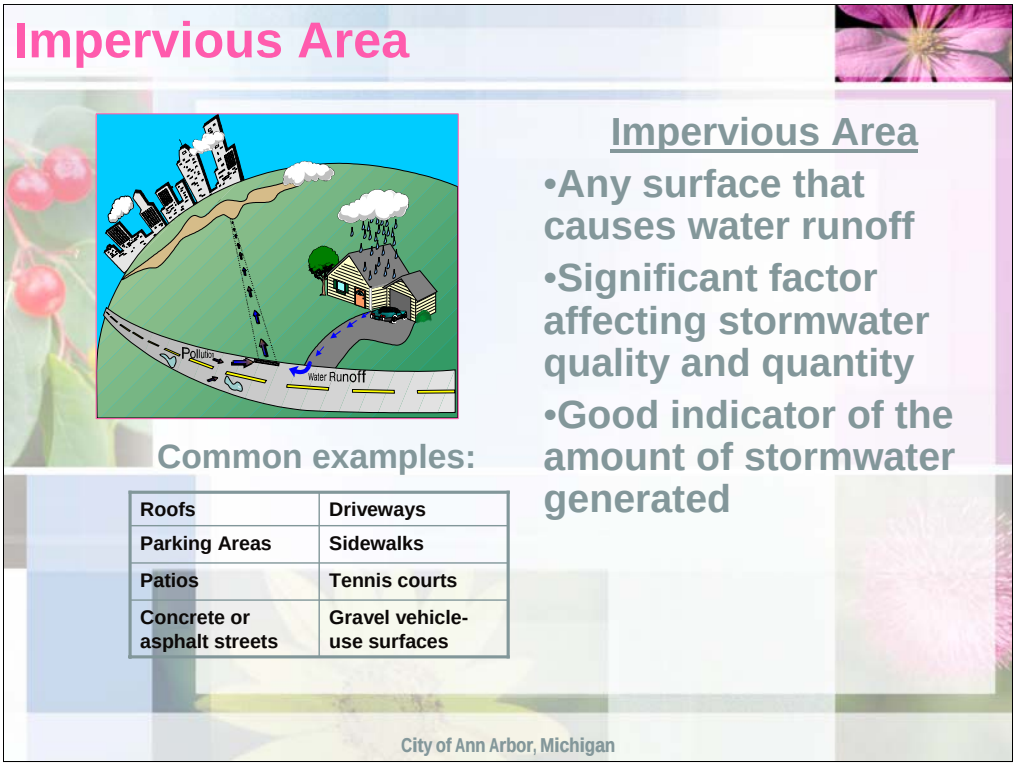
•**Quality:** Stormwater runoff picks up anything in its path and delivers it to our water resources. Pollutants including oil, yard waste, fertilizers, litter, and sediment can create stormwater of poor quality which can harm our waters. The initial half-inch of stormwater tends to carry the most pollution as it washes fertilizers, automotive fluids, animal waste, deicers, and dirt into the street and down the gutter.



City's Stormwater drainage system consists of a network of storm drains, catch basins, underground pipes, open channels, culverts, and creeks. Keeps water from flooding roads and property. Water is diverted through the network to the City's creeks, lakes, and eventually the Huron River.

<u>The utility fee raises the revenues needed to fund the City's stormwater management program.</u>

1. This program brings us into compliance with federal regulations and safeguards our community through improved drainage and protection of local waters.
2. The fee structure primarily enables the City to make needed improvements to storm drainage infrastructure including stormwater inlets and pipes, culverts, open stream channel systems, and other public drainage ways. These improvements will further help protect surface water quality and minimize flood hazards.
3. The utility fee also enables the City to meet its responsibilities to:
    - closely manage the storm drain system,
    - study the contents of stormwater,
    - seek out and eliminate illicit connections and illegal dumping,
    - enforce codes more strictly,
    - and facilitate public awareness.

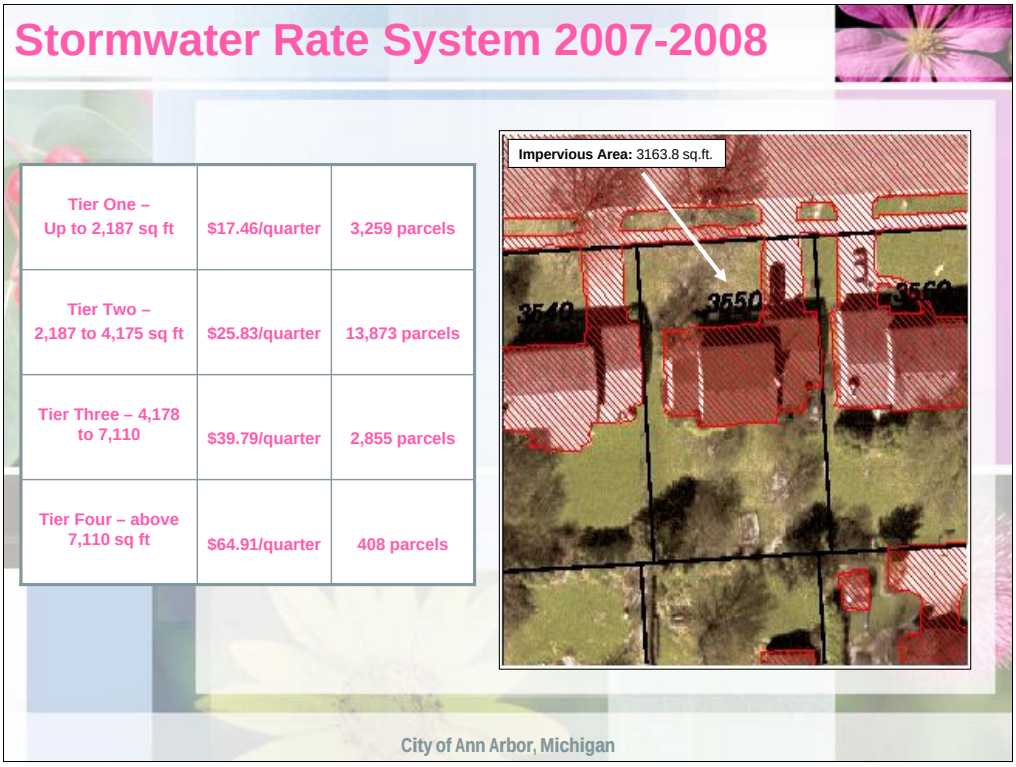


What is impervious surface

An impervious surface is any area that water will not soak in to. Impervious surface area is any surface that does not readily absorb water and impedes/inhibits the natural infiltration of water into the soil. Common examples include roofs, driveways, parking areas, sidewalks, patios, decks, tennis courts, concrete or asphalt streets, crushed stone and gravel surfaces.

The stormwater fee and Impervious Area?

In an urban environment, the amount of impervious area on a property is the most significant factor affecting stormwater quality and quantity. A stormwater utility fee is a fee structure set up to generate funding specifically for stormwater related activities. Impervious Area is used because it is an "indicator" of the amount of stormwater that will be generated. There is no practical way to measure the stormwater flow from each property, but Impervious Area is a good “indicator” of the amount that will be generated. The fee is based on how much impervious area exists on a piece of property, not the actual or theoretical stormwater runoff.



Stormwater Rate Structure

The stormwater utility fee rate is based on the total amount of impervious surface on a property (including: buildings, dwelling, parking lots, driveway, sidewalk, etc.). The Single-Family and Two-Family Residential rate consists of four tiers:

•Tier One – Up to 2,187 square feet = $17.46 per quarter

•Tier Two – 2,187 to 4,175 square feet = $25.83 per quarter

•Tier Three – 4,178 to 7,110 square feet = $39.79 per quarter

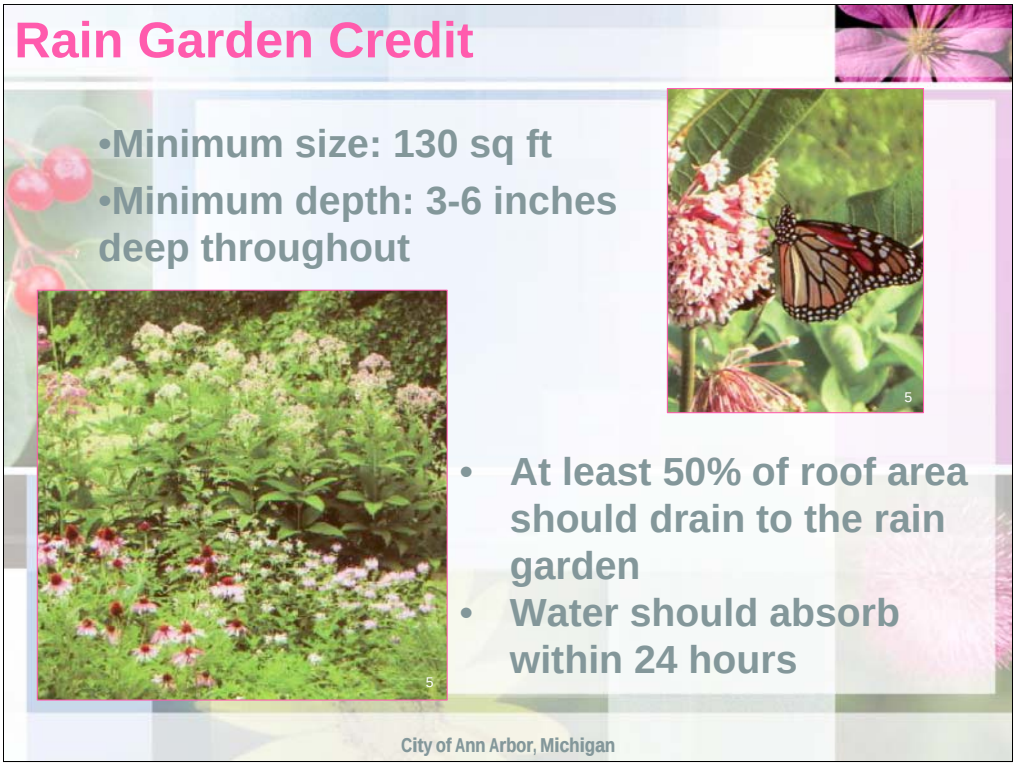
•Tier Four – Above 7,110 square feet = $64.91 per quarter

How is stormwater usage measured by impervious area?

A computer analysis of infrared aerial photographs is able to distinguish hard, impervious surfaces in contrast to areas that can absorb stormwater, such as lawns and gardens. The computer program assigns the residential property into one of four billing tiers to more equitably distribute costs proportional to use instead of using a flat fee. Homes with larger impervious areas pay more. You can review your property's stormwater assessment online.

1. Make your home a **RiverSafe Home** partner (save $1.24/quarter). Review Washtenaw County's online RiverSafe Home information and take the survey. The survey is also available by mail by phoning (734) 222-6833. Participants also receive a RiverSafe Home plaque to display. There is no cost to enroll at: www.ewashtenaw.org/riversafe. ONCE YOU HAVE COMPLETED THE SURVEY, PLEASE EMAIL storm@a2gov.org WITH YOUR ADDRESS TO OBTAIN YOUR CREDIT.
2. **Rain barrels** allow homeowners to collect storm water runoff from impervious surfaces (i.e. rooftops) and direct that water towards home landscaping projects -- gardens, flowerbeds, lawn -- and away from direct runoff into drains. Using storm water from your home saves water and allows water to percolate through plant roots and soil to cleanse the water. Water in the rain barrel is ideal for home gardening since it is ambient temperature and contains no municipal chemicals. We require that rain barrels be connected to a downspout on your home and be at least 35 gallons in capacity to receive credit. You should use the rain water collected in your barrel to water your garden or lawn at a later date (when needed - such as during a dry spell or drought). Also, it is recommended that people make sure they have some way to cover the barrel with a screen or a top.
3. **Cisterns** are water management devices that provide retention storage volume in above or underground storage tanks. A cistern is a receptacle built to catch and store rainwater for irrigation during dryer periods. While they are similar to rain barrels in purpose, cisterns are usually much larger. It is recommended that they be watertight, have smooth interior surfaces, enclosed lids, and be fabricated from non-reactive materials such as reinforced concrete, galvanized steel, and plastic.
4. **Drywells** are stormwater management structures that can play an important role in reducing total runoff volume. Dry wells are underground structures that store water in the void space between crushed stone or gravel and allow the water to slowly percolate downward into the subsoil. Drywells are installed by digging a deep hole and setting the drywell in it. Gravel is usually dumped around the outside of the drywell and a lid put on top. This structure often receives water from one or more entry pipes or channels at its top and discharges the same water through a number of small exit openings on the sides and bottom of the dry well into the soil that surrounds it.

Example (photo): Land Architects Inc. of Ann Arbor designed the following customer's landscaping to allow the down-spouted water to drain slowly underground through perforated hard plastic coils. Two 100' coils of drain tile provide stormwater storage and infiltration within the front yard. They are set within two holes that are filled with pea gravel that surrounds the drain tile coils.



Requirements for Credit:

1. At least 50% of your property's roof area (at least half of your home's downspouts) should drain to the rain garden OR the rain garden must capture runoff from impervious area on your property that is equal to 50% of your roof area.
2. Size:

   Minimum 130 Square feet

   3" to 6" deep throughout
3. Must have vegetation to absorb runoff. Native perennial are *preferred* to encourage infiltration.
4. INFILTRATION: Ground should infiltrate within 24 hours

   ** To test ground before installing:

Dig an 18" hole and fill it with water.

Let it drain down, and then fill it again. If the 2nd time it takes less than 24 hours to drain down, the soils are adequate for the rain garden.

OTHER RECOMMENDATIONS

Garden should be kept at least 10 ft away from foundations and should overflow safely.

Overflows should not go directly to a sidewalk, steep slope, retaining wall, or to a neighbor's property.

"While an individual rain garden may seem like a small thing, collectively they produce substantial neighborhood and community benefits"

1. **City of Ann Arbor's stormwater site: www.a2gov.org/storm**

   Details and links to other resources

   Slideshow

   Instructions for submitting the residential stormwater credit.

2. **Natural Area Preservation (NAP): www.a2gov.org/nap**

   Works to protect and restore Ann Arbor's natural areas and foster an environmental ethic among its citizens.

   Recommended plant lists

3. **Washtenaw County:** www.ewashtenaw.org

   Virtual tour of properties where the county drain commissioner's offices has helped owners add rain gardens

   Rain Garden construction tips

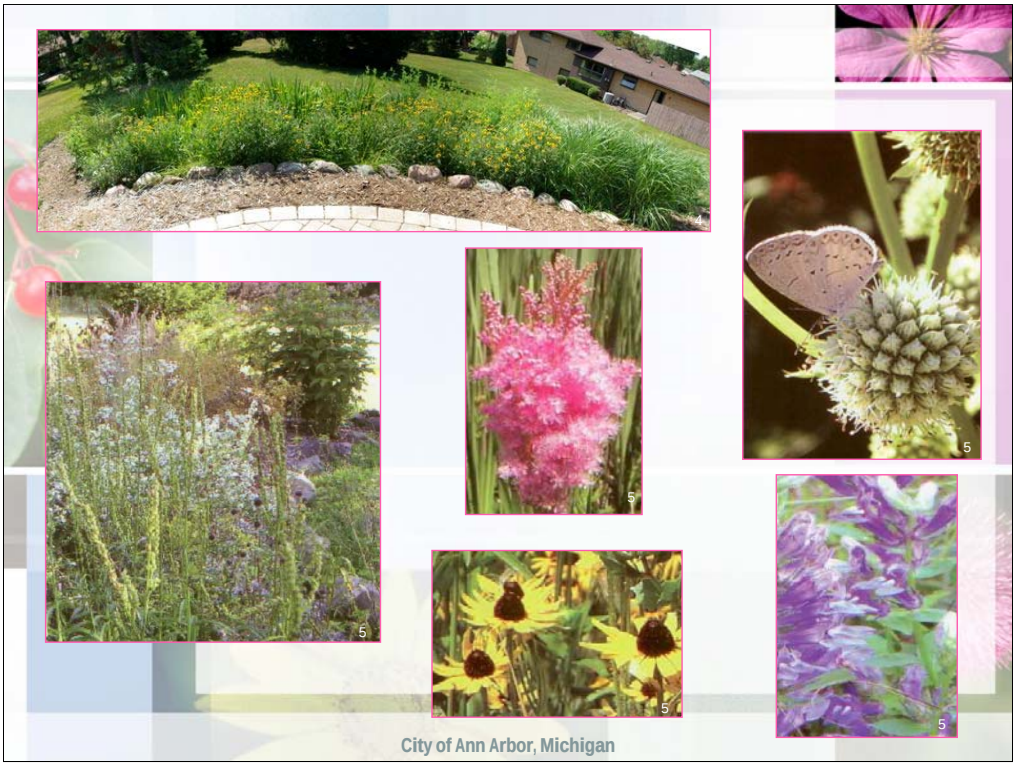
4. **Education University of Wisconsin Extension & Wisconsin Department of Natural Resources:** clean-water.uwex.edu/pubs/pdf/home.rgmanual.pdf

   Water Resources Publication: Rain Gardens - A How-To Manual for Homeowners

5. **Geauga Soil and Water Conservation:** www.geaugaswcd.com

6. **Rain Gardens of West Michigan:** www.raingardens.org

   Overview and design of rain gardens


City of Ann Arbor, Michigan