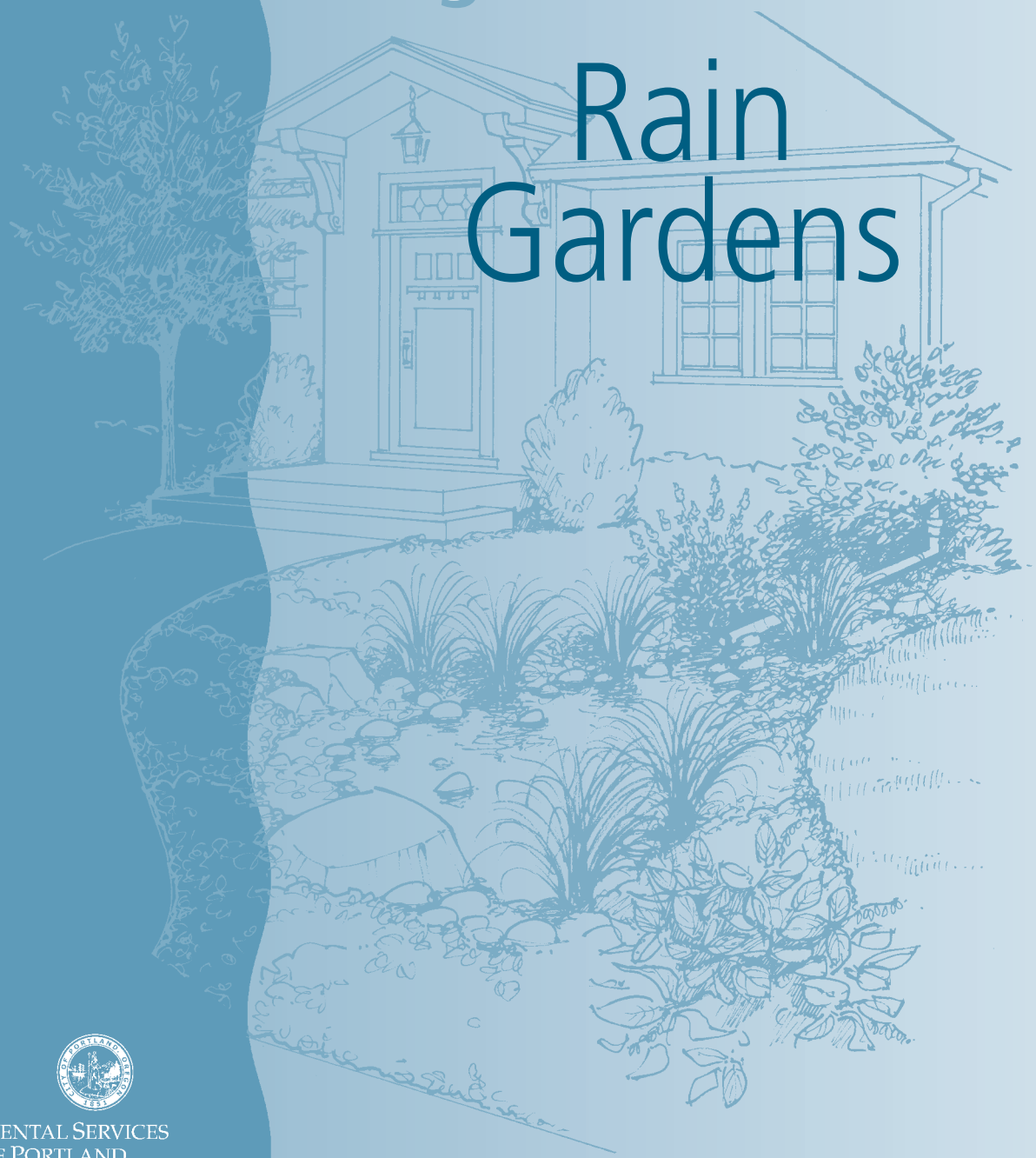


stormwater management for clean rivers

# How to manage stormwater

## Rain Gardens



ENVIRONMENTAL SERVICES  
CITY OF PORTLAND  
working for clean rivers

# how to build a residential rain garden

Portland gets an average of 37 inches of rain a year. Rain that runs off your roof or patio can flow into a sewer pipe, stream or groundwater. Why not put it to better use? You can create an attractive rain garden in your yard that captures runoff and lets it to soak into the ground. Containing rainwater from hard surfaces on your property also reduces wear and tear on the sewer system and protects water quality in local streams and groundwater.

## What is a rain garden?

A rain garden is a shallow depression that collects rainwater and is often planted with native plants. They can blend with your existing landscape, and design can be formal or informal. A rain garden is a great place to direct the water from disconnected downspouts or paved areas, or to capture the overflow from a rainwater harvesting system.

Other brochures in this series show you *How to* disconnect downspouts, build a soakage trench, or rain barrel to manage the stormwater runoff. Refer to the resources section on page 7 to learn how to get copies.

## Why plant a rain garden?

When rain falls, it washes over roofs, driveways and other impervious surfaces. If stormwater runoff isn't managed properly, it can wash dirt, oil and chemicals into rivers, streams and groundwater.

A rain garden that filters pollutants as water soaks into the ground also replenishes groundwater, helps reduce flooding and erosion in streams, keeps sewers from backing up into basements, and reduces combined sewer overflows (CSOs). Rain gardens can also provide habitat for birds, butterflies, and beneficial insects, like bees.

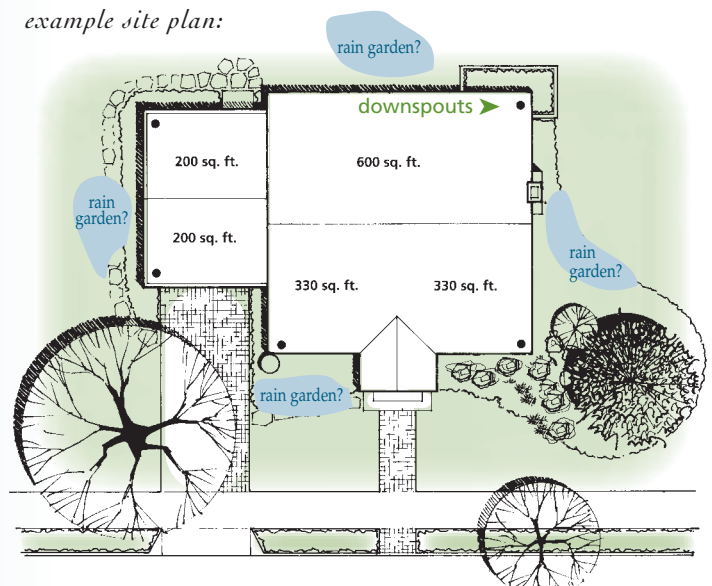
## Are there incentives?

A rain garden can save you money. When you contain the rain on your property, you could qualify for a discount on your city utility bill's on-site stormwater management fee.

## How to begin

Start by learning about your site and preparing a good plan to ensure that the plants in your rain garden thrive and stormwater soaks into the ground. This brochure describes an easy, four step process to help you create your rain garden. See the resources section for more information on managing stormwater safely on your property.

*example site plan:*



# 1 observe your site



**A**re your roof downspouts already disconnected to your lawn? Are they connected to the sewer system or a drywell? Does your driveway runoff go into your yard or into the street? Locate your rain garden where it will intercept and collect the most runoff.

## Draw What You See

- Sketch a site plan. You can start by printing an aerial view of your property from [www.portlandmaps.com](http://www.portlandmaps.com).
- Mark the locations of downspouts and paved areas. You can always move a downspout and re-grade gutters so the rain drains to a suitable location to build your rain garden, such as landscaped or lawn areas.
- Estimate the square footage of your roof area and pavement that will drain to the rain garden.
- Map out where you might construct a rain garden. Choose spots that are down slope of the downspouts or paved areas that will drain to the rain garden.

## Safety Considerations

- **Call before you dig.** Make sure you don't damage underground utilities by digging a rain garden. Call 1-800-332-2344 to locate all underground utilities. The service is free.
- You may need to add or remove soil to make sure that the slope of the ground allows water to flow away from buildings, including your house and garage.
- Disconnected downspouts must discharge water at least six feet from a building's basement and two feet from a building's crawl space or concrete slab foundation.
- Water in your rain garden must be at least five feet away from neighboring properties and three feet away from public sidewalks.
- Do not locate the rain garden over a septic system, drain field or underground oil tank unless they have been decommissioned.

- Avoid building a rain garden in an area that is too small for good drainage or too close to a retaining wall.

## Other Factors To Consider

- It's easier to build a rain garden in a relatively flat area.
- A naturally low spot with good drainage is ideal for a rain garden because water already ends up there.
- Avoid building a rain garden where water ponds, because that indicates that soils don't drain well.
- Consider removing paved surfaces to create space for a rain garden, or replacing pavement or concrete with pavers or gravel where appropriate.
- Avoid placing rain gardens underneath the canopy of existing trees.

You do not need city permits to construct a residential rain garden if:

- You don't excavate or remove more than 10 cubic yards of dirt (that's about enough to fill one standard size dump truck);
- You don't disturb over 500 square feet of landscape area (about the size of a small two-car garage);
- Your property has less than a 10% slope (see "Measuring slope");
- Your property is not within 50 feet of a wetland or waterbody;
- Your property is not in a floodplain; or
- You do not install underground piping (such as soakage trenches or French drains).

If any of these conditions do apply to your property, you may need to include additional options to safely manage stormwater. See the brochures resources section for more information on managing stormwater safely on your property.

## 2 design your rain garden

**A**dd your rain garden to your existing site plan. Mark where you might move downspouts, where stormwater comes from and flows to, and where you might add or move plants.

Make sure your rain garden is large enough to drain the water directed to it within 36 hours. This keeps water from stagnating and mosquitoes from breeding. Size your rain garden to be at least 10% of the area that drains to it.

\* For example, if 500 square feet of rooftop drains to your rain garden, the rain garden should be at least 50 square feet.

roof area	sizing factor	rain garden size
500 sq. ft.	x 10%	= 50 sq. ft. (or 5' x 10')

If your soils drain slowly, your rain garden may need to be larger.

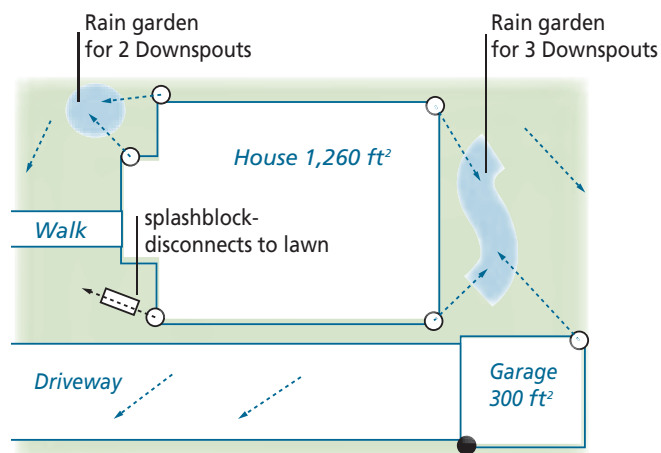
### Test Your Soils

Dig a hole two feet deep and two feet wide where the deepest part of the rain garden will be. Fill the hole with water and let it drain completely. Fill it again and monitor how fast the water drains. If it drains within 24 hours, this is a good spot to locate a rain garden. It's a good idea to dig a couple of holes to see if drainage in your yard is uniform.

Sand, gravel or compost can improve drainage. Till in a mix of two thirds sandy loam topsoil and one third compost to improve conditions for plant growth. Blend it well to a depth of 18 inches to loosen compacted soil and allow plant roots to establish more quickly.

### Direct Water Away From Your House

An above-ground pipe is the easiest way to convey water from your downspout to your rain garden. Metal downspout material is durable and easy to



find at hardware stores. Make sure that materials you use are sturdy and made for outdoor conditions (no dryer hose or indoor tubing). Suggested materials include cast iron and Schedule 40 ABS or PVC. If you are draining less than 1,500 square feet of roof to your rain garden, you should use 3-inch pipe. If you are draining more roof area, use 4-inch pipe. You may want to:

- Direct the water into a shallow conveyance swale (make sure the swale is lined if it's close to buildings);
- Build a rock-lined swale that looks like a dry creek bed;
- Carve a channel in a piece of flagstone;
- Send water through a piece of bamboo into a container or let it splash onto a rock; or
- Use a concrete or plastic splashblock.

Plan where the rain garden will overflow when it's full. Make sure excess water will flow away from buildings and neighboring properties. You may need to use additional stormwater management options to handle the overflow or if you only have a small area available for a rain garden. See this brochures resources section for more information on managing stormwater safely on your property.

Plan in advance where the rain garden will overflow if it ever gets completely full. Make sure excess water will flow away from buildings and neighboring properties.

### Choose Your Plant Palette

Plants are an important living feature of rain gardens. They filter pollutants and keep soil in place. Plant root systems loosen soil and improve drainage. They stimulate biological activity that helps the soil break down pollutants and increase runoff infiltration and retention. There are a wide variety of native plants that resist disease and provide wildlife habitat. Many non-native plants will also work well in your rain garden.


Choose plants suitable for the different water levels of your rain garden. In the bottom two thirds, use plants like wetland rushes and sedges that can tolerate lots of water. Upland plants that need less water will do well in the upper one third. Dogwoods, spirea and flowering currants are good choices. Keep in mind the height and width of the plants when they mature when you make your selections.



*hardback*

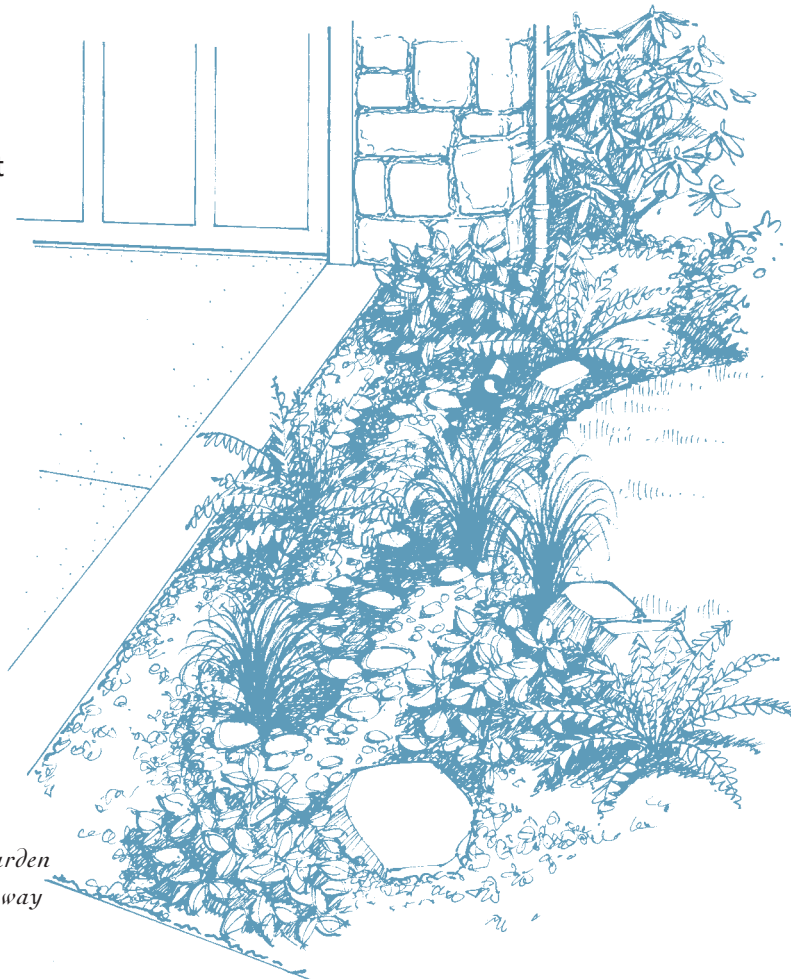


*rushes and sedges*

 Native plant nursery professionals or garden clubs can help you choose plants that are best suited for your garden based on soil, sunlight and your design. Take your site sketch with you when you purchase your plants.



*let rain splash onto a boulder or into group of smaller rocks*



*build a rain garden along the driveway*

# 3 building it

Now you're ready to start.

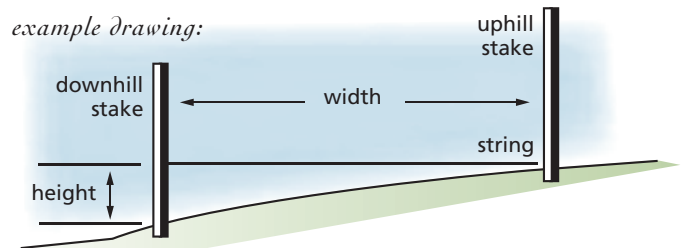
- A** Use string and stakes to outline the area you're going to dig.
- B** Moisten hard soils with a garden hose to make digging easier. Dig up existing grass and plants. Set aside any plants you might be able to replant in the rain garden.
- C** Dig the entire rain garden about 18 inches deep to loosen soil, then add a few inches of soil, sloping the sides at about 20% (or at a ratio of 3:1) to reduce the risk of erosion and soil falling back into the bottom of the rain garden.
- D** The minimum suggested depth of the finished rain garden should be 6 to 12 inches. The deepest part of your rain garden should be furthest from buildings, a suggested ten foot distance.
- E** Plant your rain garden. Use a variety of species and plant densely to make it harder for weeds to take root and to reduce soil erosion. After planting, add some compost to prevent erosion and provide nutrients to plants. Consider using weed-free straw for soil cover during the first winter.
- F** Disconnect your downspouts. After the plants are established in a few months, disconnect your downspouts to water your new rain garden.



## Measuring a slope

Tie a level string from a stake pounded into the ground at an uphill spot to a stake pounded into the ground downhill. Measure the distance between the stakes (width) and from the string to the ground at the downhill stake to the ground (height). Divide the height by the width to get the slope in decimal format. Multiply this by 100 to obtain the percent.

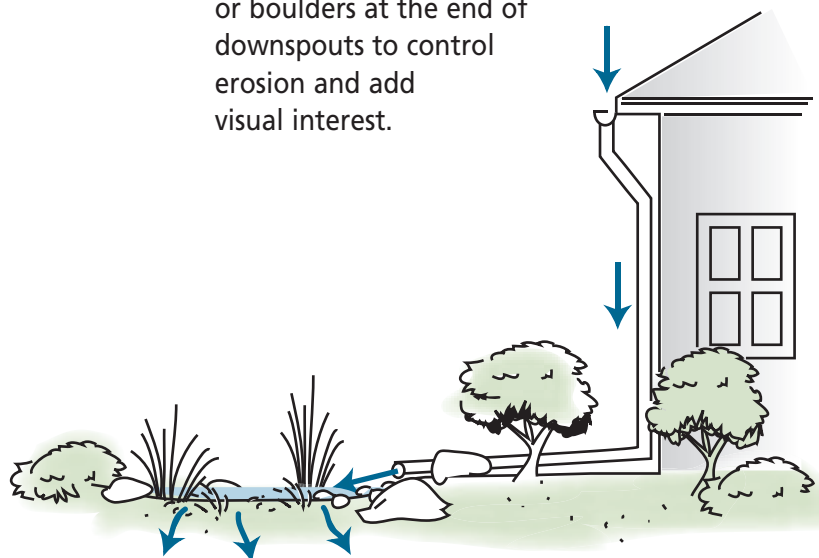
*example drawing:*



*If the width is 10 feet and height is 6 inches, then your slope is 5%.*

Height	Width	percentage	Slope
6 inches (0.5 feet)	÷ 10 feet	= 0.05 x 100	5%

- Make the main basin of the garden as level as possible so that water spreads evenly.
- If the garden is on a slight slope, add a berm on the downhill slope to hold in rainwater.
- Use plastic or concrete splashblocks, rocks or boulders at the end of downspouts to control erosion and add visual interest.



## 4 maintenance

**M**aintain your rain garden regularly as you would with any other kind of garden. After the garden is established in one to three years, maintenance should be minimal. Inspect your rain garden periodically, especially after a heavy rain.

- Irrigate deeply once a week during dry months to encourage root growth and keep plants strong, especially while plants are getting established.
- Avoid chemical weed killers or fertilizers in stormwater management facilities. Pull weeds by hand before they become established.
- Remove sediment and debris, watch for erosion, and replace plants as needed.
- Add compost or mulch two to three inches deep once a year to boost stormwater infiltration and feed the plants.



### Be Flexible

If a plant isn't thriving where you first placed it, move it to another part of the rain garden. Some areas in a rain garden will be wetter or drier than others. Sometimes it isn't easy to tell where a plant will grow best until it's rained a few times. A rain garden is a living system, so go with the flow.

## resources

### Clean River Rewards

Clean River Rewards is Portland's stormwater discount program. When you contain the rain safely on your property, you qualify for an on-site stormwater management charge discount on your city utility bill. Go to [www.CleanRiverRewards.com](http://www.CleanRiverRewards.com) or call 503-823-1371 for more information.

At [www.CleanRiverRewards.com](http://www.CleanRiverRewards.com), you can download publications to help you plan, build and maintain your stormwater management options, and find other technical assistance information and useful links.

Download all the *How to* brochures at [www.CleanRiverRewards.com](http://www.CleanRiverRewards.com)



### More Resources

*Harvesting The Rain in the Pacific Northwest: Rain Gardens*  
<http://clark.wsu.edu/volunteer/ws/ws-raingardens.pdf>

### Rain Garden Network

[www.raingardennetwork.com/](http://www.raingardennetwork.com/)

### East Multnomah Soil and Water Conservation District

<http://emswcd/raingarden>

### Rain Garden Examples

For inspiration, check out these beautiful rain gardens:

- Glencoe Elementary School, 825 SE 51st Avenue
- Mt. Tabor Elementary School, 5800 SE Ash
- Hayhurst Elementary School, 5037 SW Iowa
- Astor Elementary School, 5601 N Yale
- Whitaker Ponds, 7040 NE 47th Avenue
- East Multnomah Soil and Water Conservation District, 5211 N Williams Avenue

Walk through your neighborhood. You may be surprised at the number of yards that already have something similar. Ask neighbors about their rain gardens to see what worked for them.

Environmental Services  
Dan Saltzman, Commissioner  
Dean Marriott, Director

1120 SW Fifth Avenue  
Portland Oregon, 97204

503-823-7740  
[www.cleanriverspdx.org](http://www.cleanriverspdx.org)

Other publications in this brochure series:  
*How to manage stormwater - Downspout Disconnection*  
*How to manage stormwater - Soakage Trenchs*  
*How to manage stormwater - Rain Barrels*

To help ensure equal access to city programs, services, and activities, the city will reasonably accommodate persons with disabilities. Call 503-823-7740 or 1-800-735-2900 with such requests. TDD 503-823-6868.