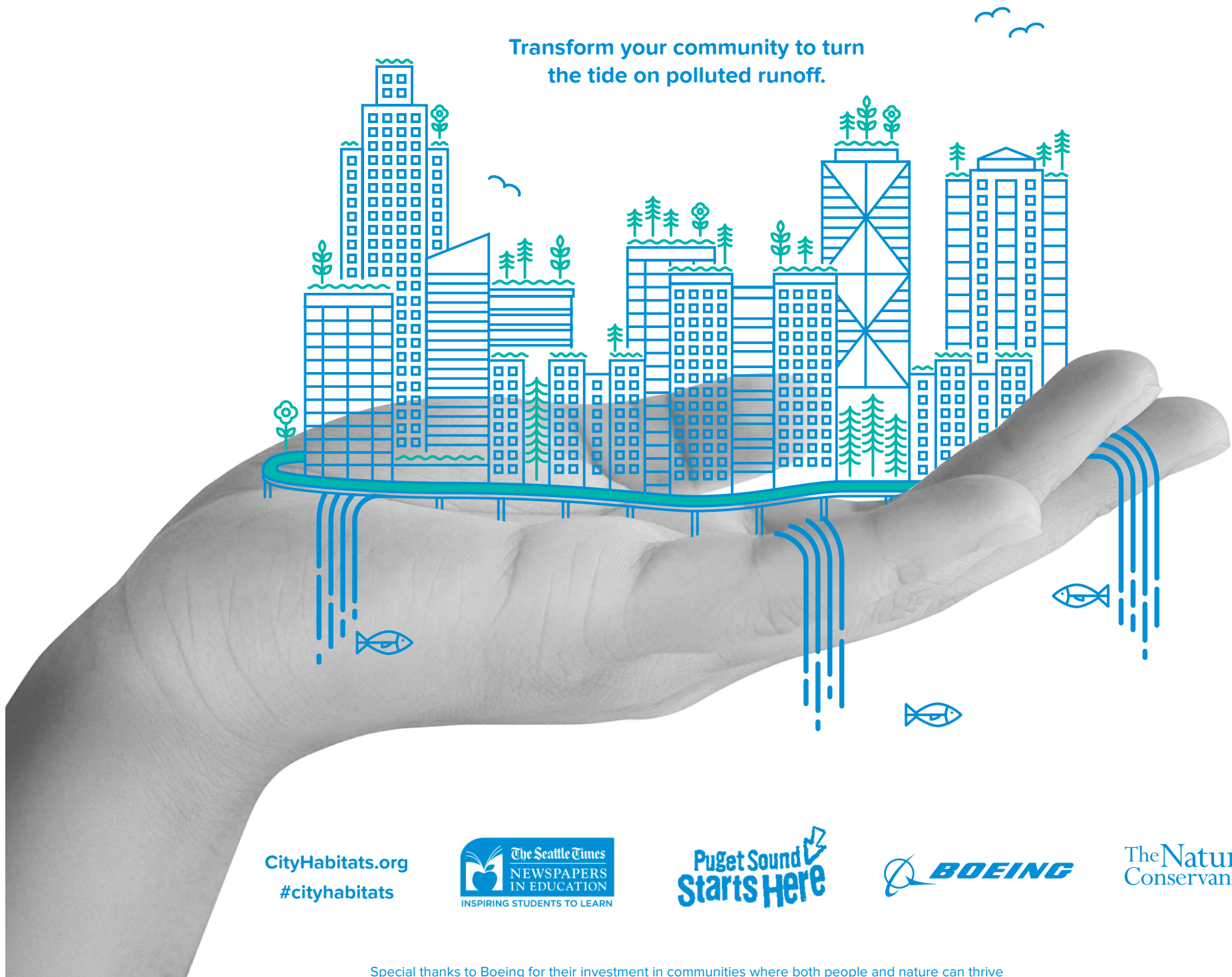




# city habitats

Transform your community to turn  
the tide on polluted runoff.



CityHabitats.org  
#cityhabitats



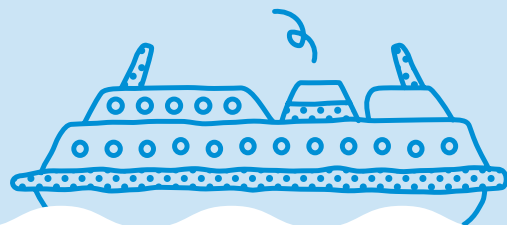
Puget Sound  
Starts Here



Special thanks to Boeing for their investment in communities where both people and nature can thrive

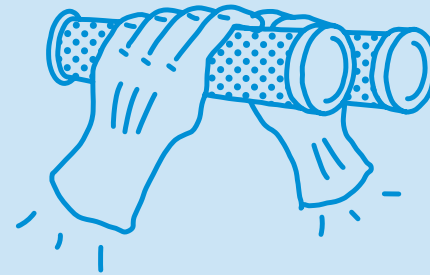
# Why is Puget Sound important?

Puget Sound is an estuary – a place where salt water from the Pacific Ocean mixes with freshwater flowing down from rivers and streams. About 10,000 streams flow into Puget Sound. There are 4.3 million people who live around the Sound, and an average of 236 people move here every day! Puget Sound is home to millions of fish and other creatures, like salmon, orca, sea stars, and even the six-gill shark! As people who live near Puget Sound, we rely on it to provide us with food (like salmon, crabs, and oysters), places to play (like beaches, parks, and forests), and places to go to work and school.



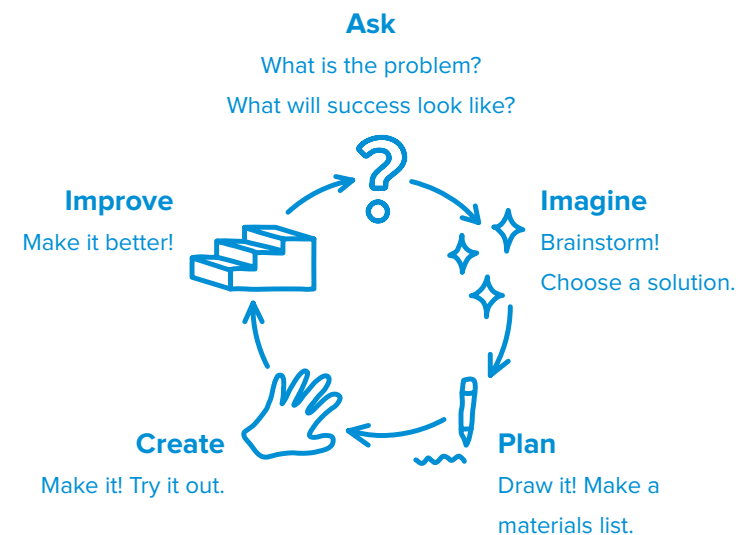
## Puget Sound needs us too

Just as we need Puget Sound, the Sound needs us to take care of it too. The Puget Sound region was once full of forests, wetlands, and grasslands that absorbed and benefited from rainfall. As our human population has grown, those natural landscapes have diminished as we use more land for driveways, roads, and rooftops. **These hard surfaces are known as impervious since they don't let water soak into the soil.** Polluted runoff is water that “runs” across impervious surfaces and washes into storm drains when it rains. Runoff picks up pollutants and other garbage as it moves across the impervious surfaces. The runoff then ends up in the nearest body of water - our streams, rivers, lakes - and eventually collects in Puget Sound! The pollutants are very dangerous for the fish and other wildlife, as well as the people that depend on the Sound for food, clean water, recreation, and jobs.



Can you find where you live on a map of Puget Sound? What is your favorite place in the region? Is there something you could do to make it better?

## How can you use engineering design process to transform your community?



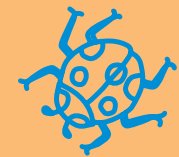


# What can you do about polluted runoff?

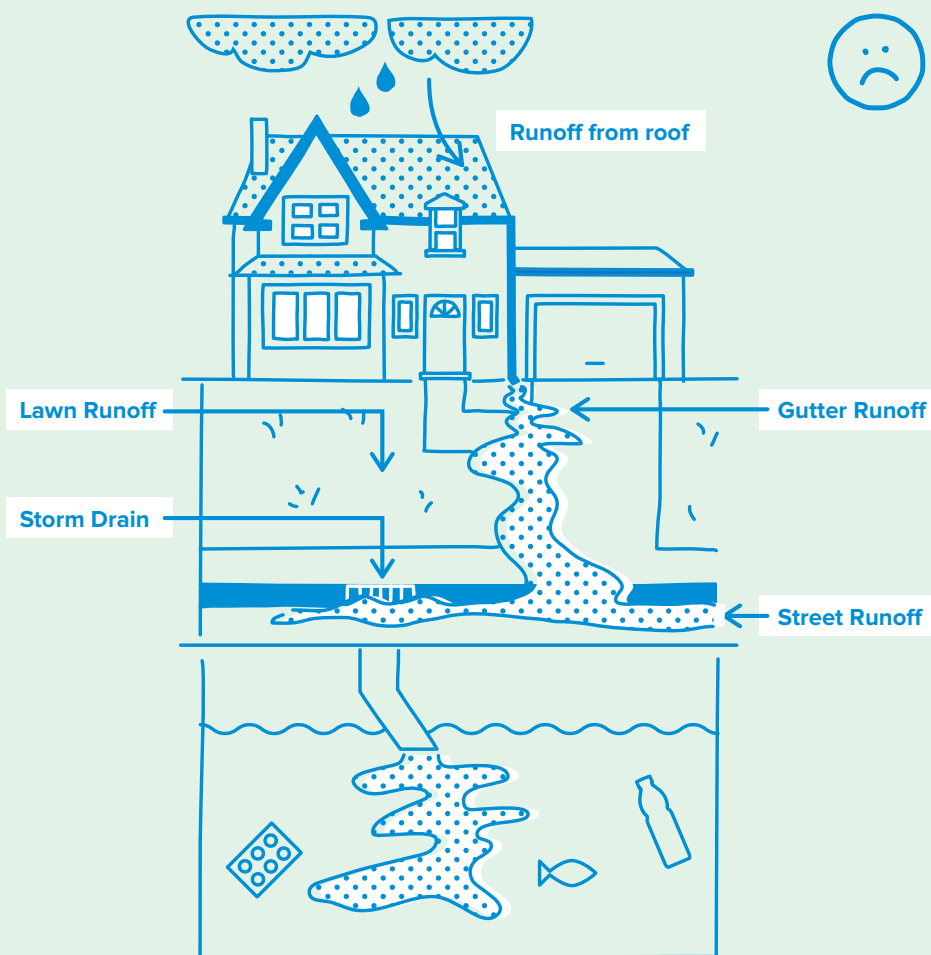
Engineers are asking this very question all over Puget Sound, and YOU can apply engineering methods to problem solving in your neighborhood. Bringing more nature into our neighborhoods can help clean the polluted runoff before it ends up in Puget Sound.

Trees, grasses, and natural soils slow down the flow of water and allow it to soak into the ground, which helps clean it up.

Check out these natural solutions you could implement in your neighborhood or at school.



## Too Much Stormwater Runoff



Stormwater runoff ends up in local streams, creeks, rivers and lakes.



## Things YOU Can Do



### 1. Green Roofs:

planted roofs provide extra insulation and limit the rain from running off your roof and into the street

**2. Plant a Tree:** tree canopy catches and holds on to rain that falls from the sky

### 3. Water Reuse:

collect water in rain barrels to water your yard, instead of using precious drinking water

### 4. Soil Building:

add compost to your garden or sprinkle it over your lawn to help the soil hold water like a sponge

**5. Depave:** remove unnecessary pavement and replace it with a garden or other pervious surface, so water can soak in and be absorbed

### 6. Rain Gardens:

polluted runoff can be cleaned when it's absorbed by plants and soils. Learn more about building a rain garden on pages 4 and 5!

### 7. Natural Yard Care:

avoid pesticides or other chemicals that contribute to polluted runoff

# Anatomy of a

Rain gardens capture and clean polluted runoff from rooftops, driveways, and other impervious surfaces (for the definition of impervious see page 6). Roots and soil act as a natural water filter. Building a rain garden can be a fun engineering project to reduce water pollution and prevent flooding in our communities. We are providing basic info on how to design a rain garden, but before building it is important that you have your parents or the adult you're working with attend an in-person rain garden workshop, and review the Washington State University Rain Garden Handbook for Homeowners or LID Technical Assistance for Student Engineers. Find these and other rain garden resources at [www.cityhabitats.org/resources](http://www.cityhabitats.org/resources)

gutter downspout >10ft from house

“Rain gardens are beauty. Rain gardens are color. Rain gardens are serenity. But more than anything, rain gardens are an example of nature doing exactly what it was intended to do.”

-Vincy Fok, Issaquah School District Student,  
LID Technical Assistance for Student Engineers

## Test

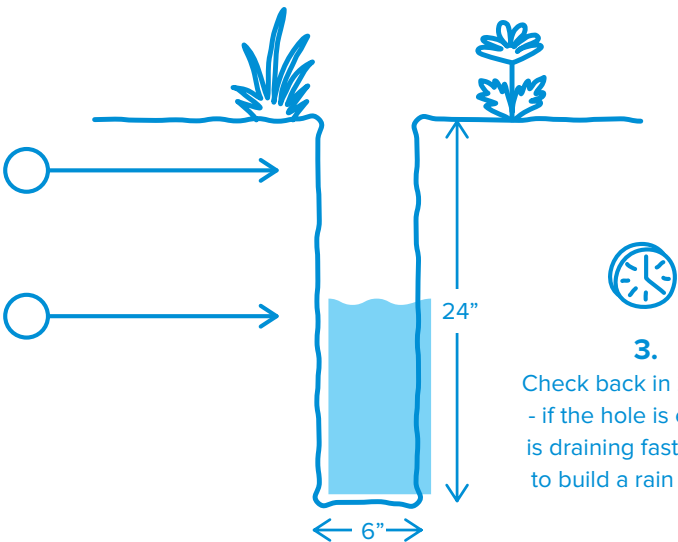
### Test soil drainage at your proposed rain garden site!

To avoid creating a pond, water needs to soak into the soil at a rate of at least a quarter inch of water per hour. This means a hole six inches deep would need to drain in 24 hours. You can test this by digging a hole.

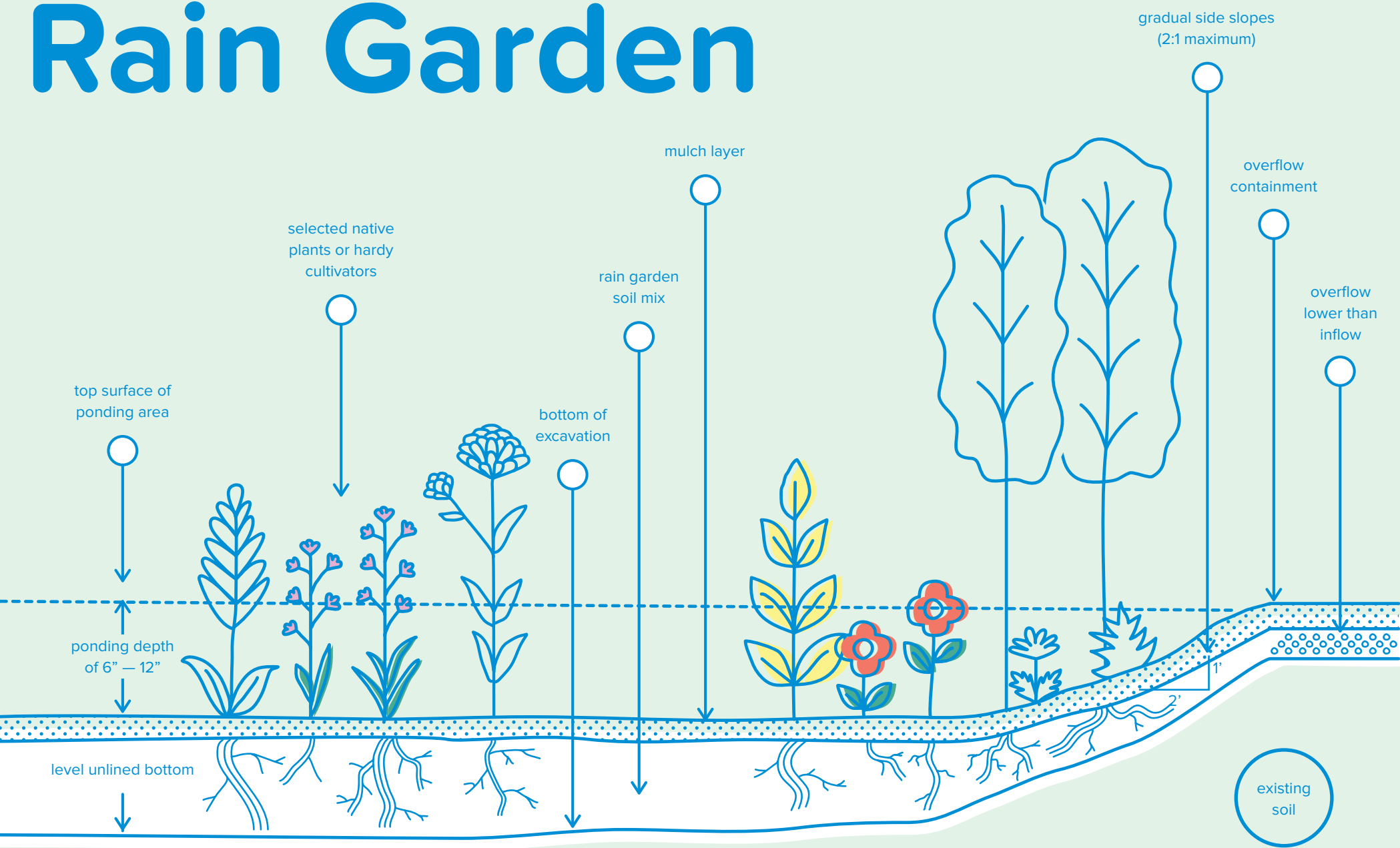
1.  
Dig a hole that is at least 2 feet deep and 6 inches in diameter.

2.  
Fill the hole to the top with water. After it drains, fill it again, this time to six inches.

3.  
Check back in 24 hours - if the hole is empty, it is draining fast enough to build a rain garden!



# Rain Garden



## Plan

Which impervious surfaces cause runoff? Choose a rain garden location on a nearby pervious surface that will collect the runoff. It shouldn't be too close to a building or near steep slopes. Think about how it will look. Draw a sketch of the rain garden – how big will it be? What plants will you use? You can find guides for native plants for Puget Sound at [cityhabitats.org/nativeplantguides](http://cityhabitats.org/nativeplantguides). Create a list of materials you will need (see page 8).

Check out the Rain Garden Handbook for Western Washington at [cityhabitats.org/resources](http://cityhabitats.org/resources) for a complete list of instructions.



## Create

Once you have your rain garden design, mark the boundary and begin removing the soil. You'll need an entry point for water, like a pipe from a roof downspout. The bottom of your rain garden should be level. Fill the rain garden with a rain garden soil mix, plant your plants, then cover with mulch to minimize erosion and weeds.

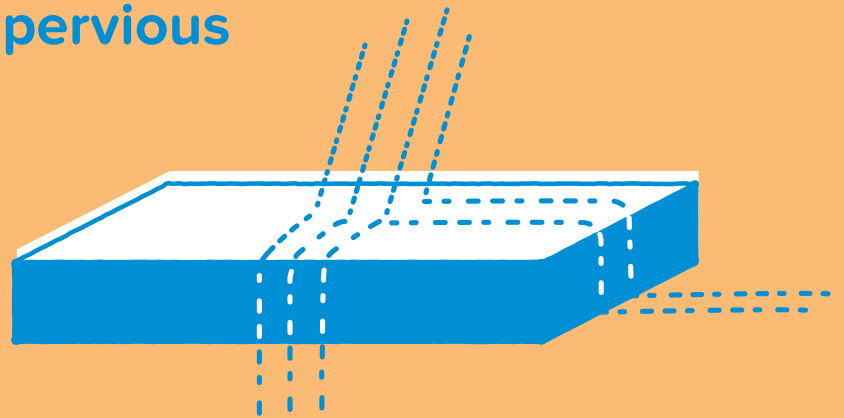
## Improve

Keep an eye on your rain garden to make sure it is working. Does the water soak in after a storm? Are the plants surviving? Maintain your rain garden by keeping the water entry and overflow points free of debris, and water your plants if they need it during summer especially for the first two years.

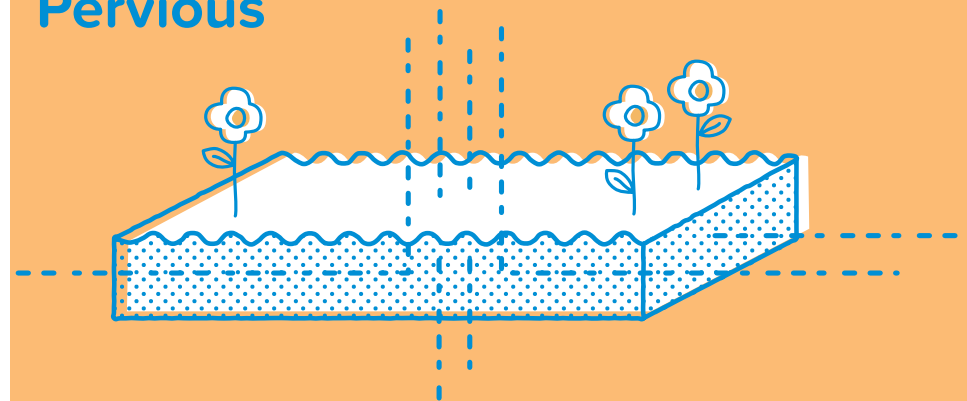
# Impervious vs. Pervious

Take a walk around your neighborhood or school grounds and look for surfaces that you think are impervious – make a list of five impervious surfaces. Don't forget to look up and down, impervious surfaces aren't always on the ground! Pervious surfaces, sometimes called permeable, slow down water and allow it to soak into the ground. Examples include grassy areas, mulch, and gravel. Can you find at least five different pervious surfaces? Test it out! Pour some water on the ground in each of these places and observe what happens. What does the water do? If it soaks right in it is pervious. If spreads out or it all runs off to somewhere else, it is probably impervious. If the water flows, which way does it go? When it rains heavily and the water doesn't soak in, where does it go? Can you find a storm drain or drainage ditch? When a big rain storm happens, water that goes into the storm drain or ditch will continue into a local stream and/or larger body of water before ending up in Puget Sound.

## Impervious



## Pervious



## Plan and Carry Out an Investigation

If you want to compare locations for their degree of imperviousness, you need to design an investigation procedure. A fair test is when you make sure you are only testing one variable at a time and "controlling" or keeping all other conditions the same. List the types of surfaces you would like to test for imperviousness. How could you control other factors such as time and amount of water so that the only variable you are changing is the surface type?



Teachers! Nature Works Everywhere has numerous resources and lessons to help engage students around solutions to environmental issues. Find activities and lessons specific to stormwater, polluted runoff, water quality, and nature-based solutions to improving water quality at our web-site below. This year the Nature Works Everywhere Garden Grants program will be providing up to FIVE grants of up to \$2,000 each to public or charter schools within Puget Sound to implement natural solutions to improve the quality of water that runs off school buildings and school yards when it rains. Examples of projects include:

- Rain gardens and other nature-based solutions for urban stormwater
- Native habitat and/or pollinator gardens
- Urban forestry like orchard plantings, native tree plantings, or tree care
- Food gardens that help address challenges related to access to fresh, healthy food
- Other student-driven projects that address a challenge around air quality, the urban heat island effect, climate change, stormwater, or access to healthy food.



Check out [cityhabitats.org/natureworkseverywhere](http://cityhabitats.org/natureworkseverywhere) for lesson plans and information about how to apply for a Garden Grant at your school.



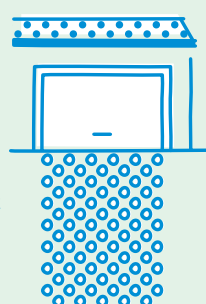


# Scavenger Hunt!






Take a walk around your neighborhood – can you find the following nature-based solutions to polluted runoff?

- ☐ **Trees** — where do you find trees in your neighborhood? Do you think there are enough of them?
- ☐ **Rain garden** — do any homes or nearby buildings have rain gardens? What about the areas between sidewalks and the street – do you see any rain gardens there?
- ☐ **Rain barrel** — do you see any homes or buildings with barrels collecting water from roof gutters?
- ☐ **Pervious pavement** — can you find any of the new special pavement that lets water flow through it? Can you find any unnecessary pavement that could be removed to let water absorb into the ground?
- 

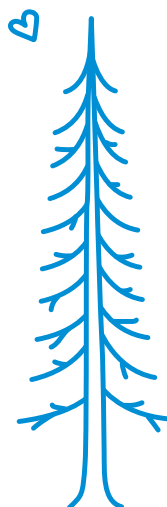


Next time you are outside, look for what happens to runoff in your community!  
Here are some things to look for:

- ☐ **The nearest storm drain to your apartment or house.**  
Is this where the water from your driveway or rooftop goes? Where do you think this drain leads?
- ☐ **The nearest stream, creek, river, lake or pond to where you live.**  
**If you don't see it, try looking on Google maps!**  
Where does the water come from? How does it get there?
- ☐ **Something that might get carried by the water as it runs off into the street.**  
Where would it end up?
- ☐ **Something that might collect and hold, or slow down runoff.**
- ☐ **Oil stains or puddles on the ground from leaky vehicles.**
- ☐ **Storm drains marked with a sign that says “Drains to Stream” or “Puget Sound Starts Here”**
- 

## Love Letter to your favorite tree, park or body of water

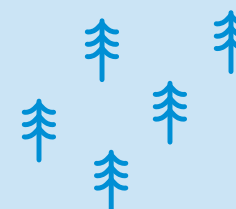
In addition to cleaning water, nature offers opportunities to improve our lives. It's our human habitat, and it's everywhere! People who spend time around nature, like walking by a rain garden or down a street with trees, are happier and healthier. Even small amounts of nature can have an impact. How do you feel when you are outside – happy, excited, or chill? Do you have a favorite park? What about a favorite natural feature – like a tree, flower, or stream? Take a picture or write a letter about it! Where is it? What do you like about it? How do you feel when you are around it? Post your picture or letter on Facebook or Instagram with #cityhabitats and tag @conserve\_wa and we might share it! Find out more about how nature benefits people at [cityhabitats.org/outsideourodoors](http://cityhabitats.org/outsideourodoors).



## Urban Design 101

Are you interested in sustainable landscape architecture, gardening, and wildlife? You can use Habitat Network to map pervious and impervious surfaces around your home or schoolyard and identify areas for improvement. Habitat Network can help you learn new skills and support plants, animals, and water quality in Puget Sound. Check it out at [cityhabitats.org/habitatnetwork](http://cityhabitats.org/habitatnetwork).

**Habitat Network**  
powered by **yardmap**



Thank you!