CONTENTS
Stormwater in the Schoolyard – Lesson 3
Local Stormwater Systems – Lesson 5
Stormwater in Our Community – Lesson 6

How to Use This Guide
This guide supports the Community Waters Science Unit Teacher Manual with information, maps, and images specific to your school and neighborhood. It is written for teachers; its goal is to provide a better understanding of what is happening with stormwater in and around your school. The points of interest and walking field trip route are suggestions and should be adapted as desired.

If you have any questions about these maps, accompanying lessons, or stormwater around your school, contact IslandWood staff at communitywaters@IslandWood.org.
Stormwater in the Schoolyard– Lesson 3

This map and points of interest (photos and info) can be used to guide your class’ exploration of the schoolyard. You will find the student worksheet for this lesson following the teacher guide version. Please use the extra space on the pages to add your own notes and questions! ☺

A. Trees

Trees catch some rainwater in their leaves, releasing it more slowly to the ground. Tree roots hold soil in place so that it doesn't get washed away by runoff. Ask the students what they think trees do for stormwater. What would be different in this spot if these trees weren’t there? What is around the tree(s)? What kind of ground are they growing in? Do you like having trees in your schoolyard? Why or why not?
B. Downspout

Some downspouts drain into the ground near houses, while others are attached directly to the buildings sewer or stormwater pipes. Some go to locations where the water can soak in while others drain to the street or sewer systems. These downspouts collect water from this roof and send the stormwater into the ground. Can students find them? Where do you think the water might go? Where else can you find downspouts? Where does the water come from and where do you think it might go?

C. Mulch

Woodchips also offer a good comparison of a pervious surface. Do woodchips help with stormwater problems or not? (Think about how well stormwater will absorb compared to pavement, but also consider how the woodchips might get washed into the storm drain)

D. Different surfaces

Observe all the surfaces in this area. Asphalt and most other paved surfaces are impervious. This means that no water soaks into them. Instead, it flows off the pavement into drains and onto soil, carrying whatever substances are on the pavement. Some newer surfaces are designed to pervious (let the water in) - what happens when water hits this surface? Where does the water go? What do you see that slows down stormwater? What speeds it up?
E. Garden

How do the gardens help with stormwater, or not? What would be different if they were not there? Consider that vegetation slows stormwater by helping it soak into the ground and holding soil in place with its roots. However, anything that is put in the garden or on the plants may be washed off—including chemicals or fertilizers, if they are used. Presumably, school gardens have few or no chemicals.

F. Drain

Storm Drains move water into underground pipes to take it somewhere else. Anything that gets carried into the drain could end up in the Puget Sound. Why do you think the drain was built in this location? Where does water come from that goes into this drain? Why might it have been placed in this place? Is the drain working properly? What is in the drain?

G. Storm Drain in Grass

Why would they build a storm drain in the grass? Is the grass pervious or impervious? Try pouring water on the grass: does the water soak in quickly? Should we represent this surface on our map as impervious or pervious? If it is pervious should we show it with a lot of dots or a few?
Mapping Your Schoolyard – Bagley

Name: _____________ Date: __________

Include on your map:
- Symbols from the Key including flow of water, surfaces, and storm drains.
- Partially pervious surfaces can be shown with less dots.
- Label locations of litter, pollution and places where puddles form.
- Sketch any specific stormwater problems you see or are aware of.
- Sketch larger plants and bushes.

Map Key

- Direction of water flow
- Pervious Surface
- Impervious Surface
- Storm Drain

Add your own symbol here!
Local Stormwater Systems—Lesson 5

Student Maps for Lesson 5

Color maps have been created for use with your students (provided and/or available on communitywaters.org). We suggest students work through them in the following order:

1. Bagley Storm Drains Map – This map helps students see that the storm drains at your school connect to the combined stormwater and wastewater pipes.
2. Lake Union Combined Pipes and Overflows Map – The students can follow the arrows on the combined pipes on this map until they merge with the treatment plant pipe. They can also take note of the various locations where combined sewer overflows could occur during extreme weather events.
3. Treatment Plant Pipes and Overflows Map – This map shows where the combined stormwater and wastewater ends up and additional places it could end up overflowing along the way.

Teacher Overview

What happens with the Stormwater Pipes around your school?

- Some of the storm drains at your school join with wastewater pipes (green lines to orange lines) before entering a combined wastewater and stormwater pipe (orange line) that travels east on N 80th St. This pipe turns south at Ashworth Ave N and joins a treatment plant pipe (pink line) at West Green Lake Drive N.
- It is likely there are storm drains not marked on the map that drain directly into the yellow lines. Any near the basketball court drain to the west but end up in the same treatment plant pipe.
- Any stormwater at your school that does not enter one of your storm drains will flow downhill (southeast) until it either enters a storm drain along N 78th St or enters Green Lake directly.
- Daniel Bagley has a red star over it in each map.
Where does your stormwater runoff end up?

- The combined wastewater and stormwater in the treatment plant pipe is pumped to the West Point Sewage Treatment Plant where it is treated before entering Puget Sound offshore at Discovery Park.
- In extreme weather events, the large amounts of stormwater entering the system can cause a combined sewer overflow (CSO) in which the stormwater mixed with sewage dumps directly into the Fremont Cut at 1st Ave NW (yellow circle with a black dot inside).
- The stormwater in your area that flows into Green Lake or overflows with wastewater into the Fremont Cut travels through Salmon Bay and the Chittenden Locks to the Puget Sound.
- The map on the next page shows where the runoff from different parts of the city ends up.

**Video:** Since the stormwater from your school could end up in the Fremont Cut we suggest watching the “Drained: Urban Stormwater Pollution” video (OPTION B) from 0:00 to 2:11 during Lesson 5. Point out to your students that a Combined Sewer Overflow during a big storm would have everything described, PLUS everything from the sewers (including human waste). You can find this video linked on communitywaters.org or at [https://vimeo.com/51603152](https://vimeo.com/51603152).

**Please Note:** The pipes information provided here is our best estimate of the stormwater flow in your community based on the information we have currently. If you encounter more information in the course of your investigation please let us know so we can update future versions of this document.
Lesson 5: Stormwater Runoff Destination Map

This map shows where the stormwater runoff in nearby neighborhoods ends up.

Daniel Bagley has a red star around it on the map.

The pink area around Green Lake shows where stormwater flows into the lake instead of a combined sewer system. The lake has a drain that empties into Lake Union near Meridian Avenue North (not shown on map). Its outflow used to be connected directly into the combined pipes system but now only does so when the main drain is beyond capacity and the lake would otherwise flood. This means during especially long duration rain storms Green Lake can also end up contributing to combined sewer overflows.
Stormwater in Our Community – Lesson 6

Please use this map and points of interest as suggestions for your walking field trip, recognizing there may be other things of importance to note in other areas. It may be useful to bring the stormwater pipes map with you for reference. Questions posed are intended to be posed to students as desired.

Suggested Route: Head towards N 77St on Stone Ave N, turn LEFT onto N 77th St, walk towards Winona Ave N, turn LEFT and cross to the other side of N 77th St walking back towards Stone Ave N, turn RIGHT onto Stone Ave N and head back to school.
Points of Interest

A. Slope
The slope of the ground affects where this water flows and how fast. Consider the slope and surfaces of this area: where will the water end up?

Look around for storm drains at this intersection. Where do those storm drains end up? (If needed, consult the neighborhood pipes map or just remind students they go into the same pipes as the sewers and can end up overflowing into the Fremont Cut.)

B. Downspout
Some downspouts drain into the ground near houses, while others are attached directly to the buildings sewer or stormwater pipes. Some go to locations where the water can soak in while others drain to the street or combined sewer systems. These downspouts collect water from this roof and send the stormwater into the sewer. Can students find these themselves? Where do you think the water might go? Where else can you find downspouts? Where does the water come from and where do you think it might go?

C. Rain chain @ 1321
Rain chains are alternatives to a downspout. They are widely used in Japan. Their purpose is largely decorative, to make a water feature out of the transport of rainwater from the guttering downwards to a drain or to a storage container. Rain chains are typically either a series of metal cups, chained together with a hole in the bottom of each, or chain links that span vertically. Rainwater run-off gets distributed from a rooftop gutter downward through the rain chain.
D. Cracked sidewalk

Here is an opportunity to explore how surfaces interact with stormwater. How does water move differently on the smooth pavement versus the cracked pavement? Note: The idea behind permeable pavers is that the water can seep through the space in between the pavers. These cracks may serve the same function, so it might enable students to grasp the idea of the pavers when you study solutions later in the unit. Why are these cracks here? How might they affect the movement of stormwater over the asphalt?

E. Downspout to pavers

Notice this downspout doesn’t go directly into the ground. It drains on to these pavers. Pavers are tiles made from brick, stone or concrete, which are arranged with spaces in between that allow water to soak through. What happens when water hits the surface of the pavers? Where will the water go from here? Why are these pavers here? What would happen if they weren't?

F. Rain garden

Rain gardens have a shallow depression to hold water while it soaks in and provides water to the plants in the garden. Rain gardens can slow, filter and absorb runoff. What do you notice about the garden? What happens to water when it goes into the garden? Have students notice where water can enter the rain garden and what happens if it fills up. What types of plants are living here, and how do they compare to the kinds of plants on the green roof? Why would they be different?