

TOPS K-8 Teacher Guide

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.



Schoolyard Mapping – Lesson 10

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! There are many storm drains in the schoolyard, so they are marked here in red squares. You can find a note about them in the box 'F' below.



**A. Storm drains:**

There are many storm drains on the school grounds. They are marked on your map in small red squares. See how many you can find!

What might be going into the storm drains other than water? Where do you think they send the stormwater?

**B. Terraces:**

Consider how stormwater flows from the schoolyard down the street here. Can students recall what happens to steep slopes in heavy rain (erosion)? Do these rock walls help keep the ground in place? What do you see that will help slow and sink stormwater? What might speed it up? Can you find the storm drains on each side?

**C. Downspouts:**

These downspouts collect water from the roof, and send the stormwater into the ground. Can students find these themselves? Where do you think the water might go? Keep these in mind when you study the stormwater pipes in Lesson 11!

Notice also these ones that are next to each other, however one goes into the ground, while the other is disconnected and empties onto the ground. Why do you think that is? (This was the way that it was when we scouted.)

**D. Rain barrels:**

Are the students aware of this rain barrel and its purpose? How are these rain barrels helping with stormwater? Where do they collect water from? Who might have put it there? Is there anything that directs water into them, or do they simply catch the water that falls on them? Where does the water they collect go? (What could you do with the water in the barrel?) Is there something that could be done to make them catch more water?

**E. Different surfaces:**

Observe all of the surfaces in this area. Where does the water go? What do you see that slows down stormwater? What speeds it up? In particular, compare the perviousness of the rubber to that of the paved surface around it, and that of the woodchips. Which do you think creates more or fewer stormwater problems?

**F. Garden; beds with slanted roofs:**

Does this garden help with stormwater runoff or make it worse? Why or why not?

Hint: 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.

Look also at the roof structures above these beds. Which way are they tilted? Why? Will rainwater fall onto the plants or not?



G. Slanted school roof:

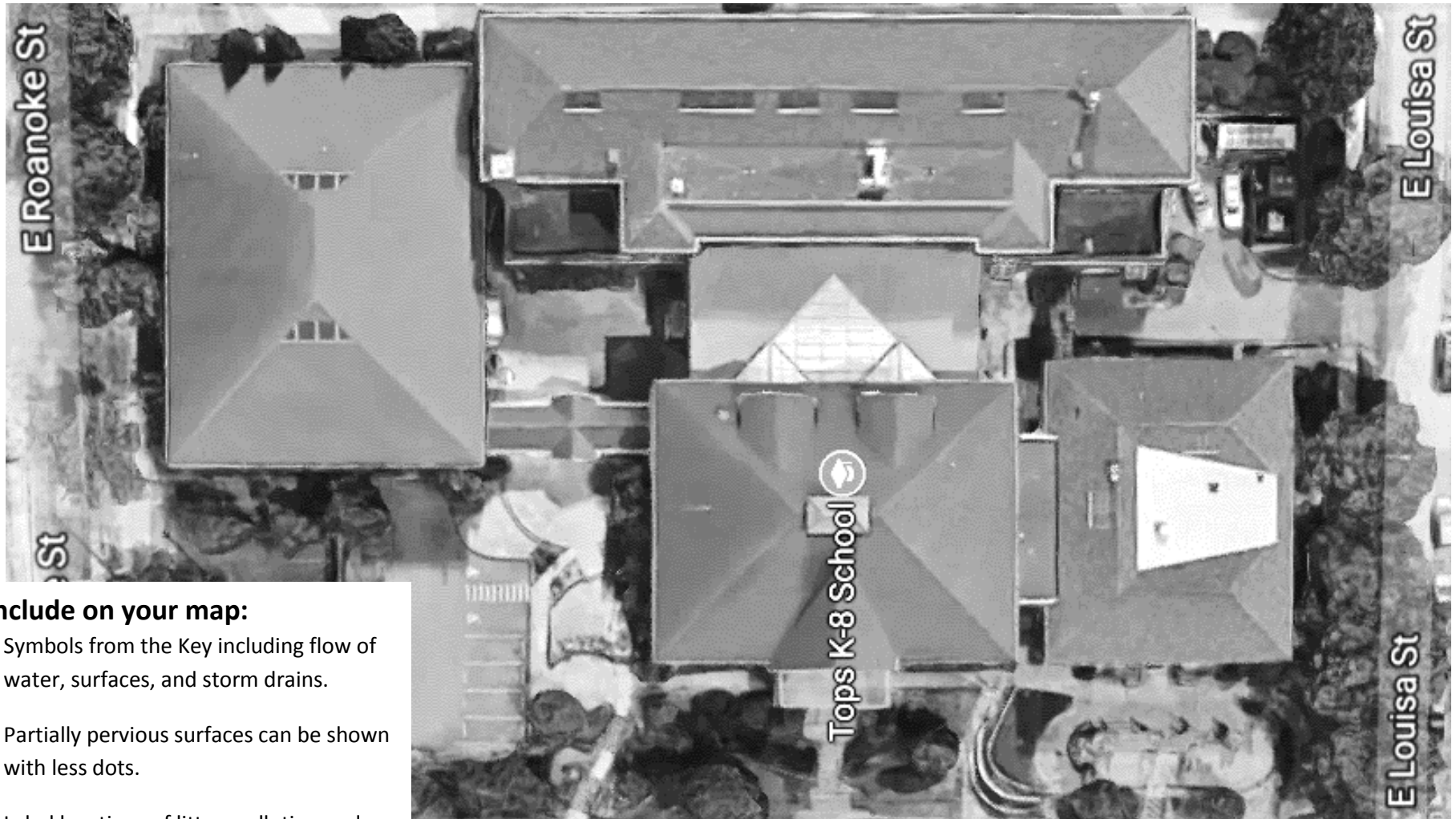
Imagine how rain water runs off of this roof-
-or observe it if it is happening currently!

Can you figure out where the water goes
from this roof? Do you see any downspouts
or other things that catch rain water?

Where does it go?

Mapping Your Schoolyard – Tops K-8

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.

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. TOPS K-8 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 red 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

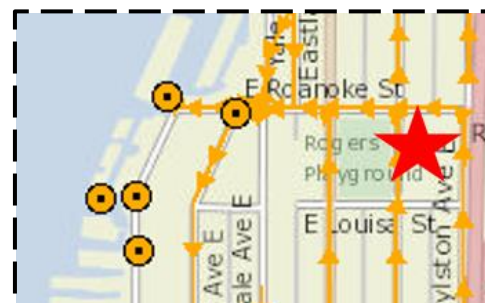
What happens with the Stormwater Pipes around your school?

- All of the storm drains (blue dots) at your school end up in a combined wastewater and stormwater pipe (green lines to orange line) that travels north on Franklin Avenue East. This pipe joins a combined pipe on Roanoke Street and flows downhill towards Lake Union.



Where does your stormwater runoff end up?

- The combined pipes on E Roanoke joins up with other combined water pipes at Minor Avenue. During extreme storm events there can end up being too much water entering the system for this local pipe to carry. In that case a “combined sewer overflow” (CSO) occurs with the stormwater and wastewater emptying directly into Lake Union there at the bottom of the hill (orange circle with a dot).
- On normal days the combined water travels south until it enters a large pipe near Lake Union Park. That water is then pumped to the West Point Sewage Treatment Facility to be treated before entering Puget Sound offshore from Discovery Park.
- In extreme weather events, when there is too much water in the larger treatment plant pipes for the West Point Plant to manage some of it can be diverted to a “Wet Weather” Treatment Facility where it is *partially* treated before entering the Puget Sound near Myrtle Edwards Park. The yellow circles on the student maps are additional possible CSO locations (owned by King County instead of Seattle).
- While most of the storm drains in your neighborhood enter the combined wastewater and stormwater pipe system, those along Fairview Avenue North empty directly into Lake Union (which means they don’t contribute to CSOs). [We didn’t show this on the provided student



maps.] The stormwater (and any CSO water) that ends up in Lake Union will eventually flow through Salmon Bay and the Chittenden Locks before entering Puget Sound.

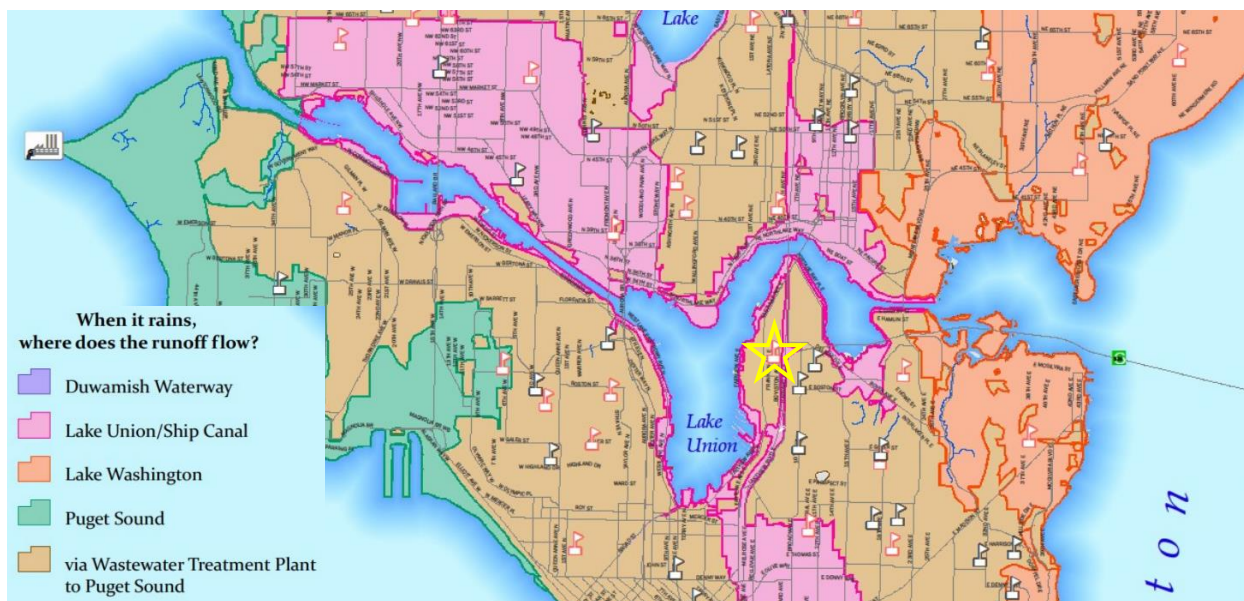
Video: Since the stormwater from your school could end up in the Lake Union we suggest watching the “**Drained: Urban Stormwater Pollution**” video (OPTION B) from 0:00 to 2:11 during Lesson 5. Point out to your students that a CSO during a big storm would have everything described, PLUS everything from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

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 from other neighborhoods ends up.

Tops K-8 has a yellow star around it on the map.



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(s): Exit front of school and walk down to the street toward the south end of Franklin Ave E. Head north up Franklin Ave E., across the street from the school. We've considered several route options:

1. Head down the stairs into the park and check out what's there and how stormwater might interact with the landscaping. Walk across past the tennis courts and out the gate at the corner. Turn right and walk up the hill on E. Roanoke Street to return to school. (Note: There are plenty of things to see on this route; group management may be tricky as students can be distracted by the playground and open field)
2. After looking at the park from above, keep walking straight north along Franklin Ave E. and cross E. Roanoke Street. Continue along Franklin Ave E. to the end of the block, then turn around at E. Edgar Street and retrace the block on the opposite sidewalk of Franklin Ave E. (note: While this route is not expansive, it is at least flat, which we've found is a big plus when leading student groups. It should also offer an okay view west toward the water, so students can think about what is downhill from the school.)
3. Walk all the way west down Roanoke Street to the water to see where the stormwater in this neighborhood ends up during a combined sewer overflow (CSO) event. You can get a great view of the water here:



Consider what happens when stormwater (or sewer water) ends up in this body of water. Who is affected? Do students or their families use this lake? Who does use it, and for what? What lives in it? Why should we care about keeping it clean?

Keep in mind that the walk back uphill will take longer and might tire some students out!

Points of Interest



A. Ramp, slope, vegetation:

Here is a steep change in elevation. Imagine where stormwater would go. What do you see that would slow it down? (hint: vegetation) What would speed it up? (hint: paved surface of ramp)



B. Different surfaces in park:

Compare the ground surfaces of this park (grass, baseball diamond dirt, pavement, woodchips on playground). How does stormwater and rain affect each surface/soil? Recall your studies of soil types. What type does the ground of the ball field remind you of the most? How about the woodchips? Which kind of surface do you think slows and sinks the most stormwater?

Try pouring some water in different places to test it out!



C. Storm drain:

See if the students can spot this one in the grass in the park! Where does the water that enters the drain come from? What else might be going in it besides water? Where do you think the water goes once it goes down the drain?

**D. Retaining walls:**

Notice these retaining walls at the corner of the park. Why were they put there? What would happen if they weren't there? Do they still have large cracks in them, or have they been repaired since we scouted in July 2017? What could happen if they don't get repaired?

**E. Large trees:**

How do trees influence stormwater? Do you think these trees help with stormwater issues or not? What would be different if they were not there? How else do they affect the neighborhood?

**F. Ivy covered walls:**

Observe the amount of vegetation on the walls at the edge of the school grounds—that's a lot of ivy! Do you think it helps slow or sink stormwater or not? What other impacts might it have?



G. Gardens plant cover, and vegetated rock walls:

Compare some of the different yards that you have seen. How do they help with stormwater or not? Do you think the gardens and rock walls along this street help to slow and sink stormwater?



H. Indented curb:

The soil at this curb seems to have worn away, leaving an indent in the ground. Water seems to be able to gather in it. Have students seen this happening? How would that impact people walking in this neighborhood?

At this point, you may be able to get a clear view downhill, out to the lake and the Aurora Ave bridge. This can be a great opportunity to visualize how stormwater would move over a landscape on a large scale. Where would the water naturally flow? Who or what might be impacted by stormwater down the hill?

Note: This neighborhood's stormwater goes into a combined system with the sewer, and all gets taken to a treatment plant. However, in a large rain event, a combined sewer overflow may spill out from an outfall into Lake Union at the end of Roanoke Street.