

Supplement B

# OPERATION STORMWATER

## SURFACE TYPE

**PERVIOUS**

**IMPERVIOUS**

**Definition**

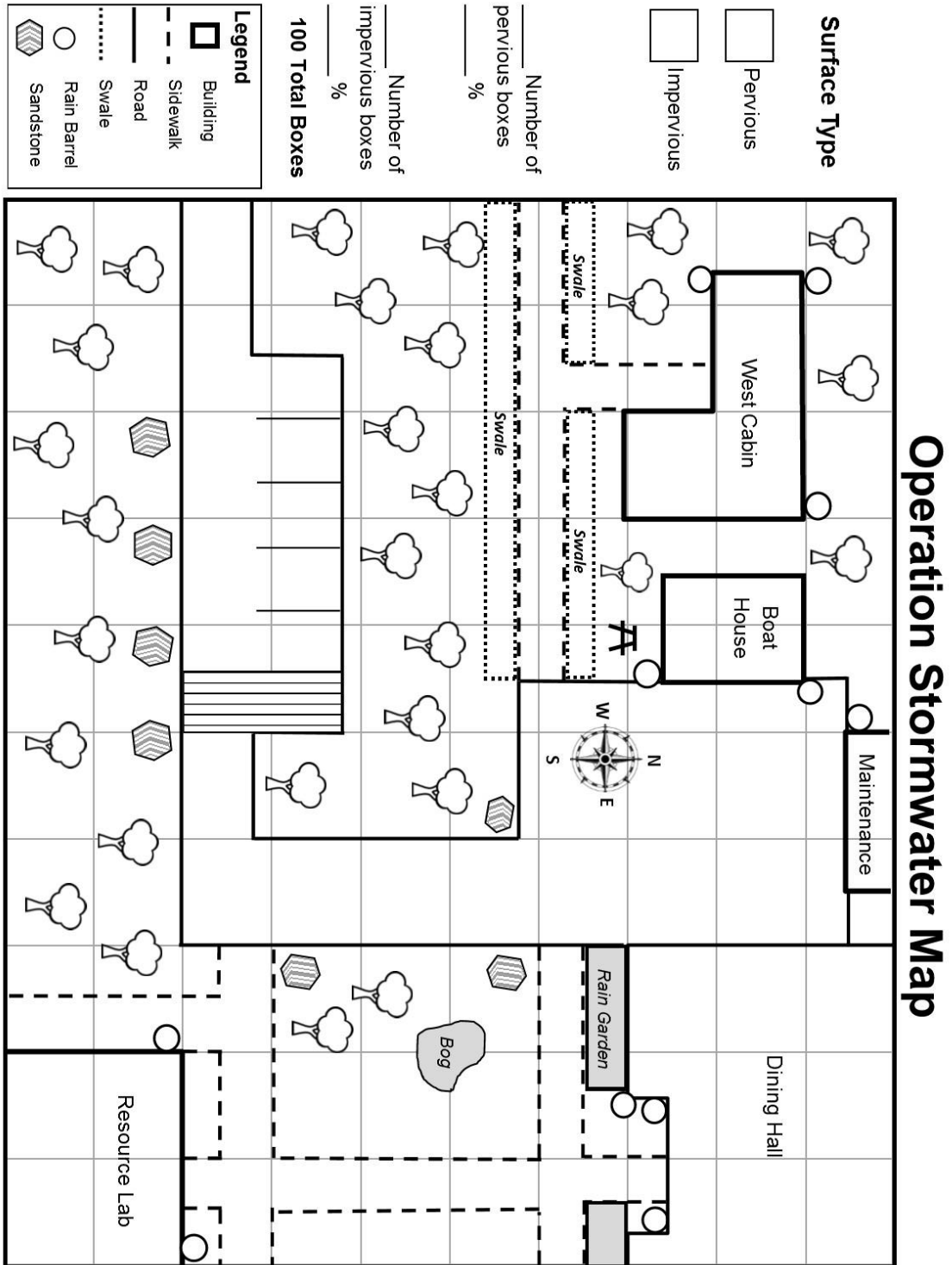
A surface where water can pass through or soak in

A surface where water cannot pass through or soak in

**Examples**

Forest Floor	Green Roof	Shingled Roof	Picnic Table
Grass	Native Garden	Pavement (Asphalt)	Rock
Pervious Pavement	Sandstone	Sidewalk (Concrete)	Building
Bog		Brick Wall	

**Supplement C: Operation Stormwater Map**



## Supplement D

### OPERATION STORMWATER KEY WORDS

**Stormwater**- water from any major storm event

**Watershed**- the area of land where all rivers and streams flow across and into a large body of water (we live in the Chesapeake Bay watershed)

**Runoff**- the flow of water from rain, snow melt or other sources over the land; it can carry pollutants with it as it moves

**Pervious Surface**- a surface that absorbs/soaks in water

**Impervious Surface**- a surface that does not absorb/soak in water

**Erosion**- the washing away of soil or sediment by the flow of water, wind, or gravity

**Rainscape**- a landscape designed to mimic natural processes and control stormwater runoff

**Green Roof**- a roof of a building that is covered with soil and vegetation

**Rain Barrel**- a barrel used to collect and store rainwater runoff, typically from rooftops via rain gutters

**Rain garden**- a garden designed to withstand the extremes of moisture and concentrations of nutrients that are found in stormwater runoff

**Bioretention Area**- an area designed to collect and slow the flow of water so that it can infiltrate into the soil; we consider our bio-retention area a “bog” (which is a natural type of wetland habitat) because of the plants growing there

**Infiltration**- the passing of water into and through the soil

**Sandstone**- a naturally-occurring pervious sedimentary rock composed of sand-sized minerals and/or rock grains

**Pervious Concrete**- a man-made porous concrete paving material; some types of pervious concrete are called “popcorn pavement”

**Swale**- a low-lying stretch of land that slows, captures, and controls runoff by spreading stormwater horizontally. Swales can be naturally occurring or man-made, and filled with grass, plants, stones, or a combination of the three.

## Supplement E: Watershed Model

### Set Up Before Students Arrive:

1. Instructor sets up the watershed model prior to the class. Place trees in the roads and in locations where houses would be. Place two triangular sponges with trees in them at water's edge of the farm field.
2. Fill 5-gallon bucket with water (*Staff will help*).

### Motivation/Warm-Up:

1. Have students stand in a circle around the model.
2. Welcome students to the activity and introduce the instructors. Show students the watershed model. Ask students what the blue area represents (water). Ask students what the green and brown areas represent (land).

### Set the Scene:

"This is the area that we live in before people came to live here. When people first came to this land by boat, they saw this beautiful, natural area." Draw attention to the clean water and the land covered with trees. Pour a little water down the river so students can see how clear it was before pollution. Hand out the appropriate model pieces to students to be placed on the model as the story is told:

1. "How did people first arrive in this area?" *By boat*. Have a student place boat in bay.
2. "What would the first people that came to this land need?" *Houses*. Remove trees. Have a student place a house in the designated area.
3. "How would they get food? (Where do crops grow? Where do cows, pigs and chickens live?)" *Farm*. Have the students place a barn, farm animals and tractor on the farm area.
4. "How would people get from one place to another?" *Roads, bridges*. Use chainsaw or bulldozer to remove trees. Have students add bridges and place cars on the road.
5. "As more people came, more houses were built." *Put bulldozer at home construction site*. Have students place the four houses in designated areas.
6. "What are some other things that people need to live?" *Cars, clothing, paper, and furniture*. "Where are these things made?" *Factories*. Have students place the factory in the designated area with drain hole facing the stream.
7. Where do children go to learn? *Schools*. Have the students put the school in the designated area. Name the school the same name as the school that is participating in the activity. The model will end up looking how our area looks in present day.

**Storyline:** Students will now watch a demonstration showing the types of pollution in the Chesapeake Bay watershed. Give each student a turn to add pollution to the model.

1. "What is left when trees are removed?" *Soil*. Sprinkle powder labeled soil over farm and construction site.
2. "As more people arrived they needed more food. What do we add to plants to make them grow?" *Fertilizer*. Sprinkle powder labeled fertilizer on farm. "People also wanted green grass, so they put fertilizer on their lawns." Sprinkle fertilizer on the lawns.

3. "When bugs attack farmers' crops or gardens at home, what do people use to kill them?" *Pesticides*. "When there are weeds on a farm and in yards some people use herbicides to kill them." Sprinkle jars labeled pesticide and herbicide over farm and yards of homes.
4. "What comes out of cars?" *Oil and gasoline*. Squirt oil bottle on roads, by the tractor on the farm and bulldozer.
5. "What comes out of our pets and farm animals?" *Animal Waste*. Sprinkle coffee grounds by the dog and farm animals.
6. "What is added to the roads in the winter when it snows so cars don't slide?" *Salt*. Sprinkle salt on roads.
7. "What comes out of the factory?" *Dirty water*. Take the bottle labeled oil and squeeze it into the hole in the top of the factory.
8. Have students predict what will happen if a rainstorm occurs. Have students make it rain by spraying the model with the two spray bottles. Send the spray bottles in opposite directions with the students and have each student spray 3 times and pass it on to the next student. Discuss what happens to the water.
9. Once the spray bottles return to the instructor, tell students that people like them are making a difference by taking action and doing something to stop pollution. One thing that people are doing is (state whatever their action project will be). Another action that people are taking is planting trees which you will do when you get back to your school.
10. *Place the trees (that were previously removed) by the water's edge at the farm. Sprinkle fertilizer on the farm land.* Spray the water on the farm. Hold the sponges so the water must pass through the sponges to get to the bay.
11. Show students the importance of the sponges in front of the trees at the farm by the water's edge by picking them up and squeezing them. Ask students how did the sponges help? Explain that trees slowed down the water and soaked up pollution to help clean the water. Have students clap for the trees.

**Assessment:** Ask students, how do trees help keep the water clean? *Slow down the water and soak up pollution. Tree roots hold soil in place and prevent erosion.*

**Clean up for next group:**

1. Remove all buildings, bridges, cars and boats from the model.
2. Clean and dry the model.
3. Place trees on the model for the next group.