

flows down stream? What size particles would be left behind? Does water velocity increase or decrease as a stream gets wider?

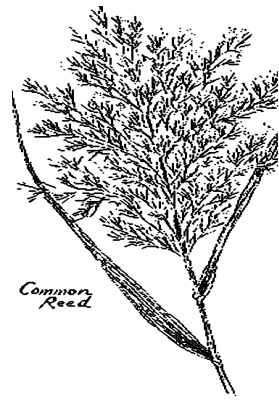
### 8. Exposed Till

The exposed sedimentary layer that you are standing on is till. Till layers are common on Long Island and typically are a few feet thick. Till is poorly sorted sediment deposited immediately in front of or at the base of a glacier. It is a mixture of silt, clay, sand, gravel and boulders. Till has low porosity and permeability. Do you think rainwater can easily infiltrate this till layer? Would you expect infiltration to dominate on a flat surface or a steep surface? Where would runoff dominate? How would plants affect infiltration?

### 9. Wetlands

Welcome to the wetlands. Here the stream is spread over a larger area. This area is a marsh. A marsh contains a variety of small plants, sedges and grasses. Hydrophilic plants are specially suited to survive in soils that are always wet. Cattails and Phragmites are competing species of hydrophilic plants. There are two varieties of cattail, narrow-leaved and broad-leaved. The narrow-leaved variety is more tolerant of pollution. The **cattails** here are narrow-leaved. Often wetlands that are polluted have the *Common Reed* known as *Phragmites* instead of cattails. What does the presence of cattails indicate about the quality of the water here?

Wetlands act as giant filters sorbing the pollution in the water that flows through it. In this setting solid pollutants sink to the bottom of the marsh increasing the clarity

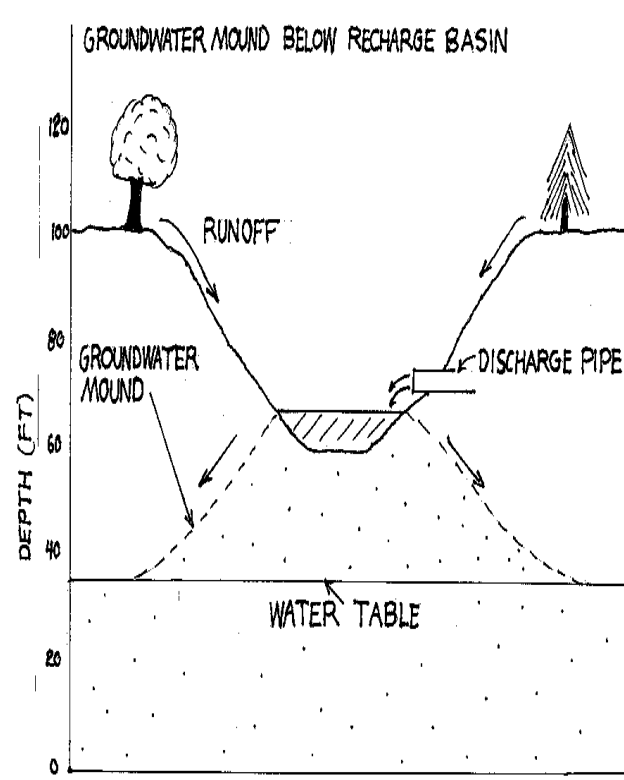


### 10. Recharge Basin

The storm water system is connected to these large recharge basins which have been placed in an abandoned stream valley which has been dammed by the Long Island Railroad. State highway 25A follows this valley to the west. These basins each hold several million gallons of water. The water slowly infiltrates into the ground. The regional groundwater table is about 35 feet above sea level (if the recharge basins were not here). The recharge basin has created a local recharge mound on the regional water table. The elevation of this stop is 100 feet above sea level. The top of the water in the basin is 87 feet above sea level. The deepest part of the basin is 27 feet deep. Due to the large volume of water entering the recharge basin the bottom of the basin may be close to the top of the recharge mound at this particular spot. Groundwater moves similar to surface water, that is down gradient. Regional groundwater is moving slowly toward Long Island Sound.

There are over 2000 recharge basins on Long Island that drain residential and commercial areas, most of which do not hold water. Sometimes recharge basins hold water, but usually they are dry. Why might some basins hold water while others are dry? What type of sediments could be on the floor of the basin that prevents water from escaping the basin? Do you think more water percolates into the ground from the sides of the basin or the bottom of the basin? (*Think about where the fine sediments collect.*)

of the water. With time more sediments accumulate burying the pollutants. Bacteria in the bottom sediments break down the pollutants to less harmful materials.

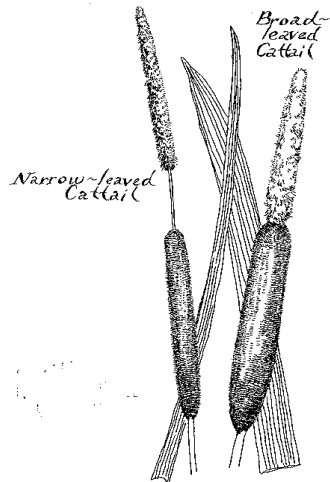


Created for the Earth Science Research Project for Teachers of Earth Science and their Students

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Illustrations by Maria T. Weisenberg of the Museum of Long Island Natural Sciences Stony Brook, New York and Steven Gessler of SUNY Stony Brook.

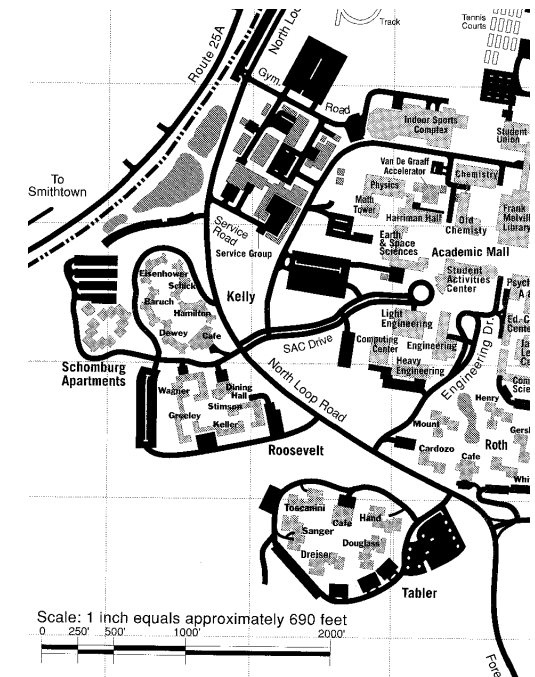
Copies of this guide and guides to other science walks may be downloaded at [www.geo.sunysb.edu/esp/](http://www.geo.sunysb.edu/esp/)



SCIENCE WALK  
HYDROLOGY OF THE WEST CAMPUS

Authors:  
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## Introduction

This walk follows the path of rain water as it falls on impervious surfaces on campus, enters catch basins, passes through the storm water drainage system, enters a recharge basin (sump) and eventually enters the groundwater system. On Long Island, groundwater is the only source for drinking water. In the natural environment on Long Island about 50% of the rain and snow infiltrates the ground and becomes part of the groundwater. The other 50% is lost to the atmosphere by evaporation and transpiration by plants. In developed areas a large part of the surface is covered by sidewalks, streets, parking lots and buildings. These structures are impervious to water. During development engineers designed storm water runoff systems so that water will not collect on the surface and cause flooding.

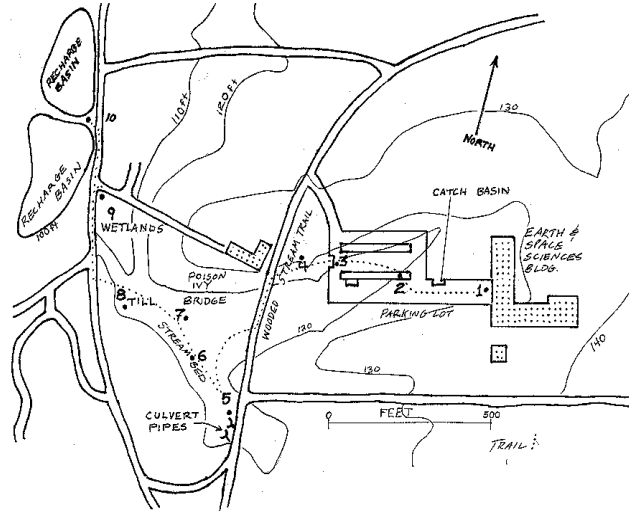
The campus has an intricate network of open bottom catch basins that can drain water directly into the ground, or overflow into the storm water drainage system that ends at the recharge basin. Open bottom basins are effective when rain is light. When rains are heavy water overflows to the next basin or ultimately to the recharge basin. With time fine sediment clogs the open bottom catch basins and infiltration rates decrease. These fine sediments should be removed periodically to re-establish the recharge rates. Developed areas with storm water drainage systems allow more water to enter the groundwater system than occurs in undeveloped areas.

Besides storm water runoff, this drainage system carries cooling water and water from leaks in the cooling and heating systems on campus.

This walk gives you the opportunity to view the landscape in a different way. Think of the path rain takes as it falls from the sky to the ground, into the groundwater, and eventually reaches your house where you drink it. As you walk the trail keep your senses open. You are on an adventure! The length of the trail is less than a mile, it should take you approximately 45 minutes to complete.

## 1. Impervious & Pervious Surfaces

Locate yourself on the map below. What is the contour interval between each line? What elevation are you standing at? Look at the map on the front cover. Estimate the percentage of campus covered with impervious structures such as buildings and parking lots? Note the catch basins along the walk, what purposes do they serve?



## 2. Storm Water System

These manholes and drains are connected to a complex storm water system which drains water from approximately one-half the main campus. Look down into a catch basin and observe what is inside. If the catch basin is full of leaves and fine sediments, can water flow easily into the underlying sediments?

When too much fertilizers and pesticides are applied they get transported to the water table. You may be surprised to know that animals pollute also. Dog waste in the street can be carried by runoff water. Animal waste (human waste also) is high in nitrogen, bacteria and other living organisms that can pollute water. Usually bacteria are removed as water passes through sand because sand acts as a filter.

Do you see any dark stained debris in the catch basin? Some parking spaces have oily stains from cars. Most of the water that falls on this parking lot

ends up in a catch basin. Motor oil leaking from a car is a mixture of many different organic compounds and heavy metals. Many are toxic or can cause cancer. Since oil is less dense than water, would you expect oil to be carried into our storm water system and eventually into our groundwater? Remember, if you see someone dumping hazardous material on the street or in a parking lot remind them that it will end up in catch basins and ultimately in the water **you** and **they** will drink.

## 3. Entrance to abandoned stream valley

This parking lot is slightly lower in elevation than the surrounding area. In the woods, you can see a storm water drain which feeds the beginning of this stream. The engineers who designed the storm sewer system used the abandoned stream valley as part of the runoff



system for storm water. Look at the trees in the area. Where there is water plants thrive. The floor is covered by layers of old leaves, branches, and smaller plants. These small plants help lessen the effects of erosion by slowing the water. When the water velocity decreases, infiltration increases. Small plants and shrubs have extensive root systems. Erosion is reduced because the root systems hold the sediments in place. Most of this forested area contains trees that lose their leaves in Autumn. Trees such as oaks that shed leaves are called deciduous. Poison Ivy is everywhere and dangerous all year. So be careful. Picture how the vegetation would appear in other seasons. What happens to areas of low elevation when it rains heavily?

## 4. Abandoned Stream Valley

Here the stream is flowing gently through the valley. The groundwater table is at an elevation of 35 feet above sea level. This location is about 115 feet above sea level. Is groundwater supplying

water into this stream or is the stream feeding the groundwater table? Campus engineers installed an asphalt base between the two culvert pipes beneath the stream. Why do you think they did this?

## 5. Culvert Pipes

There is always water running out of these pipes from the leaks in the campus cooling and heating systems. During storms large volumes of water come through these pipes. See how the water has cut into the side of the river bed (cut bank) directly in line with the pipes. Across from the cut bank, the river is depositing sediments (bar). At which of these two locations would you expect the velocity of the water to be greatest? Why is water constantly flowing through the pipes even during dry spells?

## 6. River Bed

Walk down to the river bed. Note that wind blown silt (loess) overlies till in the bank across the stream.

## 7. Poison Ivy Bridge

Under the bridge the streambed is wider and the stream velocity is slower than near the waterfall. Notice the height of the stream banks near the out fall as compare to the banks near the bridge. What could explain the differences? Note the change in the size of the sediments from the culvert pipes to the dam underneath the Poison Ivy Bridge. Based on the diagram shown below what size particles would be carried furthest when water

