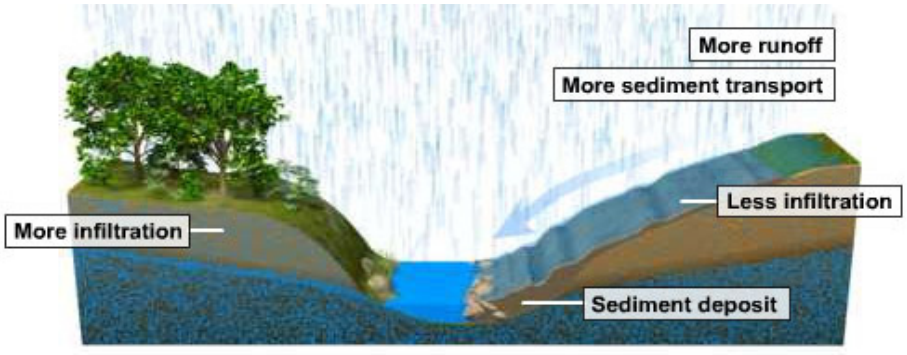
GREEN STORMWATER INFRASTRUCTURE (GSI) FACT SHEET
GSI CONCEPT #1

# Infiltration

## WHAT IS IT?

Infiltration is a natural process by which water moves into and through soil and other porous materials. Movement through the media is dominated by gravitational and capillary forces. Gravitational forces pull water down vertically through the soil. Capillary forces pull water horizontally and laterally within the soil profile.




Source: www.meted.ucar.edu

## HOW CAN IT ASSIST IN THE MANAGEMENT OF STORMWATER?

The continued urbanization of our landscape has adverse hydrologic impacts including increased flooding, diminished water quality, and decreased baseflow. Stormwater infiltration removes sediments and pollutants, decreases peak flows, and recharges groundwater. Infiltration also delays the transport of stormwater to nearby waterways, helping to alleviate and reduce flash flooding during intense storm events. Infiltration is best used on well drained soils with low water tables. In these locations, stormwater infiltration can be the most cost effective way to manage runoff.

## WHAT FACTORS AFFECT IT?

Infiltration is highly dependent on soil structure and soil saturation. Soils with a high percentage of sand generally pass water fairly easily while clayey soils restrict water movement. This has a lot to do with how much physical space (pore space) is available between the individual soil particles When soils become saturated (their pore spaces are completely filled with water) as a result of heavy rain-fall, seasonal snow melt, or high/perched water tables, infiltration will slow or not occur at all. Similar results occur when soils are compacted.

Source: USDA

## DETERMINING A SOIL'S INFILTRATION RATE

Knowing a soil's infiltration rate can help you figure out whether or not an infiltration based practice will be successful. Here are some simple steps to perform a basic infiltration test.

- Dig a hole in the ground that is roughly one foot deep. Be careful not to disturb the soil layers or to compact the sides while digging.
- Fill the hole with water to moisten the soil and allow it to drain completely.
- Fill the hole with water a second time after the original water drains out, and place a ruler or stick in the hole. Note the water level and time, and after 15 minutes check the water level again. Multiply this by four to get the number of inches of infiltration in an hour. Rates between 0.5 and 8 in/hour are generally appropriate for stormwater infiltration.

Factsheet prepared by the Vermont Green Infrastructure Initiative, a program of the Watershed Management Division of the VT Department of Environmental Conservation (http://watershedmanagement.vt.gov/).

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
GREEN INFRASTRUCTURE INITIATIVE

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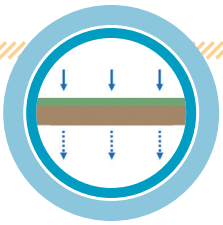
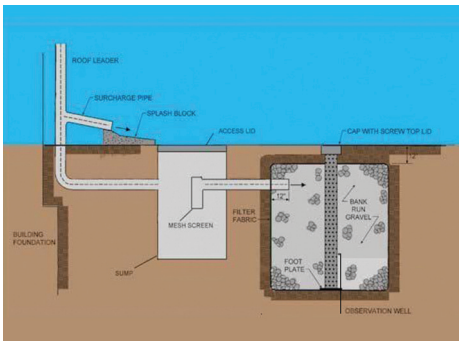
## GSI CONCEPT #1: INFILTRATION



### PUTTING THE CONCEPT TO WORK

Many green stormwater infrastructure systems and practices utilize infiltration because it effectively filters pollutants, slows water movement, provides temporary water storage and recharges groundwater. While infiltration practices are fairly common (infiltration trenches, infiltration basins, flow through planters, dry wells, and pervious pavement), they are often inappropriately designed. The key to effective use of infiltration is an in-depth understanding of site-specific soil characteristics. At sites with high nutrient and pollutant loads (hot spots), infiltration practices are not recommended due to potential groundwater contamination. Below are a few examples of GSI best management practices that utilize infiltration. Additional BMPs can be viewed at our website: http://www.watershedmanagement.vt.gov/stormwater/htm/sw_green_infrastructure.htm




Source: PA Stormwater Best Management Practices Manual

### Infiltration Trench

**BENEFITS**

> Groundwater recharge
> Peak flow reduction
> Water quality

Infiltration trenches are shallow open channels lined with dense vegetation. The first flush from a storm event can be diverted to infiltration trenches. They are highly versatile and can be applied in small residential areas to extensive systems to address downtown, commercial, and industrial impervious surfaces such a parking lots, roads/sidewalks and rooftops.

### Porous Pavement

**BENEFITS**

> Reduced impervious area
> Decrease in other structures
> Reduced sewer overflows

Porous pavement (a term that includes pervious concrete, porous asphalt, permeable paver blocks and reinforced turf) is an infiltration BMP that combines stormwater infiltration, storage, and structural pavement consisting of a permeable surface underlain by a storage or infiltration reservoir. Pervious pavement is well suited for parking lots and paths.

### Dry Well

**BENEFITS**

> Additional storage
> Low maintenance

A dry well is a subsurface storage facility that temporarily stores and infiltrates stormwater runoff from the roofs of residential and small structures. Roof leaders connect directly into the dry well, which may be either an excavated pit filled with uniformly graded stone, wrapped in geotextile or a prefabricated storage chamber or pipe segment.

### REFERENCES


Stormwater Management Manual for Western Australia: Structural Controls, Government of Western Australia, Department of Water

Soil Quality Kit - Guides for Educators, United States Department of Agriculture, Natural Resources Conservation Service

The Water Cycle: Infiltration, U.S. Department of the Interior, U.S. Geologic Survey, http://ga.water.usgs.gov/edu/watercycleinfiltration.html



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AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

**Vermont Green Infrastructure Initiative**, VT DEC Watershed Management Division, One National Life Drive, Main 2, Montpelier, VT 05620-3522; 802-490-6118