What to Look for When Inspecting an Infiltration Structure

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What is infiltration, how does it work, and why do we want it?

Infiltration is the process where water soaks into the ground eventually finding its way to the water table (groundwater). Soil contains small pore spaces between the soil particles, which when dry are filled with air. When water lands on the soil surface it moves down into the soil and fills the pore spaces. The more pore spaces, the more water it can hold. The addition of more water after the pore spaces have been filled pushes the water down through the soil towards the water table. In East Cocalico Township, all of our municipal water supply is from wells and is therefore groundwater (from hundreds of feet down). Groundwater recharge, the addition of more water into the water table, is therefore very important to maintain our water supply.

East Cocalico Township's stormwater regulations (§ 185-23 Volume control) require that the volume of runoff from newly created impervious surfaces be reduced using various BMPs (SCMs). Different methods used require different levels of reduction. The mechanisms for reducing volume are reuse, evaporation, transpiration (from plants) and infiltration. In many situations, infiltration will be the most practical method of runoff volume reduction.

Some of the most common SCMs for infiltration are described below. There are others. Their effectiveness depends on the soil's characteristics and its ability to infiltrate water.

[Click on photos to enlarge]

Infiltration basins – functions like a typical detention stormwater basin, but has amended soils to allow water to infiltrate through the bottom of the basin. Usually has an underdrain to allow draining if necessary (such as for mowing). They will often include specialized vegetation adapted to alternating wet and dry periods depending on how the basin was designed.

Outlet structure, trash rack, and clean-out on underdrain.

Infiltration basin during growing season:

Outlet structure (winter):

The underdrain has a cap on it that can be opened if it is necessary to drain the basin more rapidly. Normally it should be closed or capped If the basin has a dense growth of plants, such as cattails, it is desirable to mow the basin in the winter when it is dry or frozen. The clippings should be removed. This greatly increases the effectiveness of the basin in improving water quality.	Capped underdrain in outlet structure:  Mowed infiltration basin in winter:  The same basin in the summer: 
Infiltration trenches – an infiltration trench is a linear feature that catches runoff and allows part or all of the water to infiltrate into the ground. It can have vegetation, or, as in this example, just have stone on the surface.	

Underground infiltration beds - an underground infiltration bed in a lawn area should look like any other area of lawn, with the exception of the clean-out pipes (small white spot in lower left corner of photo). If the area is wet or the grass is dying, that can indicate a problem.	 During installation: 
Level spreaders – a device that releases water from a SCM (such as a basin) that spreads out the flow evenly so that it leaves the SCM as an even-depth thin layer. This allows the water to infiltrate rather than run off in a defined channel.	
Vegetated swale – an infiltration SCM where the length of a channel carrying stormwater has amended soils (if necessary) and vegetation to permit infiltration along the whole length of the channel. The infiltration will be greater if the slope of the swale is shallow.	

Problems with infiltration SCMs (BMPs):

Infiltration basin where the soil wasn't infiltrating properly, killing the grass. The amended soil was replaced and reseeded, correcting the problem.

The same basin above after corrections were made.

Infiltration bed with gravel surface (for stormwater off of a roof). This area was being used to park a trailer. Parking (or driving) on an infiltration structure can lead to compaction of the soil, reducing the ability of the soil to infiltrate water, potentially causing the bed to fail.

Paved area with a subsurface infiltration basin. This SCM was on a farm, and equipment was being washed above here after use. The soil in the wash water was allowed to run into the basin. Had this continued, the basin would eventually fail, requiring it to be dug up and replaced at a very significant expense.

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