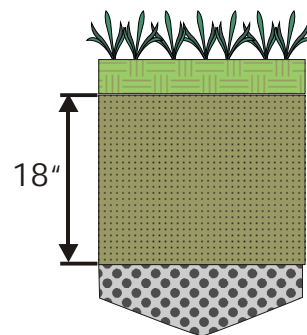
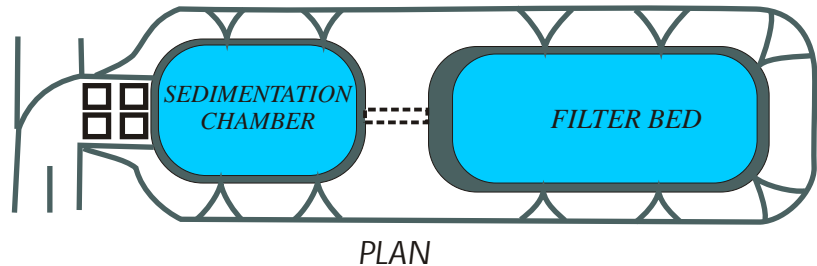
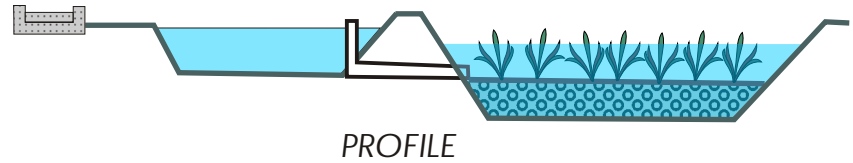




Stormwater Management with Filtration Systems

Ten Towns Great Swamp Watershed Management Committee

What are Filtration Systems?



Filtration systems are Best Management Practices (BMPs) that treat polluted stormwater runoff by filtering the runoff through sand or other media. Filtration systems can be used to treat stormwater runoff from new developments and from existing developments.

Filtration systems provide water quality benefits by removing stormwater runoff pollutants such as sediments, nutrients (nitrogen and phosphorus), organic material, and heavy metals. Filters, however, do not control the volume or peak flow rate of stormwater runoff. Their main benefit is in removing pollutants from stormwater and protecting downstream water quality.

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Filtration systems provide many water quality

Pollutant Removal by Filtration Systems

Types of Filtration Systems

Filtration systems are designed to treat the first flush stormwater runoff. Studies have shown that this first flush runoff contains the highest pollutant concentrations. The remaining, less polluted, stormwater runoff is bypassed around the filter and is not treated. Most filtration systems have a small pre-treatment basin in front of the filter to remove large particles that could clog the filter.

- Filtration systems, if designed properly, can remove an average of 42 percent of the phosphorus and 36 percent of the nitrogen in stormwater runoff. High levels of phosphorus and nitrogen in runoff can cause excessive growth of plants and algae.
- Filtration systems can also remove an average of 74% of suspended solids from stormwater runoff. Suspended solids can damage fish habitat by causing siltation.
- The percent removal for metals depends on the specific metal and the chemical form of the metal (soluble forms are not removed by filtration). In general, metals are toxic to many forms of aquatic life and can accumulate in the food chain.

These are average pollutant removals. The actual removals depend on the design of the system, the land use draining to the filtration system, and the form of the pollutant being removed (particulate vs. soluble).

There are two general types of filter systems: the surface filter and the underground filter. Most of the filter systems use sand to filter stormwater, but some filters use organic material such as peat or leaf compost. Some filter systems use a combination of sand and organic material.

Surface Sand Filter

- The simplest and least expensive sand filter is the surface sand filter. It is the least structural of the sand filters and can be constructed of earthen berms.

benefits by removing stormwater runoff pollutants.

- Stormwater runoff enters a dry sedimentation chamber where the heavy pollutant particles settle out. The stormwater runoff then flows through 18" of sand. The filtered water is then discharged to a swale or stream or it is re-combined with the untreated runoff.
- The top of the sand filter can contain attractive plants to enhance the aesthetics of the system.

Underground Sand Filter

- The underground sand filter is more structural than the surface sand filter and is usually constructed of concrete. These filters are usually larger than surface filters and are often used in urban areas. For example, they are used to treat roof-top and parking lot runoff from urban buildings.
- It is similar to the surface sand filter in that the first flush stormwater runoff enters a sediment chamber (usually with standing water in it) to remove the large particles. The runoff then flows through 18 to 24 inches of sand to an underdrain system. The treated stormwater then flows into the storm drainage system.

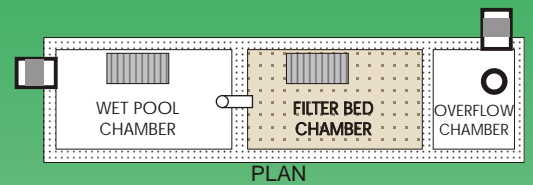
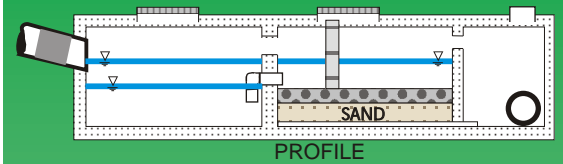
Perimeter Sand Filter

- A perimeter sand filter is a smaller version of the underground sand filter. It is usually placed next to a parking lot or other impervious area. The first flush stormwater flows over an inlet into the sedimentation chamber, then into the sand filter. The remainder of the stormwater runoff is directed to a bypass drop inlet.

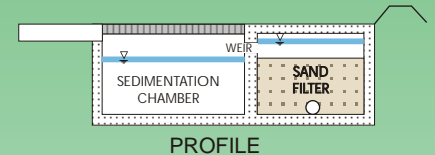
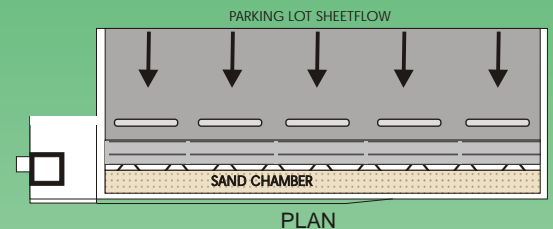
Organic Filter

- The organic filter is a modification of the sand filter whereby peat, compost or other organic material is added to the filter. Organic filters can be surface or underground filters. Some studies have shown that organic filters provide greater pollutant removals than conventional sand filters.

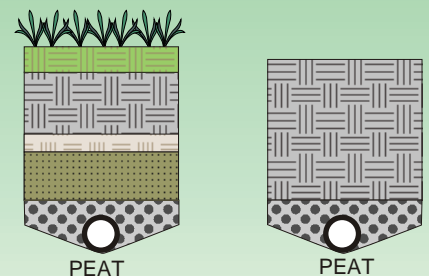
Types of Filtration Systems (continued)



UNDERGROUND SAND FILTER



PERIMETER SAND FILTER



ORGANIC FILTER

Stormwater Management with Filtration Systems

Ten Towns Great Swamp Watershed Management Committee

A surface sand filter is an excellent method to treat stormwater runoff from a parking lot. The figure below illustrates how a surface sand filter could be used to treat runoff from a building and a parking lot.

Stormwater runoff from the parking lot flows into an existing storm inlet. A splitter box installed in the existing inlet directs the first flush into the filter and diverts the remaining stormwater around the filter. The stormwater flows through the sedimentation basin into the sand filter. The filtered stormwater then flows into the existing drainage swale and combines with the bypassed stormwater.

Filtration systems can be used for new developments or to retrofit the stormwater systems of existing developments. Filtration systems provide excellent treatment of stormwater runoff. They are good for small (less than 5 acres) drainage areas, and are excellent for treating stormwater runoff from buildings, streets, and parking lots.

Filtration systems require a moderate amount of annual maintenance. Approximately every five years, some of the top sand must be removed and replaced. The peat and compost filters require more maintenance. The peat or compost must be replaced on a regular basis.

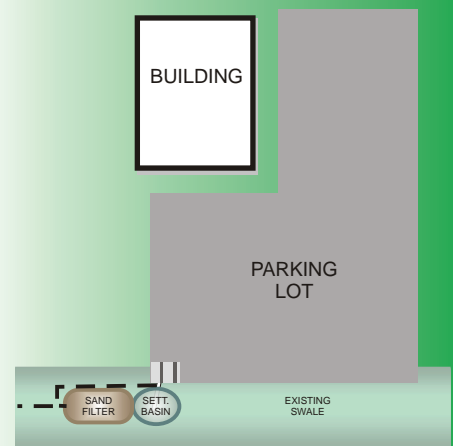
Filtration systems, if designed properly, can remove significant pollutants from stormwater runoff. They can also enhance the aesthetics of the site.

The Ten Towns Great Swamp Watershed Management Committee was formed in 1995 through an Intermunicipal Agreement for the specific purpose of developing and implementing a watershed management plan for the Great Swamp watershed. The organization has 501 (c) (3) status and is supported by annual financial contributions from each of the ten Municipalities that have lands within the Great Swamp watershed and by Somerset and Morris Counties in New Jersey.

The ten municipalities that make up the Ten Towns Great Swamp Watershed Management Committee are as follows; Bernards Township, Bernardsville, Chatham Township, Harding Township, Long Hill Township, Madison Borough, Mendham Township, Mendham Borough, Morris Township, and Morristown.

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Treatment of Parking Lot Runoff



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