PUTNAM VALLEY CENTRAL SCHOOL DISTRICT
PUTNAM VALLEY, NY

MS4PY2 STORMWATER PROGRAM

FACT SHEET # 5
APRIL 2012

STORMWATER RETROFIT OF PARKING LOTS

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1. Stormwater Retrofit

A stormwater retrofit is a stormwater management practice, put into place after facilities have been constructed, to improve water quality, reduce runoff volume and/or protect downstream channels. A Stormwater retrofit can be readily used for collecting and treating stormwater runoff from a parking lot.

2. Pollutants from a Parking Lot

Parking lots collect grease, oil, antifreeze, and other vehicle leakage; heavy metals from brake dust; as well as litter, other debris, and pathogens. All of these pollutants are flushed into waterways by rain and melting snow. In addition, impervious areas hasten the movement of stormwater runoff across the surface, into a series of curbs, gutters, drains, and pipes, increasing flood occurrence and stream bank erosion.

3.Bioretention System as a Stormwater Retrofit Practice

A Bioretention system utilizes microorganisms plants and vegetation, as follows:

- At the start of the storm (the first flush) the runoff is diverted directly from overland flow into the bioretention system
- During the storm, the pond above the bioretention system (6 inches to 9inches) collects and stores the stormwater
- The runoff is then filtered through the topsoil and planting medium
- Pollutants from the stormwater are adsorbed by soil particles plants and vegetation,
- The organic topsoil layer provides a medium in which microorganisms bio-degrade petroleum-based solvents and hydro-carbons

- The planting medium below, consisting of 50% sand, 30 percent organic material and 20 % top soil, filters sediment and particulates and absorbs heavy metals, nutrients and other pollutants
- Through plant evapotranspiration, about 35% of the runoff is released into the atmosphere
- Excess stormwater not absorbed by the plants and vegetation recharges the ground water below, or is discharged to an existing storm sewer
- During normal rains, filtered runoff, not absorbed by the plants, flows through the planting bed into a system of perforated pipes, submerged in a bed of about 12 inches of gravel
- During heavy rains, excess stormwater flows through an emergency overflow pipe and the system of perforated under-drain pipes to a nearby water body or adjacent MS4 storm sewer system

4. Benefits of a Bioretention System

Bioretention systems offer the following water quality benefits:

- Bioretention systems reduce water flow rates and pollution loading
- Bioretention areas can be used for storage of snow from winter plowing
- Bioretention systems do not require a very large treatment foot print.
- An optimal minimum coverage for the bioretention areas is five to ten percent of the entire paved surface
- Bioretention is a good option in cold water streams because water ponds in them for only a short time, decreasing the potential for stream warming
- Bioretention areas can be applied in almost any soils, since runoff percolates through a man-made sand bed, and is returned to the stormwater system
- Bioretention systems, with suitable permeable soils, can be used to recharge the groundwater below

5.Bioretention System Limitations

Bioretention systems have some limitations as noted below:

- The bioretention system should be located at least 10 feet from any building and away from septic systems or wetlands
- The parking lot draining to the bioretention system should be upstream of the system with slopes of intercepting land not greater than 10%
- The bioretention area should be designed to pond a small depth of water (6" to 9") above the filter bed
- The site of the bioretention system, shall have a surface topography that permits an excavation depth of about 40 to 42 inches, to permit excess stormwater to flow to the connecting storm sewer
- For bioretention systems without a connection to an existing storm sewer, the seasonal high water table should be at least 2 feet below the bottom of the soil planting bed and the soil below should have an infiltration rate of 1inch/hr. or greater
- For bioretention systems without a connection to an existing storm sewer, the soil bed permeability should be sufficient to allow the system to drain the storage volume within 72 hours