PUTNAM VALLEY
CENTRAL SCHOOL DISTRICT
146 PEEKSKILL HOLLOW ROAD
PUTNAM VALLEY, NY 10579

MS4PY8 STORMWATER PROGRAM

FACT SHEET #5
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ATERNATIVE STORMWATER BEST MANAGEMNT PRACTICES

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1. THE USE OF ALTERNATIVE STORMWATER BEST MANAGEMENT PRACTICES

Like the air we breathe, water is a vital natural resource and an important part of our quality of life. We all need to be aware of the importance of water in our daily lives and we must protect it now, so that it never becomes an endangered resource. The use of Best Management Practices (BMPs) for stormwater can be a cost-effective means to protect our water resources. Alternatives to managing stormwater include rain gardens, permeable paving surfaces, filter strips, grassed swales, infiltration basins, planter boxes and natural native vegetation. These are examples of attractive and water-friendly alternatives to the conventional stormwater management practices. Remember because of our location in or near the East of the Hudson Watershed, we have a special responsibility to protect our water resources.

2. THE SUITABILITY OF BMP APPLICATIONS

Alternative BMPs emulate natural systems by integrating a variety of stormwater treatments, typically referred to as green stormwater infrastructure practices. Green stormwater practices can be designed for new construction projects or retrofitted into the District's existing parking lots and many other settings. The selection of a particular BMP depends on the:

- **Stormwater Rate and Volume:** Can the BMP handle the site's stormwater rate and volume?
- **Treatment Effectiveness:** Can the BMP improve water quality relative to total

suspended solids, phosphorus and nitrogen, metals and fecal coliform?

- **Site Physical Constraints:** Are there site limitations, such as: drainage area, soil conditions, water table, land slope or hydraulic conditions present at the site that may limit the use of a particular BMP?
- **BMP Maintenance Considerations:** Does the BMP require excessive maintenance?
- **Community Acceptance:** Does the BMP meet community acceptance such as visual and aesthetic acceptance?
- **Construction Cost:** Is the BMP too costly to install and maintain?
- **Wildlife and/or Natural Habitat:** Does the BMP provide wildlife and/or a wetland habitat?

3. THE COMPARISON OF SOME GREEN INFRASTRUCTURE PRACTICES

The following section provides the suitability of some commonly utilized green infrastructure practices, as reported in USEPA, NYSDEC and various stormwater publications.

1. Rain Gardens

Rain Gardens are soil-based and plant-based stormwater managed practices that filter runoff from developed sites by mimicking natural vegetated systems through infiltration and evapotranspiration. Stormwater flows into a rain garden or ponds on the surface, and gradually infiltrates into the soil bed (planting bed). Pollutants are removed by plants and soil bed through adsorption, filtration, and decomposition. Treated water is allowed to infiltrate into the soil, or is collected by an underdrain system and discharged to the stormwater system or directly to receiving waters

- **Effectiveness:** Improves water quality and may remove up to 90% of suspended solids, 65% phosphorus, 50% nitrogen and 80% of metals
- **Advantages:** Provides effective flood control, increases water infiltration into the soil, minimally consumes land, relatively inexpensive, provides aesthetic enhancement and can be used as a stormwater retrofit
- **Disadvantages/Limitations:** Treats a relatively small drainage area with relatively shallow slopes (less than 5%) and is susceptible to clogging by sediment

2. Grassed Swales

Grassed swales are an effective alternative to enclosed storm sewers. Their main function is to convey water down a gradient away from its source. Grassed swales are flat bottomed channels, 2 to 8ft. wide and the bottom should be at least 3 feet above the groundwater. Swale slope should be kept at less than 4:1. Swales, beside conveying water from one source to another, can also remove pollutants by infiltrating a portion of the runoff into the ground.

- **Effectiveness:** Swales can remove from 30% to 70% of suspended solids and metals and 10% to 30% of nutrients such as phosphorus and nitrogen as well as other organic compounds.

- **Advantages:** They are less expensive than storm sewers in initial construction and maintenance phases
- **Disadvantages/Limitations:** Can only treat a limited area and are less effective than vegetative bioswales at filtering and reducing rates and volumes of runoff

3. Infiltration Planter Boxes

Infiltration planters are raised structural planting beds that infiltrate runoff from surrounding rooftops, parking lots or sidewalks. They can be installed in a variety of sizes and styles to suit the adjacent architectural style. Planter wall should be constructed of durable, impervious materials such as concrete.

- **Effectiveness**: Planter boxes have limited capability to reduce significant amounts of runoff, because of their small size. However, removal of pollutants and sediments is high, often exceeding 60%.
- **Advantages**: Reduces flow rates and volumes and produces filtration and evapotranspiration by shrubs and trees. Planter boxes also reduce the amount of watering necessary to maintain shrubs and trees. Costs are relatively low.
- **Disadvantages/Limitations**: Requires soils that allow at least 2 inches of infiltration per hour. The walls of the planter box should allow up to a foot of standing water to accumulate for less than twelve hours at a time. A minimum of 3 feet of permeable medium (washed gravel or other aggregate) should exist between the bottom of the growing medium (topsoil) and the soil into which the runoff discharges.

4. Permeable Pavements

Permeable pavement consists of a variety of materials such as brick, concrete, asphalt, plastic, rock and gravel, that promote the absorption of rain and snowmelt. Some permeable paving systems may integrate vegetation within spaces in the paving units, augmenting infiltration.

- **Effectiveness:** Permeable paving can provide removal rates of over 80% of sediment and from 65% to 95% of pollutants
- **Advantages:** Permeable paving reduces runoff volume, and may provide pollutant filtering
- **Disadvantages/Limitations**: Pervious paving should not be used in sites where excessive oil, grease or other chemical deposition may lead to groundwater contamination, such as automotive repair shops. Snow plowing must be done carefully to avoid damaging the surface and paving units, and sanding and de-icing should be avoided as they will increase clogging. Required maintenance, especially for porous concrete and asphalt paving, includes vacuum sweeping to remove deposited sediment as well as high-pressure hose washing to remove clogged materials in the surface of the pavement. Cost of permeable paving is moderate and may be 2-3 times more expensive than conventional pavement.