LAKELAND CENTRAL SCHOOL DISTRICT
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MS4PY9 STORMWATER PROGRAM

FACT SHEET #5
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INNOVATIVE ALTERNATIVES FOR STORMWATER MANAGEMENT

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1. INNOVATIVE ALTERNATIVES FOR STORMWATER MANAGMENT

The use of innovative alternatives for stormwater management is a cost-effective means to protect our drinking water, a vital natural resource and an important part of our quality of life. A few of the many innovative stormwater alternatives, included in this Fact Sheet, consist of green roofs, infiltration basins, rain barrels, cisterns and drainage swales.

2. GREEN ROOFS

Green roofs are layers of living vegetation installed on the top of buildings. They assist in managing stormwater by retaining and filtering rainwater through the plant's soil and root uptake zone. The water retained on the roof is cooler and reduces cooling and heating costs of the building and surrounding areas. For small rainfall events, little or no runoff will occur, and most of the precipitation will return to the atmosphere through evaporation and transpiration. In addition to stormwater benefits, it has been reported, green roofs can extend the life of roofs two to three times, because the plants and soil reduce the roof membrane from being exposed to ultraviolet radiation and cold weather effects. Key considerations for implementing green roofs include:

- **Structural & Load Bearing Capacity:** In both new building designs and rehabilitation, the load-bearing capacity of the roof should be analyzed to determine the type of green roof that is appropriate. A structural engineer should

be consulted for the roof load bearing capacity

- **Extensive Roof Systems:** These roofs contain 2 to 4 inches of soil and load the roof with 12 to 40 pounds per square foot of roof area. They contain short plants with shallow root systems. Extensive roof systems are easier to maintain. They absorb stormwater and provide insulation
- **Intensive Roof Systems:** These roofs have a minimum 6 to 12 inches of soil, and load the roof with 80 to 150 pounds per square foot of roof area. They contain deep-rooted plants, including shrubs and trees, and require more maintenance. These roofs provide reduced stormwater runoff, increased building insulation, water filtration, storage and increased bird habitat opportunities
- **Maintenance Requirements:** Once a green roof is established, maintenance requirements are minimal and include inspection of the roof membrane and drainage flow paths. Water will be required until the plants are well established, and some weeding may be necessary

3. INFILTRATION BASINS

An infiltration basin is an impoundment designed to capture stormwater runoff. Infiltration basins are typically off-line, end-of-pipe practices that vary in size and shape. Infiltration basins use the existing soil and vegetation to facilitate the percolation of stormwater runoff into the ground. The basin should have enough area to maintain a shallow pool that will infiltrate into the ground within 48 hours or less. They are typically constructed to intercept runoff from nearby parking lots. Key considerations for implementing infiltration basins include:

- **Soil Infiltrates Tests:** The underlying soils should be sandy and not clayey soils. The soil permeability should be at least between 0.5 and 3.0 inches per hour, to permit groundwater infiltration
- **Location:** The infiltration basin should be located at least 100 feet away from drinking water wells and at least 25 feet downgradient from building structures and septic systems. Preserve the existing surrounding vegetation if possible and locate the basin in an uncompacted sub-grade
- **Contributing Drainage Areas:** the contributing drainage area for an infiltration basin should be designed to hold/infiltrate a 2-yr storm
- **Design Considerations:** The basin inlet should have erosion protection. There should be at least 2 feet of freeboard between the inlet and the top of the basin. Allow 3 feet of buffer between the bed bottom and the seasonal high groundwater table and 2 feet of buffer for rock. The slope of the basin should be flat or less than 1percent. Provide an emergency stormwater overflow through an outlet pipe connected to the nearest storm drain for peak stormwater conditions and excess flows
- **Vegetation:** Planting vegetation in the basin will improve water quality and encourage infiltration and promote evapotranspiration. The vegetation may range from a meadow grass to shrubs that can withstand wet water conditions.

4. RAIN BARRELS AND CISTERNS

Roof runoff, traditionally, has been routed via downspouts directly into a storm drain system. However, rain barrels and cisterns can be effectively used to capture and store the runoff from small to moderate storms. The stored water can then be used to irrigate lawns and gardens and other landscaped areas between storm events. Key considerations include:

- **Rain Barrels:** Rain barrels can be used to capture a rooftop runoff. For example, a 0.1" rainfall event falling on a 1000 square foot roof top produces about 60 gallons of runoff, enough to fill an average 55-gallon rain barrel
- **Cisterns:** A rain cistern is similar to a rain barrel, except it is designed to store water below ground. Rain cisterns provide much greater storage than a rain barrel, and are more complex and cost more to install
- **Rain Barrel Design Considerations:** The main components of a rain barrel include tubing to connect the barrel to the down spout, a cover to prevent mosquitoes from entering, a faucet to allow regulated use of the captured water, and an overflow pipe to divert excess water once the barrel is filled. Rain barrels can be purchased from a number of retailers, or they can be constructed relatively easily and economically.
- **Rain Cistern Design Considerations:** The basic components of a rain cistern are the same as with the rain barrel, but with a larger storage tank that is buried underground. Hence, a pump must be installed to pump the water out of the cistern. Rain cisterns are more complex, and more expensive than rain barrels, and require more complex design and construction
- **Advantages and Disadvantages:** Rain barrels and cisterns reduce flow volumes, thereby reducing demands on stormwater management systems. They both provide a free supply of water for non-potable uses, such as for gardens, lawns and flower beds, easing demands on portable drinking water sources. They both require cleaning to remove debris, such as leaves, coming off the rooftop. The rain barrel must be covered to prevent mosquitoes from breeding. The rain barrel must be drained during the winter months. These systems are not effective for the removal of pollutants and sediments may collect in the vessels that will have to be removed

5. DRAINAGE SWALES

A swale is a broad, vegetated channel used for the movement and temporary storage of runoff. Swales, if located in sandy soils, can also move a portion of the runoff into the ground and filter out runoff pollutants. Drainage swales that are planted with native vegetation are commonly called bioswales. Swales are effective alternatives to enclosed storm sewers and lined channels, where they function to rapidly move runoff to the final discharge point. Ponding can be avoided by providing adequate slopes and/or locating swales in permeable soils.

SOURCES: The information in this fact sheet was extracted from various EPA publications.