

**PUTNAM VALLEY  
CENTRAL SCHOOL  
DISTRICT  
PUTNAM VALLEY, NY**

**MS4PY6 STORMWATER  
PROGRAM**

**FACT SHEET # 6  
DECEMBER 2015**

**BASIC ELEMENTS OF GREEN  
ROOFS: BASED ON NYS  
STORMWATER MANAGEMENT  
DESIGN MANUAL**

**FOR MORE INFORMATION CONTACT  
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**1. GREEN ROOFS**

Green roofs consist of a layer of vegetation and soil placed on the top of a conventional flat or sloped roof. General components consist of:

- **Supporting Roof Structure:** The load bearing capacity of the roof is critical for the support of soil, plants and people who will access the roof.
- **Roofing Membrane:** In a green roof system the first layer above the roof system is a waterproofing membrane, which is designed to protect the building from water leaks
- **Drainage System:** The drainage system, located above the roofing membrane, consists of layer of porous media on top of which is a synthetic filter mat to prevent fine particles from clogging the porous media. Water collected in the porous media is directed to a traditional rooftop storm drain system
- **Planting Soil Bed:** The planting soil bed located above the drainage system is the growing media for plants. Soils used in green roofs are generally lighter than standard soil mixes.
- **Plants:** plants selected for green roofs should be selected by a qualified botanist or a landscape architect. The selection of rooftop plants will be limited to microclimate, wind speeds and low winter temperatures.

Because of load bearing capacity of the roof structure all green roof designs require the consultation of a **qualified and licensed structural engineer.**

**2. GREEN ROOF TYPES**

Green roofs are characterized as **extensive or intensive** roof types, depending on the area and storage depth.

- **Extensive Green Roofs:** Extensive green roofs have thin layer of soil and are lighter, less expensive and generally require low maintenance. Stormwater retention and energy efficiency are less than with an intensive green roof system. They can cover large areas (extensive) but have a limited plant choice selection. Because of the lighter loads, they are more suitable to building retrofits.
- **Intensive Green Roofs:** Intensive roofs have deeper soil layer with greater weight, higher capital cost, increased plant diversity and more maintenance requirements. Intensive roof systems have a greater stormwater retention and better energy efficient than an extensive roof system. They are more attractive and allow public access and provide improved building insulation. Because of the greater load bearing, they are generally more suitable to new building construction than retrofits.

### 3. APPLICATIONS

Green roofs are suitable for retrofits as well as new buildings and can be installed on small garages, larger industrial or commercial buildings or municipal buildings. Green roofs are an alternative when on-site space for stormwater practices is limited. Green roofs can be installed on flat roofs or on roofs with slopes of up to 30% provided special strapping and erosion control devices are installed.

### 4. BENEFITS OF GREEN ROOFS

Green roofs reduce stormwater runoff and delay peak flows. Some of the other benefits are:

- **Energy Efficiency:** The layers of soil and vegetation moderate interior temperatures and provide insulation from the heat and cold. This reduces the amount of energy required to heat and cool the building, providing energy savings to the owner.
- **Extend Life of a Standard Roof:** The additional rooftop insulation protects rooftop materials from ultraviolet radiation and extreme temperature fluctuations, which deteriorates standard roof materials
- **Urban Heat Island Effects:** Green roofs reduce urban heat island effect by cooling and humidifying the surrounding air
- **Habitat for Birds and Butterflies:** The additional rooftop vegetation creates habitats for birds and butterflies and other insects
- **Aesthetics:** Green roofs can be aesthetically pleasing and improve views from neighboring buildings

### 5. LIMITATIONS

The primary limitation to the implementation of green roofs is the increased design and construction costs. Other limitations include:

- **Structural Analysis of Building Retrofits:** The retrofits of existing structures require a detailed structural analysis by a licensed structural engineer to determine if additional structural reinforcement is required. In cold climates, snow loads should be evaluated should be in the structural analysis
- **Water Damage to Existing Roof Retrofit:** Damage to existing waterproofing elements during the retrofit of the roof can present the risk of water leaks
- **Roof Maintenance:** Green roofs require more maintenance than traditional roofs