

## Stormwater Management & Green Roof Technology

Nonpoint source pollution has a great impact on the quality of Maryland's waters. Rooftops, roads, parking lots, driveways, and other impervious surfaces reduce groundwater recharge and increase the amount of runoff. This increase in runoff exceeds the capacity of natural systems, increasing channel erosion and flooding. Trash, oil, rubber, fertilizers, pesticides, and other pollutants that accumulate on the entire surface area, whether it is grassed or paved, affect water quality. An overriding factor that governs both the quantity and quality of stormwater runoff is the amount of impervious surfaces constructed on a site.

Stormwater management practices help control nonpoint source pollution through the use of nonstructural and/or structural techniques. Structural techniques are used to mitigate the impacts of impervious areas, filtering and treating runoff, and then discharging it at a controlled rate. Nonstructural techniques are used to reduce or physically disconnect imperviousness areas thereby reducing the need for mitigation using structural controls. With the adoption of the **2000 Maryland Stormwater Design Manual, Vol. I & II**, greater importance is placed on the use of nonstructural practices. However, building rooftops, which are significant impervious areas, are often neglected in the site design process. Green roof technologies provide an innovative stormwater management solution that also improves the energy performance of buildings as well as urban air quality and ecology without using additional land.



**What is a Green Roof?** The typical or "extensive" green roof is a multi-layered system consisting of a waterproof membrane or liner, insulation, gravel and soil layers, and plants. Typically, green roofs range from one to five inches in soil depth and are planted with a variety of low growing succulents or herbaceous plants. Structural loads vary from 15 to 50 pounds per square foot depending on the thickness of the soil and substrate type. While extensive green roofs are not designed for public access, routine maintenance and inspection is not a problem for most commonly used plants.

**Green Roof Benefits** - Whether planted in the ground or on a rooftop, plants provide a wide range of benefits. Plants use energy from the sun to convert carbon dioxide into oxygen and chlorophyll, transpire moisture in the air and provide shade, and filter and treat rainwater as it percolates through the ground. All of these natural processes are present in green roofs, providing effective stormwater management, energy efficiency, and urban ecology and aesthetic benefits. Other reasons to use a green roof are extended roof service life, increased property values, and conservation of valuable space that would otherwise be used to provide stormwater management.



**Green Roofs and Stormwater Management** – Although very common in Europe, green roofing techniques are a new design option in the United States. Accordingly, much of the information concerning green roofs is either proprietary or anecdotal. While excited by this emerging technology, the Maryland Department of the Environment (MDE) is still evaluating its performance with respect to stormwater requirements. In the interim, MDE encourages the use of green roof techniques as a nonstructural option for stormwater design and sustainable development. MDE currently recommends that each green roof design be reviewed individually for stormwater purposes. Many jurisdictions currently allow green roofs to be modeled as grassed areas in good condition when determining stormwater management requirements (e.g., channel protection and overbank flood control volumes). Again, MDE recommends that each green roof be evaluated individually for hydrologic impacts.



### **Why Use a Green Roof?**

- **Reduces Summer Air Conditioning & Winter Heating Costs**
- **Lengthens Roof Life by Two to Three Times**
- **Reduces Stormwater Runoff**
- **Reduces Noise**
- **Aesthetically Pleasing**

**For More Help & Information on Green Roofs...please contact the Nonpoint Source Program at (410) 537-3543 or [www.mde.state.md.us](http://www.mde.state.md.us), or visit the following websites:**

- **Maryland Green Building Council – [www.dgs.state.md.us/GreenBuildings/default.htm](http://www.dgs.state.md.us/GreenBuildings/default.htm)**
- **Maryland Environmental Design Program – [www.dnr.state.md.us/smartgrowth/ed/](http://www.dnr.state.md.us/smartgrowth/ed/)**
- **Penn State Center for Green Roof Research – <http://hortweb.cas.psu.edu/research/greenroofcenter/history.html>**

### **Description of Photographs:**

1. **Green roof at Montgomery Park, October 2002 (two months after planting)**
2. **Green roof at Epworth Manor (Tyrone, PA), May 2002 – photo courtesy of **Green Roof Plants @ Emory Knoll Farms****
3. **Residential green roof - photo courtesy of **Green Roof Plants @ Emory Knoll Farms****
4. **Green roof at Montgomery Park during construction, April 2002**
5. **Green roof at Montgomery Park, June 2003 (10 months after planting)**

### **Montgomery Park wins Green Roof Award for Excellence!**

The Montgomery Park Business Center recently won a Green Roof Award for Excellence for the 30,000 square foot green roof completed in 2002. Go to <http://www.greenroofs.ca/grhcc/awards.htm> or [www.scholz-barth.com](http://www.scholz-barth.com) for more information.

**The 2000 Maryland Stormwater Design Manual and related information are available on MDE's WEB Page – [www.mde.state.md.us](http://www.mde.state.md.us)**



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