Stormwater Management

As much as 50 percent of the rain and snow that falls to the ground in rural areas percolates to groundwater, and another 40 percent may evaporate. The remaining 10 percent runs over the surface to streams, lakes, and wetlands. This is stormwater runoff. In urban areas, as much as 50 percent of precipitation can become runoff. Roads, parking lots, driveways, and other paved surfaces, as well as rooftops, prevent percolation. Storm sewers carry away water before it can evaporate.

As stormwater runs over land, it picks up pollutants that have been deposited there, such as toxins, nutrients, sediment, dust, and debris. Common contaminants in stormwater include:

- Petroleum hydrocarbons, salt, and sand from roads and parking lots.
- Fertilizer and pesticide residues from residential lawns, commercial landscaping, and agricultural operations.
- Animal waste from household pets, livestock, and wildlife.
- Sediment from road swales, farm fields, and logging operations.
- Industrial toxins and heavy metals.

Car fluids, such as motor oil and coolant – to give one example – contain heavy metals picked up from the engine during use. They are hazardous wastes that can contaminate our drinking water and harm fish, birds, and all wildlife.

Problems of Quantity and Quality

Stormwater is a problem of both quantity and quality. Quantity problems result from the high volume of runoff in urban areas. The increased rush of water during significant rainfalls can cause streams to overflow their banks and storm sewers to discharge into sanitary sewers. During storms, streets can flood or even wash out, low-lying areas can flood, sewers can back up into basements, stream banks can erode, and steep slopes can fail.

Quality problems result from pollutants picked up by runoff. Most land-based pollutants are picked up during the first half-inch of rainfall, known as the "first flush" of a storm. Pollutants are carried directly to surface waters where they degrade water quality and damage aquatic habitat.

QUANTITY-RELATED PROBLEMS		QUANTITY-RELATED PROBLEMS
- Flooding (road, basement, land). - Clogged storm drains and ditches. - Road "wash-outs". - Erosion. - Stream scouring.		- Oil slicks on road or water surfaces. - Sedimentation. - Dirty, discolored surface waters. - Beach closures after rain events. - Weed growth in lakes and bays. - Fish kills.

Genesee Transportation Council · 50 West Main Street · Suite 8112 · Rochester, New York 14614
Phone: 585-232-6240 · Fax: 585-262-3106 · Website: www.gtcmpo.org

Stormwater Management

Stormwater Management

Whether a project involves development of a "greenfield" site or redevelopment of an existing site, the goal is to reduce the amount of stormwater reaching surface waters. The New York State Department of Environmental Conservation has identified several Standard Management Practices (SMPs) as highly effective and practical means of preventing and reducing quantity- and quality-related stormwater runoff problems. These SMPs include managerial techniques, structural and nonstructural controls, and maintenance procedures.

Land development may change natural storm-water flows. To protect water resources, the state requires communities to manage storm-water using accepted standards.

MANAGERIAL TECHNIQUES

Individual site planning and development practices can be designed to reduce the amount of impervious surface they create and increase the amount of natural area they maintain. Four site design strategies include:

Cluster, Open Space, or Conservation Subdivisions. Cluster of development concentrates buildings and roadways together while protecting natural areas. Open Space subdivisions can reduce the amount of impervious cover by 10-50 percent, while providing undeveloped areas for the discharge and infiltration of stormwater. Protected wetlands, forests, and green areas are natural pollutant filters.

Street Widths. Street widths can be reduced proportionally with the number of daily vehicle trips. While road rights-of-way may be sized to accommodate safety features, the actual pavement width can be significantly reduced in many residential areas, which may improve safety as narrower roadways encourage slower speeds. Rights-of-way can be constructed of pervious material to allow infiltration of the pavement runoff.

Green Parking Lots. Parking areas for commercial development are often oversized to accommodate infrequent "peak" periods such as the day after Thanksgiving. Local laws can reduce requirements for excessive parking. Other options for improving parking lot design include use of pervious pavement, especially for overflow parking, and planting "infiltration islands." Increasing tree canopy coverage in a commercial area can reduce the volume and peak flow of stormwater runoff.

Rooftop Runoff. Rooftop runoff can be directed over grassy surfaces to infiltrate before reaching paved surfaces. This can reduce the annual stormwater runoff from a site by as much as 50 percent. Runoff from most residential and commercial roofs can be directed to drywells, filtration chambers, bioretention ponds, rain barrels, and rain gardens, as appropriate.

Stormwater Management

NONSTRUCTURAL CONTROLS

Practices that control the source of stormwater runoff and pollutants common to stormwater are known as nonstructural controls. Some of the strongest of these controls are local laws and local practices. The New York State Department of Environmental Conservation recommends that municipalities, at minimum, should adopt the following:

- Plan to detect and eliminate illicit discharges.
- Law to control sediment and erosion during construction.
- Measures and laws to reduce runoff pollution after construction.
- Public education through storm drain labeling programs, waterfront clean-ups, brochures to help reduce residential pollution, and the like.
- Good housekeeping, such as regular street sweeping and catch basin inspection and cleaning.

Other effective local laws and practices include:

- Maintaining adequate setbacks from water resources.
- Encouraging development close to existing development.
- Impervious surface caps on development.
- Not allowing any more stormwater to leave a site than enters it.
- Recycling and hazardous waste disposal.
- Pet waste laws.
- Closely monitoring storage and use of road salt and other de-icing materials.

STRUCTURAL CONTROLS

Structural controls are usually the most expensive tools for addressing stormwater problems. While each structural intervention requires a site-specific design, the goals for using all structural controls are generally the same:

- Prevent flooding.
- Maintain groundwater recharge and quality.
- Reduce stormwater pollutant loads.
- Protect stream channels.
- Safely convey extreme rainfall events.

MAINTENANCE

Maintenance is one of the most important factors in the effectiveness of nonstructural and structural SMPs. The major types of SMPs are:

Pretreatment options. Water quality inlets (oil/grit separators) and deep sump catch basins are common features of most municipal stormwater systems. However, they are often employed as the only form of treatment. These SMPs remove oil and coarse sediment out of the stormwater, but their effectiveness is severely limited by the maintenance and routine cleaning they receive.

Ponds and wetlands. Dry ponds, wet ponds, and constructed wetlands require a large amount of space and are commonly used in mid- to large-size developments such as road construction, residential subdivisions, office parks, and big-box retailers. Dry ponds are a relatively inexpensive option, but constructed wetlands are very expensive. Maintenance costs, however, can be low on most pond

Stormwater Management

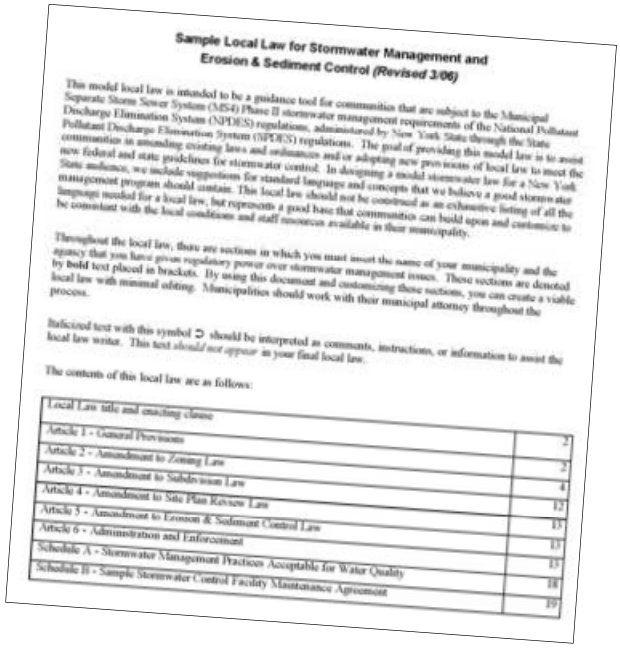
types. The amount of pollutant removal is subject to design criteria and can range from low to very high. Pretreatment may or may not be a part of the design.

Filtration/Infiltration systems. These types of SMPs typically require the use of pretreatment options to prevent clogging and reduce the potential for groundwater contamination. Filtration systems, such as sand filters, have few site constraints and can be used for retrofitting. Infiltration systems like leaching chambers and leaching basins have soil and groundwater constraints similar to septic systems.

Selection of appropriate stormwater control measures for any development involves a combination of site planning, institution of nonstructural controls, use of structural SMPs, and a commitment to ongoing maintenance.

Federal and State Stormwater Management Policy

Under the authority of the Clean Water Act, the US Environmental Protection Agency created the National Pollutant Discharge Elimination System (NPDES). Phase I of this program, created in 1990, required permits for large municipal storm systems, large construction projects, and industrial activities. In New York State, Phase I regulations applied only to New York City. In 1999, under Phase II of NPDES, thresholds on the size of municipal systems and construction activities were lowered. Phase II regulations apply to all of New York State. Under Phase II, developers of construction sites of one or more acres must prepare stormwater pollution prevention plans and obtain permits for discharges of runoff from these sites to surface waters.



Sample Local Law for Stormwater Management and Erosion & Sediment Control *(Revised 3/06)*

This model local law is intended to be a guidance tool for communities that are subject to the Municipal Separate Storm Sewer System (MS4) Phase II stormwater management requirements of the National Pollutant Discharge Elimination System (NPDES) regulations, administered by New York State through the State Pollutant Discharge Elimination System (SPDES) regulations. The goal of providing this model law is to assist communities in amending existing laws and ordinances and/or adopting new provisions of local law to meet the new federal and state guidelines for stormwater control. In designing a model stormwater law for a New York State audience, we include suggestions for standard language and concepts that we believe a good stormwater management program should contain. This local law should not be construed as an exhaustive listing of all the language needed for a local law, but represents a good base that communities can build upon and customize to be consistent with the local conditions and staff resources available in their municipality.

Throughout the local law, there are sections in which you must insert the name of your municipality and the agency that you have given regulatory power over stormwater management issues. These sections are denoted by **bold** text placed in brackets. By using this document and customizing these sections, you can create a viable local law with minimal editing. Municipalities should work with their municipal attorney throughout the process.

Italicized text with this symbol ⊃ should be interpreted as comments, instructions, or information to assist the local law writer. This text *should not appear* as your final local law.

The contents of this local law are as follows:

Local laws are perhaps the most cost-effective and long-lasting means of controlling runoff, erosion, and sedimentation *(Source: NYS Department of Environmental Conservation's* Stormwater Management Guidance Manual).

Resources

Stormwater Management Guidance Manual for Local Officials, New York State Department of Environmental Conservation, 2004.
www.dec.ny.gov/chemical/9007.html

New York State Stormwater Management Design Manual, New York State Department of Environmental Conservation, 2010.
www.dec.ny.gov/chemical/29072.html

Low Impact Development Stormwater Management, Low Impact Development Center, Inc.
www.lid-stormwater.net/site_map.htm

- Genesee Transportation Council – September 2010
(Adapted from materials published by the Berkshire Regional Planning Commission)