

BERKSHIRE PLANNING TOOLS



One in a series of "toolbox" items to accompany the Regional Plan for the Berkshires

June 2001

Stormwater management

What is Stormwater?

When rain or snow falls to the ground in a rural area, as much as 50% percolates to groundwater. Another 40% may evaporate. The remaining 10% runs over the surface to streams, lakes and oceans. This runoff is stormwater. In urban areas paved surfaces and rooftops prevent percolation and drainage systems carry away water before it can evaporate. As much as 50% of the precipitation can become stormwater runoff.

Stormwater

The water from precipitation running off the surface of a drainage area during and immediately following a storm.

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

Common contaminants in stormwater include:

- Sediment from dirt roads, farm fields & logging operations
- Fertilizer & pesticide residue from residential, agricultural & commercial properties
- Petroleum hydrocarbons, sand & salt from roadways and parking lots
- Animal waste from domestic pets, livestock & wildlife
- Toxins and heavy metals from commerce and industry

What is a Stormwater Problem?

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 can cause streams to overflow their banks and flood low-lying areas. During storms, roadways can be washed out and streambanks can be eroded.

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

Symptoms of stormwater problems include:

Quantity-related problems

- Flooding
- Erosion
- Clogged storm drains and ditches
- Road "wash-outs"
- Stream scouring

Quality-related problems

- Sediment build-up in waterways or wetlands
- Oil slicks on road or water surfaces
- Dirty, discolored surface waters
- Beach closures after rain events
- Weed growth in lakes
- Fish kills

What to Do About Stormwater

Whether a development project involves construction at a "green" site, or involves redevelopment of an existing site, the goal is to reduce the amount of stormwater reaching surface waters. Three steps can help achieve that goal. The first step is to use design techniques that reduce runoff. The second step requires institution of non-structural BMPs. The final step requires the use of structural BMPs.

Best Management Practice (BMP)

Structural, non-structural and managerial techniques that are recognized to be the most effective and practical means to prevent and reduce nonpoint source pollution.

1. Site Planning:

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

Open Space or Cluster Subdivisions

This type of development concentrates buildings and roadways together while protecting natural areas. Open Space subdivisions can reduce the amount of impervious cover by 10-50%, while providing undeveloped areas for the discharge and infiltration of stormwater. Protected forest and wetland areas are natural pollutant filters.

Green Parking Lots

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

Street Widths

Street widths can be reduced proportionally with the number of daily vehicle trips. While road right-of-ways may be sized to accommodate safety features, the actual pavement width can be significantly reduced in many residential areas. Right-of-ways can be constructed of pervious material to allow infiltration of the pavement 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%. The runoff from most residential roofs can be directed to a drywell for infiltration, while runoff from some industrial rooftops cannot.

2. Nonstructural BMPs:

Practices that control the source of stormwater runoff and pollutants common to stormwater are known as nonstructural BMPs. One of the strongest of these controls is the local bylaw. All municipalities should have bylaws that cover:

- Sediment and erosion control during construction
- Recycling and hazardous waste disposal
- Setbacks from water resources

Less common (but effective) bylaws include:

- Pet waste laws
- Impervious surface caps on development
- Road salt storage and use

Where no bylaw exists, municipal practices can provide excellent nonstructural BMPs. Regular street sweeping and catch basin cleaning can result in significant reductions of stormwater pollutants. Public education through storm drain labeling programs, river clean-ups, and brochures help to reduce residential pollution.

Some practices that facilitate the control of stormwater are less obvious, but useful. Encouraging development close to existing developed areas makes the use of regional or shared structural BMPs practical and cost-effective.

3. Structural BMPs:

Structural BMPs are often the most expensive tool for addressing stormwater problems. While most BMPs call for specific design objectives, the general goals for using structural BMPs are comparable:

- Maintain groundwater recharge and quality;
- Reduce stormwater pollutant loads;
- Protect stream channels;
- Prevent increased overbank flooding; and
- Safely convey extreme floods.

Maintenance is one of the most important factors in the effectiveness of stormwater BMPs. The major types of BMPs are:

Pretreatment options

Water quality inlets 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 BMPs remove oil and coarse sediment out of the stormwater but their effectiveness is severely limited by the maintenance and routine cleaning they receive. For this reason, they cannot be used alone to meet the requirements of the State Stormwater Management Policy.

Ponds and wetlands

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

Both of these types of BMPs 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 non-structural controls and use of structural BMPs.

State Stormwater Management Policy

Adopted in 1997, the Massachusetts Stormwater Management Policy seeks to reduce the negative impact of development on surface waters. The policy is written to provide a consistent, performance-based approach to stormwater management that coordinates the numerous and fractured regulations over stormwater control.

The state policy is set in motion when there is any discharge of runoff proposed to surface water and in some cases, groundwater. Most commonly, projects that require review under the state Wetlands Protection Act, must comply with the nine (9) stormwater standards set under the policy. These standards seek to:

- Prevent direct discharges of stormwater to surface waters and wetlands;
- Maximize infiltration of stormwater;
- Prescribe treatment of stormwater;
- Require the removal of 80% of the Total Suspended Solids in runoff; and
- Ensure proper maintenance of stormwater BMPs.

(For a complete description of standards, see the Stormwater Management Policy and Technical Handbooks prepared by DEP and CZM, March 1997).

A few projects are exempt from meeting the standards. These are single-family house projects; emergency road repairs; and some small residential subdivisions. The Policy relaxes the standards for redevelopment projects. Generally, redevelopment projects must improve the quality of and reduce the quantity of stormwater generated by the site. In most cases, treating stormwater with BMPs will alleviate this problem.

Berkshire Planning Tools

NPDES Phase II

Under the authority of the Clean Water Act, the US Environmental Protection Agency (EPA) created the National Pollutant Discharge Elimination System (NPDES). Phase I under this program requires permits for large municipal storm systems, large construction projects and industrial activities. Phase II of the program lowers the threshold on the size of municipal systems and construction activities.

This means that in Berkshire County, the "urbanized area" (defined in the US Census) of Pittsfield (including portions of Lanesborough, Dalton and Hinsdale), will need to implement a stormwater management program. This program must meet six (6) requirements for:

1. Education and Outreach;
2. Public Participation and Involvement;
3. Illicit Discharge Detection and Elimination;
4. Construction Site Runoff Control;
5. Post-Construction Runoff Control; and
6. Pollution Prevention and Good Housekeeping.

In addition to the Pittsfield urbanized area, **ALL municipalities** must obtain a permit for stormwater discharge associated with municipally owned light industrial activities including DPW yards, vehicle repair/maintenance facilities and gravel pits.

Stormwater Project in Berkshire County

The town of Lanesborough participated in a recent stormwater assessment project.

Problem:

Miner Road in Lanesborough contributes runoff from 1500 linear feet of roadway to Town Brook, a major tributary of Pontoosuc Lake. The force of the runoff erodes a path directly to the brook in the Zone I (that area within 400 feet of the wellhead) of the municipal water supply.

Goals:

- To improve drainage (for safety), especially during winter and spring runoff;
- To alleviate ice build-up and therefore reduce salt applications in the Zone I;
- To stop erosion and sediment build-up in Town Brook;

Solution:

Paired catch basins will collect runoff at several points along the road. Sediment and leaves that block existing drainage ditches will collect in the basins and be cleaned out at least once per year. A water quality basin will collect the runoff from the catch basins and provide passive treatment to clean and remove stormwater discharge from the Zone I.

Additional recommended practices along the road include removing the berms and curbing created by homeowners. This will disperse surface runoff so it does not collect and cause erosion in the Zone I.

This publication is one in a series of "toolbox" items to support the Regional Plan for the Berkshires. If you would like to receive additional copies of this or other toolbox items, please contact the Berkshire Regional Planning Commission, 33 Dunham Mall, Pittsfield, MA 01201 or call (413) 442-1521. Copies of the toolbox items are also available on the web. Visit www.berkshireplanning.org

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