4. Stormwater Management

The Rundown on Stormwater Runoff

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"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."

~ Albert Einstein

Stormwater runoff is created when rain or snowmelt accumulates and runs across the surface of the land. Undeveloped, forested landscapes generate relatively low volumes of stormwater. However, as residential and commercial land development proceeds, the volume of stormwater in Pike County watersheds increases.

This increase is primarily the result of the **removal of forests**, the **compaction of soils** by construction equipment and the creation of **impervious surfaces** in the form of parking lots, driveways, roads and highways, as well as rooftops of homes and buildings. Rain and snowmelt that would have been absorbed by leaf litter, soil and plant roots or that would have filtered into the ground and provided groundwater recharge instead accumulates, creating excess levels of stormwater runoff. The lack of effective, long-term planning for stormwater management in the development of Pike County's older residential communities is another primary factor underlying current stormwater problems being experienced by residents.

What does all this mean to the average Pike County homeowner? For many it means persistent stormwater-related problems including:

- Washed-out lawns and driveways
- Flooded basements
- Damaged septic systems
- Nuisance areas of ponded water
- Damage to public and private roads
- Declining property values
- Conflicts between residents
- Polluted swimming areas
- Contaminated groundwater supplies

Despite the challenge that managing stormwater presents, there are options available for residents, community associations and municipalities.

Correcting these problems "after the fact" is often difficult and costly for homeowners and places a financial strain on community association and municipal budgets. Despite the challenges that stormwater management presents there are options available for residents, community associa-

tions and municipalities to address both existing and potential future, stormwater-related problems outlined in this chapter.

Stormwater Control at Home

The most effective strategy for managing strom water is to prevent it from being created in the first place.

Solutions for residents may exist right in their own backyard. Homeowners can reduce stormwater runoff from their properties in a number of ways including the following:

- Minimizing impervious surfaces (sidewalks, driveways, patios, etc.)
- Planting native vegetation, wherever possible, in place of lawn areas
- Not removing trees and other growing vegetation from existing forested areas
- Directing rain gutters onto lawn or garden areas where more water can seep back into the ground
- Constructing rain gardens or infiltration trenches
- Using rain barrels to collect and recycle rooftop runoff

While the aforementioned measures can help to alleviate stormwater problems, a broader-scale approach is often necessary to effectively address the bigger picture of stormwater management. The remainder of this chapter will focus on the tools available to implement more comprehensive stormwater control measures.

Rain gutters direct rooftop runoff to this attractive rain garden reducing stormwater problems for the homeowner and neighbors

Municipal Options for Stormwater Management

Stormwater is a natural resource that can be managed to the benefit of residents and the environment. The most effective strategy for stormwater management is to prevent it from being created in the first place.

This requires planning for managing stormwater upfront, in the beginning phases of land development planning efforts. Here, municipal land use regulations play a critical role by guiding the manner in which

development takes place in Pike County townships and boroughs, including how stormwater is managed.

Municipal governments can provide for more effective stormwater management by adopting land use regulations that support **Conservation Design** and **Low Impact Development (LID)** principles (Chapter 11). Incorporating Conservation Design and LID principles into land development projects reduces stormwater runoff in communities by decreasing amounts of impervious surfaces, maximizing stormwater infiltration, maintaining natural vegetation and existing drainage patterns, and conserving open space.

Conservation Design standards also provide for maintaining buffer areas along streams, lakes and wetlands to help attenuate flood waters and to remove stormwater pollutants. Research has demonstrated that communities that adopt these principles enjoy cleaner, healthier water resources.

Managing Stormwater in Pike County Community Associations

Options for community associations include enlisting the services of a professional consulting engineer to conduct a **stormwater assessment** that evaluates problem areas and outlines potential solutions. A stormwater assessment can also include suggestions for measures to reduce the poten-

Stormwater and Pike County Streams

Stormwater Pollutes Streams

Increasing levels of stormwater runoff present significant challenges to protecting Pike County's streams, lakes and wetlands. Of particular concern are the County's High Quality (HQ) and Exceptional Value (EV) streams.

Stormwater moving across the human-built landscape, picks up and transports **non-point source pollutants** (Chapter 2). This now polluted stormwater frequently runs off the land into a nearby stream impacting the aquatic life found there, including species of fish, aquatic insects and aquatic salamanders that are less tolerant to a polluted environment.

Stormwater, heated as it travels across sun-baked impervious surfaces including roads, parking lots, roofs and driveways, creates another type of water pollution known as **thermal pollution**. Stormwater flowing into streams increases water temperatures resulting in decreased levels of dissolved oxygen. Lower levels of dissolved oxygen make it more difficult for fish, insects and other members of a stream's aquatic community, adapted to an oxygen-rich stream environment, to survive, particularly during warmer summer months.

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Stormwater and Pike County Streams (continued from previous page)

Stormwater Damages Stream Habitat

Increasing volumes of stormwater runoff also damage the physical habitat of streams. A typical Pike County stream works its way down through its watershed in a repeated, step-wise fashion from **pools** (deeper areas) to **riffles** (resembling small rapids) to **runs** (longer, slower stretches). This creates smaller **"microhabitats"** within the larger stream habitat that support a rich, diverse collection of aquatic life.

The tremendous amount of energy carried by excess amounts of stormwater runoff flowing through a stream can seriously damage the pool-riffle-run microhabitats leaving the overall stream habitat much less diverse. As a result, a less diverse assemblage of animals, characterized by fish, insects and other life that are able to withstand an altered, simplified and more polluted environment, will eventually predominate. Also, stream banks, washed out by high volumes of stormwater, release considerable amounts of soil particles or sediment (Chapter 5) that is detrimental to stream life.

Within a short amount of time, a stream can become seriously damaged from the effects of increasing stormwater volumes in a developing watershed. Many communities that have undertaken projects to repair stormwater-damaged streams find that this is often a labor and money-intensive undertaking and seldom will a stream be restored to its original state.

State environmental laws and municipal land use regulations incorporating effective, long-term stormwater management (Chapter 4) – integrated into watershed-based natural resource planning – provide an excellent framework for the conservation of Pike County's streams.

tial for future increases in stormwater runoff that are created as remaining undeveloped parcels in, or adjacent to a community, are developed.

But communities don't have to wait for a stormwater assessment to take proactive measures. Community associations can also utilize Conservation Design and LID principles by incorporating them into their **community covenants**.

Other community association options include programs that offer incentives to residents for lot consolidations or utilizing community funds for the outright purchase of vacant lots. Tax sales offer an opportunity for community associations to acquire remaining, undeveloped land parcels at relatively low cost.

Conservation of Forests and Wetlands for Stormwater Management

Conservation of open space, including Pike County forestlands, can be cost effective for communities and municipalities, over the long-term, in stormwater management. Why? Because protected land makes much less of a contribution to stormwater problems that would otherwise be created as a result of both compaction of soils and creation of impervious surfaces when a parcel of land is developed.

Stormwater damage to community infrastructure

Efforts to provide long-term protection of forestlands can be initiated by individual landowners, community associations, fishing and hunting clubs, municipalities or county-level initiatives. **Conservation Easements** (Chapter 11), legally binding agreements that restrict or prohibit development on a parcel of land, are one very effective option that have been used successfully to preserve forested lands in Pike County.

Wetlands (Chapter 7) – a naturally occurring yet critical component in a community's stormwater management infrastructure – should be given high priority in land protection efforts. The **Delaware Highlands Conservancy** (Appendix D) is a local land trust that provides assistance to individuals, communities and municipalities interested in land conservation.

Watershed-based Stormwater Management

Managing water resources on a watershed basis (Chapter 1) provides a highly effective means of managing stormwater. This approach requires cooperative efforts between neighboring municipalities, whose boundaries fall partly or completely within the same watershed. Residents can support and promote these efforts by attending municipal meetings or by writing letters voicing support for cooperative efforts between their officials and adjoining municipalities to address stormwater management concerns for both present and future needs.

Summary

Stormwater occurs naturally in undeveloped watersheds. However, increasing land development, particularly where land use regulations and planning for stormwater management are inadequate or lacking altogether, often results in excessive volumes of stormwater impacting Pike County's

natural resources, residents and communities. Stormwater causes flooding and infrastructure damage, pollutes and degrades surface waters and can lead to contaminated community drinking water supplies.

Stormwater need not be seen solely as a nuisance to be simply collected in ditches and pipes and moved off-site as quickly as possible. Overemphasizing these control measures, often the basis of conventional stormwater management strategies, often only shifts problems elsewhere, reduces groundwater recharge for community water supplies and fails to address protection of water quality.

Options for community associations include enlisting the services of a professional consulting engineer to conduct a stormwater assessment that evaluates problem areas and outlines potential solutions. Incorporating Conservation Design and Low Impact Development (LID) principles into land development projects can reduce stormwater runoff in communities by decreasing amounts of impervious surfaces, maintaining natural vegetation and existing drainage patterns, maximizing stormwater infiltration and conserving open space. Through comprehensive planning and the enactment of land use regulations that incorporate Conservation Design and LID principles, municipal governments can play a significant role in effective stormwater control.

Stormwater management on a watershed basis requires cooperation on many levels and provides an excellent model for a holistic approach to stormwater management. Various options exist, including the measures listed in this chapter, to address both existing stormwater problems and to plan to prevent future problems from occurring.

Need an NPDES Permit?

Although single home construction, addition and renovation projects usually do not require an NPDES (National Pollution Discharge Elimination System) permit for stormwater discharges, land development activities that involve 1 acre or more of disturbance, over the life of a project, may require an NPDES permit. (See Chapter 10 for more information on NPDES permits). Contact the Pike County Conservation District for assistance in determining whether or not your project will require an NPDES permit.

Action Steps for Stormwater Management

☞ Let your local officials (Appendix B) know you support intermunicipal, watershed-based stormwater management.

☞ Support local municipal officials in the implementation of land use regulations that incorporate Low Impact Development and Conservation Design principles.

☞ Encourage your community association to conduct a stormwater assessment that looks at solutions for existing as well as potential, future stormwater problems.

☞ Protect wetlands (Chapter 7) that remove pollutants from stormwater runoff and help to control flooding.

☞ For residents, directing downspouts onto lawn areas or into rain gardens or rain barrels, minimizing areas of impervious surfaces, maintaining native vegetation (including forests) and minimizing lawn areas can all help to reduce stormwater runoff.

☞ Support community association and municipal-level initiatives for open space conservation.

Resources for More Information

Low Impact Development Center: www.lowimpactdevelopment.org

Natural Resources Defense Council, Low Impact Development: www.nrdc.org/water/pollution/storm/chap12.asp

Non-point Education for Municipal Officials, University of Connecticut: http://nemo.uconn.edu

PA DEP, permitting information: www.dep.state.pa.us/dep/efacts/generalpermitslisting.htm

PA DEP, Stormwater Management: www.depweb.state.pa.us/dep/site/default.asp. Select "Search" and "Stormwater Management."

Pike County Conservation District: www.pikeconservation.org. Good source for technical information on obtaining permits for development activities. Downloadable forms available.

Delaware Highlands Conservancy (Appendix D): www.delawarehighlands.org

Master Gardeners at Pike County Cooperative Extension Office: http://pike.extension.psu.edu/. Select "Horticulture/Gardening." Telephone: 570-296-3400. Information on selecting and growing native plants.

Native Plant Society of New Jersey: www.npsnj.org/ rain_garden_home.htm. Downloadable manual on building a rain garden.

PA Bureau of Forestry: www.dcnr.state.pa.us/forestry. Select "Education and Information" and "Wild Plant Program." Information on landscaping with native plants.