




Here are a few suggestions
about what you can do to make a difference

- Disconnect your rain gutters (downspouts) from impervious surfaces (such as driveways and sidewalks) and direct the flow to grassed areas or into infiltration beds (dry wells).
- Install a rain barrel and use the collected rainwater for watering flowers and gardens.
- Allow a buffer of native grasses and other vegetation to grow along streams, ponds, or wetlands. This will filter pollutants, protect the stream channel and bank from erosion, and provide better habitat for aquatic based animals.
- Convert small low-lying areas into rain gardens. These can consist of small gardens of water tolerant plants and bushes that will help retain and infiltrate runoff.
- One of the best ways you can reduce the impacts of stormwater is to reduce the pollutants that can be carried in runoff into streams, reservoirs and water supply intakes. Always properly dispose of household hazardous waste, including cleaning solutions, paints, oils, batteries, solvents, pesticides, sealants, fertilizers, etc. When applying fertilizers or pesticides to your lawn or garden, only apply the recommended amount, and do not apply just before a rainstorm, or near a water body.

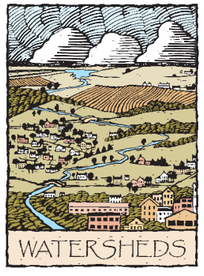
Other sources of information and assistance

Chester County
Planning Commission
610-344-6285

Penn State Cooperative Extension of
Chester County
610-696-3500

Chester County
Conservation District
610-696-5126

Natural Resources Conservation Service
U.S. Department of Agriculture
(Chester County Office)
610-696-0398



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Reducing Stormwater and Flooding
The Ten Principles of Effective Stormwater Management

The recent wet weather has made us all aware of what can happen when repeated rainstorms and intense showers occur: runoff—overflowing streams—erosion—property damage—power outages—hazardous traveling conditions—flooding. We can't turn the rain on and off as we see fit and the damaging storms can never be fully tamed to our desires. We can, however, remain ever aware of the influence we have on the environment when we build, farm and reshape the land and streams to meet society's wants and needs.

Rainfall happens and with it the inevitable runoff and resulting impacts. What we as a society do to address the influences we have on our environment will have far reaching implications on the health, safety and welfare of future generations as well as on us here and now. The impacts listed above have one thing in common: They are all related to stormwater and how, once the rain hits the ground, the stormwater will interact with the environment.

Goal 5 of the ***Watersheds*** plan is to "Reduce Stormwater Runoff and Flooding." Several objectives have been established to meet this goal. The ultimate and collective purpose of these objectives is to accommodate planned growth in a manner that protects public safety while sustaining ground water recharge, stream baseflows, stable stream channel processes and geomorphology conditions, the flood carrying capacity of streams and their floodplains, and ground water and surface water quality—to the maximum extent practicable. This can be accomplished through municipal implementation of "effective stormwater management," which includes ten principles.

Stormwater retention basin (pond) integrates access for pedestrians as well as providing vegetation along the shoreline.

Reducing Stormwater and Flooding

The Ten Principles of Effective Stormwater Management

1 Minimize the volume of stormwater runoff generated

The single most important element of effective stormwater management is to encourage and promote land development that minimizes the volume of stormwater created in the first place. By updating local ordinance design requirements, and incorporating conservation development design criteria, municipalities can contribute to minimizing the amount of stormwater runoff generated. Leaving pervious areas undisturbed to the maximum extent practical for infiltration of rainfall, or for use as part of infiltration Best Management Practices (BMPs), also reduces the volume of stormwater runoff.

2 Define "predevelopment condition" as "woodland, pasture or meadow condition"

The selection of an appropriate predevelopment ground cover assumption is required in order to design stormwater systems that provide post development hydrologic conditions that are more consistent with the instream flow conditions and carrying capacities of receiving streams and floodplains, and to protect ground water recharge. For new development sites where existing cover conditions consist of woodlands or meadow, these cover types should be used in the calculations. For areas with agricultural ground covers (e.g. row crops, etc.), it is suggested that "pasture in good condition" be used as the predevelopment ground cover assumption. For sites in urban areas and areas of redevelopment, a reduction of existing runoff volume, water quality improvement or increased infiltration is recommended, but at a lesser magnitude than is required for new development in other areas.

3 Promote infiltration to protect ground water recharge and reduce runoff

To sustain stream baseflows, and reduce flooding and instream erosion, the volume of runoff infiltrated into the ground must be maintained at or near that expected from undisturbed land. For sites within or discharging to Special Protection Waters designated as Exceptional Value or High Quality, infiltrating the net increase in runoff volume from a 2-year storm event is recommended. For all other areas, it is recommended that the volume of runoff from the first one and one-half (1.5) inches of rainfall be infiltrated. A minimum infiltration volume should be required that protects the volume of predevelopment ground water recharge on all new development sites. Where additional onsite infiltration is not provided, the use of additional peak rate controls is recommended.

4 Protect water quality by removing pollutants prior to discharge to streams

Removing sediments, nutrients and pollutants from stormwater runoff prior to its release to streams is the most promising and widespread approach needed to protect stream water quality in Chester County. By using effective BMPs to capture the volume of runoff from the first one (1) inch of rainfall, between 85 percent and 90 percent of the total annual average rainfall runoff can be handled through BMPs for pollutant reduction prior to discharge to streams.

5 Protect instream channels and geomorphology conditions

This principle strives to protect and maintain the stability of stream channels from excessive and frequent flow rates and damaging erosion. Temporarily attenuating the runoff from a 1-year 24-hour storm event on site for a period of 12 to 24 hours reduces the runoff rates and volumes received by streams to that which is in better balance with the conditions of the receiving stream. This attenuation can be achieved by routing runoff through the site via grassed swales, wetlands, riparian buffers, or retention ponds.

6 Reduce impacts of development to flood flows

A reduction in flood peak rates is recommended to achieve a balance between post developed site conditions and the flow-carrying capacity of the stream and its floodplain. By reducing the post development peak rates of runoff for the 2-year through 100-year storm events to be equal to the corresponding peak rate for a "woodland, pasture or meadow condition," the total flood volume received by the stream system can be more efficiently conveyed within the natural channel and floodplain. Further reductions in release rates are recommended where onsite infiltration is not provided.

7 Protect adjacent lands from direct stormwater discharge

Stormwater management designs that simply discharge stormwater runoff to a neighboring property without first providing appropriate water quantity and quality measures should be avoided. Adjacent lands that are downstream of a new development should be protected from adverse impacts caused by increased runoff. Protections can include establishing a drainage easement over the adjacent lands and design and construction of conveyance systems that will protect the adjacent lands from erosion and flooding.

8 Ensure long-term operation and maintenance of stormwater facilities

Stormwater management improvements constructed to comply with the best design standards possible are all for naught if these measures are not properly maintained to function as designed. Therefore, an operation and maintenance plan should be prepared and made part of any plans approved for construction. The entity responsible for the long term operation and maintenance should be clearly designated along with an adequate source of funding.

9 Establish forested riparian buffer networks

Riparian buffers should be made part of any site design because of the water quality, infiltration and stream bank stabilization functions they can provide. Protecting the riparian zone along water bodies can provide multiple benefits including water quality improvements, reducing runoff, lower stream temperatures, and providing in-stream habitat. These areas also provide open space, and passive recreation areas. Riparian buffers can be established in urban, suburban and rural areas and are most effective when interconnected from one location to the next.

10 Protect wetlands, floodplains, and forested slopes

Wetlands located in riparian corridors and floodplains serve an often unrecognized and undervalued function—storage and attenuation of floodwaters. This in turn contributes to reducing the peak rate of flood flows further downstream. Floodplains are areas where flood flows expand across the stream valley, causing lower flood levels and slowing flood flows. Protecting floodplains from fill and construction are strongly encouraged to preserve the maximum flood carrying capacity of the natural floodplains; and therefore avoiding increasing peak flow rates or flood levels. Protecting forest cover on steep slopes helps to reduce the rate and volume of rainfall runoff and associated erosion. The tree canopy captures the rainfall and the root systems, understory brush, and leaf litter slow down runoff and increase infiltration.