

## CHAPTER 6

### STORMWATER MANAGEMENT TECHNIQUES

Techniques to lessen the impact of stormwater runoff from both existing and proposed land uses fall into two broad categories; structural, and non-structural. Structural stormwater management techniques utilize physical means to reduce or manage runoff. Stormwater detention basins, infiltration trenches, and grassed waterways are all examples of structural stormwater management techniques. Non-structural stormwater management techniques generally refer to land use restrictions used to manage the amount and extent of land use changes. Floodplain, stormwater management, subdivision, and zoning regulations are all examples of effective non-structural stormwater management techniques.

A summary of stormwater management alternatives for the Chatham Run watershed is presented below. The applicability of a particular stormwater management technique is site specific. On-site characteristics such as topography, soils, sub-surface geology, water table, existing and proposed land uses, land requirements, and regulatory controls must be considered to determine the suitability of a particular stormwater management technique.

#### **Structural Stormwater Management Techniques**

Structural stormwater management techniques can be broken down into two categories, volume reduction and peak reduction techniques. Volume reduction techniques decrease the amount of stormwater that runs off a site by increasing the infiltration fraction of precipitation. Peak reduction techniques decrease the magnitude of peak flows while increasing the duration of runoff period.

A discussion of volume reduction and rate reduction techniques that may be appropriate for use in the Chatham Run watershed is presented below. A description of the techniques, applicability, advantages and disadvantages, maintenance requirements, and approximate construction costs (where available) are presented at the end of this Chapter in Table 6-1. The “Pennsylvania Handbook of Best Management Practices for Developing Areas” (Pennsylvania Association of Conservation Districts, 1998) “...describes practices and principles that are effective in controlling erosion and sediment and managing storm water, and that also efficiently use space, are esthetically pleasing, and preserve or even improve water quality and wildlife habitat.”

## **Volume Reduction Techniques**

Land use changes and development in the watershed will increase the volume of runoff. Any reduction in the amount of runoff from new developments that can be accomplished through the prudent implementation of a stormwater management plan for the site will play a role in the success or failure of the watershed-wide stormwater management plan. Volume reduction techniques can be a valuable part of any stormwater management plan.

Some volume reduction techniques decrease runoff from a site by routing water to the subsurface and the local water table. Great care must be taken to ensure these types of volume reduction techniques do not degrade the water quality of local aquifers. Title 25, Chapter 97 (Industrial Wastes) Underground Disposal, Section 97.71, clearly refers to stormwater runoff as potential pollution unless "...the disposal is close enough to the surface so that the wastes will be absorbed in the soil mantle and be acted upon by the bacteria naturally present in the mantle before reaching the underground or surface waters." Discharges to sinkholes are not acceptable unless a geologic evaluation shows that groundwater would not be adversely affected. Stormwater runoff discharges containing materials that are not biodegradable or are not capable of being absorbed/adsorbed by the soil structure are not acceptable. This includes solvents which may be spilled in parking lots, and de-icing agents used during winter months.

Volume reduction techniques are typically used in conjunction with peak reduction techniques as part of the overall stormwater management plan. Volume reduction techniques normally are not sufficient by themselves to provide adequate attenuation of stormwater runoff, except for use at individual homes and small parking lots. Volume reduction techniques can be used to decrease the size of the peak reduction facilities, thereby lowering capital costs.

## **Peak Reduction Techniques**

Peak reduction techniques are generally temporary storage facilities that decrease peak flows from a site. Proper design of peak reduction facilities can decrease peak discharges to acceptable values within the constraints of the watershed-wide stormwater management plan. The design of peak reduction facilities must consider pre-development peak flows, anticipated post-development peak flows, applicable release rates, and site constraints.

## **Non-Structural Stormwater Management Techniques**

Non-structural stormwater management techniques rely primarily on federal, state, and local regulations. Applicable federal regulations which regulate activities in waters of the United States include, but are not limited to, Section 404 of the Clean Water Act (PL 92-500) and the River and Harbor Act of 1899, which regulate activities such as filling, dredging, and wetlands encroachment. State regulations include, but are not limited to, the Dam Safety and Encroachment Act (P.L.177), which regulates activities such as stormwater detention pond outflows into receiving streams under the jurisdiction of the PA DEP Bureau of Dams & Waterway Management, in or near waters of the Commonwealth. On the local level, ordinances such as floodplain management, stormwater management, subdivision, and zoning regulate development. All non-structural stormwater management techniques affect runoff by regulating land use.