

1.17 Stormwater Management Facilities

Prior to the 1970's in New Jersey, the general approach to stormwater was to collect it and send it downstream. Water was collected in storm sewers and piped to the nearest stream or ditch. In urban areas, it was not uncommon to enclose the natural stream in a pipe or culvert and to build adjacent to, and in some cases over, the enclosed stream. As areas developed, it was not uncommon for storm sewers to be installed on an as needed basis, with little planning. Most municipalities did not keep extensive records of storm sewer systems.

Replacement of forest and meadow areas with structures and pavement results in an increase in impervious surface. Redevelopment of existing low-density areas with more intense development also results in more impervious surface area. As a result, less water can percolate into the ground and more of the rainfall leaves the site as surface runoff. Water leaves the site more quickly due to the effects of traveling over smoother surfaces and being conveyed in storm sewers. This shortening of the time required for water to leave a site increases the effect of short duration high intensity storms. Thus, downstream stormwater flows tend to increase in peak rate and total volume, with a shorter time to peak.

The effects of site disturbance during construction, including increased erosion and sediment discharge downstream, have long been recognized. The local Soil Conservation Districts have jurisdiction for approval and enforcement of soil erosion and sediment control plans for site disturbances of 5,000 square feet or more. These stormwater facilities are mostly temporary in nature, however the districts also review facilities proposed for permanent stabilization at pipe or culvert outlets to waterways.

There was much new development in New Jersey in the 1960's, which included a drought period. After the drought ended and more normal rainfall patterns returned, local flooding problems experienced downstream of the newer development sites brought attention to the need to mitigate the effects of the increased rate of stormwater runoff caused by site use changes. Several counties and municipalities implemented requirements for new site development to include stormwater detention facilities to reduce the peak flow from the site after development to not more than the peak flow under pre-development conditions for a specified design storm. These requirements were generally applied on a site-by-site basis, and there was no requirement to coordinate with other site developments in the watershed.

The compound effect of several significant land use changes with individual on-site stormwater detention facilities in a watershed can result in a net increase of peak flows downstream, even though the peak flow rate at each site is controlled to be no more than the pre-development peak. This occurs due to the change in timing of flows arriving downstream. As flows from several sub-watersheds are added together, the timing change can result in an increase of the peak and an increase in the duration of high flows in the receiving stream. As stormwater management was considered more intensely in

the 1970's, it became apparent that there was a need to coordinate the individual detention basins and other stormwater management facilities on a watershed basis.

In the 1980's, the State of New Jersey awarded grants to several counties for regional stormwater management planning on a watershed basis, identified as "Phase II Stormwater Management Plans". Phase I consisted of evaluating existing policies and administrative practices and adopting a stormwater management ordinance, or making appropriate changes to existing ordinances. The results of several of the Phase II regional planning studies, as well as earlier work by the US Soil Conservation Service, indicated a need to require that peak flows from on-site detention facilities be designed to be less than peak flows under pre-development conditions.

In the 1980's, there also was increased awareness of the impacts of site development on stormwater quality. Pollutants are washed from land surfaces during a storm. The early part of a storm tends to have a higher concentration of pollutants since it is essentially washing the surface of built-up pollutants. This effect is termed the "first flush" effect. Some jurisdictions adopted requirements for storage and slow release over a period of 18 hours in residential areas, and 36 hours in industrial areas, of a water quality design storm of 1.25 inches of rainfall.

From the 1970's through much of the 1990's, varying criteria for evaluation of stormwater facilities, as well as other site development features, evolved in the municipalities and counties throughout the State. Different design storms and release rate criteria were enforced, and some agencies also required facilities to address stormwater quality. In 1997, the State of New Jersey adopted rules under NJAC 5:21, *Residential Site Improvement Standards*, to reduce the multiplicity of standards for residential subdivisions and site improvements in the State. The rules apply to any residential development approval required by any municipality, with minor exceptions. Subchapter 7 of the rules addresses stormwater management. The rules address the design of stormwater management facilities, including quantity and quality of water released from a site. In the absence of a regional stormwater management plan, post-project construction peak runoff for the 2, 10 and 100-year storm events must be no more than 50, 75 and 80 percent, respectively, of the pre-project construction peak runoff rates.

These rules apply only to proposed residential development, and do not apply to other types of development. The rules also do not address the effects of existing development.

Numerous stormwater detention basins and other stormwater management facilities have been constructed in association with development in the watersheds over the last 20 years. Many of these are on-site facilities owned and maintained by the site owner or homeowners associations. No comprehensive record or mapping of these numerous facilities has been located. For regional planning, detailed inventory of on-site detention facilities is likely not warranted, with the possible exception of those facilities which serve a significant area and were designed in conformance with the peak flow reduction concepts described above.