

A SUSTAINABLE APPROACH TO CARLISLE'S STORMWATER MANAGEMENT

When it rains, stormwater runoff can flow over impervious surfaces, picking up pollutants along the way and washing them into rivers and streams. Stormwater runoff can also cause flooding (particularly evident in a number of locations within the Carlisle borough limits), streambank and other erosion, and destruction of aquatic habitat. Traditional approaches to stormwater management have been to collect runoff and channel it within closed underground pipes (and potentially to a stormwater detention basin in an effort to control the rate of runoff) prior to releasing the runoff water into the receiving streams.

The South Central Assembly, in concert with the Borough of Carlisle and the Army College and partnering with Skelly & Loy and others, is proposing to carry out a project designed to provide sustainability criteria to a local stormwater management challenge.

The basic objectives of Sustainable Stormwater Management (SSM) include the following.

- Use a comprehensive community-based master planning approach to improve coordination between property owners and municipalities located within the same drainage area to coordinate the implementation of stormwater management.
- Protect and enhance streams and waterways in urban catchments by reducing pollution in stormwater runoff.
- Improve the energy efficiency of both constructing and maintaining stormwater management collection, conveyance, and treatment systems.
- Improve approaches to stormwater management and water conservation in practical, ecologically sensitive, and cost-effective ways.
- Reduce the overall labor and other resource demands required to comply with stormwater management regulations.
- Use the developed approach as a model that can be duplicated for other municipalities and watersheds.

In order to achieve these objectives, designing new housing and other developments to incorporate SSM is about ensuring that water, as a resource, is used as efficiently as possible. So instead of simply removing water from a site without treatment and creating water quality and quantity problems downstream, water could be stored, reused, and treated using the numerous available opportunities to incorporate Best Management Practices (BMPs). This approach helps to create more sustainable growth and development.

Many BMPs entail incorporating simple landscaping elements into the new development design inclusive of such items as

- constructed treatment wetlands;
- grass swales;
- on-site storage or infiltration systems (underground infiltration galleries and storage tanks);
- vegetated bioretention areas; or
- paver blocks or other permeable techniques in driveway and parking areas.

The different elements of water-sensitive urban design are usually integrated throughout the project area (often more than one development area) in combinations known as “treatment trains.” This involves constructing stormwater treatment devices at locations where the stormwater is collected, channeled, and released. The selection of the various treatment options can be based on the removal of pollutants from the areas exposed to the stormwater runoff waters. Targeted pollutants which can be removed from the stormwater flows prior to reaching the receiving stream may include sediment and road grits, deicing compounds and salts, nutrients, heavy metals, hydrocarbons, and other organic compounds.

The current challenge to achieving SSM is to have a coordinated approach among municipalities, property owners, land development efforts, researches, and the various involved federal, state, and local regulatory agencies to implement these principles in a coordinated effort. One critical tool needed in order to achieve this level of coordination for the Carlisle SSM project is to develop an effective GIS database which contains drainage area attributes and physical data that relate to estimating projected future changes in stormwater management flows as well as existing and proposed storm sewer collection systems and on-site as well as regional sustainable stormwater management BMPs. Use of portable hand-held GPS data collectors by municipal maintenance staff during normal daily routines (e.g., on trash collection routes, etc.) is one approach which can be a very cost-effective approach to collecting this real time physical data through the stormwater drainage system. This approach can also be employed to document extent of flooding at known problem areas during emergency responses during these events.

This GIS database would be used to demonstrated the effectiveness of various available BMP options through hydrologic and hydraulic modeling of the drainage system. This modeling effort would be used to support coordination efforts between the involved local municipalities to promote a better understanding of the effects of BMPs on upstream and downstream neighboring communities and property owners. The GIS system, therefore, would also serve as the key to monitoring the overall effectiveness of implementing the SSM BMPs through being able to track the reduction in severity or frequency of flooding at the known problem area sites. The final phases of this SSM project would then be to construct a selected BMP and monitor its actual performance to confirm its effectiveness at achieving the design SSM objectives. These monitoring data would then be used to refine the SSM approach for incorporation into subsequent BMP construction phases at other prioritized locations.

The proposed project is consistent and wholly compliance with the recommended stormwater management control provisions, as enacted through the local implementation of the model ordinance provisions contained within the Cumberland County Act 167 Stormwater Management Plan. The Plan establishes comprehensive goals for the management of both stormwater runoff quality and quantity for the express purpose of protecting and preserving public health, safety, and welfare. Within the plan, these goals have been embodied within the control provisions of a model stormwater management ordinance which must be adopted and enforced by each of the County’s constituent municipalities. The model ordinance contained within the Cumberland County Stormwater Management Plan calls for the implementation of stormwater BMPs and other environmental sustainability measures to meet the various quantity and quality control provisions.