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## Modeling Low Impact Development Alternatives with SWMM

Lewis A. Rossman

The U.S. Environmental Protection Agency's Office of Water is actively promoting the use of low impact development (LID) practices to help protect and restore water quality in urban and developing areas. Such practices support the concepts of green infrastructure and sustainability by managing stormwater close to its source so as to mimic a site's predevelopment hydrology. Computational tools are needed to objectively evaluate the hydrologic benefits of proposed LID controls. The Storm Water Management Model (SWMM) is one such tool that provides an attractive framework for modeling the long term performance of LID controls. However the latest version of SWMM (Rossman, 2008) has only a limited capability to rigorously model LID alternatives (Huber et al., 2006).

This chapter describes how SWMM's runoff engine and graphical user interface were extended to explicitly model specific types of LID controls, such as permeable pavement, bio-retention areas (e.g., rain gardens and street planters), rain barrels, infiltration trenches, and vegetative swales (see Figure 11.1). Each of these controls is represented as a unique LID object with its own set of properties. These objects can be placed within standard SWMM subcatchment areas in replicate fashion. Or they can occupy their own unique subcatchments that can be linked together to form a cascading sequence of LID controls. Time-dependent water balance models are used to describe the hydrologic performance of each individual LID unit. Several examples are used to illustrate how this approach was implemented within SWMM 5.

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