

Infiltration Techniques for Stormwater Management in Carbonate Geology

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Innovative stormwater management (SWM) has as one of its central principles the recycling of increased runoff volumes back into groundwater aquifers, accomplishing both water quantity and water quality objectives. However, in areas underlain by limestone carbonate bedrock, this otherwise optimal infiltration strategy for stormwater can pose risks of subsidence, sinkhole formation, and groundwater contamination. Cahill Associates (CA), working with the Lehigh Valley Planning Commission (LVPC) in Allentown PA, has developed a SWM program for the 107.5 square-mile Little Lehigh Creek Watershed in southeastern Pennsylvania, designed to achieve the multiple benefits of infiltration, even as the limestone-related risks are minimized. The result is a new design manual, *Technical Best Management Practice Manual and Infiltration Feasibility Report: Infiltration of Stormwater in Areas Underlain by Carbonate Bedrock in the Little Lehigh Creek Watershed*.

The objectives of the design manual are to set forth complete and understandable technical guidance for the design of infiltration BMPs, with special focus on applications in limestone geology and to provide detailed directions describing successful infiltration practices in limestone. Secondly, the design manual provides information to convince and even motivate watershed/municipal officials to implement and maintain these sustainable watershed practices. Lastly, the design manual offers many case studies of infiltration on limestone and demonstrates the benefits/costs and proper applications of infiltration BMPs.

Carbonate geology is both a blessing and curse. For some time, the fear of sinkhole creation has tended to convince many that stormwater should simply be kept away from limestone, even though carbonate aquifers are wonderfully rich. The primary stormwater management technique in the watershed has been detention basins, often with impermeable liners. However, the removal of water from carbonate in whatever manner effectively weakens the rock and may promote subsidence and therefore is hardly a sound strategy. The management solution stated simply is to use infiltration BMPs carefully, in a way that mimics the natural hydrologic regime to the maximum extent through broad and even distribution of stormwater. If this approach is employed and other basic precautions are taken, sinkhole creation can be minimized and water quality can be protected.