

Streambank Stability: Modeling Channel Evolution and Pollutant Transport in an Urban Stream

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A stable stream is balanced in flow regime, sediment load and profile. Urbanization of a watershed creates an imbalance in flow regime through increased impervious coverage resulting in increased stormwater runoff. Without proper management, these amplified flows increase pollutant transport capacity and accelerate channel erosion. These impacts are magnified in streams without sufficient bank stability and may result in channel degradation unless appropriate best management practices (BMPs) are applied. This study evaluates the channel evolution and transport capacity of a small (<1.0 square mile drainage area) urban stream, already experiencing significant degradation, located in Middletown, Pennsylvania. Single event and time-series simulations were performed using USDA Conservational Channel Evolution and Pollutant Transport System (CONCEPTS) modeling software. The stream was evaluated for three conditions, including: existing, partially developed conditions; fully developed conditions without BMPs; and fully developed conditions with BMPs using the Pennsylvania Stormwater Best Management Practices (BMP) manual and the Virginia Stream Restoration and Stabilization Best Management Practices Guide. For each scenario modeled, channel dynamics were examined under both summer and winter conditions to best evaluate the appropriate restoration measures. Results predict which BMPs are appropriate in the restoration of a small urban stream for channel stability.