

Determination of cost-effective first flush criteria for BMP sizing

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ABSTRACT

Effective control of nonpoint source pollution in urban areas relies on the appropriate application of best management practices (BMPs). Many strategies are used in designing the BMPs considering efficiency, cost, benefits, etc. In Korea, the first flush criterion is typically employed to size the BMPs. However, the criterion was only adopted from foreign literature without verification of its applicability. This study was conducted to investigate the most suitable first flush design rainfall that can be used in sizing the BMPs in Korea. The data used to calculate the pollutant concentrations were gathered from a total of 22 storm events during the three-year monitoring on a paved parking lot site. The magnitude of the generated first flush at 5 mm and 7.5 mm accumulated rainfall were quantified and analyzed by means of mass first flush (MFF) ratio. The results showed that the pollutant concentration at 5 and 7.5 mm accumulated rainfall were 36% and 22% greater than the average event mean concentration (EMC), respectively. Although the BMP size could be appreciably reduced by almost 70% when 5 mm rainfall is to be used as compare to 50% size reduction for 7.5 mm rainfall, it is still better to select 7.5 mm as design rainfall. In this case, the treated mass is above 50% for 7.5 mm but only 40% for 5 mm rainfall. Therefore, “cost-effective” BMP design must not only depend on treated runoff quantity but also quality of the treated runoff.

Keywords: Accumulated rainfall; BMP; Design; EMCs; First flush; MFF

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