

# Environmental Performance of the Stormpav Permeable Pavement Using the Stormwater Management Model (SWMM)

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**Abstract:** Urban stormwater runoff is contaminated with a variety of pollutants, including total suspended solids (TSS) and total phosphorus (TP), as a result of non-source pollution from transportation, residences, and businesses, as well as sediment from human activities and construction sites. These pollutants are expected to degrade the water quality in local rivers and streams, impairing the quality of marine life and contaminating drinking water supplies. This study evaluates the environmental performance of a permeable pavement system in an urban catchment using the stormwater management model (SWMM). Two pavement systems with different hydraulic designs were compared to reduce runoff, increment of groundwater storage and the environmental parameters assessments on total suspended solids (TSS) and Total Phosphorus (TP). The first system comprises a StormPav, which is the UNIMAS innovated green pavement with subsurface hollow cylindrical micro-detention pond storage of about 70% void content. The second system consists of porous concrete (PC) pavement assembled in a layered of coarse and fine particles to ensure water can infiltrate through, with about 40% void content. The environmental impact assessment was applied at Padungan Commercial Centre in the Kuching City of Malaysia. The case study simulated in low impact development (LID) sub-catchment in SWMM to obtain the runoff, infiltration and environmental quality performance. In the assessment, it was found that, for both pavement systems, higher storms at shorter duration resulted in higher reduction efficiency. The StormPav is more effective in reducing runoff, while presenting a lower value for environmental assessments in removing TSS and TP compared to PC.

**Keywords:** Stormwater management, StormPav, permeable pavement, SWMM, environmental assessment

## 1. Introduction

Urbanization is the process by which human populations are concentrated into discrete areas. Rapid urbanization has created a slew of perplexing issues, resulting in land being converted to residential, commercial, industrial, and