

Lab scale study on integrated GSI for urban drainage systems

ABSTRACT

Urbanization grows rapidly in Malaysia and has known to have several negative impacts. As development intensifies, water runs rapidly into rivers and less filters through the soil, contributes to the congestion of the stormwater drainage system that leads to the flash flood problem. Waste and pollution transported by stormwater also posed environmental problems, thus several open drain systems were introduced to improve it. However, some of those open drainage systems contributes to more pollutions and worsened the quality of life of the urban dwellers in Malaysia. Several approaches with different concepts have been developed, including the Best Management Practices (BMPs), Low Impact Development (LID), Water Sensitive Urban Design (WSUD), Sustainable Urban Drainage Systems (SUDS), Innovative Stormwater Management and the Green Stormwater Infrastructure (GSI). This paper proposed the potential system that gives minimal impact to the environment while improving the water filtration and flood control system in the urban areas. The GSI system can effectively address water environment issues caused by traditional stormwater drainage systems. Research focuses on the development and application of an integrated GSI storage used in urban areas adapted to flood risk with the used of bio-composite material. A lab scale system was developed to study the performance of bio-composite materials and the design of inner storage as an infiltrator as runoff decelerator. Results showed that the used of rice husk and coconut fibre as an infiltrator improved the quality of rainwater. The integrated GSI that was designed to have an inner storage also elongates the surface runoff time. It is expected that the proposed design of eco-friendly integrated storage for drainage system could prevent ponding and at the same time the contaminated flow will be filtrated by the embedded biocomposite materials before entering the water bodies.

Keyword: Integrated storage; Stormwater; Bio-composite; Urban drainage