Pertanika J. Sci. & Technol. 26 (1): 283 - 298 (2018)

SCIENCE & TECHNOLOGY

Journal homepage: http://www.pertanika.upm.edu.my/

Green Wall for Retention of Stormwater

J. T. Lau* and D. Y. S. Mah

Department of Civil Engineering, Faculty of Engineering, University Malaysia Sarawak, 94300 UNIMAS, Kota Samarahan, Sarawak, Malaysia

ABSTRACT

Urbanisation increases the level of imperviousness in a catchment, and more runoff is converted from rainfall in urban areas. To mitigate this adverse situation, dispensed green infrastructure presents the best solution for delivering results in reducing stormwater impact. Green roofs and rain gardens are extensively studied and widely available in the literature, but this is not the case for green walls, which more often than not, are treated as ornaments. Thus, this study developed a computer-aided stormwater model that incorporates a green wall to investigate its effectiveness as an urban drainage system. The effectiveness of employing a green wall as a stormwater component is tested using USEPA SWMM 5.1 and the embedded bioretention cell interface. Four simulation models according to different conditions and precipitation input are tested, compared and discussed. The conditions include investigation of different soil types, average recurrence interval (ARI) and storm duration with design and observed rainfall. The results reveal that synthesis precipitation data, used in Scenario 1, 2 and 3, decreased runoff by more than half, at 55% on condition of one-year ARI and 5 minutes of storm duration. Meanwhile, Scenario 4 also shows a repetition of runoff reduction by half after the integration of the green wall using the observed rainfall data. Thus, it is verified that a green wall can be effectively used as an urban drainage system in reducing surface runoff.

Keywords: Bioretention, green wall, runoff, SWMM, urban stormwater management

ARTICLE INFO

Article history:
Received: 26 June 2016
Accepted: 09 May 2017

E-mail addresses:
dante.lau91@hotmail.com (J. T. Lau),
ysmah@feng.unimas.my (D. Y. S. Mah)
*Corresponding Author

ISSN: 0128-7680

INTRODUCTION

The process of urbanisation turns natural ground cover into urban infrastructure or utility developments. Impervious surfaces such as roofs, paved roads and parking lots have expanded significantly together with post-development progress (see Figure 1). Consequently, the infiltration of stormwater into the ground as depression storage is reduced with the gradual elimination of