



## **Modelling of green roofs hydrologic performance using EPA's SWMM**

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### **ABSTRACT**

Green roofs significantly affect the increase in water retention and thus the management of rain water in urban areas. Studies have shown that green roofs retain from 40% to 80% of rain water and therefore can be considered to be a type of flood protection. It is one of the reasons that green roofs are increasingly being installed also in Poland. However there is relatively little data on their in situ performance. Attempts to model water runoff from green roofs, taking into account their construction, slope, the amount of precipitation and selected meteorological parameters such as temperature, humidity as well substrate are relatively rare. In this study the storm water performance was simulated for the green roofs experimental plots using popular Storm Water Management Model (SWMM) with Low Impact Development (LID) Controls module (version 5.0.022). The calibration of SWMM was performed using rainfall storm events and runoff data obtained at the experimental site in Wroclaw, Poland. Simulation results shows the SWMM model has rather poor capabilities to properly describe the hydrologic response of the green roofs. For majority of tested rain events the Nash coefficient had negative values, it indicates a weak fit between observed and measured flow-rates. Because the SWMM model doesn't involve the slope of green roof thus has a tendency to underestimate the runoff. For continuous simulations the main problem is modeling of drying process during the inter-event duration.

### **KEYWORDS**

green roof; hydrologic model; retention, runoff delay; stormwater; SWMM