

# SWMM 水文模擬：低衝擊開發設施於淹水熱區之應用

## Hydrologic Simulation Using SWMM: Application of Low Impact Development Facilities in Flood-Prone Areas

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### 摘要

因地表不透水面積增加，使集水區內逕流量上升並導致洪峰提前，進而對農田水利設施及排水系統造成沉重負擔。本研究選定一台北市歷史淹水熱區，應用暴雨事件模擬（10 年重現期）以 SWMM 建立集水區模型，評估在不同管理情境下導入低衝擊開發（LID）設施（綠屋頂與透水鋪面）之效益。

模擬結果顯示，LID 設施可有效削減總逕流量（約 9%），並顯著降低排水節點的溢流時數與洪峰流量，具在地滯洪與逕流分擔效益。研究結果具應用於農業聚落周邊排水改善、洪水風險調適與農田水利永續管理之潛力，亦可作為氣候變遷下推動分散式水資源管理的參考依據。

關鍵詞：SWMM，低衝擊開發，在地滯洪，逕流分擔，農田水利，洪峰削減

### Abstract

The increase in impervious surface area leads to higher runoff volumes and earlier peak flows within the watershed, thereby imposing a heavy burden on agricultural water infrastructure and drainage systems. This study selected a historical flood-prone area in Taipei and developed a hydrologic simulation model using SWMM under a 10-year return period rainfall event. The effectiveness of implementing Low Impact Development (LID) practices—green roofs and permeable pavements—under different management scenarios was evaluated.

Simulation results indicate that LID practices can effectively reduce total runoff volume (by approximately 9%), and significantly decrease overflow duration and peak discharge at critical drainage nodes. These findings highlight the local detention and runoff mitigation potential of LID strategies, with implications for improving drainage near agricultural settlements, enhancing flood resilience, and supporting sustainable

agricultural water management. The study offers reference value for decentralized water management strategies under climate change scenarios.

Keywords: SWMM , Low Impact Development , Local Detention , Runoff Mitigation , Agricultural Water Resources , Peak Flow Reduction