

**THE IMPACT OF THE DESIGNED URBAN
ENVIRONMENT ON PLUVIAL FLOOD: A CASE
STUDY OF SELECTED LOCATIONS IN
COLOMBO MUNICIPAL AREA**

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Degree of Master of Urban Design

Department of Architecture

University of Moratuwa

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Dissertation Submitted in Partial Fulfillment of The Requirements for The
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DECLARATION

I declare that this is my own work, and that this dissertation does not incorporate without acknowledgement any material previously submitted for a degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and believe it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out this research for the dissertation under my supervision.

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ABSTRACT

Pluvial flooding, caused by intense rainfall overwhelming urban drainage capacity, has become an increasing concern in rapidly urbanizing cities. While conventional flood studies often emphasize engineering and hydrological factors, the role of urban design remains underexplored. This research aims to assess the urban design aspects that influence the occurrence and severity of pluvial flooding within the urban context. It investigates how spatial configurations, built form patterns, surface materials, and the integration of natural and artificial drainage systems contribute to surface water accumulation and flow behavior. Through spatial mapping, field observations, and morphological analysis of selected urban areas, the study identifies the design-related characteristics that either exacerbate or mitigate pluvial flood risks. The findings are expected to reveal critical urban form attributes such as street layout, building density, open space distribution, and permeability that affect stormwater dynamics. Ultimately, this research contributes to developing a framework for integrating flood resilience strategies into urban design practices, for supporting more adaptive, and sustainable, urban environment.

Key words:

Pluvial Flood (Rain-Related Flooding), Impermeable Surfaces, Permeable Surfaces, Water Sensitive Urban Design (WSUD), Surface Runoff, Flood Resilience, Urban Retrofitting, Effective Catchment, Morphological assessment, Hydrological response.

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LIST OF ABBREVIATIONS

Abbreviation	Description
BMP	Best Management Practices
CC	Climate Change
CDM	Continuous Diagnostics and Mitigation
CMC	Colombo Municipal Council
CWA	Clean Water Act
EC	Effective Catchment
EEA	European Environment Agency
ESA	Environmentally Sensitive Area
GI	Green Infrastructure
LID	Low Impact Development
LIUDD	Low Impact Urban Design and Development
LULC	Land Use/Land Cover
OSD	On-Site Stormwater Detention
OSR	On-Site Stormwater Retention
SUDS	Sustainable Urban Drainage Systems
WSUD	Water Sensitive Urban Design