**University of Technology Sydney**

# COUPLED ONE and TWO-DIMENSIONAL MODELING in URBAN CATCHMENTS – REDUCING UNCERTAINTY in FLOOD ESTIMATION

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# Certificate of Authorship

I certify that the work in this thesis has not previously been submitted for a degree, nor has it been submitted as part of requirements for another degree.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of this thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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# ABSTRACT

## COUPLED ONE and TWO-DIMENSIONAL MODELING in URBAN CATCHMENTS – REDUCING UNCERTAINTY in FLOOD ESTIMATION

KEY WORDS: Urban Stormwater, spatial, coupled, two-dimensional, rainfall, runoff, models, hydrology, hydraulics, conceptual, distributed, calibration, validation, pipe, design, drainage

ABSTRACT: A recent trend in urban stormwater modeling projects is the application of coupled one and two dimensional models whereby a two dimensional model routes rainfall excess overland and interfaces with a one dimensional representation of a pipe drainage system.

Two principle advantages are sought in utilising the 1d/2d model. These are:

- 2d routing of surface flow means that flow paths do not need to be known prior to model run; and
- The 2d surface flow model can replace conceptualised lumped hydrology with a physical process based distributed approach.

Numerous studies have been carried out which demonstrate the 1d/2d methodology. Few however have been able to demonstrate model performance against gauged data. Also few such applications have separated out hydrological response from different areas in the urban catchment, such as road, roof and yard response.

This study aims to test the 1d/2d coupled modeling approach on a data set which includes numerous gauged events which separate out three main hydrological processes: roof, road and yard runoff. The data set was compiled as part of PhD dissertation work undertaken by Goyen (2000) for a catchment in the A.C.T, Australia.

It is found that the 1d/2d model system examined, given specific inclusions in the methodology, does demonstrate an ability to reproduce gauged flows extremely well without need for variation of model parameters other than proportional loses applied.