

2. CATCHMENT DESCRIPTION AND PREVIOUS STUDIES

2.1 CATCHMENT OVERVIEW

2.1.1 Catchment Overview

For the purposes of Council's management of the stormwater systems within the City of Ryde, the study area has been traditionally divided into a number of subcatchments. As shown in **Figure 1** they are known as the Mars Creek, Shrimptons Creek, Industrial Creek, Porters Creek and Lane Cove catchments. All consist of tributaries draining to the Lane Cove River while part of the Lane Cove catchment includes the Lane Cove River itself downstream of Fullers Bridge. Details of catchment areas, lengths of stormwater conduits and numbers of stormwater pits are provided in **Table 1**.

TABLE 1: STUDY CATCHMENT AREAS

Catchment	Area (ha)	Total Conduit length (m)	No. of Stormwater Pits
Mars Creek (including University Creek)	327	15,900	540
Shrimptons Creek	555	47,000	1590
Industrial Creek	148	8,900	340
Porters Creek	225	16,300	540
Lane Cove Catchment	303	8,100	330

Of the three major roads, both Epping Road and the M2 Motorway cross all the catchments while Lane Cove Road passes through the Shrimptons Creek, Industrial Creek and Porters Creek catchments.

Broadly speaking, the study area landuse patterns vary either side of Epping Road. To the south-west, or upslope, of Epping Road the landuse is predominantly residential while north-east of the road it is a mixture of industrial landuse, tertiary education (Macquarie University and a number of small institutions) and medium density residential developments.

2.1.2 Flood History

A picture of flood problems in the study catchment has been compiled from three principal sources. They are the entries in Council's flood database, Council's historic (post flood) photographs for the November 1984 flood and the responses to the study questionnaire.

Council's database includes entries for thirteen flood events which have been experienced between November 1984 and March 1990. The events with the most number of entries are November 1984, August 1986, December 1989, 7 and 8 February 1990 and March 1990.

As part of the community consultation process for this study a questionnaire seeking information about personal property and local area flood experiences was mailed to approximately 2800 property owners in September 2008. A total of 272 responses were received and of those 153 (or 56%) reported some past problems with water on their property with 12 reporting above floor inundation in the worst flood. For residents who had occupied their properties for at least twenty five years, the most frequently reported 'worst' flood event was November 1984.

Not only was the November 1984 event considered to be the 'worst flood', it was the only event for which there was any record of watercourse flooding as opposed to neighbourhood overland flow observations. That the 'worst flood' query in the questionnaire was dominated by experiences of November 1984 is consistent with the flood history in the neighbouring Terrys Creek catchment which lies immediately west of the study area (**Reference 1**).

2.1.3 Watercourses

The Mars Creek catchment consists of three separate watercourses. All three are a combination of open channel flow and below ground trunk drainage. The majority of the two southern watercourses – being Mars Creek proper and 'University' Creek – are almost totally open channel regimes as they pass through the grounds of Macquarie University.

Not surprisingly given its much larger catchment area, Shrimptons Creek has a much longer open channel regime, extending from Santa Rosa Park (upstream of Bridge Road) to its confluence with the river. Along this reach, the only significant portion of underground conduits is where the creek passes under Waterloo Road, the Macquarie Shopping Centre and Talavera Road.

Except for their very downstream ends, that is close to the Lane Cove River, the Industrial Creek, Porters Creek and Lane Cove catchments have only occasional reaches of open channel flow. Their flowpaths mostly consist of depressions through residential or industrial areas which carry flow whenever the storm runoff exceeds the capacity of the underground conduit system.

2.2 EARLIER FLOOD STUDIES

2.2.1 1990 Ryde Stormwater Drainage Investigation

This study (**Reference 2**) examined stormwater drainage in four of Council's major urban catchments, being Eastwood, Charity Creek, Buffalo Creek and Shrimptons Creek. It included field inspection, measurement plus hydrologic and hydraulic modelling of all stormwater conduits equivalent to 600mm diameter or greater.

For Shrimptons Creek, catchment runoff regime was modelled using RAFTS software with 32 sub-catchments defining the catchment-wide flows. The modelling included an assessment of the November 1984 flood between Santa Rosa Park and Waterloo Road and parameter values in the RAFTS model (and an accompanying HEC-2 hydraulic model) were adjusted until

satisfactory agreement was obtained with a series of historic flood levels. Those RAFTS parameters were then preserved to calculate the Shrimptons Creek catchment design event flows.

Design events from 1 year ARI to 100 year ARI were subsequently modelled with pipe hydraulic analysis being undertaken using RATHGL software (which analysed 198 sub-catchments with a total of 262 pits).

The report includes a series of photographs some of which are relevant to this study area as follows. Photograph 1 depicts post-flood peak conditions in Eastview Avenue for the December 1989 event while the remaining photographs do not actually depict flood time conditions; that is Photograph 2 which relates to the December 1989 event in Eastview Avenue; Photograph 15 which relates to the December 1989 event in Rocca Street, and Photographs 17 & 18 which relate to December 1989 and November 1984 flooding respectively in the North Road area.

2.2.2 1998 'University Creek' Drainage Master Plan Report

Between 1989 and 1998, Bowden & Partners produced a series of reports for Macquarie University which modelled and reported on a stormwater drainage system for University Creek between Epping Road and Talavera Road.

The 1998 report (**Reference 3**) documents a scheme consisting of four in-creek detention basins which were designed to offset all of the proposed development within the university lands plus an adjoining private development on the corner of Herring Road and Talavera Road. The 1998 report updated the RAFTS modelling undertaken as part of earlier reports and included the modelling of a Council detention basin in Dunbar Park as well as the then proposed four basins. (It is noted that the four basins were subsequently constructed.)

2.2.3 2001 Mars Creek Stormwater Management Plan

This report prepared by Patterson Britton for Macquarie University (**Reference 4**) documents the development of a RAFTS hydrologic model to assess the performance of a series of then current Mars Creek in-creek detention basins. The basins were described as: Basin B1 (at the Link Road Crossing); Basin B2 (adjacent to the Childcare Centre); Basin B3 (at the Waterloo Road Crossing) and Basin B4 (University Lake) and the modelling found that the existing basins were substantially attenuating the peak flood flows.

The RAFTS model was then adjusted to reflect details contained in a ten year plan for development of the university. The resultant model runs showed that the peak outlet flows at all four basin locations were found to be slightly higher and subsequent analysis resulted in recommendations that amendments be made at several of the basin outlets in order to achieve additional off-setting detention for future development.

2.3 DATA BASE

2.3.1 Topography

The topography of the study area was defined by airborne laser scanning (ALS) data provided by Council.

Details of watercourses were directly extracted from specifically commissioned supplementary field measurements undertaken by registered surveyors.

Bed levels in the tidal reach of Lane Cove River (i.e. at and downstream of Fullers Bridge) were sourced from NSW Maritime.

2.3.2 Stormwater Assets

A majority of the stormwater pit and pipe data was contained in either Council's stormwater asset database or from design plans supplied by Council. Additional information was obtained from the RTA and Macquarie University.

Details of road culverts were obtained from specifically commissioned supplementary field measurements undertaken by registered surveyors.

2.3.3 Streamflow and Rainfall Data

There are no streamflow stations in the study area.

Information regarding rainfall stations was gathered from a number of sources. For such relatively small catchments, which respond particularly quickly to short duration storms, the most important data relates to real time measurement of rainfall intensities as measured by dedicated rainfall recorders rather than daily stations which only provide twenty four hour totals.

For the 'worst' November 1984 flood event, there was one rainfall recorder located within the study area. This rainfall recorder station was located at Marsfield (that is, centrally within the study area) and operated by Macquarie University. For the other historic flood events which were reviewed in this study, the nearest available rainfall recorder records were from the Sydney Water Corporation station at West Ryde (which is just beyond the western boundary of the study area).

Details of rainfall data gathered for the individual historic events are presented in **Chapter 4**.