

Review of Site Flooding

**Proposed Cochlear Global Headquarters
University Avenue
Macquarie University**

Prepared For:
CRI Australia
Level 2
76 Berry Street
North Sydney NSW 2060

Prepared by:
Costin Roe Consulting
55 Harrington Street
The Rocks, Sydney NSW 2000

TABLE OF CONTENTS

1	INTRODUCTION	2
2	CATCHMENT DESCRIPTION & HYDROLOGY	3
3	PREVIOUS STUDIES	4
4	CURRENT AND FUTURE STUDIES	5
5	MODELLING AND VERIFICATION	6
6	CONCLUSION	7

1 INTRODUCTION

Cochlear propose to construct a new global headquarters on the site of Macquarie University. The new building will be located in the southern portion of the site adjacent to University Creek. The site is also located near an existing stormwater drainage detention pond and near future planned drainage infrastructure.

As part of the development application process a review of available flood study information has been completed. The purpose of this review was to assess the flood levels adjacent to the site so that potential impacts on the development can be assessed.

2 CATCHMENT DESCRIPTION & HYDROLOGY

University Creek drains in a north easterly direction on the south eastern side of Macquarie University. The creek consists of a combination of below ground piped drainage and modified open channels. The banks of the open channel are steep in the vicinity of the proposed development.

The origin of the creek is south west of Epping Road. It continues through the University, under Talavera Road and the M2 Motorway and into Shrimptons Creek. Shrimptons Creek flows into the Lane Cove River. There are four detention basins formed in the creek where it passes under roads and footpaths within the university.

The catchment is approximately 85 Ha in size of which approximately 30 Ha is upstream of the university. The catchment upstream of the university is predominantly urbanised comprising medium low and medium density housing, sealed roads and some recreational parks. Within the university the catchment is located on the south eastern side of a ridge that runs though the centre of the university.

The average annual rainfall within the catchment is approximately 1,100mm. The area will experience a wide variety of rainfall events in any given period with varying intensity and duration. The relatively small catchment will mean that the response time for the creek is relatively short. The creek is sensitive to intense storms of shorter duration with flows increasing rapidly.

3 PREVIOUS STUDIES

Macquarie University has commissioned various studies as part of an overall stormwater management scheme for the university. The Mars Creek catchment has been extensively studied and University Creek has been studied to a lesser degree.

The following information has been located;

Mars Creek Stormwater Management Options, March 1997 by Patterson Britton.

Macquarie University On-Site Detention Plan, August 2001, by Patterson Britton.

Stormwater Drainage Masterplan, 1998 by Boyden & Partners.

The following key aspects that impact the proposed development are listed below;

The critical storm events for the 20 and 100 year ARI events is 30 minutes. For the five year ARI event the critical duration is two hours.

Flooding in University Creek is influenced by relatively short and intense storms of up to two hour duration. These events are typical thunder storm events localised over the immediate catchment. Runoff within the creek increases significantly over the storm duration with the creek levels rising to full bank in the short period of the critical storm.

The water levels in University Creek are directly influenced by the presence of the detention structures and ponds. The ponds and restrictions act to slow stream velocity and increase water depths. These ponds have been constructed intentionally as part of an overall stormwater management strategy that has been developed for Macquarie University.

The 100 year ARI flood level at the site of the proposed Cochlear Global Headquarters has been estimated at RL58.0. This level is well below the proposed floor level and is suitable to provide a minimum freeboard of 500mm to habitable floors. It is noted that within the University generally that along the creek path that numerous walkways and footpaths are located within the 100 year ARI flood level.

It is noteworthy that the topography of the University Creek channel in the vicinity of the proposed development is steep and acts to contain and channelise the water flow. Ponding does occur on the opposite side of the creek to the proposed development at an existing detention pond.

The critical level for flooding appears to occur at a pedestrian footbridge located just downstream of the Cochlear site. The 100 year ARI water level at this location is within 500mm of the walkway level.

4 CURRENT AND FUTURE STUDIES

Macquarie University has recently commissioned a master-plan scheme for the entire university campus. This scheme includes a proposed stormwater management strategy. Part of this work includes the area for the proposed development. In particular the proposed development is located in areas allocated for future planned drainage structures. The proposed development is also located near a proposed manufactured (not natural) wetland that is to form part of planned bio-filtration treatment for improvement of run-off water quality.

Ryde City Council has commissioned Brewsher Consulting to complete a comprehensive and detailed flood study of the entire Lane Cove River catchment. This work shall include Macquarie University area and Mars and University Creeks. We understand that this study will be completed in approximately six months (second half of 2008).

Based on the information currently available from Ryde Council it is anticipated that the study will provide detailed flooding information for the catchment. It is expected that due to the methods being used and the scale of the study that the flood levels in the University Creek adjacent to the development will be lower than that presently reported.

5 MODELLING AND VERIFICATION

To verify the flooding levels determined from previous studies a conservative one-dimensional analysis was conducted using Watershed Bounded Network Modelling software (WBNM).

The model was set up to simulate five, 20, 50 and 100 year Average Recurrence Interval (ARI) storms. Durations of five, 30, 60 and 120 minutes were modelled.

The maximum water level critical to the proposed development was found to occur at the existing culvert and weir footbridge. This is indicated on drawing CO9459.00-SK01. The weir and footbridge are labelled O & P.

Rainfall and runoff was modelled using local rainfall intensity frequency data from the Bureau of Meteorology.

A series of eight sub-catchments were modelled with flood routing to represent the runoff flow through the six combination outlet structures. The effects of urbanisation were conservatively modelled by estimating the impervious surfaces to cover an average 85% of the 85 hectare catchment. Initial and continual losses were included based on Australian Rainfall and Runoff.

Data collection for the modelling work was completed by various site inspections, review of aerial photographs, data available from the Bureau of Meteorology and Australian Rainfall & Runoff.

The following critical results were found:

Five year ARI two hour duration storm water level RL57.844.

20 year ARI two hour duration storm maximum water level RL58.041.

50 year ARI two hour duration storm maximum water level RL58.124.

100 year ARI two hour duration storm maximum water level RL 58.198.

6 CONCLUSION

A review of available flooding information for University Creek in the vicinity of the proposed Cochlear Global Headquarters has been completed.

The 100 year ARI flood level adjacent to the proposed development is estimated to be RL58.2. This level is considered to be conservative, based on the currently available information and is appropriate for the locality.

Ryde Council is presently completing a comprehensive flood study for the entire catchment. This flood study will not be completed until the latter half of this year. The recommended 100 year ARI flood level of RL58.2 is considered appropriate for the proposed development.

WATERCOURSE STRUCTURE SCHEDULE

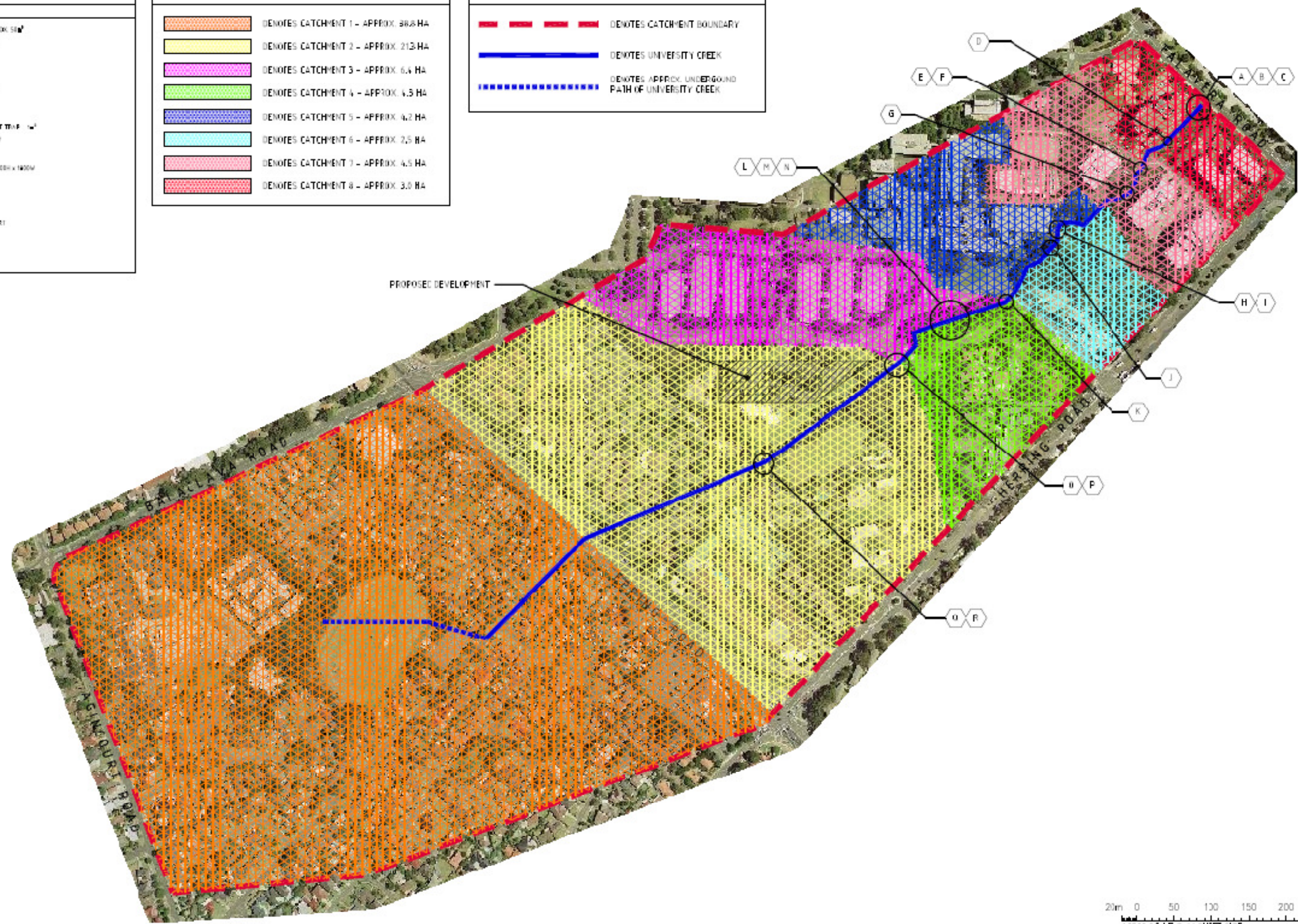
TAG	DESCRIPTION
A	0.50 TANK - APPROX 50M ³
B	DETENTION BASIN
C	10000 INLET
D	3000 INLET
E	DETENTION BASIN
F	2 x 3000 INLET
G	3000 INLET
H	6000 PULL-TIGHT TRAP
I	3x5000 OVERFLOW
J	3000 INLET
K	8000 INLET - 10000 x 1000W
L	4000 INLET
M	4000 INLET
N	5000 INLET
O	12000 FIRE CULVERT
P	6000 WBF
Q	2 x 4000 INLET
R	5x4000 INLET

CATCHMENT AREA LEGEND

	DENOTES CATCHMENT 1 - APPROX 38.8 HA
	DENOTES CATCHMENT 2 - APPROX 21.3 HA
	DENOTES CATCHMENT 3 - APPROX 6.4 HA
	DENOTES CATCHMENT 4 - APPROX 4.3 HA
	DENOTES CATCHMENT 5 - APPROX 4.2 HA
	DENOTES CATCHMENT 6 - APPROX 2.5 HA
	DENOTES CATCHMENT 7 - APPROX 4.5 HA
	DENOTES CATCHMENT 8 - APPROX 3.0 HA

CATCHMENT AREA LEGEND

	DENOTES CATCHMENT BOUNDARY
	DENOTES UNIVERSITY CREEK
	DENOTES APPROX. UNDERGROUND PATH OF UNIVERSITY CREEK



PROJECT: CRI AUSTRALIA Pty Ltd LEVEL 2 76 BERRY STREET, NORTH SYDNEY, NSW 2060		PROJECT: COCHLEAR GLOBAL HQ HAQUE UNIVERSITY CAMPUS (SOUTH) NORTH RYDE NSW 2113		Costin Roe Consulting Pty Ltd Consulting Engineers Suite 301, 75 Berkeley Street Sydney, New South Wales 2000 Tel: (02) 9251-7688 Fax: (02) 9251-7688 Email: info@costinroe.com.au				Drawing No: C09459.00-SK01 SHEET: 1 OF 1	
PREPARED BY: [Name] CHECKED BY: [Name] DATE: [Date]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]	DATE: [Date] ISSUE: [Number]