APPENDIX A

FLOOD DAMAGES DATABASE

Confidential

APPENDIX B

FLOOD DAMAGES SPREADSHEETS

SITE SPECIFIC INFORMATION FOR RESIDENTIAL DAMAGE CURVE DEVELOPMENT

Version 3.00 October 2007 — Queries to duncan.mcluckie@dnr.nsw.gov.au

PROJECT	DETAILS	DATE	JOB No.
Macquarie Park Floodplain Risk Management Study & Plan		May-10	J1609

BUILDINGS

Regional Cost Variation Factor	1.00	*From Rawlinsons*
Post late 2001 adjustments	1.45	*Changes in AWE see AWE Stats Worksheet*
Post Flood Inflation Factor	1.40	*1.0 to 1.5*
Multiply overall structural costs by this factor		*Judgement to be used. Some suggestions below*

	Regional City Houses Affected		Factor	Regional Town Houses Affected		Factor
Small scale impact	<	*50*	*1.00*	<	*10*	*1.00*
Medium scale impacts in Regional City		*100*	*1.20*		*30*	*1.30*
Large scale impacts in Regional City	>	*150*	*1.40*	>	*50*	*1.50*

Typical Duration of Immersion	2	hours
Building Damage Repair Limitation Factor	0.85	*due to no insurance* — *short duration* — *long duration*
		Suggested range 0.85 to 1.00
Typical House Size	240	m^2 — *240 m^2 is Base*
Building Size Adjustment	1.0	
Total Building Adjustment Factor	**1.73**	

CONTENTS

Average Contents Relevant to Site	$ 60,000	*Base for 240 m^2 house $ 60,000*
Post late 2001 adjustments	1.45	*From above*
Contents Damage Repair Limitation Factor	0.75	*due to no insurance* — *short duration* — *long duration*
Sub-Total Adjustment Factor	1.09	*Suggested range 0.75 to 0.90*
Level of Flood Awareness	low	*low or high only. Low default unless otherwise justifiable.*
Effective Warning Time	1	hour
Interpolated DRF adjustment (Awareness/Time)	0.98	IDRF = Interpolated Damage Reduction Factor
Typical Table/Bench Height (TTBH)	0.90	*0.9m is typical height. If typical is 2 storey house use 2.6m.*
Total Contents Adjustment Factor AFD <= TTBH	**1.07**	AFD = Above Floor Depth
Total Contents Adjustment Factor AFD > TTBH	**1.09**	

Most recent advice from Victorian Rapid Assessment Method

Low level of awareness is expected norm (long term average) any deviation needs to be justified.

Basic contents damages are based upon a DRF of	*0.9*				
Effective Warning time (hours)	***0***	***3***	***6***	***12***	***24***
RAM Average IDRF Inexperienced (Low awareness)	*0.90*	*0.80*	*0.80*	*0.80*	*0.70*
DRF (ARF/0.9)	*1.00*	*0.89*	*0.89*	*0.89*	*0.78*
RAM AIDF Experienced (High awareness)	*0.80*	*0.80*	*0.60*	*0.40*	*0.40*
DRF (ARF/0.9)	*0.89*	*0.89*	*0.67*	*0.44*	*0.44*
Site Specific DRF (DRF/0.9) for Awareness level for iteration	*1.00*	*0.89*	*0.89*	*0.89*	*0.78*
Effective Warning time (hours)	*0*	*3*	*1*		
Site Specific iterations	*1.00*	*0.89*	*0.98*		

ADDITIONAL FACTORS

Post late 2001 adjustments	1.45	*From above*
External Damage	$ 6,700	*$6,700 recommended without justification*
Clean Up Costs	$ 4,000	*$4,000 recommended without justification*
Likely Time in Alternate Accommodation	2	weeks
Additional accommodation costs /Loss of Rent	$ 220	*$220 per week recommended without justification*

TWO STOREY HOUSE BUILDING & CONTENTS FACTORS

Up to Second Floor Level, less than	2.6 m	70%	Single Storey Slab on Ground
From Second Storey up, greater than	2.6 m	110%	Single Storey Slab on Ground

Base Curves

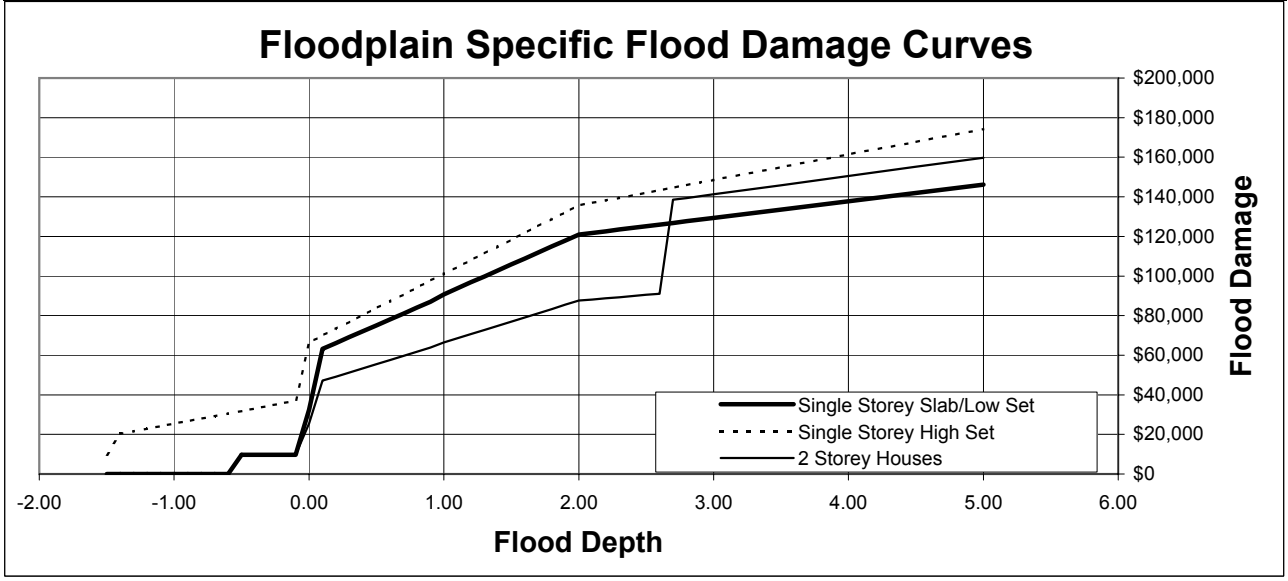
AFD = Above Floor Depth

Single Storey Slab/Low Set	13164	+	4871	x	AFD	in metres
Structure with GST	AFD	greater than	0.0	m		
Validity Limits	AFD	less than or equal to		6	m	
Single Storey High Set	16586	+	7454	x	AFD	
Structure with GST	AFD	greater than	-1.50	m		
Validity Limits	AFD	less than or equal to		6	m	
Contents	20000	+	20000	x	AFD	
Contents with GST	AFD	greater than		0		
Validity Limits	AFD	less than or equal to		2		

Floodplain Specific Damage Curves for Individual Residences

Steps in Curve 0.1 m

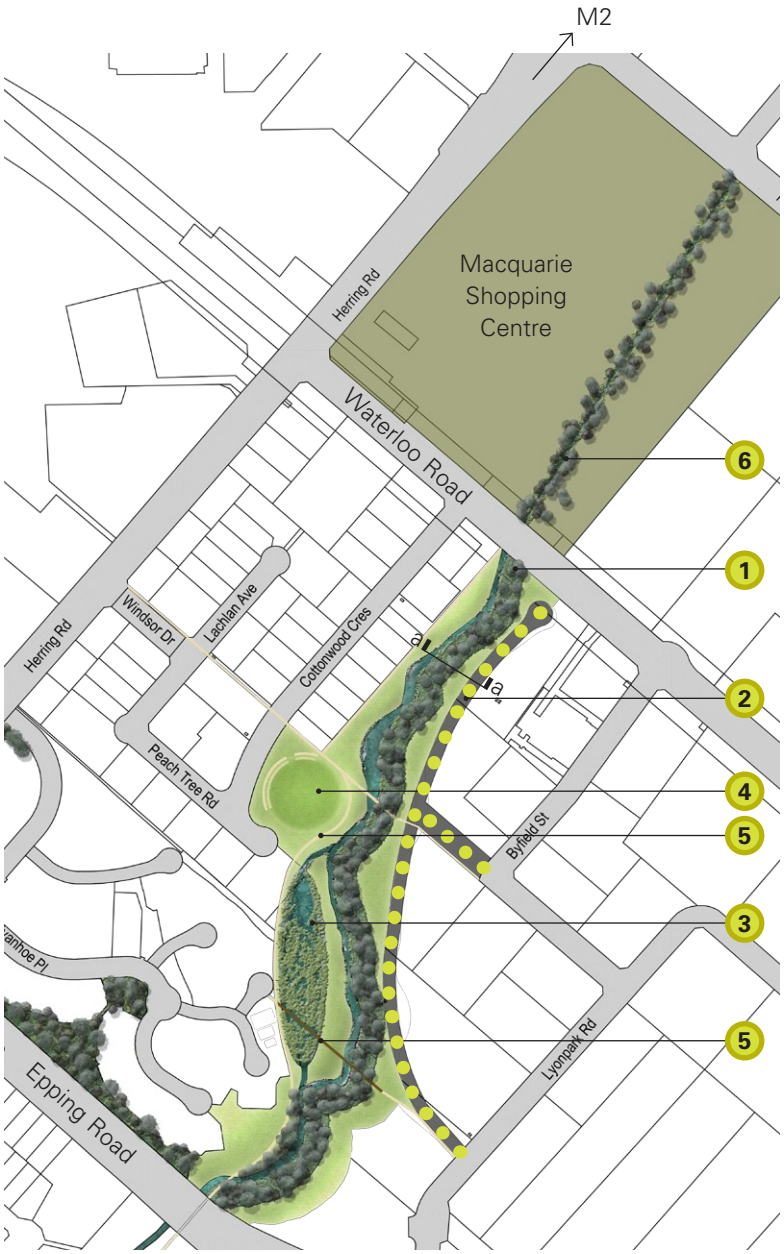
	Single Storey High Set	Single Storey Slab/Low Set	2 Storey Houses
Type	**1**	**2**	**3**
AFD from Modelling	**Damage**	**Damage**	**Damage**
-5.00	$0	$0	$0
-1.50	$9,715	$0	$0
-1.40	$20,328	$0	$0
-1.30	$21,614	$0	$0
-1.20	$22,900	$0	$0
-1.10	$24,186	$0	$0
-1.00	$25,473	$0	$0
-0.90	$26,759	$0	$0
-0.80	$28,045	$0	$0
-0.70	$29,331	$0	$0
-0.60	$30,617	$0	$0
-0.50	$31,903	$9,715	$9,715
-0.40	$33,189	$9,715	$9,715
-0.30	$34,475	$9,715	$9,715
-0.20	$35,762	$9,715	$9,715
-0.10	$37,048	$9,715	$9,715
0.00	$66,522	$32,429	$25,615
0.10	$69,983	$63,189	$47,147
0.20	$73,444	$66,165	$49,230
0.30	$76,905	$69,140	$51,312
0.40	$80,366	$72,115	$53,395
0.50	$83,827	$75,090	$55,478
0.60	$87,289	$78,065	$57,560
0.70	$90,750	$81,040	$59,643
0.80	$94,211	$84,016	$61,725
0.90	$97,672	$86,991	$63,808
1.00	$101,133	$90,772	$66,455
1.10	$104,594	$93,787	$68,565
1.20	$108,055	$96,802	$70,676
1.30	$111,516	$99,818	$72,787
1.40	$114,977	$102,833	$74,898
1.50	$118,439	$105,849	$77,009
1.60	$121,900	$108,864	$79,119
1.70	$125,361	$111,880	$81,230
1.80	$128,822	$114,895	$83,341
1.90	$132,283	$117,911	$85,452
2.00	$135,744	$120,926	$87,563
2.10	$137,030	$121,767	$88,151
2.20	$138,316	$122,607	$88,739
2.30	$139,603	$123,447	$89,328
2.40	$140,889	$124,288	$89,916
2.50	$142,175	$125,128	$90,504
2.60	$143,461	$125,969	$91,093
2.70	$144,747	$126,809	$138,519
2.80	$146,033	$127,650	$139,443
2.90	$147,319	$128,490	$140,368
3.00	$148,605	$129,331	$141,292
3.50	$155,036	$133,533	$145,915
4.00	$161,467	$137,735	$150,537
4.50	$167,897	$141,938	$155,160
5.00	$174,328	$146,140	$159,782



APPENDIX C

EXTRACTS FROM WATER SENSITIVE URBAN DESIGN REPORT (EDAW, 2009)

Shrimptons Creek WSUD Concepts



Plan
Not to Scale

Legend

Existing roads

New roads

Pedestrian pathways

Sections

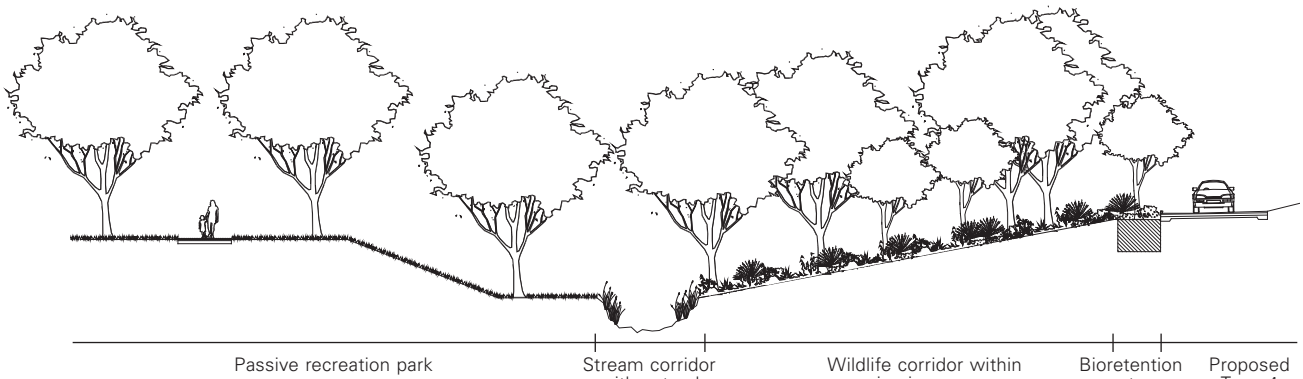
Storm flows generated from new roads will be directed towards street tree bioretention basins, minimising the impact of increased runoff on adjacent low flow channel.

Objectives

- Establish an ecological connection along the riparian zone of Shrimptons Creek downstream to Waterloo Road. This ecological connection would see rehabilitation of the riparian vegetation and improvement in the aquatic ecology.
- Improve pedestrian access along riparian corridor from residential and commercial areas to Waterloo Road.
- Protect the creek from the water quality impacts of adjoining residential and commercial areas, by treating these catchments to the targets identified in the WSUD Chapter of the City of Ryde DCP.
- WSUD strategy to complement Councils open space plans of management and strategies

Strategy

1. Establish a wildlife corridor along the steeper south-eastern riparian zone, through rehabilitation of the riparian zone.
2. Install a bioretention system to treat stormwater from the Type 4 road buffering the commercial precinct and wildlife corridor.
3. Construct a wetland in the passive recreation park adjacent to the residential area for local or regional stormwater quality treatment.
4. Incorporate flood detention functions into the redesign of playing field.
5. Increase pedestrian and cycle activity along and across the creek line through the:
   a. Construction of better links and/or augmentation of pedestrian network from existing residential and commercial areas to the creek corridor;
   b. Provision of passive recreation e.g. creek viewing platforms / picnic areas;
   c. Pedestrian links and passive recreation areas are designed to ensure pedestrian safety (e.g. through lighting, appropriate fencing and other "safety by design" considerations).
6. Where practicable, daylight creek between Waterloo and Talavera Roads within the existing Macquarie Shopping Centre site and enhance pedestrian links along creek line (NB. This option is unlikely given the current development footprint, layout of the shopping centre and cost involved).



Section A
Not to Scale

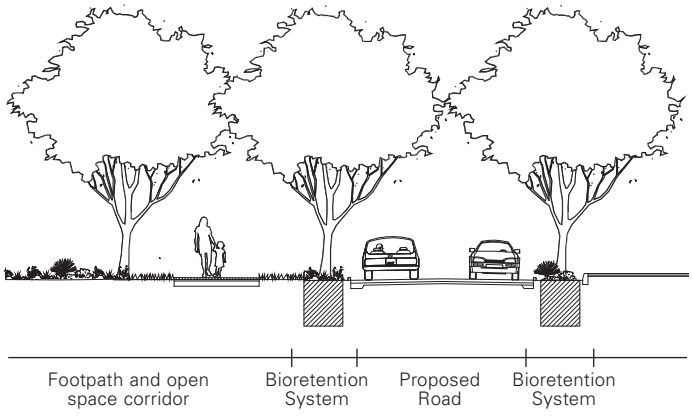
Industrial Creek WSUD Concepts

Plan
Not to Scale

Legend

Existing roads

New roads



Section A
Not to Scale

Objectives

- Visual connectivity. That is, the creek corridor for its length through Macquarie Park is identified and enhanced by appropriate vegetation and access points along the proposed open space network.
- Retention and rehabilitation of natural vegetation along the creek corridor and accommodation of overland flows within this zone.
- The open space network contributes significantly to activating pedestrian movement.
- Align with Councils deep soil planting requirements

Strategy

1. Epping Road to Waterloo Road:
    a. Enhance visual pedestrian and vehicular mobility and connectivity,
    b. Microclimate control through WSUD elements to enhance street activation and visual appeal,
    c. Blend setbacks, open space and WSUD elements along the road and within adjacent private developments to create a significant and enjoyable pedestrian boulevard
2. Waterloo Road to Talavera Road:
    a. Maximise the quality of urban and open space design, particularly in the vicinity of Central Park,
    b. Conserve and/or restore appropriate vegetation, pedestrian and view corridors and the overland flow paths along the natural creekline,
    c. Preserve the natural vegetation,
    d. Incorporate best Practice WSUD into roads.
3. Talavera Road to the M2:
    a. Extend the daylighting of the creek downstream from Talavera Road.

Sections

Storm flows generated from new roads will be directed towards street tree bioretention basins.

Porters Creek WSUD Concepts

Plan
Not to Scale

Legend
Existing roads
New roads

Objectives

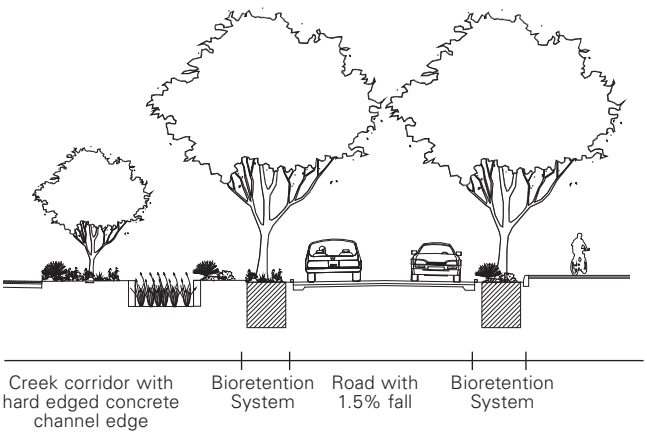
- Maximise the open space corridor proposed in the Macquarie Park DCP.
- Achieve a vegetated corridor along the drainage line, which incorporates public and private land and provides appropriate pedestrian access.
- All new roads including the extension of Waterloo Road are to incorporate best practice WSUD.
- Retain the natural condition and rehabilitate the creek and bushland zone between the Waterloo Road extension and the M2.
- Address the interface between the low flow channel / piped system and the natural section of Porters Creek north of the Waterloo Road extension to enhance the geomorphology of the creek.
- Align with Councils deep soil planting requirements

Strategy

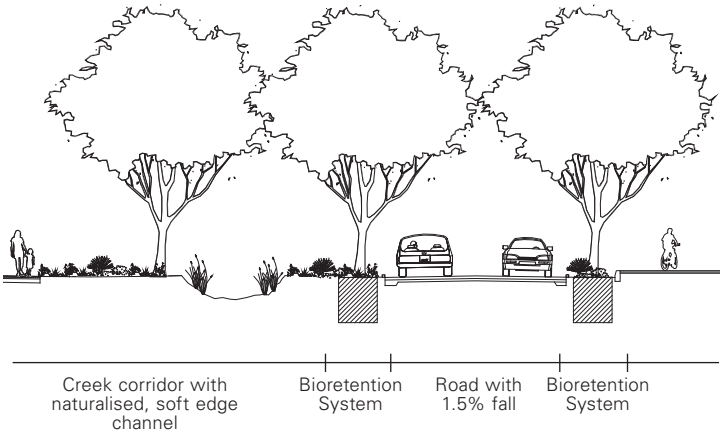
1. Maintain the existing creek and rehabilitate creek and surrounding bushland.
2. Extension of Waterloo Road to include works to improve the geomorphology of Porters Creek downstream.
3. Low flows from Porters creek to be diverted from underneath the current Officeworks site to a 2m wide low flow urban creek adjacent to the new road.
4. The low flow urban creek to transition from hard edged urban stream upstream to a natural rock lined channel downstream. Appropriate vegetation, open space areas and pedestrian links to be incorporated into the design of the channel.
5. The low flow urban creek should be designed to provide stormwater treatment, for example through a bioretention swale. The design of the treatment system will be influenced by the quantity of stormwater diverted and the surrounding landscape design.
6. Overland flows to be accommodated in the design of the road to minimise the impact on the low flow channel.

Sections

Storm flows generated from new roads will be directed towards street tree bioretention basins, minimising the impact of increased runoff on adjacent low flow channel.



Section A
Not to Scale



Section B
Not to Scale