10 CONCLUSION

This Stormwater Strategy describes the management of stormwater within the Googong Creek catchment area of the proposed Googong New Town. The stormwater management options outlined in this report have been designed to satisfy the requirements for stormwater quality and quantity control identified by Queanbeyan City Council.

Detention areas and stormwater harvesting have been designed to limit post-development changes in flow rate and flow duration for the protection of receiving environments. The concept stormwater layout for Googong Creek incorporates four basins located on-line within the existing creek line and tributaries. This layout has been modelled to ensure that the design meets Queanbeyan City Council requirements.

The modelling of water quality measures as part of the integrated water management of Googong New Town within Googong Creek catchment indicate that the design achieves the pollutant removal targets in the Queanbeyan City Council requirements with the inclusion of recycled water from the Googong Water Recycling Plant.

11 REFERENCES

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12 GLOSSARY OF TERMS

Afflux	The rise in water level upstream of a hydraulic structure such as a bridge or culvert, caused by losses incurred from the hydraulic structure.
Australian Height Datum	National survey datum corresponding approximately to mean sea level.
Annual Exceedance Probability	The chance of a flood of a given size or larger occurring in any one year, generally expressed as percentage probability. For example, a 100 year ARI flood is a 1% AEP flood. An important implication is that when a 1% AEP flood occurs, there is still a 1% probability that it could occur the following year.
Average Recurrence Interval	Is the long term average number of years between the occurrence of a flood as big as, or larger than the selected flood event.
Brownfield site	Generally refers to abandoned or underused industrial and commercial land, often contaminated and available for re-use. The term developed from the term "greenfield", used to describe a previously undeveloped parcel of land. In Australia this term also applies to degraded land, including rural land.
Catchment	The catchment at a particular point is the area of land which drains to that point.
Climate Change	Climate change (in this context) refers to the changes in temperature, rainfall and evaporation resulting from the anthropogenic increase in greenhouse gas concentrations in the Earth's atmosphere.
Design floor level	The minimum (lowest) floor level specified for a building.
Design flood	A hypothetical flood representing a specific likelihood of occurrence (for example the 100 year or 1% probability flood). The design flood may comprise two or more single source dominated floods.
Development	Existing or proposed works which may or may not impact upon flooding. Typical works are filling of land, and the construction of roads, floodways and buildings.
Discharge	The rate of flow of water measured in terms of volume over time. It is not the velocity of flow which is a measure of how fast the water is moving rather than how much is moving. Discharge and flow are interchangeable.
Digital Terrain Model	A three-dimensional model of the ground surface that can be represented as a series of grids with each cell representing an elevation (DEM) or a series of interconnected triangles with elevations (TIN).
Effective warning time	The available time that a community has from receiving a flood warning to when the flood reaches their location.
Flood	Above average river or creek flows which overtop banks and inundate floodplains.
Flood awareness	An appreciation of the likely threats and consequences of flooding and an understanding of any flood warning and evacuation procedures. Communities

	with a high degree of flood awareness respond to flood warnings promptly and efficiently, greatly reducing the potential for damage and loss of life and limb. Communities with a low degree of flood awareness may not fully appreciate the importance of flood warnings and flood preparedness and consequently suffer greater personal and economic losses.
Flood behaviour	The pattern / characteristics / nature of a flood.
Flooding	The State Emergency Service uses the following definitions in flood warnings: *Minor flooding:* causes inconvenience such as closing of minor roads and the submergence of low level bridges *Moderate flooding:* low-lying areas inundated requiring removal of stock and/or evacuation of some houses. Main traffic bridges may be covered. *Major flooding:* extensive rural areas are flooded with properties, villages and towns isolated and/or appreciable urban areas are flooded.
Flood frequency analysis	An analysis of historical flood records to determine estimates of design flood flows.
Flood fringe	Land which may be affected by flooding but is not designated as a floodway or flood storage.
Flood hazard	The potential threat to property or persons due to flooding.
Flood level	The height or elevation of flood waters relative to a datum (typically the Australian Height Datum). Also referred to as "stage".
Flood liable land	Land inundated up to the probable maximum flood – flood prone land.
Floodplain	Land adjacent to a river or creek which is inundated by floods up to the probable maximum flood that is designated as flood prone land.
Flood Planning Levels	Are the combinations of flood levels and freeboards selected for planning purposes to account for uncertainty in the estimate of the flood level.
Flood proofing	Measures taken to improve or modify the design, construction and alteration of buildings to minimise or eliminate flood damages and threats to life and limb.
Floodplain Management	The coordinated management of Activities which occur on flood liable land.
Floodplain Management Manual	A document by the NSW Government (2001) that provides a guideline for the management of flood liable land. This document describes the process of a floodplain risk management study.
Flood source	The source of the flood waters.
Floodplain Management Standard	A set of conditions and policies which define the benchmark from which floodplain management options are compared and assessed.
Flood standard	The flood selected for planning and floodplain management Activities. The flood may be an historical or design flood. It should be based on an understanding of the flood behaviour and the associated flood hazard. It should also take into account social, economic and ecological considerations.

Flood storages	Floodplain areas which are important for the temporary storage of flood waters during a flood.
Floodways	Those areas of the floodplain where a significant discharge of flow occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if they are partially blocked, would cause significant redistribution of flood flows, or a significant increase in flood levels.
Freeboard	A factor of safety usually expressed as a height above the flood standard. Freeboard tends to compensate for the factors such as wave action, localised hydraulic effects and uncertainties in the design flood levels.
Geographical Information System	A form of computer software developed for mapping applications and data storage. Useful for generating terrain models and processing data for input into flood estimation models.
High hazard	Danger to life and limb; evacuation difficult; potential for structural damage, high social disruption and economic losses. High hazard areas are those areas subject to a combination of flood depth and flow velocity that are deemed to cause the above issues to persons or property.
Historical flood	A flood which has actually occurred – Flood of Record.
Hydraulic	The term given to the study of water flow in rivers, estuaries with coastal systems.
Hydrograph	A graph showing how a river or creek's discharge changes with time.
Hydrology	The term given to the study of the rain-runoff process in catchments.
Low hazard	Flood depths and velocities are sufficiently low that people and their possessions can be evacuated.
Management plan	A clear and concise document, normally containing diagrams and maps, describing a series of actions that will allow an area to be managed in a coordinated manner to achieve defined objectives.
Map Grid Australia	A national coordinate system used for the mapping of features on a representation of the earth's surface. Based on the geographic coordinate system 'Geodetic Datum of Australia 1994'.
Peak flood level, flow or velocity	The maximum flood level, flow or velocity occurring during a flood event.
Probable Maximum Flood	An extreme flood deemed to be the maximum flood likely to occur at a particular location.
Probable Maximum Precipitation	The greatest depth of rainfall for a given duration meteorologically possible over a particular location. Used to estimate the probable maximum flood.
Probability	A statistical measure of the likely frequency or occurrence of flooding.
Riparian Zone	Areas that are located adjacent to watercourses. Their definition is vague and can be characterised by landform, vegetation, legislation or their function.
Runoff	The amount of rainfall from a catchment which actually ends up as flowing water in the river of creek.

Stage	Equivalent to water level above a specific datum- see flood level.
Stage hydrograph	A graph of water level over time.
Triangular Irregular Network	A mass of interconnected triangles used to model three-dimensional surfaces such as the ground (see DTM) and the surface of a flood.
Velocity	The speed at which the flood waters are moving. Typically, modelled velocities in a river or creek are quoted as the depth and width averaged velocity, i.e. the average velocity across the whole river or creek section.
Water Sensitive Urban Design	An approach to planning and design of urban development that aims to minimise the negative impacts on the natural water cycle. This design philosophy aims to protect the health of aquatic ecosystems by integrating "natural" features into the stormwater, water supply and sewage management of a development.

13 APPENDICES

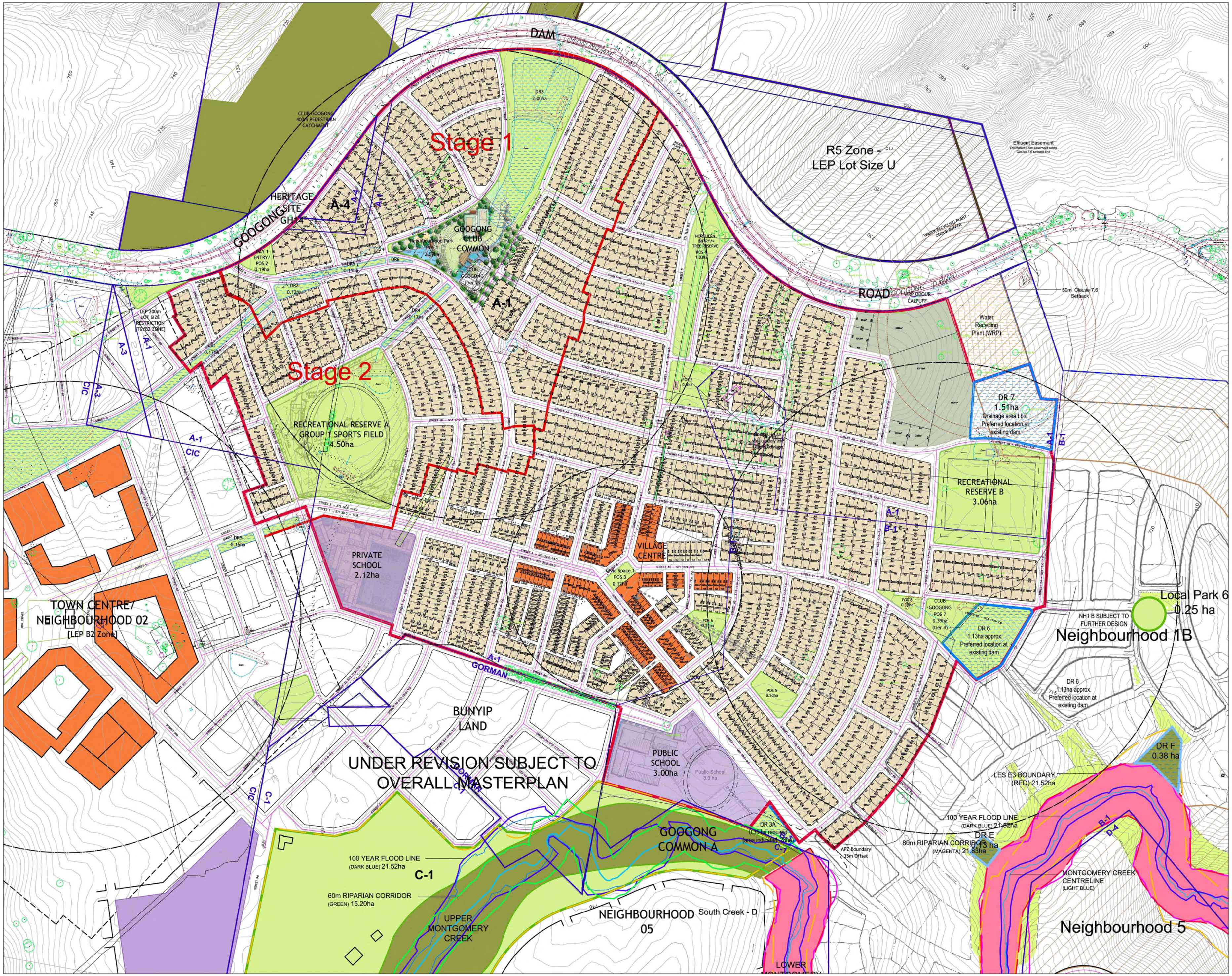
Appendix A Drawings

Appendix B XP-RAFTS Input and Results

Appendix C MUSIC Input

APPENDIX A

DRAWINGS



Neighbourhood 01
Googong

Concept Plan Review

DRAFT ONLY

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LEGEND

- Googong Site Boundary
- Superlot Boundary
- Neighbourhood 1 Boundary
- LEP Clause 7.6 - 50m offset
- LEP 200m Lot Size Restriction - Lots under 330sqm/ over 170sqm
- 400m Neighbourhood Pedestrian Catchment
- Northern Hamlets - 60m APZ [within Googong Dam Road Reserve]
- School [Private/ Primary]
- Public Open Space/ Recreation
- Drainage Reserve

NOTATIONS

Drawing is based on NH1 survey information: 03074.01_DT_001_Rev D.dwg / CONTOURS AND TRIANGLES_REV D.dwg. Source: Browns Consulting 02.12.08

Town Centre/ R5 Areas reflects those indicated within Overall Yield I 281008 - Reference Plan (UD1505).

Riparian Zone per EDAW [EDAW_SP-2904-LOS_master_08-12-08.dwg] Requires review and confirmation.

DRAFT - FOR DISCUSSION PURPOSES ONLY.

MWH (Australia) Pty. Ltd. ACN. 007 820 322

REVISION RECORD

Document Type:	MWH Document No.:	Page
Googong Development Water Balance Outputs - WATNET Modelling		1
Document Title:		**Rev.:**
Googong WRP Discharge Time Series		A

Rev No.	Prepared Initials	Prepared Date	Verified Initials	Verified Date	Approved Initials	Approved Date	Description
A	AJ	07-Sep-09					EXTRACTED FROM P:\Projects\A1081402 Googong Concept Stage
B	RB	14-Oct-09					Modifed to updated TN and TSS estimates

Project Use

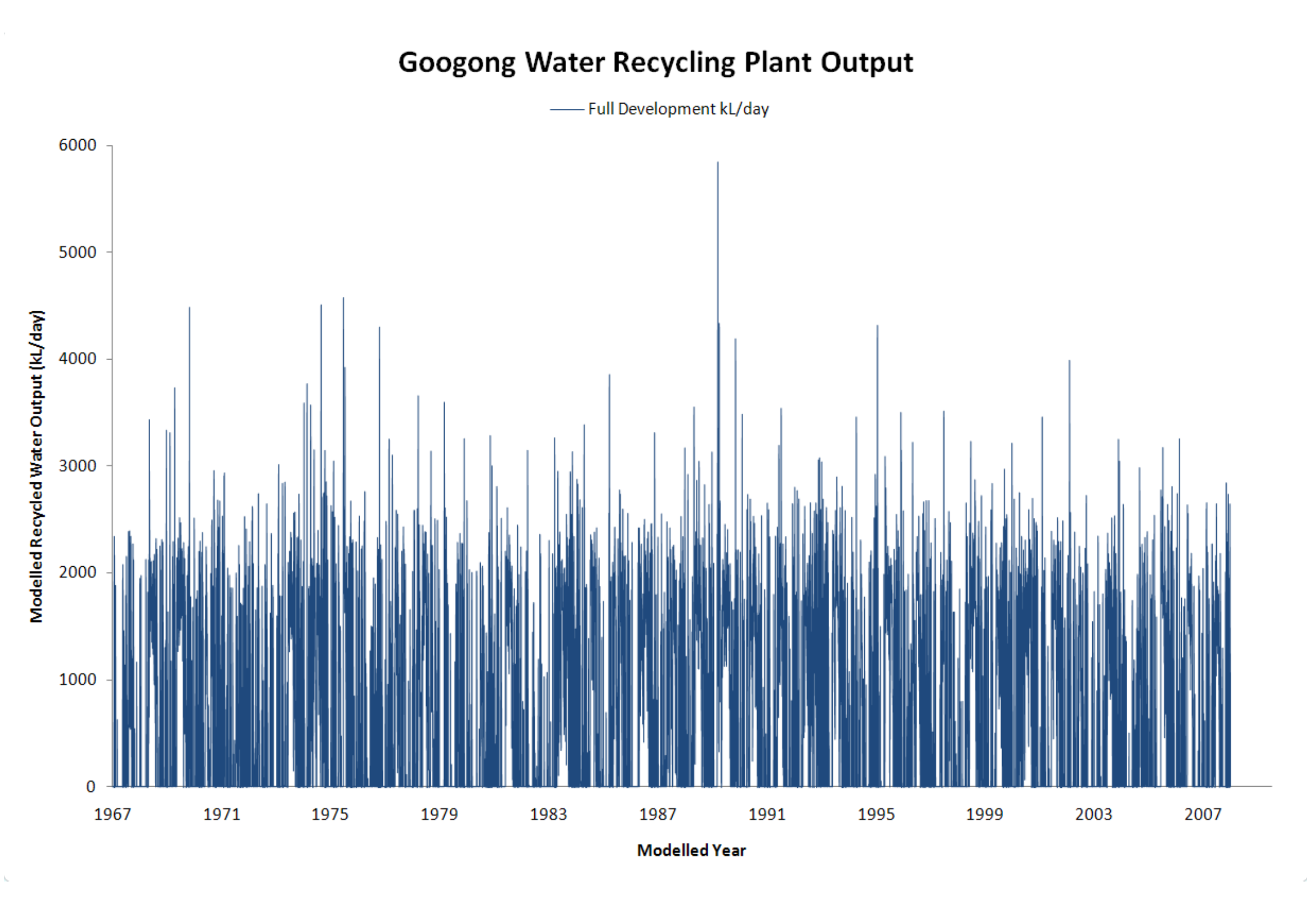
Notes:
MWH Information key sources:
- SummaryofGoogongRuns_v5.xls - WRP Effluent Discharge Time Series
- Process advice re WRP effluent quality (Email Ari dated 26/8/09)

Please note: Leap year extra days removed from dataset to allow WATHNET Modelling

Owner:	Client Project No:	Client Rev.:
Client: Canberra Investment Corp	Client Doc No:	
Plant Area:	Project Name: Googong Concept Stage	
Original Corporate Doc. No.:		

MWH Project No.: A1081402

H:\X07\X07008 - Googong New Town\Engineering - Water\Music\Water Recycling Plant Data\[091102 Googong WRP Discharge Time Series Rev B.xlsx]REVISION


Googong Water Recycling Plant Output
Full Development kL/day
Modelled Recycled Water Output (kL/day)
6000
5000
4000
3000
2000
1000
0
1967
1971
1975
1979
1983
1987
1991
1995
1999
2003
2007
Modelled Year

Yield Analysis Table - Neighbourhood 01

Prepared by Roberts Day, Melbourne

UD4902G NH1 Yield

Project: Googong New Town - Neighbourhood 01
Client: CIC
Date: 24th June 2009
Revision: J
Subdivision Plan Ref: -
Design Plan: UD1104H Concept Plan Review 240609
Prepared by: Koston Tang
Approved by: David Leone
Local Authority: City of Queanbeyan
Job Code: CIC GO1

Design Plan - UD1104H 240609				Design Plan - UD1103B UD1103B NH1 Design Plan 171208			Nov 08 - UD4903 Overall Yield I UD1505 Overall Yield I 080908		
A **Gross Area - GA**	**119.22**	**ha**		**116.32**	**ha**		**111.76**	**ha**	
1 Gross Area - NH1 A	**119.22**	**ha**							
B **Deductions - Encumbered Land (Drainage)**	**5.20**	**ha**	4.36 % of GA	**3.20**	**ha**	2.75 % of GA	**2.76**	**ha**	2.47 % of GA
1 Drainage DR1	0.17			0.15					
2 Drainage DR2	0.12			0.29					
3 Drainage DR3 (Googong Club Common)	2.00			2.00					
4 Drainage DR4	0.12			0.12					
6 Drainage DR5	0.15			0.15					
7 Drainage DR6	1.13			0.49					
8 Drainage DR7	1.51								
C **Gross Developable Area - GDA**	**114.02**	**ha**	95.64 % of GA	**113.12**	**ha**	97.25 % of GA	**109.00**	**ha**	97.53 % of GA
D **Schools**	**5.12**			**6.45**			**6.00**		
1 Primary School	3.00			3.40			3.00		
2 Private School	2.12			3.05			3.00		
E **Village Centre**	**0.51**			**0.70**			**1.00**		
1 Commercial/Retail/Civic	0.32			0.32			1.00		
1 Parking Courts (Village Centre)	0.19		0.17 % of GDA	0.38					
F **Gross Residential Area - GRA**	**108.38**	**ha**	95.06 % of GDA	**105.97**	**ha**	93.68 % of GDA	**102.00**	**ha**	93.58 % of GDA
G **Road Reserve**	**31.63**	**ha**	29.19 % of GRA	**32.46**	**ha**	30.63 % of GRA	**29.42**	**ha**	28.84 % of GRA
H **Local Open Space**	**13.02**	**ha**	12.01 % of GRA	**9.07**	**ha**	8.56 % of GRA	**8.84**	**ha**	8.67 % of GRA
1 POS 1 (Googong Club Mini Common, including Club Googong site)	2.57			2.64					
2 POS 2 (Day 1 Entry)	0.19								
3 POS 3 (Civic Space)	0.12			0.12					
4 POS 4 (Northern Entry Tree Reserve North)	1.03			0.76					
5 POS 5 Local park	0.30								
6 POS 6 Local park	0.21								
7 POS 6 Local park	0.50			0.50					
8 POS 7 (Club Googong - tier 4)	0.39								
9 POS 8 Local Park	0.15								
10 Recreation Reserve A	4.50			4.46					
11 Recreation Reserve B (including Club Googong site)	3.06								
POS 2				0.25					
POS 7 (Underpass Park)				0.13					
POS 8 (Day 1 Entry)				**0.21**					
I **Nett Subdivisable Area - NSA**	**63.73**	**ha**	58.80 % of GRA	**64.44**	**ha**	60.81 % of GRA	**63.74**	**ha**	62.49 % of GRA
Gorman Home Super lot	**0.42**	**ha**							
Odour buffer rural residential allotments	**3.40**	**ha**							
Standard Residential	**59.91**	**ha**							

J **Preliminary Lot Mix/ Yield - NH1**

Design Plan - UD1104H 240609

R1 Zone - General Residential

Lot type	Frontage	Av. Lot Depth	Avg. size sqm	Yield		Yield as % of Total	Yield as % of Total
Terraces	6m	30m	**180**	55	lots	4.4%	12.3%
	7.5m	30m	**225**	98	lots	7.9%	
Small Courtyard	10m	32m	**320**	46	lots	3.7%	20.3%
	11m	32m	**352**	71	lots	5.7%	
	12.5m	32m	**400**	135	lots	10.9%	
Large Courtyard	14m	32m	**448** (h)	206	lots	16.6%	23.5%
	15m	32m	**480**	85	lots	6.9%	
Large House	16m	32m	**512**	250	lots	20.2%	37.7%
	18m	32m	**576**	218	lots	17.6%	
Estate Homes	20m+	32m	**640**	69	lots	5.6%	5.6%
Rural Living (Buffer Zone)			**4857**	7	lots	0.6%	0.6%
Total Dwellings				**1240**		**100.0%**	**100.0%**

Lot type	indicative building footprint	Avg. size sqm	no. of units
Studio Units*	8m x 8m	64	48

* indicative only and not represented within the design plan

NOTES + ASSUMPTIONS

a All areas in table above are measured in hectares unless otherwise noted.

b Areas are approximate only and are subject to site survey, concept planning and detailed design.

c NH1 East layout/inclusions are indicative only and are subject to design studies and confirmation of required buffer to WRP and allocation for Gorman home.

d Drainage areas are subject to further engineering and design studies.

e Regional recreation areas and school site areas require further negotiation with relevant authorities.

f Buffers and offsets require confirmation and further negotiation with relevant authorities.

g Lot Mix is preliminary and for discussion purposes.

h 448m² lots to be revised to 450m² at detailed design stage - set to NSW housing code compliance

i please note POS 4 Northern Entry Tree Reserve South park replaces was previous POS 4 Underpass Park

k Areas to be confirmed in progression of NH1 East CAD layout. Areas indicative of previous NH1 East Layout 270109

APPENDIX B

XP-RAFTS Input and Results

Table B.1: Adopted ARBM loss parameters for XP-RAFTS modelling

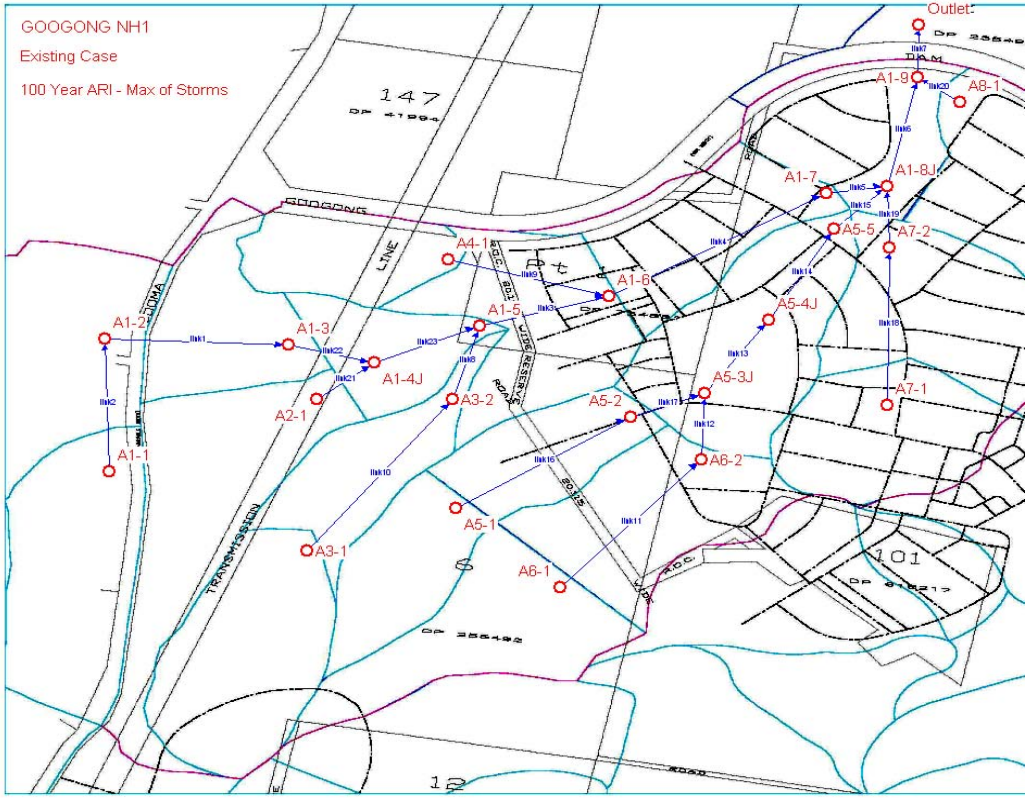
PARAMETER	ADOPTED VALUE	INITIAL VALUE
Storage Capacities		
Impervious (IMP)	0.50	0.0
Interception (ISC)	1.00	0.0
Depression (DSC)	1.00	0.0
Upper Soil (USC)	25.00	20.00
Lower Soil (LSC)	50.00	40.00
Infiltration		
Dry soil sorptivity (SO)	3.00	
Hydraulic conductivity (KO)	0.33	
Lower soil drainage FACTor (LDF)	0.05	
Groundwater recession;		
Constant rate (KG)	0.94	
Variable rate (GN)	1.00	
Evapo-Transpiration		
Proportion of rainfall intercepted by vegetation (IAR)	0.70	
Max potential evapo-transpiration (EV)		
Upper soil (UH)	10.00	
Lower soil (LH)	10.00	
Proportion of EV from upper soil zone (ER)	0.70	
Ratio of potential evaporation to A class pan (ECOR)	0.90	

Taken from Table 1.3, Section 1.07 of *Greater Queanbeyan City Council Handbook of Drainage Design Criteria (December 2004).*

EXISTING CASE INPUT DATA							
Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
A1-2	14.35	4.4	0	0.045	ARBM	0	1
A2-1	14.13	4.9	0	0.04	ARBM	1	1
A5-5	12.68	2.5	0	0.04	ARBM	0	1
A3-1	12.63	9.83	0	0.04	ARBM	0	1
A8-1	12.52	3.3	0	0.04	ARBM	0	1
A1-1	12.37	4.5	0	0.045	ARBM	1	1
A7-2	11.56	2.6	0	0.04	ARBM	0	1
A1-6	11.04	2.5	0	0.04	ARBM	0	1
A6-2	10.82	3.3	0	0.04	ARBM	1	1
A6-1	10.6	8.6	0	0.035	ARBM	1	1
A7-1	9.54	5.3	0	0.04	ARBM	0	1
A1-7	9.27	2.4	0	0.04	ARBM	1	1
A1-9	9.03	1.35	0	0.04	ARBM	0	1
A1-3	8.23	5.3	0	0.04	ARBM	1	1
A3-2	7.13	3	0	0.04	ARBM	0	1
A5-1	6.85	7.8	0	0.04	ARBM	1	1
A4-1	6.45	7.4	0	0.04	ARBM	0	1
A5-2	6.32	3	0	0.04	ARBM	1	1
A1-5	5.52	1.8	0	0.04	ARBM	0	1

PEAK FLOWS - Existing

Node	100Y ARI Peak Outflow [m³/s]	50Y ARI Peak Outflow [m³/s]	20Y ARI Peak Outflow [m³/s]	10Y ARI Peak Outflow [m³/s]	5Y ARI Peak Outflow [m³/s]	2Y ARI Peak Outflow [m³/s]	18M ARI Peak Outflow [m³/s]	1Y ARI Peak Outflow [m³/s]	9M ARI Peak Outflow [m³/s]	6M ARI Peak Outflow [m³/s]	3M ARI Peak Outflow [m³/s]
A1-1	1.14	0.92	0.68	0.51	0.38	0.24	0.19	0.14	0.10	0.08	0.10
A1-2	2.37	1.92	1.42	1.08	0.80	0.51	0.40	0.30	0.18	0.14	0.10
A1-3	3.21	2.62	1.93	1.46	1.11	0.67	0.54	0.39	0.21	0.16	0.10
A1-4J	4.58	3.75	2.73	2.06	1.58	0.94	0.75	0.55	0.24	0.18	0.10
A1-5	7.23	5.90	4.29	3.25	2.53	1.41	1.15	0.82	0.28	0.19	0.10
A1-6	8.34	6.80	5.00	3.80	2.97	1.71	1.38	1.01	0.34	0.21	0.10
A1-7	8.70	7.11	5.32	4.05	3.14	1.85	1.50	1.10	0.36	0.22	0.10
A1-8J	13.94	11.46	8.73	6.67	5.13	3.06	2.50	1.84	0.59	0.30	0.00
A1-9	14.58	12.04	9.43	7.22	5.56	3.38	2.77	2.04	0.63	0.32	0.00
A2-1	1.38	1.13	0.80	0.61	0.47	0.27	0.22	0.16	0.04	0.02	0.00
A3-1	1.75	1.44	1.08	0.82	0.65	0.35	0.26	0.18	0.07	0.03	0.00
A3-2	2.32	1.87	1.40	1.06	0.84	0.46	0.33	0.25	0.09	0.03	0.00
A4-1	0.90	0.74	0.55	0.42	0.32	0.19	0.14	0.10	0.03	0.01	0.00
A5-1	0.96	0.79	0.59	0.45	0.35	0.20	0.15	0.10	0.04	0.02	0.00
A5-2	1.53	1.24	0.90	0.69	0.53	0.30	0.22	0.16	0.06	0.02	0.00
A5-3J	3.99	3.26	2.38	1.80	1.41	0.79	0.57	0.43	0.15	0.06	0.00
A5-4J	3.99	3.26	2.38	1.80	1.41	0.79	0.57	0.43	0.15	0.06	0.00
A5-5	4.65	3.81	2.80	2.11	1.65	0.92	0.73	0.55	0.17	0.07	0.00
A6-1	1.56	1.29	0.96	0.74	0.59	0.33	0.24	0.16	0.06	0.02	0.00
A6-2	2.46	2.02	1.48	1.11	0.88	0.48	0.36	0.27	0.09	0.04	0.10
A7-1	1.06	0.87	0.63	0.48	0.36	0.20	0.16	0.12	0.04	0.01	0.00
A7-2	1.88	1.53	1.12	0.82	0.62	0.39	0.31	0.22	0.06	0.03	0.05
A8-1	1.03	0.81	0.59	0.43	0.33	0.22	0.18	0.13	0.03	0.01	0.10
Outlet	14.58	12.04	9.43	7.22	5.56	3.38	2.77	2.04	0.63	0.32	0.00



PEAK EXISTING FLOWS - 100 YEAR ARI STORM

Node	Storm 1 - 15min		Storm2 - 20min		Storm 3 - 25min		Storm 4 - 30min		Storm 5 - 45min		Storm 6 - 60min		Storm 7- 90min		Storm 8 - 120min		Storm 9 - 180min		Storm 10 - 270min		Storm 1 1- 360min		Max	Min	Average
	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Peak Outflow [m^3/s]	Peak Outflow [m^3/s]
A1-1	0.72	15	0.81	15	0.89	25	0.95	30	1.07	40	1.14	45	1.06	46	1.06	55	0.98	60	0.89	75	0.80	90	1.14	0.72	0.94
A1-2	1.47	15	1.66	20	1.80	30	1.96	30	2.25	45	2.37	50	2.24	50	2.24	60	2.06	66	1.89	75	1.68	95	2.37	1.47	1.97
A1-3	2.07	18	2.36	23	2.56	28	2.77	33	3.05	44	3.21	48	2.99	53	2.92	60	2.77	64	2.47	75	2.21	93	3.21	2.07	2.67
A1-4J	2.88	18	3.34	23	3.65	28	3.95	33	4.36	44	4.58	48	4.23	48	4.14	56	3.95	63	3.49	73	3.12	91	4.58	2.88	3.79
A1-5	4.47	41	5.21	46	5.83	50	6.18	50	6.83	60	7.23	64	6.57	65	6.51	66	6.23	78	5.42	84	4.76	107	7.23	4.47	5.93
A1-6	5.18	50	5.97	54	6.61	54	7.07	59	7.79	68	8.34	71	7.69	72	7.70	74	7.31	87	6.43	90	5.74	116	8.34	5.18	6.89
A1-7	5.44	70	6.26	70	6.92	74	7.38	79	8.11	88	8.70	89	8.08	90	8.15	94	7.81	106	6.93	109	6.23	136	8.70	5.44	7.27
A1-8J	8.85	65	10.33	69	11.37	70	11.78	74	12.87	79	13.94	84	13.06	84	13.37	87	12.89	100	11.47	104	10.23	129	13.94	8.85	11.83
A1-9	9.31	85	10.83	89	11.90	90	12.32	94	13.49	99	14.58	104	13.81	102	14.31	107	13.93	120	12.53	123	11.32	148	14.58	9.31	12.58
A2-1	0.81	16	0.98	21	1.10	26	1.19	31	1.32	41	1.38	46	1.25	46	1.23	54	1.19	61	1.03	68	0.92	90	1.38	0.81	1.13
A3-1	1.22	16	1.44	21	1.58	26	1.61	29	1.65	35	1.75	36	1.48	36	1.51	40	1.47	51	1.24	53	0.98	71	1.75	0.98	1.45
A3-2	1.54	39	1.80	44	1.97	48	2.01	51	2.15	56	2.32	59	2.03	59	2.07	62	1.98	72	1.72	75	1.41	94	2.32	1.41	1.91
A4-1	0.64	16	0.74	21	0.82	26	0.83	29	0.84	35	0.90	36	0.76	36	0.78	39	0.75	51	0.64	52	0.50	69	0.90	0.50	0.75
A5-1	0.70	16	0.80	21	0.89	25	0.90	28	0.91	35	0.96	36	0.82	36	0.83	39	0.81	50	0.68	52	0.54	68	0.96	0.54	0.80
A5-2	1.00	32	1.17	37	1.28	41	1.32	42	1.43	48	1.53	52	1.35	51	1.35	55	1.31	64	1.11	69	0.91	89	1.53	0.91	1.25
A5-3J	2.66	32	3.11	37	3.39	41	3.48	42	3.73	48	3.99	52	3.49	51	3.52	55	3.40	65	2.91	69	2.39	89	3.99	2.39	3.28
A5-4J	2.66	46	3.11	51	3.39	55	3.48	56	3.73	62	3.99	66	3.49	65	3.52	69	3.40	79	2.91	83	2.39	103	3.99	2.39	3.28
A5-5	3.03	60	3.53	65	3.84	69	3.99	70	4.35	75	4.65	79	4.22	79	4.28	82	4.17	92	3.62	97	3.09	117	4.65	3.03	3.89
A6-1	1.15	16	1.34	21	1.45	25	1.44	27	1.46	33	1.56	36	1.30	35	1.33	38	1.31	49	1.10	50	0.86	68	1.56	0.86	1.30
A6-2	1.65	32	1.95	37	2.11	41	2.16	42	2.30	48	2.46	52	2.14	51	2.17	55	2.10	65	1.80	68	1.48	88	2.46	1.48	2.03
A7-1	0.66	16	0.76	21	0.89	26	0.95	31	1.02	40	1.06	44	0.95	44	0.94	45	0.90	60	0.77	62	0.65	85	1.06	0.65	0.87
A7-2	1.11	32	1.30	37	1.50	42	1.59	46	1.77	54	1.88	57	1.75	59	1.74	62	1.64	75	1.45	78	1.29	105	1.88	1.11	1.55
A8-1	0.56	16	0.67	21	0.75	26	0.83	31	0.96	45	1.03	50	0.96	51	0.95	60	0.88	68	0.81	75	0.73	103	1.03	0.56	0.83
Outlet	9.31	85	10.83	89	11.90	90	12.32	94	13.49	99	14.58	104	13.81	102	14.31	107	13.93	120	12.53	123	11.32	148	14.58	9.31	12.58
Sum1	9.31	85	10.83	89	11.90	90	12.32	94	13.49	99	14.58	104	13.81	102	14.31	107	13.93	120	12.53	123	11.32	148	14.58	9.31	12.58

DEVELOPED CASE INPUT DATA

Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
A8-8	0.76	4.4	100	0.015	Initial/ Cont	0	1
	14.35	4.4	0	0.045	ARBM	1	1
A8-7	4.12	5.3	100	0.015	Initial/ Cont	0	1
	4.12	5.3	0	0.04	ARBM	0	1
A11-1	4.31	5.3	100	0.015	Initial/ Cont	0	1
	1.85	5.3	0	0.04	ARBM	1	1
A8-5	2.76	4.9	100	0.015	Initial/ Cont	0	1
	2.76	4.9	0	0.04	ARBM	0	1
A8-4	3.9	7.5	100	0.015	Initial/ Cont	1	1
	3.9	7.5	0	0.04	ARBM	1	1
A8-1	1.24	3	100	0.015	Initial/ Cont	0	1
	0.53	3	0	0.04	ARBM	1	1
A1-3J	0.001	0.001	0	0.025	Initial /Cont	0	1
A1-1	1.95	1	100	0.015	Initial/ Cont	1	1
	1.95	1	0	0.04	ARBM	0	1
Outlet A	0.001	0.001	0	0.025	Initial/ Cont	1	1
A9-1	4.52	7.4	100	0.015	Initial/ Cont	0	1
	1.94	7.4	0	0.04	ARBM	1	1
A1-9	2.43	5.5	100	0.015	Initial/ Cont	0	1
	1.04	5.5	0	0.04	ARBM	1	1
A13-3	7.41	8.6	100	0.015	Initial/ Cont	0	1
	3.17	8.6	0	0.04	ARBM	0	1
A13-1	1.54	2	100	0.015	Initial/ Cont	1	1
	2.3	2	0	0.03	ARBM	0	1
A1-6	0.95	1	100	0.015	Initial/ Cont	1	1
	3.78	1	0	0.03	ARBM	0	1
A1-5	1.01	1	100	0.015	Initial/ Cont	1	1
	1.01	1	0	0.03	ARBM	0	1

DEVELOPED CASE INPUT DATA

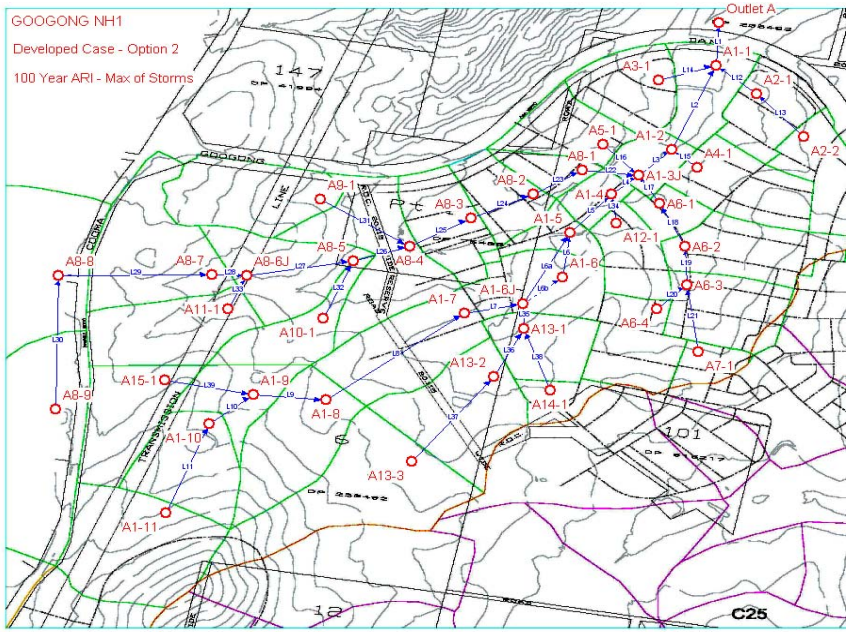
Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
					Initial/		
A1-4	0.77	1	100	0.015	Cont	1	1
	0.77	1	0	0.03	ARBM	0	1
					Initial/		
A1-8	4.79	7.8	100	0.015	Cont	0	1
	2.05	7.8	0	0.04	ARBM	0	1
					Initial/		
A1-7	4.63	3	100	0.015	Cont	0	1
	1.98	3	0	0.04	ARBM	1	1
					Initial/		
A6-2	3.75	3.5	100	0.015	Cont	0	1
	1.61	3.5	0	0.04	ARBM	1	1
					Initial/		
A6-1	1.23	2.6	100	0.015	Cont	0	1
	0.53	2.6	0	0.04	ARBM	1	1
					Initial/		
A2-1	2.77	3.3	100	0.015	Cont	0	1
	1.19	3.3	0	0.04	ARBM	1	1
					Initial/		
A8-6J	0.001	0.001	0	0.025	Cont	0	1
					Initial/		
A10-1	2.56	3	100	0.015	Cont	1	1
	1.1	3	0	0.04	ARBM	0	1
					Initial/		
A8-9	0.65	4.5	100	0.015	Cont	1	1
	12.37	4.5		0.045	ARBM	0	1
					Initial/		
A8-3	3.09	5	100	0.015	Cont	1	1
	1.33	5	0	0.04	ARBM	0	1
					Initial/		
A8-2	2.28	3	100	0.015	Cont	1	1
	0.98	3	0	0.04	ARBM	0	1
					Initial/		
A1-2	1.07	1	100	0.015	Cont	1	1
	1.07	1	0	0.04	ARBM	0	1
					Initial/		
A3-1	3.05	8	100	0.015	Cont	1	1
	1.31	8	0	0.04	ARBM	0	1
					Initial/		
A5-1	2.62	3	100	0.015	Cont	1	1
	1.12	3	0	0.04	ARBM	0	1
					Initial/		
A4-1	3.55	6	100	0.015	Cont	1	1
	1.52	6	0	0.04	ARBM	0	1
A13-2	5.15	3.3	100	0.015	Initial/	1	1

DEVELOPED CASE INPUT DATA

Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
					Cont		
	2.21	3.3	0	0.04	ARBM	0	1
					Initial/		
A14-1	1.19	3	100	0.015	Cont	1	1
	0.51	3	0	0.04	ARBM	0	1
					Initial/		
A12-1	2.3	3	100	0.015	Cont	1	1
	0.98	3	0	0.04	ARBM	0	1
					Initial/		
A1-10	4	7.5	100	0.015	Cont	1	1
	1.71	7.5	0	0.04	ARBM	0	1
					Initial/		
A1-11	4.62	10	100	0.015	Cont	1	1
	4.62	10	0	0.04	ARBM	0	1
					Initial/		
A15-1	3.96	4.9	100	0.015	Cont	0	1
	1.7	4.9	0	0.04	ARBM	0	1
					Initial/		
A6-3	3.51	5.3	100	0.015	Cont	0	1
	1.51	5.3	0	0.04	ARBM	1	1
					Initial/		
A6-4	3.19	5.3	100	0.015	Cont	0	1
	1.37	5.3	0	0.04	ARBM	1	1
					Initial/		
A7-1	1.08	5.3	100	0.015	Cont	0	1
	0.46	5.3	0	0.04	ARBM	1	1
					Initial/		
A2-2	2.99	3.3	100	0.015	Cont	0	1
	1.28	3.3	0	0.04	ARBM	1	1
					Initial/		
A1-6J	0.001	0.001	0	0.025	Cont	0	1

PEAK FLOWS - Developed (no WSUD)

Node	100Y ARI Peak Outflow [m³/s]	50Y ARI Peak Outflow [m³/s]	20Y ARI Peak Outflow [m³/s]	10Y ARI Peak Outflow [m³/s]	5Y ARI Peak Outflow [m³/s]	2Y ARI Peak Outflow [m³/s]	18M ARI Peak Outflow [m³/s]	1Y ARI Peak Outflow [m³/s]	9M ARI Peak Outflow [m³/s]	6M ARI Peak Outflow [m³/s]	3M ARI Peak Outflow [m³/s]
A8-8	2.37	1.92	1.42	1.08	0.80	0.51	0.40	0.30	0.18	0.14	0.10
A8-7	3.07	2.52	2.24	1.87	1.59	1.13	0.98	0.84	0.70	0.60	0.41
A11-1	2.07	1.81	1.59	1.34	1.16	0.87	0.77	0.66	0.57	0.50	0.34
A8-5	7.01	6.12	5.52	4.65	3.99	2.97	2.61	2.25	1.93	1.66	1.14
A8-4	10.74	9.40	8.51	7.20	6.26	4.62	4.05	3.49	3.00	2.57	1.75
A8-1	12.69	11.10	9.80	8.27	7.18	5.39	4.75	4.10	3.55	3.04	2.08
A1-3J	35.54	30.98	26.48	22.42	19.51	14.65	12.89	11.14	9.61	8.27	5.70
A1-1	38.40	33.58	28.39	24.00	20.79	15.54	13.68	11.83	10.19	8.77	6.03
Outlet A	38.40	33.58	28.39	24.00	20.79	15.54	13.68	11.83	10.19	8.77	6.03
A9-1	2.20	1.92	1.70	1.44	1.24	0.92	0.81	0.70	0.60	0.52	0.36
A1-9	7.24	6.29	5.59	4.70	4.06	3.04	2.67	2.30	1.96	1.69	1.17
A13-3	3.58	3.12	2.76	2.34	2.03	1.50	1.32	1.15	0.99	0.86	0.58
A13-1	7.08	6.15	5.42	4.57	3.97	2.98	2.62	2.27	1.95	1.67	1.14
A1-6	11.71	9.56	7.61	5.57	4.12	1.74	0.90	0.15	0.13	0.11	0.07
A1-5	17.35	15.17	13.14	11.09	9.62	7.23	6.38	5.54	4.74	4.08	2.83
A1-4	18.06	15.74	13.58	11.53	10.03	7.53	6.65	5.77	5.00	4.32	2.95
A1-8	9.13	7.92	7.09	5.99	5.17	3.85	3.39	2.93	2.52	2.16	1.49
A1-7	10.46	9.14	7.94	6.74	5.86	4.37	3.85	3.35	2.90	2.49	1.71
A6-2	5.42	4.72	4.17	3.53	3.07	2.32	2.04	1.77	1.52	1.30	0.90
A6-1	5.86	5.13	4.53	3.84	3.34	2.52	2.22	1.91	1.65	1.42	0.97
A2-1	2.68	2.34	2.06	1.75	1.53	1.16	1.02	0.88	0.76	0.65	0.45
A8-6J	4.92	4.26	3.83	3.20	2.75	1.99	1.74	1.50	1.27	1.09	0.75
A10-1	1.19	1.04	0.92	0.78	0.68	0.51	0.45	0.39	0.34	0.29	0.20
A8-9	1.14	0.92	0.68	0.51	0.38	0.24	0.19	0.14	0.10	0.08	0.05
A8-3	11.78	10.38	9.31	7.87	6.83	5.05	4.43	3.83	3.30	2.83	1.94
A8-2	12.25	10.84	9.64	8.14	7.08	5.25	4.61	3.98	3.44	2.94	2.01
A1-2	36.63	32.04	27.32	23.12	20.06	15.03	13.21	11.41	9.85	8.47	5.81
A3-1	1.52	1.32	1.18	0.98	0.84	0.63	0.55	0.47	0.41	0.35	0.24
A5-1	1.22	1.07	0.94	0.80	0.70	0.53	0.46	0.40	0.35	0.30	0.21
A4-1	1.73	1.51	1.33	1.11	0.96	0.72	0.64	0.55	0.48	0.41	0.28
A13-2	5.87	5.10	4.52	3.82	3.32	2.49	2.18	1.89	1.63	1.40	0.96
A14-1	0.56	0.49	0.43	0.37	0.32	0.24	0.21	0.18	0.16	0.14	0.09
A12-1	1.07	0.94	0.83	0.71	0.61	0.46	0.41	0.35	0.30	0.26	0.18
A1-10	4.26	3.71	3.31	2.81	2.42	1.76	1.55	1.34	1.14	0.98	0.68
A1-11	2.50	2.15	1.91	1.60	1.38	0.99	0.86	0.73	0.62	0.53	0.37
A15-1	1.89	1.65	1.46	1.22	1.06	0.80	0.71	0.61	0.53	0.45	0.31
A6-3	3.69	3.22	2.86	2.40	2.09	1.57	1.38	1.19	1.03	0.88	0.61
A6-4	1.54	1.33	1.20	0.99	0.86	0.65	0.57	0.49	0.43	0.37	0.25
A7-1	0.53	0.46	0.41	0.35	0.30	0.22	0.20	0.17	0.15	0.12	0.09
A2-2	1.40	1.22	1.07	0.92	0.80	0.60	0.53	0.46	0.39	0.34	0.23
A1-6J	16.73	14.63	12.87	10.88	9.44	7.09	6.25	5.42	4.65	3.99	2.76



PEAK FLOWS - Detention - 100 YEAR ARI STORM

Node	Storm 1 - 15min		Storm2 - 20min		Storm 3 - 25min		Storm 4 - 30min		Storm 5 - 45min		Storm 6 - 60min		Storm 7- 90min		Storm 8 - 120min		Storm 9 - 180min		Storm 10 - 270min		Storm 1 1- 360min		Max	Min	Average
	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Peak Outflow [m^3/s]	Peak Outflow [m^3/s]
A10-1	1.20	10	1.16	8	1.15	15	1.06	15	0.93	13	1.00	23	0.97	13	0.95	23	0.67	45	0.58	45	0.4118	60	1.20	0.41	0.92
A1-1	8.43	24	9.34	33	10.62	35	11.50	38	13.13	49	13.81	54	13.49	59	13.65	68	13.31	67	12.32	79	11.85	96	13.81	8.43	11.95
A1-10	4.28	10	4.02	10	4.22	15	3.88	15	3.29	15	3.76	25	3.46	15	3.45	25	2.72	45	2.37	45	1.706	60	4.28	1.71	3.38
A1-11	2.48	10	2.29	10	2.51	15	2.32	15	1.86	15	2.26	25	1.97	15	2.06	25	1.66	45	1.44	45	1.034	60	2.51	1.03	1.99
A11-1	2.07	10	1.97	10	1.99	15	1.83	15	1.58	15	1.74	25	1.67	15	1.62	23	1.16	45	1.02	45	0.7348	60	2.07	0.73	1.58
A1-2	22.48	12	21.92	14	22.09	17	20.92	17	18.88	18	20.08	27	19.08	17	18.90	28	16.96	46	15.41	46	12.99	61	22.48	12.99	19.07
A12-1	1.07	10	1.04	8	1.03	15	0.95	15	0.84	13	0.90	23	0.88	13	0.85	23	0.61	45	0.52	45	0.3697	60	1.07	0.37	0.82
A13-1	7.10	11	6.84	11	6.80	16	6.26	16	5.48	16	5.98	26	5.68	16	5.59	26	4.09	45	3.57	45	2.595	60	7.10	2.60	5.45
A13-2	5.88	10	5.61	10	5.63	15	5.18	15	4.49	15	4.92	25	4.72	15	4.60	25	3.29	45	2.87	45	2.081	60	5.88	2.08	4.48
A13-3	3.59	10	3.43	10	3.47	15	3.18	15	2.76	15	3.05	25	2.90	15	2.81	25	2.06	45	1.79	45	1.282	60	3.59	1.28	2.76
A1-3J	20.88	12	20.25	12	20.63	16	19.56	16	17.52	17	18.98	27	17.85	17	17.84	27	15.94	46	14.51	46	12.316	61	20.88	12.32	17.84
A1-4	7.34	9	7.26	10	7.26	15	7.12	15	6.91	14	7.05	24	6.98	14	6.94	24	6.53	45	6.37	45	6.097	60	7.34	6.10	6.90
A14-1	0.57	10	0.54	10	0.54	15	0.50	15	0.43	13	0.47	25	0.46	15	0.44	23	0.32	45	0.27	45	0.1978	60	0.57	0.20	0.43
A1-5	5.91	10	5.88	10	5.90	15	5.86	15	5.79	14	5.85	25	5.81	15	5.81	25	5.72	45	5.67	45	5.597	60	5.91	5.60	5.80
A15-1	1.89	10	1.80	10	1.82	15	1.68	15	1.45	13	1.59	25	1.52	15	1.49	23	1.07	45	0.93	45	0.6738	60	1.89	0.67	1.45
A1-6	0.12	60	0.13	66	0.13	164	0.15	75	0.17	82	0.18	88	0.15	102	0.13	123	0.11	178	0.08	254	0.0499	367	0.18	0.05	0.13
A1-6J	16.78	13	16.78	16	16.29	18	15.23	18	13.55	21	13.85	29	13.27	18	12.88	31	10.69	47	9.33	47	6.799	62	16.78	6.80	13.22
A1-7	10.13	13	10.50	14	9.70	18	9.04	18	8.46	19	8.73	29	8.05	18	8.28	29	6.60	45	5.76	45	4.204	60	10.50	4.20	8.13
A1-8	9.16	10	8.86	11	8.96	15	8.32	15	7.13	16	7.80	26	7.31	15	7.29	26	5.69	45	4.94	45	3.588	60	9.16	3.59	7.19
A1-9	7.27	10	6.88	10	7.07	15	6.51	15	5.54	16	6.25	25	5.82	15	5.79	25	4.41	45	3.84	45	2.782	60	7.27	2.78	5.65
A2-1	2.68	10	2.58	9	2.59	15	2.38	15	2.07	14	2.26	25	2.18	14	2.08	24	1.51	45	1.32	45	0.9293	60	2.68	0.93	2.05
A2-2	1.40	10	1.36	8	1.36	15	1.25	15	1.08	13	1.18	25	1.14	13	1.10	23	0.79	45	0.69	45	0.4849	60	1.40	0.48	1.07
A3-1	1.52	10	1.45	10	1.48	15	1.37	15	1.16	15	1.30	25	1.23	15	1.21	25	0.87	45	0.76	45	0.5486	60	1.52	0.55	1.17
A4-1	1.73	10	1.64	10	1.67	15	1.53	15	1.32	15	1.46	25	1.39	15	1.35	25	0.98	45	0.85	45	0.6194	60	1.73	0.62	1.32
A5-1	1.22	10	1.18	8	1.18	15	1.08	15	0.95	13	1.02	23	1.00	13	0.97	23	0.69	45	0.60	45	0.421	60	1.22	0.42	0.94
A6-1	5.88	10	5.69	11	5.67	15	5.24	15	4.57	16	4.99	26	4.75	15	4.65	26	3.37	45	2.95	45	2.144	60	5.88	2.14	4.54
A6-2	5.43	10	5.19	10	5.24	15	4.85	15	4.16	15	4.60	25	4.37	15	4.27	25	3.08	45	2.69	45	1.957	60	5.43	1.96	4.17
A6-3	3.70	10	3.52	9	3.57	15	3.31	15	2.83	15	3.14	25	2.97	15	2.91	24	2.13	45	1.86	45	1.346	60	3.70	1.35	2.84
A6-4	1.55	10	1.46	10	1.49	15	1.37	15	1.17	15	1.30	25	1.24	15	1.21	23	0.88	45	0.77	45	0.555	60	1.55	0.56	1.18
A7-1	0.53	10	0.51	7	0.52	15	0.47	15	0.41	15	0.46	25	0.43	15	0.42	25	0.31	45	0.27	45	0.1907	60	0.53	0.19	0.41
A8-1	6.88	12	6.78	12	6.86	17	6.35	16	5.51	17	6.45	27	5.54	17	5.94	27	5.43	46	4.66	46	4.132	89	6.88	4.13	5.87
A8-2	6.59	11	6.34	11	6.61	16	6.10	16	5.15	16	6.17	26	5.31	16	5.66	26	5.17	46	4.44	46	3.993	88	6.61	3.99	5.59
A8-3	5.76	10	5.41	10	5.85	15	5.39	15	4.43	16	5.43	25	4.64	15	4.96	25	4.68	45	4.03	98	3.754	121	5.85	3.75	4.94
A8-4	4.42	10	4.08	10	4.57	15	4.23	15	3.82	38	4.36	25	4.22	66	4.36	75	3.98	87	3.80	97	3.534	121	4.57	3.53	4.12
A8-5	1.90	47	2.21	48	2.32	41	2.58	52	3.11	58	3.46	64	3.47	72	3.58	77	3.25	89	3.05	97	2.814	126	3.58	1.90	2.89
A8-6J	1.90	25	2.21	29	2.35	36	2.60	36	3.09	47	3.28	56	3.16	59	3.20	66	2.92	75	2.71	80	2.415	113	3.28	1.90	2.71
A8-7	2.88	10	2.81	15	3.02	15	2.81	15	3.00	40	3.12	45	2.93	45	2.94	55	2.72	60	2.51	75	2.273	90	3.12	2.27	2.82
A8-8	1.54	15	1.72	20	1.86	30	2.01	30	2.29	45	2.41	50	2.28	50	2.27	60	2.09	65	1.92	75	1.707	95	2.41	1.54	2.01
A8-9	0.75	15	0.84	15	0.92	25	0.97	30	1.09	40	1.15	45	1.08	46	1.08	55	0.99	60	0.90	75	0.8132	90	1.15	0.75	0.96
A9-1	2.21	10	2.09	10	2.13	15	1.97	15	1.70	15	1.87	25	1.79	15	1.73	25	1.26	45	1.10	45	0.7929	60	2.21	0.79	1.69
Outlet A	8.43	24	9.34	33	10.62	35	11.50	38	13.13	49	13.81	54	13.49	59	13.65	68	13.31	67	12.33	79	11.85	96	13.81	8.43	11.95

DETENTION CASE INPUT DATA

Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
A10-1	2.56	3	100	0.015	Initial/ Cont	0	1
	1.1	3	0	0.04	ARBM	1	1
A1-1	1.95	1	100	0.015	Initial/ Cont	0	1
	1.95	1	0	0.04	ARBM	0	1
A1-10	4	7.5	100	0.015	Initial/ Cont	0	1
	1.71	7.5	0	0.04	ARBM	1	1
A1-11	4.62	10	100	0.015	Initial/ Cont	0	1
	4.31	5.3	100	0.015	Initial/ Cont	0	1
A11-1	4.62	10	0	0.04	ARBM	1	1
	1.85	5.3	0	0.04	ARBM	1	1
A1-2	1.07	1	100	0.015	Initial/ Cont	0	1
	1.07	1	0	0.04	ARBM	1	1
A12-1	2.3	3	100	0.015	Initial/ Cont	0	1
	0.98	3	0	0.04	ARBM	1	1
A13-1	1.54	2	100	0.015	Initial/ Cont	0	1
	2.3	2	0	0.03	ARBM	1	1
A13-2	5.15	3.3	100	0.015	Initial/ Cont	0	1
	2.21	3.3	0	0.04	ARBM	1	1
A13-3	7.41	8.6	100	0.015	Initial/ Cont	0	1
	3.17	8.6	0	0.04	ARBM	1	1
A1-3J	0.001	0.001	0	0.025	Initial/ Cont	0	1
A1-4	0.77	1	100	0.015	Initial/ Cont	0	1
	0.77	1	0	0.03	ARBM	1	1
A14-1	1.19	3	100	0.015	Initial/ Cont	0	1
	0.51	3	0	0.04	ARBM	1	1
A1-5	1.01	1	100	0.015	Initial/ Cont	0	1
	1.01	1	0	0.03	ARBM	1	1
A15-1	3.96	4.9	100	0.015	Initial/ Cont	0	1

DETENTION CASE INPUT DATA

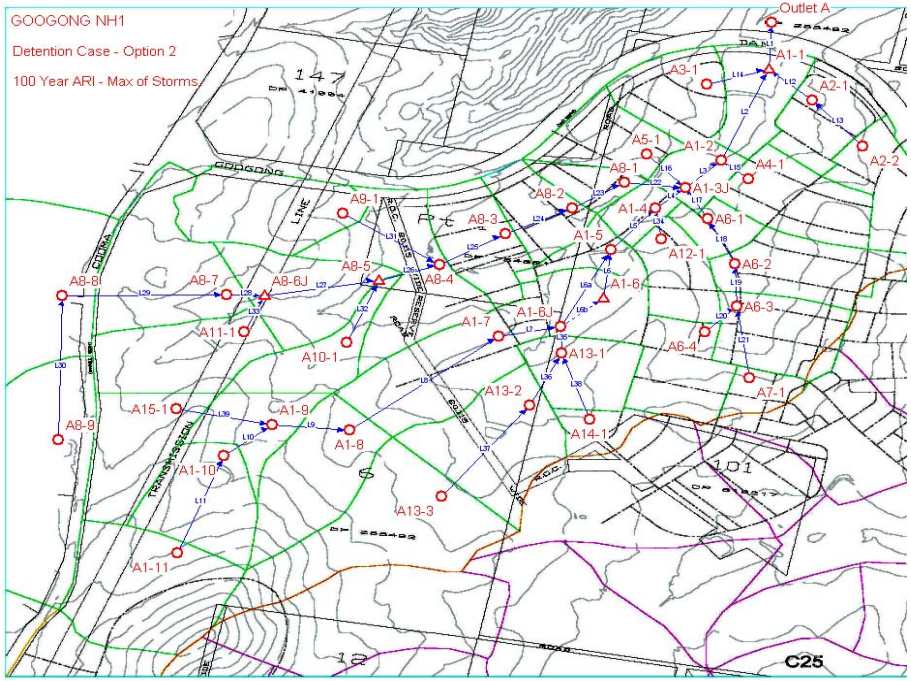
Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
	1.7	4.9	0	0.04	ARBM	1	1
A1-6	0.95	1	100	0.015	Initial/ Cont	0	1
	3.78	1	0	0.03	ARBM	0	1
A1-6J	0.001	0.001	0	0.025	Initial/ Cont	0	1
A1-7	4.63	3	100	0.015	Initial/ Cont	0	1
	1.98	3	0	0.04	ARBM	1	1
A1-8	4.79	7.8	100	0.015	Initial/ Cont	0	1
	2.05	7.8	0	0.04	ARBM	1	1
A1-9	2.43	5.5	100	0.015	Initial/ Cont	0	1
	1.04	5.5	0	0.04	ARBM	1	1
A2-1	2.77	3.3	100	0.015	Initial/ Cont	0	1
	1.19	3.3	0	0.04	ARBM	1	1
A2-2	2.99	3.3	100	0.015	Initial/ Cont	0	1
	1.28	3.3	0	0.04	ARBM	1	1
A3-1	3.05	8	100	0.015	Initial/ Cont	0	1
	1.31	8	0	0.04	ARBM	1	1
A4-1	3.55	6	100	0.015	Initial/ Cont	0	1
	1.52	6	0	0.04	ARBM	1	1
A5-1	2.62	3	100	0.015	Initial/ Cont	0	1
	1.12	3	0	0.04	ARBM	1	1
A6-1	1.23	2.6	100	0.015	Initial/ Cont	0	1
	0.53	2.6	0	0.04	ARBM	1	1
A6-2	3.75	3.5	100	0.015	Initial/ Cont	0	1
	1.61	3.5	0	0.04	ARBM	1	1
A6-3	3.51	5.3	100	0.015	Initial/ Cont	0	1
	1.51	5.3	0	0.04	ARBM	1	1
A6-4	3.19	5.3	100	0.015	Initial/ Cont	0	1
	1.37	5.3	0	0.04	ARBM	1	1
A7-1	1.08	5.3	100	0.015	Initial/ Cont	0	1
	0.46	5.3	0	0.04	ARBM	1	1

DETENTION CASE INPUT DATA

Node	Total Area [ha]	Catchment Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'	Rainfall Loss Method	Baseflow Flag	Baseflow Multiplier
A8-1	1.24	3	100	0.015	Initial/ Cont	0	1
	0.53	3	0	0.04	ARBM	1	1
A8-2	2.28	3	100	0.015	Initial/ Cont	0	1
	0.98	3	0	0.04	ARBM	1	1
A8-3	3.09	5	100	0.015	Initial/ Cont	0	1
	1.33	5	0	0.04	ARBM	1	1
A8-4	3.9	7.5	100	0.015	Initial/ Cont	0	1
	3.9	7.5	0	0.04	ARBM	1	1
A8-5	2.76	4.9	100	0.015	Initial/ Cont	0	1
	2.76	4.9	0	0.04	ARBM	0	1
A8-6J	0.001	0.001	0	0.025	Initial/ Cont	0	1
A8-7	4.12	5.3	100	0.015	Initial/ Cont	0	1
	4.12	5.3	0	0.04	ARBM	1	1
A8-8	0.76	4.4	100	0.015	Initial/ Cont	0	1
	14.35	4.4	0	0.045	ARBM	1	1
A8-9	0.65	4.5	100	0.015	Initial/ Cont	0	1
	12.37	4.5	0	0.045	ARBM	1	1
A9-1	4.52	7.4	100	0.015	Initial/ Cont	0	1
	1.94	7.4	0	0.04	ARBM	1	1
Outlet A	0.001	0.001	0	0.025	Initial/ Cont	0	1

PEAK FLOWS - Detention

Node	100Y ARI Peak Outflow [m³/s]	50Y ARI Peak Outflow [m³/s]	20Y ARI Peak Outflow [m³/s]	10Y ARI Peak Outflow [m³/s]	5Y ARI Peak Outflow [m³/s]	2Y ARI Peak Outflow [m³/s]	18M ARI Peak Outflow [m³/s]	1Y ARI Peak Outflow [m³/s]	9M ARI Peak Outflow [m³/s]	6M ARI Peak Outflow [m³/s]	3M ARI Peak Outflow [m³/s]
A10-1	1.20	1.05	0.93	0.79	0.69	0.52	0.45	0.39	0.34	0.29	0.20
A1-1	13.81	12.15	10.42	8.65	8.12	5.86	5.02	4.26	3.33	2.73	1.63
A1-10	4.28	3.73	3.33	2.83	2.43	1.78	1.57	1.36	1.16	0.99	0.70
A1-11	2.51	2.16	1.92	1.61	1.39	1.00	0.87	0.74	0.63	0.54	0.38
A11-1	2.07	1.81	1.60	1.34	1.16	0.88	0.77	0.67	0.58	0.50	0.34
A1-2	22.48	20.35	18.62	16.64	15.19	12.55	11.18	9.70	8.38	7.23	4.99
A12-1	1.07	0.94	0.83	0.71	0.62	0.46	0.41	0.35	0.31	0.26	0.18
A13-1	7.10	6.17	5.44	4.59	3.99	3.00	2.64	2.29	1.97	1.69	1.16
A13-2	5.88	5.12	4.53	3.83	3.33	2.50	2.20	1.91	1.64	1.41	0.98
A13-3	3.59	3.13	2.77	2.35	2.04	1.51	1.33	1.15	1.00	0.87	0.59
A1-3J	20.88	18.93	17.51	15.70	14.38	12.03	10.89	9.44	8.15	7.03	4.84
A1-4	7.34	7.10	6.90	6.68	6.52	6.22	5.93	5.72	4.98	4.31	2.96
A14-1	0.57	0.49	0.44	0.37	0.32	0.24	0.21	0.19	0.16	0.14	0.09
A1-5	5.91	5.85	5.80	5.74	5.70	5.63	5.57	5.47	4.75	4.08	2.84
A15-1	1.89	1.65	1.47	1.23	1.06	0.81	0.71	0.61	0.53	0.46	0.31
A1-6	0.18	0.12	0.07	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00
A1-6J	16.78	14.69	12.93	10.93	9.50	7.14	6.30	5.47	4.70	4.04	2.81
A1-7	10.50	9.17	7.97	6.77	5.89	4.40	3.89	3.39	2.94	2.53	1.75
A1-8	9.16	7.95	7.11	6.02	5.20	3.88	3.42	2.96	2.54	2.19	1.51
A1-9	7.27	6.32	5.61	4.72	4.08	3.06	2.69	2.32	1.99	1.72	1.19
A2-1	2.68	2.35	2.07	1.76	1.54	1.16	1.02	0.88	0.76	0.66	0.46
A2-2	1.40	1.22	1.08	0.92	0.80	0.60	0.53	0.46	0.40	0.34	0.24
A3-1	1.52	1.33	1.18	0.98	0.84	0.63	0.55	0.48	0.41	0.35	0.25
A4-1	1.73	1.51	1.34	1.12	0.96	0.72	0.64	0.55	0.48	0.41	0.28
A5-1	1.22	1.07	0.95	0.80	0.70	0.53	0.47	0.40	0.35	0.30	0.21
A6-1	5.88	5.14	4.54	3.85	3.35	2.53	2.23	1.93	1.66	1.43	0.99
A6-2	5.43	4.73	4.18	3.54	3.08	2.33	2.05	1.78	1.53	1.32	0.92
A6-3	3.70	3.23	2.87	2.41	2.10	1.58	1.39	1.20	1.03	0.89	0.62
A6-4	1.55	1.34	1.20	1.00	0.86	0.65	0.57	0.50	0.43	0.37	0.26
A7-1	0.53	0.46	0.41	0.35	0.30	0.23	0.20	0.17	0.15	0.13	0.09
A8-1	6.88	5.98	5.35	4.55	3.94	2.91	2.56	2.21	1.90	1.62	1.12
A8-2	6.61	5.76	5.18	4.36	3.78	2.80	2.45	2.11	1.80	1.55	1.06
A8-3	5.85	5.09	4.59	3.86	3.34	2.46	2.15	1.84	1.57	1.35	0.92
A8-4	4.57	3.97	3.59	3.04	2.62	1.88	1.64	1.41	1.21	1.03	0.70
A8-5	3.58	2.95	2.33	1.85	1.52	1.03	0.85	0.62	0.47	0.38	0.22
A8-6J	3.28	2.72	2.12	1.66	1.35	0.92	0.75	0.58	0.45	0.38	0.24
A8-7	3.12	2.61	2.32	1.95	1.67	1.21	1.06	0.92	0.78	0.68	0.49
A8-8	2.41	1.96	1.46	1.12	0.84	0.52	0.41	0.33	0.25	0.21	0.17
A8-9	1.15	0.93	0.70	0.53	0.40	0.25	0.20	0.17	0.13	0.11	0.09
A9-1	2.21	1.93	1.71	1.44	1.24	0.92	0.81	0.70	0.61	0.53	0.37
Outlet A	13.81	12.15	10.42	8.65	8.12	5.86	5.02	4.26	3.33	2.73	1.64



PEAK EXISTING FLOWS - 100 YEAR ARI STORM

Node	Storm 1 - 15min		Storm2 - 20min		Storm 3 - 25min		Storm 4 - 30min		Storm 5 - 45min		Storm 6 - 60min		Storm 7- 90min		Storm 8 - 120min		Storm 9 - 180min		Storm 10 - 270min		Storm 1 1- 360min		Max	Min	Average
	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Time to peak [min]	Peak Outflow [m^3/s]	Peak Outflow [m^3/s]	Peak Outflow [m^3/s]
A10-1	1.20	10	1.16	8	1.15	15	1.06	15	0.93	13	1.00	23	0.97	13	0.95	23	0.67	45	0.58	45	0.4118	60	1.20	0.41	0.92
A1-1	8.43	24	9.34	33	10.62	35	11.50	38	13.13	49	13.81	54	13.49	59	13.65	68	13.31	67	12.32	79	11.85	96	13.81	8.43	11.95
A1-10	4.28	10	4.02	10	4.22	15	3.88	15	3.29	15	3.76	25	3.46	15	3.45	25	2.72	45	2.37	45	1.706	60	4.28	1.71	3.38
A1-11	2.48	10	2.29	10	2.51	15	2.32	15	1.86	15	2.26	25	1.97	15	2.06	25	1.66	45	1.44	45	1.034	60	2.51	1.03	1.99
A11-1	2.07	10	1.97	10	1.99	15	1.83	15	1.58	15	1.74	25	1.67	15	1.62	23	1.16	45	1.02	45	0.7348	60	2.07	0.73	1.58
A1-2	22.48	12	21.92	14	22.09	17	20.92	17	18.88	18	20.08	27	19.08	17	18.90	28	16.96	46	15.41	46	12.99	61	22.48	12.99	19.07
A12-1	1.07	10	1.04	8	1.03	15	0.95	15	0.84	13	0.90	23	0.88	13	0.85	23	0.61	45	0.52	45	0.3697	60	1.07	0.37	0.82
A13-1	7.10	11	6.84	11	6.80	16	6.26	16	5.48	16	5.98	26	5.68	16	5.59	26	4.09	45	3.57	45	2.595	60	7.10	2.60	5.45
A13-2	5.88	10	5.61	10	5.63	15	5.18	15	4.49	15	4.92	25	4.72	15	4.60	25	3.29	45	2.87	45	2.081	60	5.88	2.08	4.48
A13-3	3.59	10	3.43	10	3.47	15	3.18	15	2.76	15	3.05	25	2.90	15	2.81	25	2.06	45	1.79	45	1.282	60	3.59	1.28	2.76
A1-3J	20.88	12	20.25	12	20.63	16	19.56	16	17.52	17	18.98	27	17.85	17	17.84	27	15.94	46	14.51	46	12.316	61	20.88	12.32	17.84
A1-4	7.34	9	7.26	10	7.26	15	7.12	15	6.91	14	7.05	24	6.98	14	6.94	24	6.53	45	6.37	45	6.097	60	7.34	6.10	6.90
A14-1	0.57	10	0.54	10	0.54	15	0.50	15	0.43	13	0.47	25	0.46	15	0.44	23	0.32	45	0.27	45	0.1978	60	0.57	0.20	0.43
A1-5	5.91	10	5.88	10	5.90	15	5.86	15	5.79	14	5.85	25	5.81	15	5.81	25	5.72	45	5.67	45	5.597	60	5.91	5.60	5.80
A15-1	1.89	10	1.80	10	1.82	15	1.68	15	1.45	13	1.59	25	1.52	15	1.49	23	1.07	45	0.93	45	0.6738	60	1.89	0.67	1.45
A1-6	0.12	60	0.13	66	0.13	164	0.15	75	0.17	82	0.18	88	0.15	102	0.13	123	0.11	178	0.08	254	0.0499	367	0.18	0.05	0.13
A1-6J	16.78	13	16.78	16	16.29	18	15.23	18	13.55	21	13.85	29	13.27	18	12.88	31	10.69	47	9.33	47	6.799	62	16.78	6.80	13.22
A1-7	10.13	13	10.50	14	9.70	18	9.04	18	8.46	19	8.73	29	8.05	18	8.28	29	6.60	45	5.76	45	4.204	60	10.50	4.20	8.13
A1-8	9.16	10	8.86	11	8.96	15	8.32	15	7.13	16	7.80	26	7.31	15	7.29	26	5.69	45	4.94	45	3.588	60	9.16	3.59	7.19
A1-9	7.27	10	6.88	10	7.07	15	6.51	15	5.54	16	6.25	25	5.82	15	5.79	25	4.41	45	3.84	45	2.782	60	7.27	2.78	5.65
A2-1	2.68	10	2.58	9	2.59	15	2.38	15	2.07	14	2.26	25	2.18	14	2.08	24	1.51	45	1.32	45	0.9293	60	2.68	0.93	2.05
A2-2	1.40	10	1.36	8	1.36	15	1.25	15	1.08	13	1.18	25	1.14	13	1.10	23	0.79	45	0.69	45	0.4849	60	1.40	0.48	1.07
A3-1	1.52	10	1.45	10	1.48	15	1.37	15	1.16	15	1.30	25	1.23	15	1.21	25	0.87	45	0.76	45	0.5486	60	1.52	0.55	1.17
A4-1	1.73	10	1.64	10	1.67	15	1.53	15	1.32	15	1.46	25	1.39	15	1.35	25	0.98	45	0.85	45	0.6194	60	1.73	0.62	1.32
A5-1	1.22	10	1.18	8	1.18	15	1.08	15	0.95	13	1.02	23	1.00	13	0.97	23	0.69	45	0.60	45	0.421	60	1.22	0.42	0.94
A6-1	5.88	10	5.69	11	5.67	15	5.24	15	4.57	16	4.99	26	4.75	15	4.65	26	3.37	45	2.95	45	2.144	60	5.88	2.14	4.54
A6-2	5.43	10	5.19	10	5.24	15	4.85	15	4.16	15	4.60	25	4.37	15	4.27	25	3.08	45	2.69	45	1.957	60	5.43	1.96	4.17
A6-3	3.70	10	3.52	9	3.57	15	3.31	15	2.83	15	3.14	25	2.97	15	2.91	24	2.13	45	1.86	45	1.346	60	3.70	1.35	2.84
A6-4	1.55	10	1.46	10	1.49	15	1.37	15	1.17	15	1.30	25	1.24	15	1.21	23	0.88	45	0.77	45	0.555	60	1.55	0.56	1.18
A7-1	0.53	10	0.51	7	0.52	15	0.47	15	0.41	15	0.46	25	0.43	15	0.42	25	0.31	45	0.27	45	0.1907	60	0.53	0.19	0.41
A8-1	6.88	12	6.78	12	6.86	17	6.35	16	5.51	17	6.45	27	5.54	17	5.94	27	5.43	46	4.66	46	4.132	89	6.88	4.13	5.87
A8-2	6.59	11	6.34	11	6.61	16	6.10	16	5.15	16	6.17	26	5.31	16	5.66	26	5.17	46	4.44	46	3.993	88	6.61	3.99	5.59
A8-3	5.76	10	5.41	10	5.85	15	5.39	15	4.43	16	5.43	25	4.64	15	4.96	25	4.68	45	4.03	98	3.754	121	5.85	3.75	4.94
A8-4	4.42	10	4.08	10	4.57	15	4.23	15	3.82	38	4.36	25	4.22	66	4.36	75	3.98	87	3.80	97	3.534	121	4.57	3.53	4.12
A8-5	1.90	47	2.21	48	2.32	41	2.58	52	3.11	58	3.46	64	3.47	72	3.58	77	3.25	89	3.05	97	2.814	126	3.58	1.90	2.89
A8-6J	1.90	25	2.21	29	2.35	36	2.60	36	3.09	47	3.28	56	3.16	59	3.20	66	2.92	75	2.71	80	2.415	113	3.28	1.90	2.71
A8-7	2.88	10	2.81	15	3.02	15	2.81	15	3.00	40	3.12	45	2.93	45	2.94	55	2.72	60	2.51	75	2.273	90	3.12	2.27	2.82
A8-8	1.54	15	1.72	20	1.86	30	2.01	30	2.29	45	2.41	50	2.28	50	2.27	60	2.09	65	1.92	75	1.707	95	2.41	1.54	2.01
A8-9	0.75	15	0.84	15	0.92	25	0.97	30	1.09	40	1.15	45	1.08	46	1.08	55	0.99	60	0.90	75	0.8132	90	1.15	0.75	0.96
A9-1	2.21	10	2.09	10	2.13	15	1.97	15	1.70	15	1.87	25	1.79	15	1.73	25	1.26	45	1.10	45	0.7929	60	2.21	0.79	1.69
Outlet A	8.43	24	9.34	33	10.62	35	11.50	38	13.13	49	13.81	54	13.49	59	13.65	68	13.31	67	12.33	79	11.85	96	13.81	8.43	11.95

APPENDIX C

MUSIC Input

Table C.1: Adopted MUSIC modelling parameters

PARAMETER	PASTURE	URBAN	FOREST
Rainfall Runoff parameters			
Impervious Area properties			
Rainfall Threshold (mm/day)	0	0	0
Pervious Area Properties			
Soil Storage Capacity (mm)	40	40	120
Soil Initial Storage (% of capacity)	20	20	30
Field Capacity (mm)	25	25	80
Infiltration Capacity Coefficient - a	200	200	200
Infiltration Capacity Exponent - b	1	1	1
Groundwater Properties			
Initial Depth (mm)	1	1	10
Daily Recharge rate (%)	25	25	25
Daily Baseflow rate (%)	1	1	5
Daily Deep Seepage rate (%)	15	15	5
Storm water Quality Parameters			
Baseflow TSS Mean (log mg/L)	1.400	1.100	1.900
Baseflow TSS Standard Deviation (log mg/L)	0	0	0
Baseflow TSS Estimation Method	Mean	Mean	Mean
Stormflow TSS Mean (log mg/L)	2.370	2.407	0.900
Stormflow TSS Standard Deviation (log mg/L)	0	0	0
Stormflow TSS Estimation Method	Mean	Mean	Mean
Baseflow TP Mean (log mg/L)	-0.880	-0.820	-1.100
Baseflow TP Standard Deviation (log mg/L)	0	0	0
Baseflow TP Estimation Method	Mean	Mean	Mean
Stormflow TP Mean (log mg/L)	-0.580	-0.650	-1.500
Stormflow TP Standard Deviation (log mg/L)	0	0	0
Stormflow TP Estimation Method	Mean	Mean	Mean
Baseflow TN Mean (log mg/L)	0.074	0.320	-0.075
Baseflow TN Standard Deviation (log mg/L)	0	0	0
Baseflow TN Estimation Method	Mean	Mean	Mean
Stormflow TN Mean (log mg/L)	0.660	0.482	-0.140
Stormflow TN Standard Deviation (log mg/L)	0	0	0
Stormflow TN Estimation Method	Mean	Mean	Mean

APPENDIX B

Intensity Frequency Duration Table for Googong

Intensity-Frequency-Duration Data

Location: Googong

Map 1.7 =	*22.30*	Map 2.7 =	*4.40*	Map 3.7 =	*1.20*	2i6min =	70	mm/h
Map 4.7 =	*42.00*	Map 5.7 =	*7.70*	Map 6.7 =	*2.10*	50i6min =	147	mm/h
Map 7 =	*0.22*	Map 8 =	*4.28*	Map 9 =	*15.58*			

DUR	ARI	ARI	ARI	ARI	ARI	ARI	ARI
min	**1**	**2**	**5**	**10**	**20**	**50**	**100**
5	55.97	73.62	98.65	114.79	136.08	165.65	189.45
6	52.44	68.90	92.09	107.00	126.69	154.01	175.96
7	49.47	64.94	86.58	100.48	118.84	144.28	164.70
8	46.93	61.56	81.90	94.94	112.18	136.03	155.17
9	44.73	58.62	77.85	90.14	106.42	128.92	146.95
10	42.79	56.05	74.29	85.94	101.37	122.69	139.76
15	35.68	46.60	61.32	70.65	83.06	100.13	113.75
20	31.03	40.44	52.92	60.79	71.28	85.67	97.13
25	27.70	36.03	46.93	53.77	62.91	75.43	85.38
30	25.15	32.67	42.39	48.47	56.61	67.73	76.55
35	23.13	30.01	38.81	44.29	51.65	61.69	69.63
40	21.49	27.84	35.90	40.90	47.63	56.79	64.04
45	20.11	26.03	33.47	38.08	44.29	52.74	59.41
60	17.04	22.00	28.11	31.86	36.94	43.83	49.26
h	**1**	**2**	**5**	**10**	**20**	**50**	**100**
60	17.04	22.00	28.11	31.86	36.94	43.83	49.26
120	12.64	16.28	20.67	23.36	27.02	31.95	35.83
180	10.23	13.16	16.64	18.77	21.66	25.56	28.63
240	8.61	11.05	13.94	15.69	18.08	21.30	23.82
300	7.40	9.50	11.94	13.42	15.44	18.17	20.30
360	6.47	8.29	10.39	11.66	13.41	15.75	17.58
540	4.57	5.84	7.27	8.13	9.32	10.91	12.14
720	3.41	4.35	5.38	6.00	6.86	8.00	8.89
900	3.12	3.91	4.84	5.40	6.17	7.20	8.00
1080	2.89	3.55	4.40	4.90	5.61	6.54	7.27
1260	2.68	3.25	4.03	4.49	5.13	5.99	6.65
1440	2.51	3.00	3.71	4.14	4.73	5.52	6.13
2160	1.98	2.25	2.79	3.11	3.55	4.14	4.60
2880	1.62	1.77	2.19	2.44	2.79	3.26	3.62
3600	1.36	1.43	1.78	1.98	2.26	2.64	2.93
4320	1.17	1.19	1.47	1.64	1.87	2.18	2.42

APPENDIX C

XP-RAFTS RESULTS

PEAK DETENTION FLOWS - ALL STORMS RECAP

Node	100Y ARI Peak Outflow [m^3/s]	50Y ARI Peak Outflow [m^3/s]	20Y ARI Peak Outflow [m^3/s]	10Y ARI Peak Outflow [m^3/s]	5Y ARI Peak Outflow [m^3/s]	1Y ARI Peak Outflow [m^3/s]	3M ARI Peak Outflow [m^3/s]
A1-1	11.62	9.64	7.82	6.67	5.79	2.15	0.76
A1-10	7.27	6.32	5.61	4.72	4.08	2.32	1.19
A1-11	4.28	3.73	3.33	2.83	2.43	1.36	0.70
A1-12	2.51	2.16	1.92	1.61	1.39	0.74	0.38
A1-2	20.01	17.75	16.22	14.01	12.43	7.95	4.37
A1-3J	17.46	15.50	13.74	11.95	10.67	6.96	4.16
A1-4 SWALE	3.23	3.07	2.95	2.80	2.69	2.38	2.09
A1-5	2.75	2.26	2.20	2.16	2.13	2.06	2.03
A1-6	0.70	0.22	0.08	0.07	0.06	0.04	0.01
A1-7J	17.01	14.93	12.87	10.87	9.48	5.43	2.84
A1-8	10.36	9.06	7.88	6.68	5.82	3.34	1.73
A1-9	9.16	7.95	7.11	6.02	5.20	2.96	1.51
A10-1	0.47	0.41	0.37	0.31	0.27	0.16	0.08
A11-1	0.34	0.30	0.27	0.22	0.19	0.11	0.06
A12-1	0.62	0.54	0.48	0.40	0.35	0.20	0.10
A13-1	0.84	0.73	0.65	0.54	0.47	0.27	0.14
A14-1	0.69	0.61	0.53	0.45	0.40	0.23	0.12
A15-1	3.21	2.80	2.50	2.09	1.80	1.01	0.52
A15-2	2.21	1.93	1.71	1.44	1.24	0.70	0.37
A16-1	1.20	1.05	0.93	0.79	0.69	0.39	0.20
A17-1	2.07	1.81	1.60	1.34	1.16	0.67	0.34
A18-1	1.03	0.89	0.79	0.67	0.58	0.33	0.17
A19-1	0.45	0.40	0.35	0.30	0.26	0.15	0.07
A2-1	3.50	3.05	2.68	2.28	1.98	1.14	0.58
A2-2	1.93	1.69	1.49	1.26	1.10	0.64	0.33
A20-1	7.19	6.31	5.59	4.76	4.13	2.38	1.23
A20-2	5.78	5.04	4.45	3.77	3.28	1.88	0.96
A20.3	3.59	3.13	2.77	2.35	2.04	1.15	0.59
A21-1	0.62	0.54	0.47	0.40	0.35	0.20	0.10
A22-1	1.04	0.91	0.80	0.68	0.59	0.34	0.18
A23-1	1.89	1.65	1.47	1.23	1.06	0.61	0.31
A24-1	1.28	1.10	0.98	0.82	0.71	0.41	0.21
A3-1	0.69	0.61	0.53	0.45	0.39	0.23	0.12
A4-1	1.32	1.15	1.01	0.86	0.75	0.43	0.22
A5-1	1.53	1.32	1.17	0.98	0.85	0.49	0.25
A6-1	0.62	0.54	0.48	0.41	0.35	0.20	0.10
A7-1	5.88	5.13	4.54	3.84	3.34	1.91	0.98
A7-2	4.62	4.04	3.57	3.00	2.62	1.50	0.77
A7-3	0.61	0.53	0.47	0.40	0.35	0.20	0.10
A8-1	0.86	0.76	0.67	0.56	0.49	0.28	0.15
A9-1 SWALE	9.49	8.30	7.19	6.08	5.28	2.99	1.54
A9-2	7.86	6.89	5.99	5.06	4.40	2.53	1.32
A9-3J	7.04	6.13	5.45	4.58	3.96	2.25	1.15
A9-4	2.61	2.27	2.01	1.71	1.47	0.83	0.43
A9-5BR	1.69	1.18	1.06	0.88	0.74	0.42	0.08
A9-5J	1.71	1.18	1.06	0.88	0.74	0.42	0.08
A9-6	3.38	2.79	2.35	1.97	1.70	0.92	0.49
A9-7	2.63	2.17	1.60	1.22	0.98	0.38	0.17
A9-8	1.25	1.04	0.76	0.59	0.45	0.18	0.09
Outlet	11.62	9.64	7.82	6.67	5.79	2.15	0.76