

Civil Engineering Report Development Application

313 Magpie Lane, Galambine NSW - Caravan Park

Prepared for: CAM Engineering & Construction 383 Freemans Drive, Cooranbong NSW 2264

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1 INTRODUCTION

1.1 General

ACOR Consultants have been engaged by CAM Engineering & Construction to prepare an engineering report to support the Development Application for a proposed caravan park located at 313 Magpie Lane, Galambine in NSW. The property titles are Lot 1, DP 1003242 and DP 174385.

This report covers the concept design of:

- Road and site grading
- Stormwater drainage quantity
- Stormwater drainage quality

Stormwater quantity items addressed in this report include:

- Stormwater conveyance/network;
- Stormwater detention

Stormwater quality items addressed in this report include:

- Operational water quality management incorporating Water Sensitive Urban Design principles (WSUD);
- Construction water quality management incorporating soil and water management.

Refer to ACOR drawing set (Project No. NS230540) for the design of the road works, site grading and stormwater drainage for the proposed development.

2 SITE

2.1 Location

The site is located at 313 Magpie Lane, Galambine. The site is bounded to the north by Magpie Lane, to the west by Guntawang Road and by rural properties to the south and east. The total site area is 73.58ha. ACOR drawing C01-001 shows the location of the site.

2.2 Topography

The existing site grades generally from the south east to the north west at varying grades across the site. There are a number of existing dams and contour banks on the properties. ACOR drawing C08-401 shows the existing site topography.

The levels on the site currently range from approximate RL444m AHD at the southern corner boundary, RL442m AHD at the north eastern corner boundary, and RL421m AHD at the north western corner boundary.

2.3 Existing/previous Land Use

The site is currently used as grazing land for cattle and horses. There is a single building, fences and several dams on site. The site in its current condition is mostly cleared with some areas of vegetation spread-out throughout the properties as well as some gravel driveways.

2.4 Existing Site Drainage

The site currently drains from the southeast and east to the west and northwest. There are a number of existing dams and contour banks on the properties. There are a number of existing culvert crossings under Guntawang Road and Magpie Lane. ACOR drawing C08-401 shows the existing dams, contour banks and road culverts.



There are two (2) mapped 1st order and one (1) 2nd order streams within the property. These three (3) mapped watercourses are feeder tributaries of Pig and Whistle Creek. Refer to the Riparian Assessment Report (SEP Ref: 3282) by Anderson Environment & Planning for details on the existing streams.

2.5 External Catchments

There is an existing upstream catchment to the west of approximately 123 hectares. The upstream catchment drains through the development site along the eastern boundary and along Guntawang Road.

2.6 Proposed Development

The proposed development is a caravan park with approximately 240 long term MHE sites and 147 short term caravan park sites with associated community centre and activities areas. The proposed development includes road works, earthworks and stormwater drainage infrastructure including a detention basin and two water quality basins.

The main access to the site will be off Magpie Lane. Two emergency exits from the site are also being provided. The first emergency exit is located at the short term caravan park east of the main site access off Magpie Lane. The second emergency exit is located off Guntawang Road at the southern end of the long term sites.

The intersection of Magpie Lane and Guntawang Road is proposed to be upgraded from a Give Way BAR/BAL T-intersection to a CHR(s)/BAL intersection.

Magpie Lane is proposed to be upgrade up to the main site access to be a minimum 7m wide rural local road to Mid-Western Council's standards.

The total area of proposed development is approximately 22.5 hectares. ACOR drawing C01-201 shows the proposed development layout.

3 CONCEPT CIVIL DESIGN

3.1 Public Road Works

The main access to the site will be off Magpie Lane. Magpie Lane is proposed to be upgrade up to the main site access to be a minimum 7m wide rural local road to Mid-Western Council's standards. Refer to ACOR drawing C05-001 and C05-002 for the general arrangement plan, C06-601 for main entry intersection layout, C06-102 and C06-03 for the road longitudinal sections, and C06-201 for typical cross-section.

The intersection of Magpie Lane and Guntawang Road is proposed to be upgraded from a Give Way BAR/BAL T-intersection to a CHR(s)/BAL intersection. No additional road works are proposed in Guntawang Road. Refer to ACOR drawing C06-501 for the general arrangement plan for the intersection, and C06-101 for Guntawang Road longitudinal section at the intersection.

3.2 Concept Site and Road Grading

Access to the site and individual sites are required to meet the requirements of the Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation, Australian Standard AS2890.1-2004 Parking facilities Part 1: Off-street car parking and for Magpie Lane the requirements of Mid-Western Regional Council.

The concept grading for the proposed development was undertaken generally following the natural topography of the site. The grading of the roadways ranges from a minimum of 0.5% to a maximum of



6%. Road widths have been designed to meet the requirements the Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation.

ACOR drawings C05-002 to C05-010 show the concept site grading for the development.

ACOR drawings C06-110 to C06-190 show concept road longitudinal sections and C06-201 to C06-203 show typical road cross sections.

A roundabout is proposed to be provided at the entry to the short term caravan park sites. Refer to ACOR drawing C05-002 for the proposed roundabout layout.

The sites have generally been graded to provide 3% falls and retaining walls have been proposed at the rear of the sites to suit the proposed road grading. ACOR drawings C01-201 and C09-001 to C09-005 show the proposed site sections.

3.3 Bulk Earthworks

The bulk earthworks for the proposed road and site grading are shown in ACOR drawings C04-001 to C04-003. The preliminary earthworks volumes shown on ACOR drawing C04-001 are calculated from the existing surface levels to the design levels. Stripping of topsoil and boxing out for pavements has not been included in these volumes. The preliminary earthworks volumes are:

- Cut 97,000m³
- Fill 78,000m³
- Balance is 19,000m³ to spoil

At detail design stage, the bulk earthworks should incorporate stripping of topsoil and pavement box out, and adjustments to the site grading to balance the earthworks volumes.

4 STORMWATER MANAGEMENT

4.1 General

Stormwater management for the site will consist of stormwater quantity including detention and stormwater quality. These elements are described below.

The catchment flows from the long term sites are proposed to be directed to a detention/bio-retention basin located to the west of the development.

The catchment flows from the short term sites are proposed to be directed to a bio-retention basin located to the north west of the development.

The stormwater management plans for the development are shown in ACOR drawings C08-001 to C08-009.

5 STORMWATER QUANTITY MANAGEMENT

5.1 Objectives

The objectives of the stormwater quantity management for the site are:

- Provide a stormwater conveyance system in accordance with Australian Rainfall and Runoff's minor/major system philosophy and the requirements of Mid-western Regional Council.
- Design for new stormwater culverts and upgrades to existing.
- Address detention requirements for the site.
- Conveyance of flows from external catchments.



5.2 Stormwater Conveyance

5.2.1 Minor Storm Event Conveyance

Minor system stormwater conveyance for the development will be a via a traditional pit and pipe system. The minor stormwater system should be designed to convey the peak flows from a 20% AEP storm event. The fraction impervious for the sites and roads should be confirmed during the detailed design stage.

The concept minor stormwater management system for the development is shown in ACOR drawings C08-001 to C08-009.

5.2.2 Major Storm Event Conveyance

Major system stormwater conveyance for the proposed development will be via overland flow. This will be via traditional trunk drainage along the road carriage way and footpath. The major stormwater system will have the capacity to safely convey the peak flows from the 1% AEP storm events within the road reserve.

5.2.3 Upstream External Catchments

Catch drains have been proposed to the west of the development to direct flows from the upstream catchments around the proposed sites.

ACOR drawings C08-001 to C08-009 show the location of the catch drains and C10-001 to C10-006 detail the longitudinal sections for the catch drains.

5.2.4 Road Culverts

There are existing road culverts under Guntawang Road and Magpie Lane. The existing road culverts are shown on ACOR drawing C08-401. The capacity of the existing road culverts was found to be less than 50% AEP.

The two road culverts under Guntawang Road are to remain. The two road culverts under Magpie Lane are to be upgraded to provide capacity for 50% AEP flows and ensure that 1% AEP flows can safely discharge over the road. The culvert upgrade is generally in line with the capacity of the existing culverts. Road culvert capacity requirements should be confirmed with Council at the detail design stage.

The road culverts proposed within the development should be sized to provide capacity for 5% AEP flows and ensure that 1% AEP flows can safely discharge over the road.

ACOR drawing C08-402 shows the details for the road culverts.

5.3 Stormwater Detention

5.3.1 General

Detention has been provided for the development to ensure the developed flows from the site are not increased, thus ensuring to neighbouring properties are negatively affected by this development.

A fraction impervious of 70% has been adopted for the lots and road catchments for the detention calculations. The fraction impervious for the development should be confirmed at the detail design stage.

5.3.2 DRAINS Modelling

DRAINS modelling was undertaken to determine the predeveloped and developed peak flows for a range of AEP's from 20% to 1%, for storm durations ranging from 5 minutes to 6 hours for the proposed development.



The predeveloped and developed DRAINS models include for the upstream catchments draining through the site. The existing and proposed road culverts have also been included in the DRAINS models to confirm their capacity.

The predeveloped and post developed catchments are shown in ACOR drawings C08-401 and C08-402 respectively.

5.3.3 Predeveloped Flows

There are a total of four (4) existing road culverts draining flows from the site. There are two (2) road culverts in Guntawang Road which discharge to the west. The overflows from these culverts are directed north along the western side of Guntawang Road to the existing culverts in Magpie Lane.

The flows discharging through the existing culverts under Guntawang Road are the same in the predeveloped and post developed scenarios, hence they have not been included in the total predeveloped flows shown in Table 1 which represent the predeveloped flows from the site through the two culverts under Magpie Lane.

AEP	Predeveloped Flow (m³/s)
20%	9.710
10%	13.600
5%	16.400
2%	20.100
1%	25.500

Table 1 - Predeveloped Flows at Magpie Lane

5.3.4 Post Developed Flows

To reduce the post developed flows below the predeveloped flows, a detention basin is proposed to be installed. Refer to ACOR drawing C08-602 for Basin 1 details.

The following basin configuration was used in the DRAINS model for the detention basin:

- Top level of Basin: RL432.5
- Bottom level of Basin: RL430.2
- Outlet discharge configuration
 - Outlet pit 1500mm x 9000mm surface inlet pit at RL430.2
 - Outlet pipe from pit 1200mm x 300mm box culvert
- Weir 10m wide at RL432.0
- The stage storage areas for the basin are shown in Table 2



Table 2: Basin	1 - S	Stage St	orage Areas
----------------	-------	----------	-------------

Height (m)	Surface Area (m ²)
430.2	4657
432.0	8031
432.5	9032

The total predeveloped flows and post developed flows with the proposed BASIN 1 detention are shown in Table 3.

Table 3: Predeveloped and Post Developed Flows at Magpie Lane

AEP	Predeveloped Peak Flows	Developed Flows (with Basin)	Decrease	% Decrease
(%)	(m³/s)	(m³/s)	(m³/s)	
20%	9.710	9.590	-0.120	-1
10%	13.600	13.200	-0.400	-3
5%	16.400	15.800	-0.600	-4
2%	20.100	19.300	-0.800	-4
1%	25.500	24.200	-1.300	-5

As can be seen from the results above, the post developed flows have been reduced below the predeveloped flows downstream of Magpie Lane with the proposed detention basin configuration.

6 STORMWATER QUALITY MANAGEMENT

6.1 Objectives

The objectives of the Stormwater Quality for the site are:

- Meet the water quality objectives of Mid-Western Regional Council
- % Reductions from the developed site of:
 - 80% reduction in Total Suspended Solids (TSS)
 - 45% reduction in Total Phosphorus (TP)
 - 45% reduction in Total Nitrogen (TN)
 - 70% reduction in litter/gross pollutants
- The % reductions are from Mudgee Shire Council Urban Stormwater Management Plan.

6.2 Operational Phase Water Quality Management

6.2.1 General

To meet the water quality requirements outlined above, a range of water quality improvement devices will be required. The water quality improvement devices that can be provided for this development include:

- Rainwater tanks
- Gross pollutant traps
- Bioretention Basins



The above water quality improvement devices act as a treatment train, progressively reducing pollutants as they pass through each one.

6.2.2 Stormwater Quality Modelling

6.2.2.1 Introduction

The MUSIC model version 6 was used to assess the pollutant generation from the development and the performance of the stormwater quality treatment train. MUSIC modelling was undertaken in accordance with the NSW MUSIC Modelling Guidelines (WBM, 2015).

6.2.2.2 Rainfall Data and Evapotranspiration Data

The rainfall and evapotranspiration data used in the MUSIC model was for Canberra Rainfall and Evaporation Data 6 hour Data.

This is the closest available and relevant data in the MUSIC program database for the development site. It is similar distance from the eastern coastline and has similar environmental conditions.

For detailed design, rainfall and evapotranspiration data could be sourced for the location of the development to improve the accuracy of the MUSIC modelling.

6.2.2.3 MUSIC Model Source Inputs

The source data for the MUSIC model for the developed model were adopted from the NSW MUSIC Modelling Guidelines. The area for each roof of within the long stay housing development was assumed as 200 m² was adopted for the modelling. An overall lot fraction impervious of 70% was adopted (including the roof area) for lots. A fraction impervious of 70% was adopted for the road catchments.

The source node parameters adopted for the projects are shown in Table 4.

Soil Parameter	Value
Rainfall Threshold (mm/day)	1.00
Soil Storage Capacity (mm)	120
Initial Storage (% of Capacity)	25
Field Capacity	80
Infiltration Capacity Coefficient – a	200
Infiltration Capacity Coefficient – b	1.00
Groundwater Initial Depth (mm)	10
Groundwater Daily Recharge Rate (%)	25
Groundwater Daily Base Flow (%)	5
Groundwater Daily Deep Seepage Rate (%)	0

Table 4: MUSIC Residential Source Node Soil Properties



6.2.2.4 Catchments Pollutant Mean Concentrations

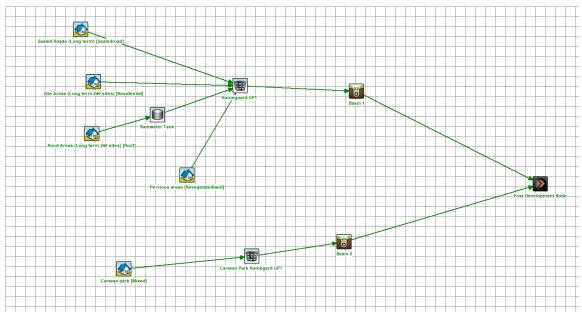
The pollutant Event Mean Concentration (EMC) values for both base flows and storm flows. The developed catchments were divided into residential lots (roofs and yards) and road areas. Table 5 shows the base flow and stormflow Pollutant Event Mean Concentrations adopted for the modelling.

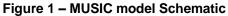
Catchment Type	Flow	TSS (lo	og 10)	TP (lo	og 10)	TN (lo	og 10)
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Desidential	Base Flow	1.2	0.17	-0.85	0.19	0.11	0.12
Residential	Storm Flow	2.15	0.32	-0.60	0.25	0.30	0.19
Deefe	Base Flow	1.10	0.17	-0.82	0.19	0.32	0.12
Roofs	Storm Flow	1.30	0.32	-0.89	0.25	0.30	0.19
Mixed	Base Flow	1.10	0.17	-0.82	0.19	0.32	0.12
Mixed	Storm Flow	2.2	0.32	-0.45	0.25	0.42	0.19
Sealed	Base Flow	1.20	0.17	-0.85	0.19	0.11	0.12
Roads	Storm Flow	2.43	0.32	-0.3	0.25	0.34	0.19

Table 5: Base Flow and Storm Flow Pollutant Event Mean Concentration Values

6.2.2.5 MUSIC Model Treatment Train

The stormwater quality treatment train for each of the two catchments consist of three parts; rainwater tanks, a gross pollutant trap and a bioretention basin. A schematic of the MUSIC model is shown in Figure 1.





A brief description on each treatment measure is listed below.

• Rainwater Tanks. Rainwater tanks receive water from the roof area of each lot. A 2kL rainwater tank was assumed for each long term site. Water captured in the rainwater tanks is expected to be reused for toilet flushing, clothes washing, hot water and garden irrigation. An average of 2 persons was assumed for each house. The reuse per house was adopted from the NSW MUSIC Modelling Guidelines, Table 6-1. The reuse adopted for each lot is shown in Table 6.



Table 6: Rainwater Tank Reuse (per lot)

Rainwater Reuse	
Internal (L/day/dwelling)	212
External (L/day/dwelling)	151

 The GPT's modelled were the Humeguard GPT units for upstream of bioretention basins. These products remove gross pollutants, sediment and attached nutrients. The MUSIC node for the Humeguard was provided by HUMES. The removal efficiencies have been confirmed via independent testing. An equivalent product could be used. Table 7 show the removal efficiencies of the Humeguard unit.

Pollutant	Removal
TSS	41%
TP	34%
TN	24%
Gross Pollutants	85%

Table 7: HUMES Humeguard GPT Performance

Bioretention Basin. A bioretention basin is the final part of the treatment train for each of the catchments for the site. Bioretention systems remove sediments (TSS) as well as nutrients (TN and TP) for the stormwater. The bioretention basin consists of a shallow dry basin with deep rooted vegetation and grass on the surface, over an infiltration/filtration area and an underdrain area.

Vegetation in the bioretention basins will be in accordance with Mid-Western Regional Council requirements. Table 8 shows the bioretention basin inputs.

Table 8: Bioretention Basin MUSIC Model Inputs

Property	Basin 1	Basin 2
Extended Detention Depth (m)	0.3	0.3
Surface Area (m ²)	4657	230
Filter Area (m ²)	500	200
Unlined Filter Material (m)	0.01	0.01
Saturated Hydraulic Conductivity (mm/hr)	100	100
Filter Depth (m)	0.4	0.4
TN Content of Filter Media (mg/kg)	400	400
Orthophosphate of Filter Media (mg/kg)	40	40
Exfiltration Rate (mm/hr)	0	0
Base Lined	No	No
Vegetation Removing Plants	Yes	Yes
Under Drain Present	Yes	Yes



6.2.3 Stormwater Quality Modelling Results

The results of the MUSIC model for the total catchment showing the mean annual pollutant loads for the existing and the developed catchment are shown in Table 9.

	Source Loads	Developed Load (with Treatment)	Reduction	% Reduction Achieved	% Reduction Required
TSS (kg/yr)	14900	685	14215	95.4	80
TP (kg/yr)	29.1	5.89	23.21	79.8	45
TN (kg/yr)	200	63.6	136.4	68.3	45
Gross Pollutants (kg/yr)	3210	0	3210	100	70

Table 9: MUSIC Model Developed Results

The results from the MUSIC modelling show that the reductions in the pollutants meet the requirements set out by Council.

6.3 Construction Phase Water Quality Management

6.3.1 General

During the construction phase of the development, an Erosion and Sediment Control Plan will be implemented to minimise the water quality impacts. The erosion and sediment controls will be in accordance with Landcom's Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition (Landcom, 2004) and the requirements of Port Stephens Council. Erosion and sediment controls will be required preconstruction, during construction and post construction until the site is stabilized. The expected erosion and sediment control measures will include stabilized site access, sediment fence, gully pit sediment barriers, rock outlet scour protection and temporary sediment basins.

ACOR drawings C03-001 to C03-010, C03-101, C03-201 and C03-202 show concept Erosion and Sediment Control Plans for the proposed development.

6.3.2 Pre-Construction Erosion and Sediment Control

Due to the topography of the site, the preconstruction erosion and sediment controls will be limited to stabilized site access, sediment fence and temporary sediment basins until the initial bulk earthworks is undertaken. The proposed basins will be utilised as sediment basins while construction is being undertaken.

6.3.3 During Construction Erosion and Sediment Control

During the construction phase of the development, the erosion and sediment controls will consist of sediment fence, sediment basins, gully pit sediment barriers and permanent rock outlet scour protection.

Regular inspection and maintenance of the erosion and sediment controls will be required during the construction process.

6.3.4 Post Construction Erosion and Sediment Control

The contractor/developer will be responsible for the maintenance of the erosion and sediment control devices from the practical completion of the works for a minimum of 6 months or until stabilization has occurred.

6.4 Water Quality Maintenance Plan

6.4.1 General

General maintenance will involve implementation of a regular inspection and maintenance schedule. As a minimum, the inspection and maintenance program is to follow the manufacturer's recommended



time frame plus after any significant rain event. The inspection regime may be increased when housing construction commences to determine if a more frequent maintenance period is required.

Installation of the bioretention filtration media in the basins will be delayed until a significant proportion of the contributing lots are built on and established.

6.4.2 Gross Pollutant Traps

HUMES Humeguard GPT (or equivalent) units will be used upstream of the bioretention basins for the development. Maintenance will be in accordance with the manufacturer's recommendations.

6.4.3 Bioretention Basin

Regular maintenance of the bioretention basins will require removal of sediment build up, maintenance of vegetation and flushing of the underdrain to maintain performance. Eventually the biofiltration material may need replacement when it has reached the end of its lifecycle. This will be determined by testing of the soil properties after 5-10 years of use.

7 CONCLUSION

This engineering report addresses the concept civil design for the proposed caravan park development located at 313 Magpie Lane, Galambine.

Road and site grading as well as stormwater quantity and stormwater quality (both operational and construction phases) management have been addressed to the requirements of Mid-Western Regional Council.

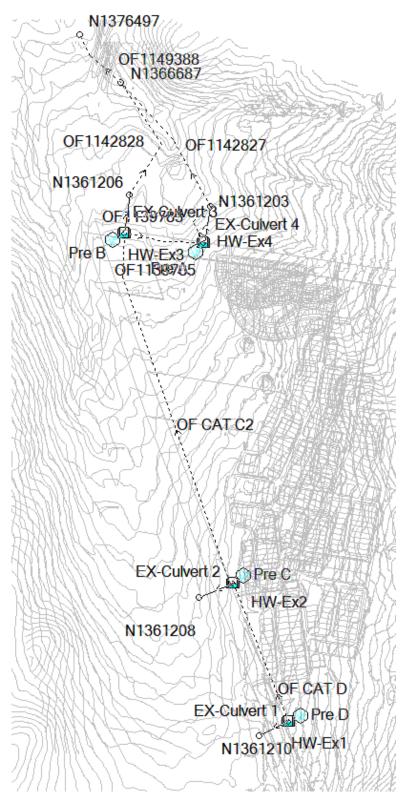


Appendix A

DRAINS Inputs and Results



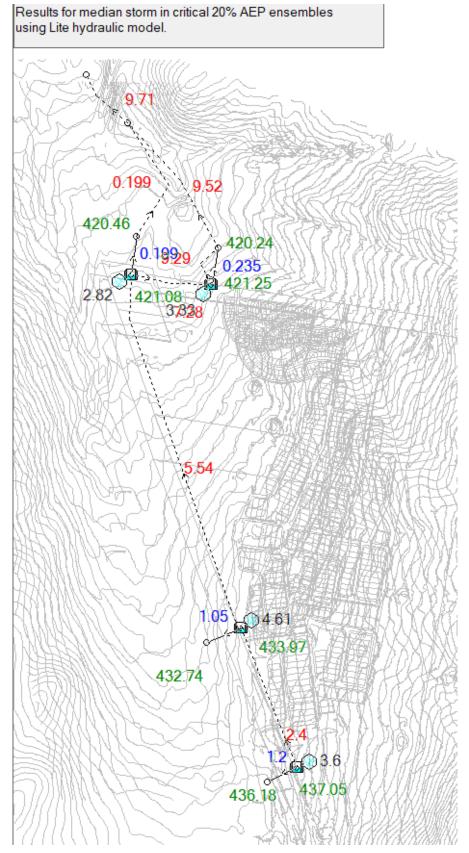
DRAINS – PREDEVELOPED MODEL



DRAINS - Predeveloped Model Schematic

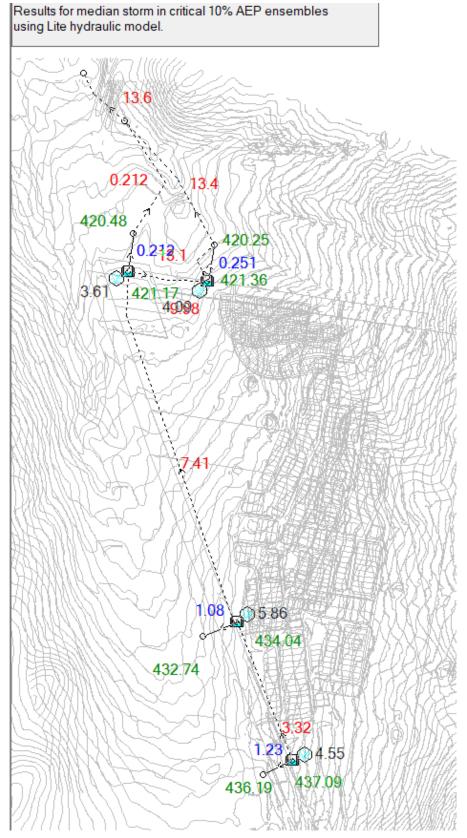
				1	1	-						1	1	1	r	1	
DRAINS Predevelope	d Model Input	t Data															1
PIT / NODE DETAILS			Version 15														
Name	Туре	Family	Size	Ponding	Pressure	Surface	Max Pond	Base	Blocking	х	у	Bolt-down	id	Part Full	Inflow	Pit is	Internal
				Volume	Change	Elev (m)	Depth (m)	Inflow	Factor			lid		Shock Loss	Hydrograph		Width
				(cu.m)	Coeff. Ku			(cu.m/s)									(mm)
HW-Ex4	Headwall				0.5	420.82		0		733886.184	6411434.536		634617220				
N1361203	Node					420.76		0		733904.282	6411535.882		634617222		No		
HW-Ex3	Headwall				0.5	420.72		0		733662.682	6411462.587		634617224		-		
N1361206	Node				0.5	420.72		0	1	733677.16	6411569.362		634617226		No		+
HW-Ex2	Headwall				0.5			0		733969.432	6410479.9		634617220		NO		l
					0.5			0							N		
N1361208	Node					433.33		0	,	733872.611	6410439.181		634617229		No		
HW-Ex1	Headwall				0.5			0		734123.26	6410090.806		634617230				1
N1361210	Node					436.64		0)	734041.822	6410050.992		634617232		No		1
N1366687	Node							0)	733653.295	6411885.926		634631511		No		
N1376497	Node							0		733536.386	6412019.943		634656795		No		
DETENTION BASIN DE	TAILS							1									
	Elev	Surf. Area	Not Lised	Outlet Type	ĸ	Dia(mm)	Centre RL	Pit Family	Pit Type	×	v	HED	Crest RL	Crest Length(m)	id		
Nume	LICV	Juli. Alca	Notoseu	outiet type	ĸ	Dia(iiiii)	Centre Re	rieranniy	пстурс	^	У	HED.	CICSUNE	creat tengen(m)	iu .		
																	l
SUB-CATCHMENT DET		L		I												L	l
Name	Pit or	Total	Impervious	Avg	Mannings		Rainfall	Hydrological								L	1
	Node	Area	Area	Slope(%)	n	(mins)	Multiplier	Model									
Pre A	HW-Ex4	55.416	1	. 3	0.035	0	1	STORAGE RAFTS- Galambin	ne NSW 2850 2023								
Pre B	HW-Ex3	45.454	2	3	0.035	0	1	STORAGE RAFTS- Galambin								I	
Pre C	HW-Ex2	58.858	1	6	0.035	0		STORAGE RAFTS- Galambin									1
Pre D	HW-Ex1	40.841	-	6	0.035	0		STORAGE RAFTS- Galambin									
PIED	HVV-EX1	40.841	2	0	0.055	0		STORAGE RAFTS- Galambin	IE INSW 2850 2025								
PIPE DETAILS																	1
Name	From	То	Length	U/S IL	D/S IL	Slope	Туре	Dia	I.D.	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg	Rİ	Chg
			(m)	(m)	(m)	(%)		(mm)	(mm)						(m)	(m)	(m)
EX-Culvert 4	HW-Ex4	N1361203	7.56	420.274	420.008	3.52	RCP-2	375	375	0.013	New	1	HW-Ex4	0			
EX-Culvert 3		N1361206	10.1		420.183		RCP-2	375		0.013			HW-Ex3	0			
	HW-Ex2	N1361208	13.5		432.317		RCP-2	750		0.013			HW-Ex2	0			
		N1361210	12.374		435.792		RCP-2	600		0.013			HW-Ex1	0			
EX-CUIVEIL I	HWY-LA1	N1301210	12.3/4	433.555	433.752	1.04	RCF-2	800	000	0.013	NEW	2	HWY-LAI	0			
																	L
DETAILS of SERVICES	CROSSING PIP																
	Chg	Bottom	Height of Service	Chg	Bottom		Chg	Bottom		etc							
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc							
CHANNEL DETAILS																	
Name	From	То	Туре	Length	U/S IL	D/S IL	Slope	Base Width	L.B. Slope	R.B. Slope	Manning	Depth	Roofed				
Hume		.0	17pc	(m)	(m)	(m)	(%)	(m)	(1:?)	(1:?)	n	(m)	noored				1
				(111)	(11)	(11)	(76)	(11)	(1.:)	(1.1)		(11)					
	1															<u> </u>	1
OVERFLOW ROUTE D							-					- 4					L
Name	From	То	Travel	Spill	Crest	Weir	Cross	Safe Depth	SafeDepth	Safe		D/S Area	L	id	U/S IL	D/S IL	Length (m)
			Time	Level	Length	Coeff. C	Section	Major Storms	Minor Storms	DxV	Slope	Contributing					1
			(min)	(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%					
OF1139783	HW-Ex4	N1361203	0.6	420.82	20	1.67	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	1	0		634617488	422	421.9	25
		N1366687	11.9			1	Open Swale Start	0.5	0.5	2	0.44	0		634631514	420	415	500
OF1139785	HW-Ex3	HW-Ex4	0.6		20	1 67	Overflow across road low point - parabola x = 15, y = 0.3	0.05		0.6		0	1	634617491		420.3	25
	-	N1366687	3.9	-	20	1.07	Open Swale End	1.6		0.0	1	0	1	634631515	420	415	406
									1.6	2	1	U	1				
OF CAT C2	HW-Ex2	HW-Ex3	19.6		20		Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6		0	1	634617494	432.65		975
OF CAT D	HW-Ex1	HW-Ex2	10		20	1.67	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0 0	0.6	0.87	0	1	634617495	437.1	433.5	415
OF1149388	N1366687	N1376497	0.6				Open Swale End	1.6	1.6	2	1	0	1	634656659	415	414.5	60
PIPE COVER DETAILS													1			I	
Name	Туре	Dia (mm)	Safe Cover (m)	Cover (m)				1	1			1	1		1	1	
EX-Culvert 4	RCP-2	375	0.6		Unsafe			1	1				1			<u> </u>	1
								1									1
	RCP-2	375	0.6		Unsafe								L		l		4
	RCP-2	750	0.6		Unsafe								1			L	
EX-Culvert 1	RCP-2	600	0.6	0.2	Unsafe			1									
																I	
This model has no pip	es with non-re	eturn valves		1	1	1		1	1			1	1	İ	1	1	()
moder has no pip				1				1	1				1				1
				1				1	1							1	1





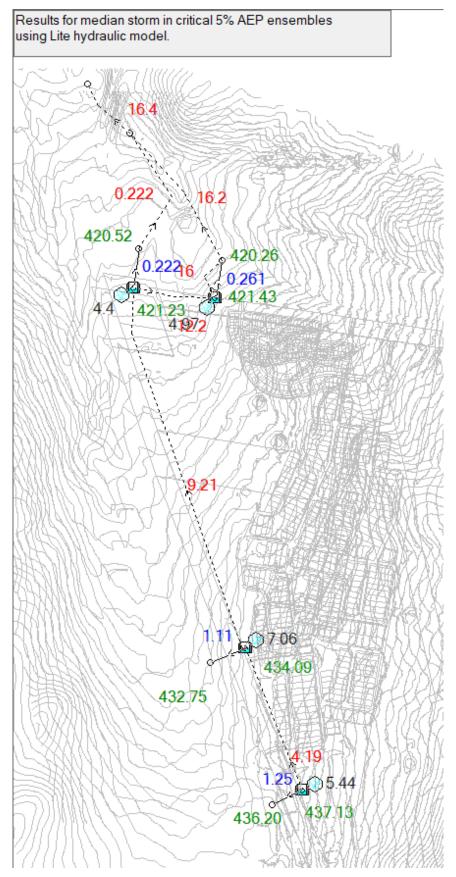
DRAINS - Predeveloped Model Schematic for 20% AEP





DRAINS - Predeveloped Model Schematic for 10% AEP

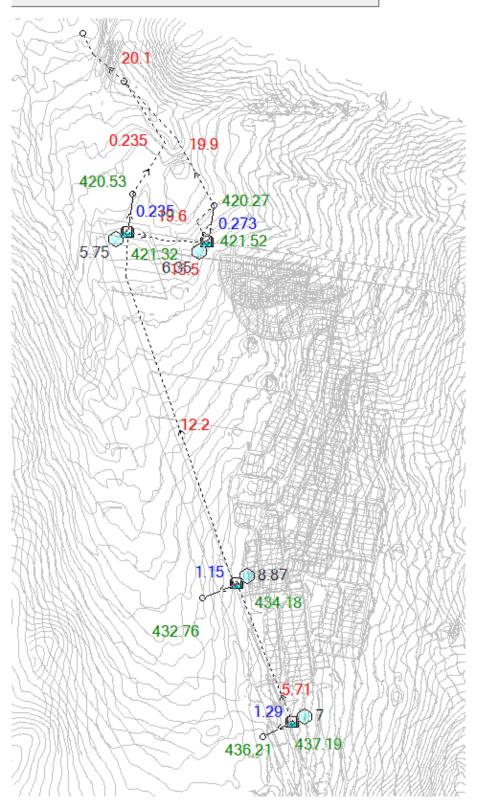




DRAINS - Predeveloped Model Schematic for 5% AEP

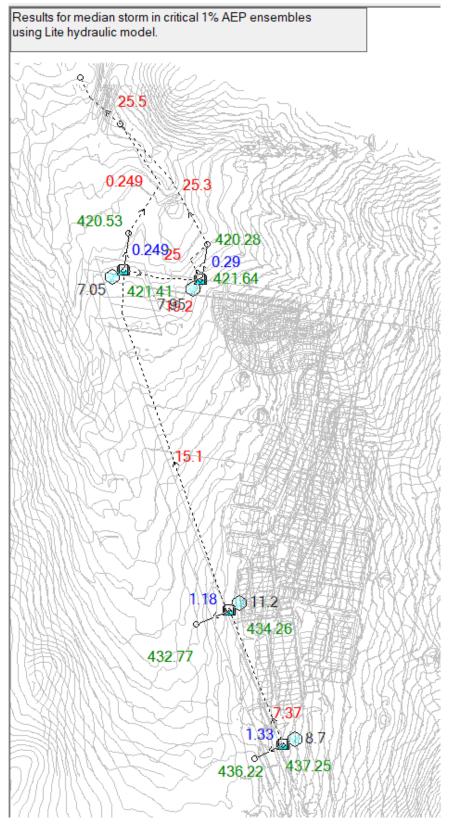


Results for median storm in critical 2% AEP ensembles using Lite hydraulic model.



DRAINS - Predeveloped Model Schematic for 2% AEP

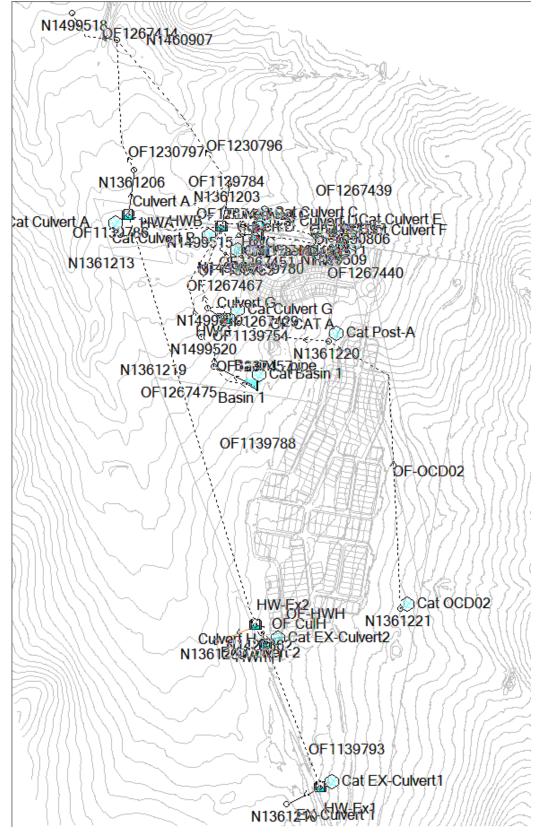




DRAINS - Predeveloped Model Schematic for 1% AEP



DRAINS – POST DEVELOPED MODEL



DRAINS - Post Developed Model Schematic

| |

 | | | | | | |
 | | 1 | |
 | 1 | | | | | 1 |
 | r - 1 | |
--
--
--|--|---
--|--|---|--
--|---|---|--|--|------------------------|--
---|---|--|
| DRAINS Predeveloped
PIT / NODE DETAILS | Model Input

 | | Version 15 | | | | |
 | | | |
 | | | | | | |
 | | |
| Name | Туре

 | Family | Size | Ponding
Volume
 | Pressure
Change | Surface
Elev (m) | Max Pond
Depth (m) | Base
Inflow
 | Blocking
Factor | x | Y | Bolt-down
lid | id | Part Full
Shock Loss | Inflow
Hydrograph
 | Pit is | Internal
Width |
| |

 | | | (cu.m)
 | Coeff. Ku | | beput (iii) | (cu.m/s)
 | 1400 | | | | | | injurograph
 | | (mm) |
| HWB
N1361203 | Headwall
Node

 | | |
 | 0.5 | 421 | | 0
 | | | 6411434.536
6411535.882 | | 634617220
634617222 | | No
 | | |
| HWA
N1361206 | Headwall

 | | |
 | 0.5 | 420.64 | | G
 | | 733662.682 | 6411462.587
6411569.362 | | 634617224
634617226 | | No
 | | |
| HW-Ex2 | Node
Headwall

 | | |
 | 0.5 | 433.67 | | 0
 |)
) | 733969.432 | 6410479.9 | | 634617227 | | NO
 | | |
| N1361208
HW-Ex1 | Node
Headwall

 | | |
 | 0.5 | 433.33 436.88 | | 0
 | | 733872.611 | 6410439.181
6410090.806 | | 634617229
634617230 | | No
 | | |
| N1361210 | Node

 | | |
 | | 436.64 | | a
 | | 734041.822 | 6410050.992 | | 634617232 | | No
 | | |
| HWD
N1361213 | Headwall
Node

 | | |
 | 0.5 | 422.2 | | 0
 | | | 6411411.57
6411417.055 | | 634617235
634617236 | | No
 | | |
| N1361219 | Node

 | | |
 | | 430 | | 6
 | | 733867.759 | 6411098.935 | | 634617270 | | No
 | | |
| N1361220
N1361221 | Node

 | | |
 | | 443 | | C
 | | | 6411158.53
6410518.009 | | 634617274
634617294 | | No
 | | |
| N1460907 | Node

 | | |
 | | | | 6
 | | 733636.268 | 6411879.866 | | 634898817 | | No
 | | |
| HWh\H
N1423362 | Headwall
Node

 | | |
 | 0.5 | 435 | | C
 | | | 6410432.496
6410460.765 | | 635011946
634794367 | | No
 | | |
| HWG | Headwall

 | | |
 | 0.5 | 426.4 | | 0
 | | 733897.439 | 6411212.647 | | 635029079 | |
 | | |
| N1499519
HWF | Node
Headwall

 | | |
 | 0.5 | 426.2 | | 0
 | | 733852.039 | 6411237.842
6411381.716 | | 635068723
635036159 | | No
 | | |
| N1499509 | Node

 | | |
 | | 429.2 | | 0
 | | 734148.461 | 6411384.487 | | 635037067 | | No
 | | |
| HWE
N1499511 | Headwall
Node

 | | |
 | 0.5 | 428.8 | | 0
 | | | 6411400.071
6411404.919 | | 635037548
635038192 | | No
 | | |
| HWC | Headwall

 | | |
 | 0.5 | 422.2 | | G
 |) | 733975.619 | 6411433.758 | | 635041528 | |
 | | |
| N1499515
N1499518 | Node
Node

 | | |
 | | 421.8 | | G
 | | | 6411439.169
6411946.326 | | 635042427
635054379 | | No
No
 | | |
| N1499520 | Node

 | | |
 | | 430.14 | | G
 | | 733836.586 | 6411170.307 | | 635076196 | | No
 | | |
| N1499528 | Node

 | | |
 | | | | u
 | | 733901.832 | 6411364.327 | | 635098975 | | No
 | | |
| DETENTION BASIN DET | TAILS

 | Surf Arear | Not Used | Outlet Turor
 | ĸ | Dia(mm) | Centre PI | Pit Family
 | Pit Tune | | v | HED | Crect PI | Crest Length/m | id
 | | |
| Name
Basin 1 | 430.2

 | 4657 | Not Used | Outlet Type
Pit/Sump
 | | Dia(mm) | Centre RL | Pit Family
Surface Inlet Pits
 | Pit Type
Surface Inlet Pit 900 x 900 | 733962.527 | 6411053.446 | | CIESC RL | Crest Length(m) | 634617239
 | | |
| | 432
432.5

 | 8031
9032 | | | | | |
 | | 1 | |
 | | | | | | |
 | | |
| |

 | 3032 | | | | | |
 | | | |
 | | | | | | |
 | | |
| SUB-CATCHMENT DET.
Name | AILS
Pit or

 | Total | Paved | Grass
 | Supp | Paved | Grass | Supp
 | Paved | Grass | Supp | Paved | Grass | Supp | Paved
 | Grass | Supp |
| | Node

 | Area | | Area
 | Area | Time | Time | Time
 | Length | Length | Length | Slope(%) | Slope | Slope |
 | | Rough |
| Cat Basin 1 | Basin 1

 | (ha)
20.783 | % 70 | % 30
 | % | (min)
8 | (min) 11 | (min)
 | (m)
50 | (m)
50 | (m)
0 | % | % | % | 0.013
 | 0.2 | 0 |
| Cat Basin2 | N1499528

 | 4.889 | 0 |
 | | 8 | 11 |
 | 50 | | | 3 | 3 | 0 | 0.013
 | 0.2 | Ū |
| Name | Pit or

 | Total | Impervious | Avg
 | Mannings | Time lag | Rainfall | Hydrological
 | | | | | | |
 | | |
| | Node

 | Area | Area | Slope(%)
 | n | (mins) | Multiplier | Model
 | I | | | | | |
 | | |
| Cat Culvert B
Cat Culvert A | HWB
HWA

 | 6.57
10.848 | 3 | 3
 | 0.015 | 0 | 1 | STORAGE RAFTS- Gal
STORAGE RAFTS- Gal
 | ambine NSW 2850 2023
ambine NSW 2850 2023 | | | | | |
 | | |
| Cat EX-Culvert1 | HW-Ex1

 | 40.841 | 2 | 6
 | 0.035 | 0 | 1 | STORAGE RAFTS- Gal
 | ambine NSW 2850 2023 | | | | | |
 | | |
| Cat Culvert D
Cat Post-A | HWD
N1361220

 | 0.768
24.833 | 0 |
 | 0.035 | 0 | 1 | STORAGE RAFTS- Gal
 | ambine NSW 2850 2023
ambine NSW 2850 2023 | | | | | |
 | | |
| Cat OCD02
Cat EX-Culvert2 | N1361221
HWh\H

 | 24.172 | 0 | | | | |
 | 0.035 | 0 | |
 | ambine NSW 2850 2023
ambine NSW 2850 2023 | | | | | |
 | | |
| Cat EX-Culvert2
Cat Culvert G | HWN

 | 4.031 | | | | | |
 | 0.035 | 0 | |
 | ambine NSW 2850 2023
ambine NSW 2850 2023 | | | | | |
 | | |
| Cat Culvert F
Cat Culvert E | HWF

 | 2.349 | 0.2 |
 | 0.035 | 0 | 1 | STORAGE RAFTS- Gal
 | ambine NSW 2850 2023 | | | | | |
 | | |
| Cat Culvert C | HWC

 | 1.214 0.437 | 34 |
 | 0.035 | 0 | 1 | STORAGE RAFTS- Gal
 | ambine NSW 2850 2023
ambine NSW 2850 2023 | | | | | |
 | | |
| PIPE DETAILS |

 | | | | | | |
 | | | |
 | | | | | | |
 | | |
| Name | From

 | То | Length | U/S IL
 | D/S IL | Slope | Туре | Dia
 | I.D. | Rough | Pipe Is | No. Pipes | Chg From | At Chg | Chg
 | RI | Chg |
| Culvert B | HWB

 | N1361203 | (m)
11.5 | (m)
420.15
 | (m)
420 | (%) | RCBC | (mm)
2.1W x 0.6H
 | (mm) | 0.012 | NewFixed | | HWB | | (m)
 | (m) | (m) |
| Culvert A | HWA

 | N1361206 | 13.5 | 420.25
 | 420.18 | 0.52 | RCBC | 1.2W x 0.3H
 | | 0.012 | NewFixed | 2 | HWA | 0 |
 | | |
| EX-Culvert 2
EX-Culvert 1 | HW-Ex2
HW-Ex1

 | N1361208
N1361210 | 13.5 |
 | 432.317 | | RCP-2
RCP-2 | 750
 | 750 | 0.013 | Existing | | HW-Ex2
HW-Ex1 | 0 |
 | | |
| Culvert D | HWD

 | N1361213 | 17.6 | 421
 | 420.8 | 1.14 | RCBC | 1.5W x 0.6H
 | | 0.012 | NewFixed | 1 | HWD | 0 |
 | | |
| Basin1 - pipe
Culvert H | Basin 1
HWh\H

 | N1361219
N1423362 | 64
24.3 |
 | | | RCBC
RCBC | 1.2W x 0.3H
2.7W x 0.6H
 | | | NewFixed
NewFixed | | Basin 1
HWh\H | 0 |
 | | |
| Culvert G | HWG

 | N1499519 | 16.5 | 425.3
 | | | RCBC | 2.7W x 0.6H
 | | 0.012 | NewFixed | 2 | HWG | 0 |
 | | |
| Culvert F
Culvert E | HWF

 | N1499509 | 7.5 | 428.48
 | 428.4 | | RCBC
RCBC | 1.5W x 0.6H
0.6W x 0.3H
 | | | NewFixed
NewFixed | | HWF
HWE | 0 |
 | | |
| |

 | | 18.7 | | | | |
 | | | |
 | | 0.012 | NewFixed | 1 | HWC | 0 |
 | | |
| Culvert C | HWC

 | N1499511
N1499515 | 18.7
30.5 | 428.45
421.5
 | 421.3 | 0.66 | RCBC | 0.6W x 0.3H
 | | | | | HWC | 0 |
 | | |
| | HWC

 | N1499515
S | 30.5 | 421.5
 | 421.3 | 0.66 | | 0.6W × 0.3H
 | | | | | HWC | 0 |
 | | |
| Culvert C | HWC
ROSSING PIPE
Chg

 | N1499515
S
Bottom | 30.5
Height of Service | 421.5
Chg
 | 421.3
Bottom | Height of Service | RCBC | Bottom
 | | etc | | | hwc | |
 | | |
| Culvert C
DETAILS of SERVICES C
Pipe | HWC
ROSSING PIPE

 | N1499515
S | 30.5 | 421.5
 | 421.3 | | RCBC | | | |
 | | | | | hwc | |
 | | |
| Culvert C
DETAILS of SERVICES C
Pipe
CHANNEL DETAILS | HWC
ROSSING PIPE
Chg
(m)

 | N1499515
S
Bottom | 30.5
Height of Service
(m) | 421.5
Chg
(m)
 | 421.3
Bottom
Elev (m) | Height of Service
(m) | RCBC
Chg
(m) | Bottom
Elev (m)
 | (m) | etc
etc | Manning | Denth | | |
 | | |
| Culvert C
DETAILS of SERVICES C
Pipe | HWC
ROSSING PIPE
Chg

 | N1499515
S
Bottom | 30.5
Height of Service | 421.5
Chg
 | 421.3
Bottom | Height of Service | RCBC | Bottom
 | (m)
L.B. Slope | etc | Manning | Depth
(m) | Roofed | |
 | | |
| Culvert C
DETAILS of SERVICES C
Pipe
CHANNEL DETAILS | HWC
ROSSING PIPE
Chg
(m)
From

 | N1499515
S
Bottom | 30.5
Height of Service
(m) | 421.5
Chg
(m)
Length
 | 421.3
Bottom
Elev (m)
U/S IL | Height of Service
(m)
D/S IL | RGBC Chg (m) Slope | Bottom
Elev (m)
Base Width
 | (m)
L.B. Slope | etc
etc
R.B. Slope | Manning
n | | | |
 | | |
| Culvert C
DETAILS of SERVICES C
Pipe
CHANNEL DETAILS
Name | HWC
ROSSING PIPE
Chg
(m)
From

 | N1499515
S
Bottom | 30.5
Height of Service
(m)
Type
Travel | 421.5
Chg
(m)
Length
(m)
Spill
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest | Height of Service
(m)
D/S IL
(m)
Weir | RRC
Chg
(m)
Siope
(%)
Cross | Bottom
Elev (m)
Base Width
(m)
Safe Depth
 | (m)
L.B. Slope
(1:?)
SafeDepth | etc
etc
R.B. Slope
(1:?)
Safe | n
Bed | (m)
D/S Area | | id | U/S IL
 | D/S IL | Length (m) |
| Culvert C DETAILS of SERVICES C Pipe CHANNEL DETAILS Name OVERFLOW ROUTE DE Name | HWC CROSSING PIPE Chg (m) From TAILS From

 | N1499515
Bottom
Elev (m)
To
To | 30.5
Height of Service
(m)
Type
Travel
Time
(min) | 421.5
Chg
(m)
Length
(m)
Spill
Level
(m)
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m) | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C | RRC Chg (m) Slope (%) Cross Section | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major Storms
(m)
 | (m)
L.B. Slope
(1:?)
SafeDepth
Minor Storms
(m) | etc
etc
R.B. Slope
(1:?)
Safe
DxV
(sq.m/sec) | n
Bed
Slope
(%) | (m) | | id |
 | | |
| Culvert C DETAILS of SERVICES C Pipe CHANNEL DETAILS Name OVERFLOW ROUTE DE Name OF1139784 | HWC HWC ROSSING PIPE Chg (m) From From TAILS HWB

 | N1499515
S
Bottom
Elev (m)
To
To
N1361203 | 30.5
Height of Service
(m)
Type
Travel
Time
(min)
0.3 | 421.5
Chg
(m)
Length
(m)
Spill
Level
(m)
421
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m) | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C | RBC Chg (m) Slope (%) Scotton Section Overflow across road low point - parabola x = 15, y = 0.3 | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major Storms
(m)
0.05
 | (m)
L.B. Slope
(1:?)
SafeDepth
Minor Storms
(m)
0 | etc
etc
R.B. Slope
(1:?)
Safe
DxV
(sq.m/sec)
0.6 | n
Bed
Slope
(%) | (m)
D/S Area | | id | 421.1
 | 420.9 | 11.5 |
| Culvert C DETAILS of SERVICES C Pipe CHANNEL DETAILS OF SERVICES C OVERLOW ROUTE DE Name OF1139784 OF1139786 OF1139786 | HWC
Chg
Chg
(m)
From
From
TAILS
From
HWB
N1361203
HWA

 | N1499515
S
Bottom
Elev (m)
To
To
To
N1361203
N1460907
HWB | 30.5
Height of Service
(m)
Type
Travel
Time
(min)
0.3
0.5 | 421.5
Chg
(m)
Length
(m)
Spill
Level
(m)
420.64
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m)
20 | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C | RGC
Chg
(m)
Slope
(%)
Cross
Section
Cross
Section
Overflow across road low point - parabola x = 15, y = 0.3
Overflow across road low point - parabola x = 15, y = 0.3 | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Majer Storms
(m)
0.05
0.05
 | (m)
L.B. Slope
(1:?)
SafeDepth
Minor Storms
(m)
0
0 | etc
etc
(1:?)
Safe
DxV
(sq.m/sec)
0.6
0.6
0.6 | n
Bed
Slope
(%)
1
1 | (m)
D/S Area | | 634898815
634617522 | 421.1
420
422
 | 420.9
415
421.8 | 11.5
500
23.8 |
| Culvert C
DETAILS of SERVICES C
Pipe
CHANNEL DETAILS
Name
OVERFLOW ROUTE DE
Name
OF1139784
OF1139784
OF1139786
OF1139786 | HWC
RESSING PIPE
Chg
(m)
From
From
From
HWB
N1361203
W1361206

 | N1499515
S
Bottom
Elev (m)
To
To
To
N1361203
N1460907
HWB
N1460907 | 30.5
Height of Service
(m)
Type
Travel
Time
(min)
0.3
11.3
0.5
8.2 | 421.5
Chg
(m)
Length
(m)
Spill
Level
(m)
420.64
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m)
20
30 | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C
1.67
1.67 | RGEC | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major Storms
(m)
0.05
0.05
0.05
 | (m)
L8. Slope
(1.?)
SafeDepth
Minor Storms
(m)
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R.B. Slope
(1:?)
Safe
DxV
(sq.m/sec)
0.6
0.6
0.6 | n
Bed
Slope
(%)
1
1
1
1
1.23 | (m)
D/S Area
Contributing
%
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0
0
0
0 | | 634898815
634617522
634898816 | 421.1
420
422
420
 | 420.9
415
421.8
415 | 11.5
500
23.8
405 |
| Culvert C DETAILS of SERVICES C DETAILS of SERVICES C Pipe CHANNEL DETAILS Name OVERLOW ROUTE DE Name OF1139784 OF1139784 OF1139786 OF1139786 OF1139786 OF1139788 OF1139788 OF1139788 | HWC
ROSSING PIPE
Chg
(m)
From
From
HWB
N1361206
HW-Ex2
HW-Ex2

 | N1499515
S
Bottom
Elev (m)
To
To
N1361203
N1460907
HWB
N1460907
HWA
HWA | 30.5
Height of Service
(m)
Type
Travel
Time
(min) 0.3
11.3
0.5
8.2
19.6
7.5 | 421.5
Chg (m)
Length
(m)
Spill
Level
(m)
421.648
43.677
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m)
20
30
20
20 | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C
Coeff. C
1.67
1.67
1.67 | RGBC Clg Clg Clg Clg Clg Clg Clg Clg Clg Cl | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major Storms
(m) 0.05
0.05
0.05
0.05
0.05
0.05
 | (m)
L8. Slope
(1.?)
SafeDepth
Minor Storms
(m)
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0 | etc
etc
R.B. Slope
(1:?)
Safe
DxV
(sq.m/sec)
0.6
0.6
0.6
0.6
0.6
0.6 | n
Bed
Slope
(%)
1
1.23
1.26
0.87 | (m)
D/S Area
Contributing
%
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0 | | 634898815
634617522
634898816
634617529
634617581 | 421.1
420
422
420
432.65
437.1
 | 420.9
415
421.8
415
420.343
434.4 | 11.5
500
23.8
406
975
311 |
| Culvert C DTALLS of SERVICES C Pipe CHANNEL DETAILS Name OVERPLOW ROUTE DE Name OF1139784 OF1139786 OF1139786 OF1139786 OF1139788 OF1139788 OF1139780 | HWC HWC CROSSING PIPE Chg (m) From TAILS From HWB N1361203 HW-Ex2 HW-Ex2 HW-Ex1 HWD

 | N1499515
S
Bottom
Elev (m)
To
To
N1361203
N1460907
HWB
N1460907
HWA
HWh\H
N1361213 | 30.5
Height of Service
(m)
Type
Travel
Time
(min)
0.3
11.3
0.5
8.2
19.6 | 421.5
Chg
(m)
Length
(m)
Spill
Level
(m)
420.64
420.64
433.67
436.88
422.2
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
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Length
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20 | Height of Service
(m)
D/S IL
(m)
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Coeff. C
Coeff. C
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1.67
1.67 | ReBC. Chg (m) Slope (%) Slope Cross Section Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road road low point - parabola x = 15, y = 0.3 Overflow across road road low point - parabola x = 15, y = 0.3 Overflow across road road low point - parabola x = 15, y = 0.3 Overflow across road road low point - parabola x = 15, y = 0.3 Overflow across road road road road x = 15, y = 0.3 Overflow across road road road x = 15, y = 0.3 Overflow across road road road x = 15, y = 0.3 Overflow across road road road x = 15, y = 0.3 Overflow across road road x = 15, y = 0.3 Overflow across road road x = 15, y = 0.3 Overflow across road road x = 15, y = 0. | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major Storms
(m)
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LB. Slope
(1:7)
SafeDepth
Minor Storms
(m)
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(1:?)
Safe
DxV
(sq.m/sec)
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0.6 | n
Bed
Slope
(%)
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1.23
1.26
0.87
1.14 | (m)
D/S Area
Contributing
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0 | | 634898815
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634898816
634617529 | 421.1
420
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432.65
437.1
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415
421.8
415
420.343 | 11.5
500
23.8
406
975
311
17.6 |
| Culvert C
DETALLS of SERVICES C
Pipe
CHANNEL DETAILS
Name
OF11307784
OF11307786
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OF11397787
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OF11397787
OF11397787
OF1139773
OF1139773 | HWC HWC CROSSING PIPE Chg (m) From TAILS From HWB N1361203 HWEAL HWEAL HWEAL HWEAL HWEAL HWEAL HWEAL Basin 1

 | N1499515
S
Bottom
Elev (m)
To
To
To
N1361203
N1460907
HWA
N1460907
HWA
N1460907
HWA
N1361213
HWB
N136121219 | 30.5
Height of Service
(m)
Type
Travel
Travel
(min)
0.3
1113
0.5
8.2
1916
7.5
8.4
10.4
10.4
10.4
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10 | 421.5
Chg (m)
Length (m)
Spill
Level (m)
421
420.64
433.67
435.88
422.2
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m)
20
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20
20 | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C
Coeff. C
1.67
1.67
1.67 | RRC CNg CNg CNg CNg CNg CNg CNg CNg CNg CN | Bottom
Elev (m)
Base Width (m)
Safe Depth
Major Storms
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0.055 0 | (m)
L8. Slope
(1.?)
SafeDepth
Mine Storms
(m)
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0
0 | etc
etc
etc
(1:?)
Safe
DxV
(sq.m/sec)
0.6
0.6
0.6
0.6
0.6
0.6
0.6
0.6
0.6
0.6 | n
Bed
Slope
(%)
1
1.12
1.26
0.87
1.14
1
1 | (m)
D/S Area
Contributing
%
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0 | | 634898815
634617522
634898816
634617529
634617581
634617286
634617286
634617286
634617286 | 421.1
420
422
420
432.65
437.1
422
420.8
432
 | 420.9
415
421.8
415
420.343
434.4
421.8
420
430 | 11.5
500
23.8
406
975
311
17.6
50
64 |
| Culvert C DETAILS of SERVICES C DETAILS of SERVICES C Pipe C CANNEL DETAILS Name OF1139784 OF1139784 OF11397784 OF11397785 OF1139785 OF1129785 F112978 OF119 OF119 OF119 OF119 OF119 OF119 OF119 OF119 OF119 OF119 OF119 OF119 OF11 | HWC Chg Chg Chg Chg Chg From From From HWB N1361206 HWC HWB N1361206 HWC HWC N1361213 Basin 1 N1361213

 | N1499515
Bottom
Elev (m)
To
To
To
N1460203
N1460907
HWB
N1361213
HWB
N1361213
HWB
N1361219
N1499520 | 30.5
Height of Service
(m)
Type
Travel
Time
(min)
0.3
11.3
0.5
8.2
13.6
7.5
0.4
0.4
1.4
1.4 | 421.5
Chg
(m)
Length
(m)
Spill
Level
(m)
421.6
420.64
420.64
423.67
435.688
422.2
432
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m)
20
30
20
20 | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C
Coeff. C
1.67
1.67
1.67 | RGBC Clog Clog Clog Clog Stopp Stop | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major Storms
(m)
0.05
0.05
0.05
0.05
0.05
0.05
 | (m)
L8. Slope
(1.?)
SafeDepth
Mine Storms
(m)
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0 | etc
etc
R.B. Slope
(1:?)
Safe
DxV
(sq.m/sec)
0.6
0.6
0.6
0.6
0.6
0.6
0.6
0.6 | n
Bed
Slope
(%)
1
1.23
1.26
0.87
1.14 | (m)
D/S Area
Contributing
%
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634617522
634898816
634617529
634617581
634617581 | 421.1
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432.65
437.1
422
420.8
432
429.15
 | 420.9
415
421.8
415
420.343
434.4
421.8 | 11.5
500
23.8
406
975
311
17.6 |
| Culvert C DETAILS of SERVICES C DETAILS of SERVICES C Pipe C CUANNEL DETAILS Name OF1130784 OF1130784 OF1130786 OF1139786 OF1139786 OF1139787 OF1139787 OF1139787 OF1139787 OF1139787 OF113978 | HWC Chg Chg Chg (m) From From HWB N1361203 HW-Ex1 HWO N1361213 Basin 1 N1361221 N1361220

 | N1499515
Bottom
Elev (m)
To
To
N1361203
N1460907
HWB
N1460907
HWB
N1460907
HWA
HWh(H
N1361213
HWB
N1361220
N1361220 | 305
Height of Service
(m)
Type
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Level
(m)
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433.67
432.7
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432
 | 421.3
Bottom
Elev (m)
U/S IL
(m)
Crest
Length
(m)
20
30
20
20 | Height of Service
(m)
D/S IL
(m)
Weir
Coeff. C
Coeff. C
1.67
1.67
1.67 | RGEC Chg (m) Stope Stope (N) Stope Cross Section Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 Overflow across road low point - parabola x = 15, y = 0.3 | Bottom
Elev (m)
Base Width
(m)
Safe Depth
Major
Storms
(m)
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| Culvert C DETAILS of SERVICES C DETAILS of SERVICES C Pipe C CULANNEL DETAILS Name OF1139784 OF1139784 OF1139786 OF1139786 OF1139786 OF1139787 OF1139787 OF1139787 OF1139787 OF1139787 OF1139787 OF1139787 OF113978 OF11 OF11 OF11 OF11 OF11 OF11 OF11 OF1 | HWC
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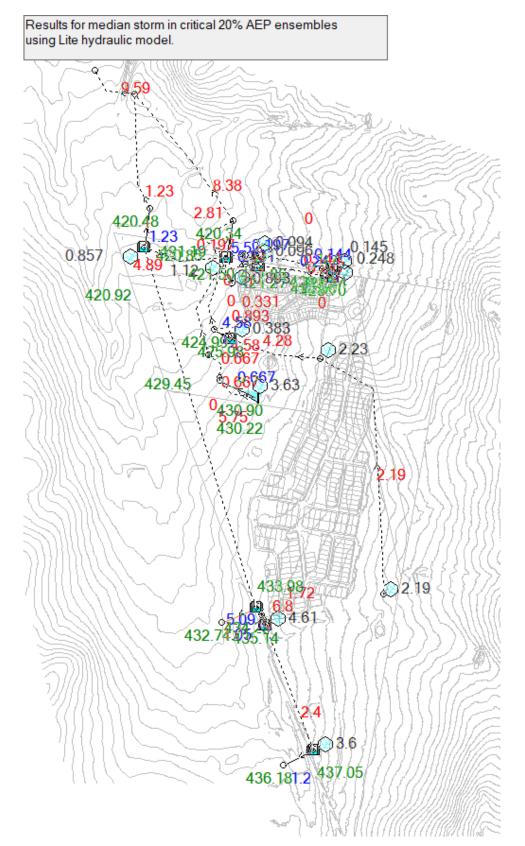
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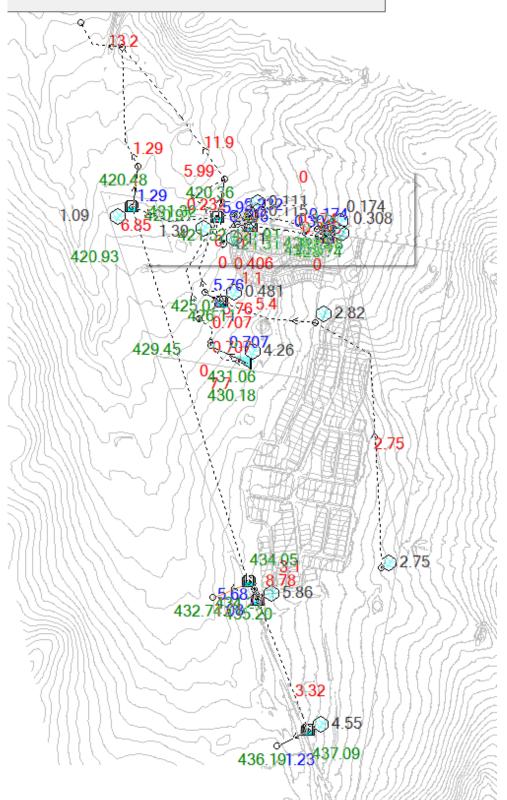




DRAINS - Post Developed Model Schematic for 20% AEP

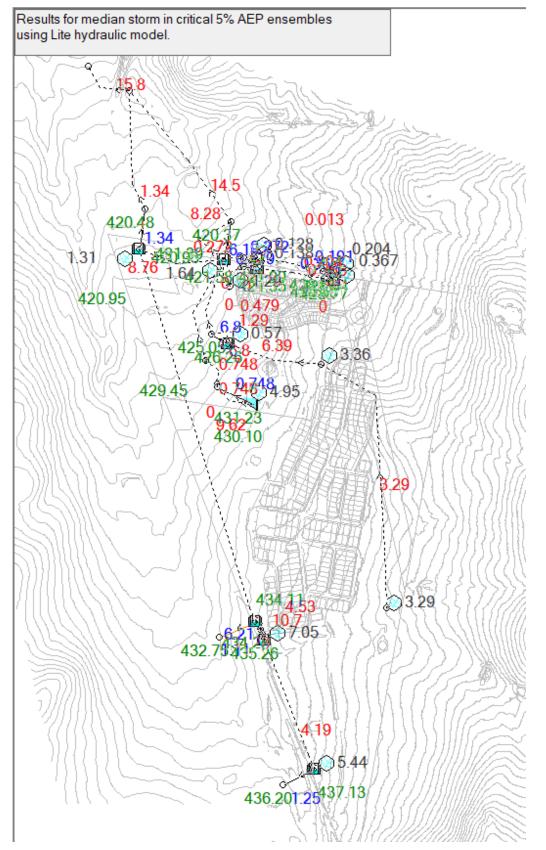


Results for median storm in critical 10% AEP ensembles using Lite hydraulic model.



DRAINS - Post Developed Model Schematic for 10% AEP

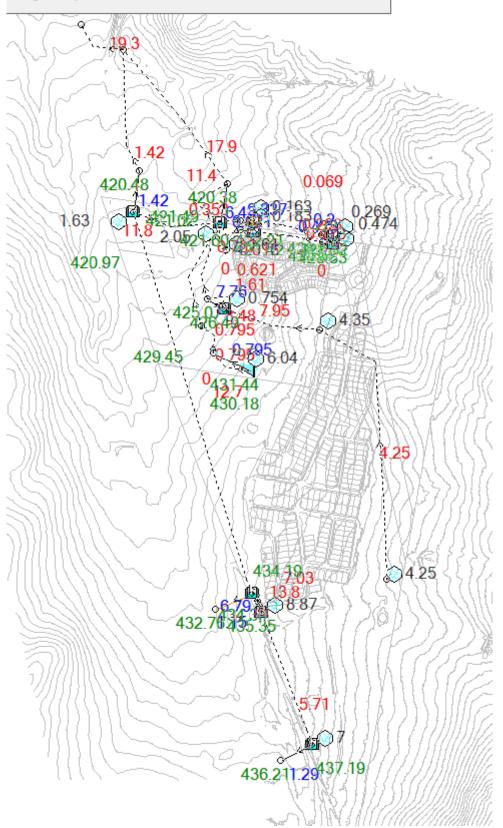




DRAINS - Post Developed Model Schematic for 5% AEP



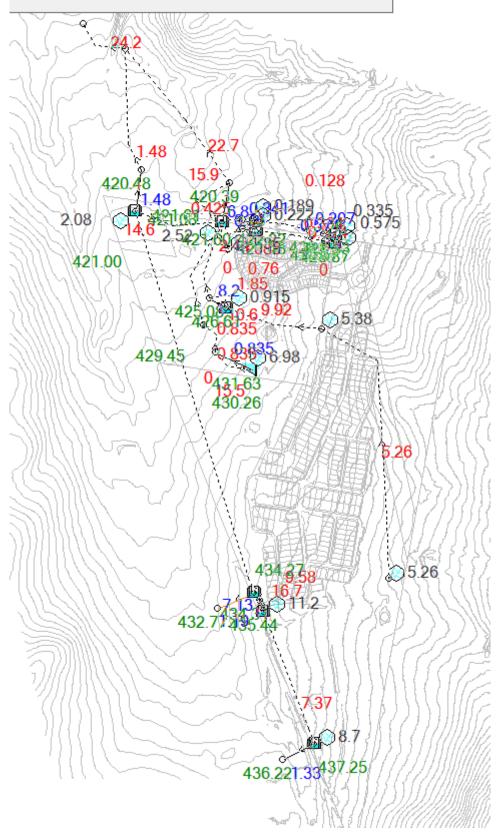
Results for median storm in critical 2% AEP ensembles using Lite hydraulic model.



DRAINS - Post Developed Model Schematic for 2% AEP



Results for median storm in critical 1% AEP ensembles using Lite hydraulic model.



DRAINS - Post Developed Model Schematic for 1% AEP



Appendix B

MUSIC Report



Source nodes

Location, Site Areas (Long term 240 sites), Sealed Roads (Long term), Rood Areas (Long term 240 sites), Caravan park, Pervious areas ID,1,2,3,4,11 Node Type,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode Zoning Surface Type, Residential, Sealedroad, Roof, Mixed, Revegetated land Total Area (ha),7.163,5.02,4.8,4.889,3.8 Area Impervious (ha), 5.03922395522388, 3.53160746268657, 4.8, 3.42704305970149, 0 Area Pervious (ha),2.12377604477612,1.48839253731343,0,1.46195694029851,3.8 Field Capacity (mm),80,80,80,80,80 Pervious Area Infiltration Capacity coefficient - a,200,200,200,200,200 Pervious Area Infiltration Capacity exponent - b,1,1,1,1,1 Impervious Area Rainfall Threshold (mm/day),1,1,1,1,1 Pervious Area Soil Storage Capacity (mm), 120, 120, 120, 120, 120 Pervious Area Soil Initial Storage (% of Capacity), 25, 25, 25, 25, 25 Groundwater Initial Depth (mm),10,10,10,10,10 Groundwater Daily Recharge Rate (%),25,25,25,25,25 Groundwater Daily Baseflow Rate (%),5,5,5,5,5 Groundwater Daily Deep Seepage Rate (%),0,0,0,0,0 Stormflow Total Suspended Solids Mean (log mg/L),2.15,2.43,1.3,2.2,1.95 Stormflow Total Suspended Solids Standard Deviation (log mg/L),0.32,0.32,0.32,0.32,0.32 Stormflow Total Suspended Solids Estimation Method, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic Stormflow Total Suspended Solids Serial Correlation,0,0,0,0,0 Stormflow Total Phosphorus Mean (log mg/L),-0.6,-0.3,-0.89,-0.45,-0.66 Stormflow Total Phosphorus Standard Deviation (log mg/L),0.25,0.25,0.25,0.25,0.25 Stormflow Total Phosphorus Estimation Method, Stochastic, StochastStormflow Total Phosphorus Serial Correlation,0,0,0,0,0 Stormflow Total Nitrogen Mean (log mg/L),0.3,0.34,0.3,0.42,0.3 Stormflow Total Nitrogen Standard Deviation (log mg/L),0.19,0.19,0.19,0.19,0.19 Stormflow Total Nitrogen Estimation Method, Stochastic, tormflow Total Nitrogen Serial Correlation,0,0,0,0,0 Baseflow Total Suspended Solids Mean (log mg/L), 1.2, 1.2, 1.1, 1.1, 1.15 Baseflow Total Suspended Solids Standard Deviation (log mg/L).0.17.0.17.0.17.0.17.0.17 **Baseflow Total Suspended Solids Estimation** Method, Stochastic, Stochastic, Stochastic, Stochastic, Stochastic Baseflow Total Suspended Solids Serial Correlation,0,0,0,0,0 Baseflow Total Phosphorus Mean (log mg/L),-0.85,-0.85,-0.82,-0.82,-1.22 Baseflow Total Phosphorus Standard Deviation (log mg/L),0.19,0.19,0.19,0.19,0.19 Baseflow Total Phosphorus Estimation Method, Stochastic, Stochasti Baseflow Total Phosphorus Serial Correlation,0,0,0,0,0 Baseflow Total Nitrogen Mean (log mg/L),0.11,0.11,0.32,0.32,-0.05 Baseflow Total Nitrogen Standard Deviation (log mg/L),0.12,0.12,0.12,0.12,0.12 Baseflow Total Nitrogen Estimation Method, Stochastic, Stochastic, Stochastic, Stochastic Baseflow Total Nitrogen Serial Correlation,0,0,0,0,0 Flow based constituent generation - enabled,Off,Off,Off,Off,Off Flow based constituent generation - flow file, , , , Flow based constituent generation - base flow column, , , , , Flow based constituent generation - pervious flow column, , , , , Flow based constituent generation - impervious flow column, , , , , Flow based constituent generation - unit, , , OUT - Mean Annual Flow (ML/yr),25.7,18.0,23.5,17.6,2.18 OUT - TSS Mean Annual Load (kg/yr),4.41E3,6.10E3,600,3.64E3,68.5 OUT - TP Mean Annual Load (kg/yr),7.74,10.3,3.44,7.27,0.234 OUT - TN Mean Annual Load (kg/yr),54.1,42.9,50.8,51.1,2.44 OUT - Gross Pollutant Mean Annual Load (kg/yr),1.01E3,707,808,689,0.00



Rain In (ML/yr),40.3084,28.2491,27.0111,27.5119,21.3838 ET Loss (ML/yr),14.5585,10.203,3.54259,9.9367,19.2005 Deep Seepage Loss (ML/yr),0,0,0,0,0 Baseflow Out (ML/yr), 1.05048, 0.736202, 0, 0.716992, 1.85762 Imp. Stormflow Out (ML/yr),24.5153,17.1809,23.4685,16.7326,0 Perv. Stormflow Out (ML/yr),0.184207,0.129097,0,0.125728,0.325741 Total Stormflow Out (ML/yr),24.6995,17.31,23.4685,16.8583,0.325741 Total Outflow (ML/yr), 25.75, 18.0462, 23.4685, 17.5753, 2.18336 Change in Soil Storage (ML/yr),-7.5E-5,-5.2E-5,0,-5.1E-5,-0.000132 TSS Baseflow Out (kg/yr),18.0192,12.5388,0,9.78035,28.2312 TSS Total Stormflow Out (kg/yr),4390.89,6083.36,599.873,3629.59,40.3186 TSS Total Outflow (kg/yr),4408.91,6095.9,599.873,3639.37,68.5498 TP Baseflow Out (kg/yr),0.163379,0.114858,0,0.119199,0.122466 TP Total Stormflow Out (kg/yr),7.57323,10.1962,3.44238,7.14686,0.111367 TP Total Outflow (kg/yr),7.73661,10.311,3.44238,7.26606,0.233833 TN Baseflow Out (kg/yr), 1.4024, 0.98351, 0, 1.54854, 1.72213 TN Total Stormflow Out (kg/yr),52.7399,41.8685,50.8134,49.5385,0.722687 TN Total Outflow (kg/yr),54.1423,42.852,50.8134,51.087,2.44481 GP Total Outflow (kg/yr),1010.14,707.932,808.393,689.458,0

No Imported Data Source nodes

USTM treatment nodes Location, Basin 1, Basin 2, Rainwater Tank ID,6,9,10 Node Type, BioRetentionNodeV4, BioRetentionNodeV4, RainWaterTankNode Lo-flow bypass rate (cum/sec),0,0,0 Hi-flow bypass rate (cum/sec),100,100,1.2 Inlet pond volume, , ,0 Area (sqm),4657,230,240 Initial Volume (m³), , ,48 Extended detention depth (m),0.3,0.3,0.2 Number of Rainwater tanks, , ,240 Permanent Pool Volume (cubic metres), , ,480 Proportion vegetated, , ,0 Equivalent Pipe Diameter (mm), , ,1549 Overflow weir width (m),10,10,10 Notional Detention Time (hrs), , ,5.33E-3 Orifice Discharge Coefficient, , ,0.6 Weir Coefficient, 1.7, 1.7, 1.7 Number of CSTR Cells,3,3,2 Total Suspended Solids - k (m/yr),8000,8000,400 Total Suspended Solids - C* (mg/L),20,20,12 Total Suspended Solids - C** (mg/L), , ,12 Total Phosphorus - k (m/yr),6000,6000,300 Total Phosphorus - C* (mg/L),0.13,0.13,0.13 Total Phosphorus - C** (mg/L), , ,0.13 Total Nitrogen - k (m/yr),500,500,40 Total Nitrogen - C* (mg/L), 1.4, 1.4, 1.4 Total Nitrogen - C** (mg/L), , ,1.4 Threshold Hydraulic Loading for C** (m/yr), , ,0 Horizontal Flow Coefficient, 3, 3, Reuse Enabled,Off,Off,On Max drawdown height (m), , ,2 Annual Demand Enabled, Off, Off, On Annual Demand Value (ML/year), , ,13.228 Annual Demand Distribution, , ,PET Annual Demand Monthly Distribution: Jan, , ,



Annual Demand Monthly Distribution: Feb, , , Annual Demand Monthly Distribution: Mar, , , Annual Demand Monthly Distribution: Apr, , , Annual Demand Monthly Distribution: May, , , Annual Demand Monthly Distribution: Jun, , , Annual Demand Monthly Distribution: Jul, , , Annual Demand Monthly Distribution: Aug, , , Annual Demand Monthly Distribution: Sep, , , Annual Demand Monthly Distribution: Oct, , , Annual Demand Monthly Distribution: Nov, , , Annual Demand Monthly Distribution: Dec, , , Daily Demand Enabled, Off, Off, On Daily Demand Value (ML/day), , ,0.05088 Custom Demand Enabled, Off, Off, Off Custom Demand Time Series File, . . Custom Demand Time Series Units, , , Filter area (sqm),500,200, Filter perimeter (m),0.01,0.01, Filter depth (m),0.4,0.4, Filter Median Particle Diameter (mm), , Saturated Hydraulic Conductivity (mm/hr), 100, 100, Infiltration Media Porosity, 0.35, 0.35, Length (m), , , Bed slope, , Base Width (m), , , Top width (m), , Vegetation height (m), , , Vegetation Type, Vegetated with Effective Nutrient Removal Plants, Vegetated with Effective Nutrient Removal Plants, Total Nitrogen Content in Filter (mg/kg),400,400, Orthophosphate Content in Filter (mg/kg),40,40, Is Base Lined?, No, No, Is Underdrain Present?, Yes, Yes, Is Submerged Zone Present?, No, No, Submerged Zone Depth (m), , , B for Media Soil Texture, 13, 13, -9999 Proportion of upstream impervious area treated, , , Exfiltration Rate (mm/hr),0,0,0 Evaporative Loss as % of PET,100,100,0 Depth in metres below the drain pipe, , , TSS A Coefficient, , , TSS B Coefficient, , , TP A Coefficient, , , TP B Coefficient, , , TN A Coefficient, , , TN B Coefficient, , , Sfc,0.61,0.61, S*,0.37,0.37, Sw,0.11,0.11, Sh,0.05,0.05, Emax (m/day),0.008,0.008, Ew (m/day),0.001,0.001, IN - Mean Annual Flow (ML/yr),57.5,17.6,23.5 IN - TSS Mean Annual Load (kg/yr),6.40E3,2.15E3,600 IN - TP Mean Annual Load (kg/yr),13.2,4.80,3.44 IN - TN Mean Annual Load (kg/yr),94.3,38.8,50.8 IN - Gross Pollutant Mean Annual Load (kg/yr),258,104,808 OUT - Mean Annual Flow (ML/yr),55.3,17.2,11.5



OUT - TSS Mean Annual Load (kg/yr),304,389,270 OUT - TP Mean Annual Load (kg/yr),4.00,1.88,1.66 OUT - TN Mean Annual Load (kg/yr),42.7,21.5,24.6 OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00,0.00 Flow In (ML/yr),57.473,17.5735,23.4685 ET Loss (ML/yr),0.906095,0.353881,0 Infiltration Loss (ML/yr),0,0,0 Low Flow Bypass Out (ML/yr),0,0,0 High Flow Bypass Out (ML/yr),0,0,0 Orifice / Filter Out (ML/yr),46.7319,10.6785,11.4979 Weir Out (ML/yr),8.5656,6.52301,0 Transfer Function Out (ML/yr),0,0,0 Reuse Supplied (ML/yr),0,0,11.5458 Reuse Requested (ML/yr),0,0,31.7896 % Reuse Demand Met.0,0,36.3194 % Load Reduction, 3.78517, 2.11697, 51.0071 TSS Flow In (kg/yr),6396.27,2146.96,599.873 TSS ET Loss (kg/yr),0,0,0 TSS Infiltration Loss (kg/yr),0,0,0 TSS Low Flow Bypass Out (kg/yr),0,0,0 TSS High Flow Bypass Out (kg/yr),0,0,0 TSS Orifice / Filter Out (kg/yr), 117.303, 28.9941, 269.643 TSS Weir Out (kg/yr),186.732,359.651,0 TSS Transfer Function Out (kg/yr),0,0,0 TSS Reuse Supplied (kg/yr),0,0,177.57 TSS Reuse Requested (kg/yr),0,0,0 TSS % Reuse Demand Met,0,0,0 TSS % Load Reduction,95.2467,81.8979,55.05 TP Flow In (kg/yr),13.1579,4.79516,3.44238 TP ET Loss (kg/yr),0,0,0 TP Infiltration Loss (kg/yr),0,0,0 TP Low Flow Bypass Out (kg/yr),0,0,0 TP High Flow Bypass Out (kg/yr),0,0,0 TP Orifice / Filter Out (kg/yr),2.85236,0.680985,1.65698 TP Weir Out (kg/yr),1.14539,1.19826,0 TP Transfer Function Out (kg/yr),0,0,0 TP Reuse Supplied (kg/yr),0,0,1.55762 TP Reuse Requested (kg/yr),0,0,0 TP % Reuse Demand Met,0,0,0 TP % Load Reduction,69.6171,60.8095,51.8653 TN Flow In (kg/yr),94.2579,38.8199,50.8134 TN ET Loss (kg/yr),0,0,0 TN Infiltration Loss (kg/yr),0,0,0 TN Low Flow Bypass Out (kg/yr),0,0,0 TN High Flow Bypass Out (kg/yr),0,0,0 TN Orifice / Filter Out (kg/yr),29.4648,7.64678,24.6003 TN Weir Out (kg/yr),13.2359,13.8464,0 TN Transfer Function Out (kg/yr),0,0,0 TN Reuse Supplied (kg/yr),0,0,22.8943 TN Reuse Requested (kg/yr),0,0,0 TN % Reuse Demand Met,0,0,0 TN % Load Reduction, 54.698, 44.6337, 51.587 GP Flow In (kg/yr),257.949,103.515,808.393 GP ET Loss (kg/yr),0,0,0 GP Infiltration Loss (kg/yr),0,0,0 GP Low Flow Bypass Out (kg/yr),0,0,0 GP High Flow Bypass Out (kg/yr),0,0,0 GP Orifice / Filter Out (kg/yr),0,0,0



GP Weir Out (kg/yr),0,0,0 GP Transfer Function Out (kg/yr),0,0,0 GP Reuse Supplied (kg/yr),0,0,0 GP Reuse Requested (kg/yr),0,0,0 GP % Reuse Demand Met,0,0,0 GP % Load Reduction, 100, 100, 100 PET Scaling Factor, 2.1, 2.1, Generic treatment nodes Location, Humeguard GPT, Caravan Park Humegard GPT ID,5,8 Node Type, GPTNode, GPTNode Lo-flow bypass rate (cum/sec),0,0 Hi-flow bypass rate (cum/sec),100,100 **Flow Transfer Function** Input (cum/sec).0.0 Output (cum/sec),0,0 Input (cum/sec),10,10 Output (cum/sec),10,10 Input (cum/sec), , Output (cum/sec), , Input (cum/sec), , Output (cum/sec), , Input (cum/sec), , Output (cum/sec), Input (cum/sec), , Output (cum/sec), , **Gross Pollutant Transfer Function** Enabled, True, True Input (kg/ML),0,0 Output (kg/ML),0,0 Input (kg/ML), 14.9664, 14.9664 Output (kg/ML),2.2499,2.2499 Input (kg/ML), , Output (kg/ML), , Input (kg/ML), Output (kg/ML), , Input (kg/ML), , Output (kg/ML), , **Total Nitrogen Transfer Function**



Enabled, True, True Input (mg/L),0,0 Output (mg/L),0,0 Input (mg/L), 5, 5 Output (mg/L),3.8,3.8 Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), Output (mg/L), , Input (mg/L), Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , **Total Phosphorus Transfer Function** Enabled, True, True Input (mg/L),0,0 Output (mg/L),0,0 Input (mg/L),5,5 Output (mg/L),3.3,3.3 Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Total Suspended Solids Transfer Function Enabled, True, True Input (mg/L),0,0 Output (mg/L),0,0 Input (mg/L),500,500 Output (mg/L),295,295 Input (mg/L), , Output (mg/L), , Input (mg/L), Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), ,



Output (mg/L), , Input (mg/L), Output (mg/L), , Input (mg/L), , Output (mg/L), , Input (mg/L), , Output (mg/L), , TSS Flow based Efficiency Enabled, Off, Off TSS Flow based Efficiency, , TP Flow based Efficiency Enabled, Off, Off TP Flow based Efficiency, TN Flow based Efficiency Enabled, Off, Off TN Flow based Efficiency, GP Flow based Efficiency Enabled, Off, Off GP Flow based Efficiency, IN - Mean Annual Flow (ML/yr),57.5,17.6 IN - TSS Mean Annual Load (kg/yr),10.8E3,3.64E3 IN - TP Mean Annual Load (kg/yr), 19.9, 7.27 IN - TN Mean Annual Load (kg/yr),124,51.1 IN - Gross Pollutant Mean Annual Load (kg/yr), 1.72E3,689 OUT - Mean Annual Flow (ML/yr),57.5,17.6 OUT - TSS Mean Annual Load (kg/yr),6.40E3,2.15E3 OUT - TP Mean Annual Load (kg/yr),13.2,4.80 OUT - TN Mean Annual Load (kg/yr),94.3,38.8 OUT - Gross Pollutant Mean Annual Load (kg/yr),258,104 Flow In (ML/yr),57.473,17.5735 ET Loss (ML/yr),0,0 Infiltration Loss (ML/yr),0,0 Low Flow Bypass Out (ML/yr),0,0 High Flow Bypass Out (ML/yr),0,0 Orifice / Filter Out (ML/yr),0,0 Weir Out (ML/yr),0,0 Transfer Function Out (ML/yr),57.473,17.5735 Reuse Supplied (ML/yr),0,0 Reuse Requested (ML/yr),0,0 % Reuse Demand Met.0.0 % Load Reduction,0,0 TSS Flow In (kg/yr),10840.7,3638.86 TSS ET Loss (kg/yr),0,0 TSS Infiltration Loss (kg/yr),0,0 TSS Low Flow Bypass Out (kg/yr),0,0 TSS High Flow Bypass Out (kg/yr),0,0 TSS Orifice / Filter Out (kg/yr),0,0 TSS Weir Out (kg/yr),0,0 TSS Transfer Function Out (kg/yr),6396.27,2146.96 TSS Reuse Supplied (kg/yr),0,0 TSS Reuse Requested (kg/yr),0,0 TSS % Reuse Demand Met,0,0 TSS % Load Reduction, 40.9974, 40.9989 TP Flow In (kg/yr),19.9357,7.26536 TP ET Loss (kg/yr),0,0 TP Infiltration Loss (kg/yr),0,0 TP Low Flow Bypass Out (kg/yr),0,0 TP High Flow Bypass Out (kg/yr),0,0 TP Orifice / Filter Out (kg/yr),0,0 TP Weir Out (kg/yr),0,0 TP Transfer Function Out (kg/yr),13.1579,4.79516 TP Reuse Supplied (kg/yr),0,0



TP Reuse Requested (kg/yr),0,0 TP % Reuse Demand Met,0,0 TP % Load Reduction, 33.9984, 33.9997 TN Flow In (kg/yr),124.027,51.0809 TN ET Loss (kg/yr),0,0 TN Infiltration Loss (kg/yr),0,0 TN Low Flow Bypass Out (kg/yr),0,0 TN High Flow Bypass Out (kg/yr),0,0 TN Orifice / Filter Out (kg/yr),0,0 TN Weir Out (kg/yr),0,0 TN Transfer Function Out (kg/yr),94.2579,38.8199 TN Reuse Supplied (kg/yr),0,0 TN Reuse Requested (kg/yr),0,0 TN % Reuse Demand Met,0,0 TN % Load Reduction,24.0021,24.0032 GP Flow In (kg/yr),1715.89,688.581 GP ET Loss (kg/yr),0,0 GP Infiltration Loss (kg/yr),0,0 GP Low Flow Bypass Out (kg/yr),0,0 GP High Flow Bypass Out (kg/yr),0,0 GP Orifice / Filter Out (kg/yr),0,0 GP Weir Out (kg/yr),0,0 GP Transfer Function Out (kg/yr),257.949,103.515 GP Reuse Supplied (kg/yr),0,0 GP Reuse Requested (kg/yr),0,0 GP % Reuse Demand Met.0.0 GP % Load Reduction, 100, 100 Other nodes Location, Post-Development Node

ID.7 Node Type,PostDevelopmentNode IN - Mean Annual Flow (ML/yr),72.5 IN - TSS Mean Annual Load (kg/yr),693 IN - TP Mean Annual Load (kg/yr),5.88 IN - TN Mean Annual Load (kg/yr),64.2 IN - Gross Pollutant Mean Annual Load (kg/yr),0.00 OUT - Mean Annual Flow (ML/yr),72.5 OUT - TSS Mean Annual Load (kg/yr),693 OUT - TP Mean Annual Load (kg/yr),5.88 OUT - TN Mean Annual Load (kg/yr),64.2 OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00 % Load Reduction, 16.7 TSS % Load Reduction,95.3 TN % Load Reduction,68.1 TP % Load Reduction,79.7 GP % Load Reduction,100

Links

Location,Drainage Link,Drainage 

IN - TSS Mean Annual Load (kg/yr),6.10E3,4.41E3,6.40E3,304,3.64E3,2.15E3,389,600,270,68.5 IN - TP Mean Annual Load (kg/yr),10.3,7.74,13.2,4.00,7.27,4.80,1.88,3.44,1.66,0.234 IN - TN Mean Annual Load (kg/yr),42.9,54.1,94.3,42.7,51.1,38.8,21.5,50.8,24.6,2.44 IN - Gross Pollutant Mean Annual Load (kg/yr),707,1.01E3,258,0.00,689,104,0.00,808,0.00,0.00 OUT - Mean Annual Flow (ML/yr),18.0,25.7,57.5,55.3,17.6,17.6,17.2,23.5,11.5,2.18 OUT - TSS Mean Annual Load (kg/yr),6.10E3,4.41E3,6.40E3,304,3.64E3,2.15E3,389,600,270,68.5 OUT - TP Mean Annual Load (kg/yr),10.3,7.74,13.2,4.00,7.27,4.80,1.88,3.44,1.66,0.234 OUT - TN Mean Annual Load (kg/yr),42.9,54.1,94.3,42.7,51.1,38.8,21.5,50.8,24.6,2.44 OUT - Gross Pollutant Mean Annual Load (kg/yr),707,1.01E3,258,0.00,689,104,0.00,808,0.00,0.00

Catchment Details Catchment Name,Magpie Lane Music Model_081123 Timestep,6 Minutes Start Date,1/01/1991 End Date,31/12/1991 11:54:00 PM Rainfall Station, 70014 CANBERRA ET Station,Monthly User Defined Mean Annual Rainfall (mm), 563 Mean Annual ET (mm), 1115