

Picton High School Redevelopment

Civil Design Report

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Report Amendment Register

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1. INTRODUCTION

This civil report has been prepared by Bonacci Group (NSW) Pty Ltd to describe the civil works including the stormwater strategy associated with the State Significant Development Application (SSDA) for the Picton High School Redevelopment works.

This SSDA report incorporates the refurbishment of existing buildings, demolition of a number of existing buildings, construction of new buildings, internal roads and internal walkways. External works include the reconfiguration of lanes on Argyle Street, including the removal of on street parking and providing a dedicated right turning lane into the school bus stop, relocation of the pedestrian refuge island, and an extension to Wonga Road is proposed with a formalised cul-de-sac enabling rear access to the school.

This report addresses the redirected, upgraded (where required) and proposed new stormwater drainage networks related to the redevelopment of Picton High School, new road and pavement works, and bulk earthworks associated with the development. This design report also incorporates the water quality strategy for the site including a bio-retention basin to treat stormwater runoff in accordance with Wollondilly Shire Council requirements.

1.1. Objectives

The objectives of this State Significant Development Application (SSDA) report is to demonstrate compliance with all the requirements of *Wollondilly Shire Council DCP 2016, Design Specifications and Standard Drawings*, and *Water Sensitive Urban design Technical Guidelines* as follows:

- To design a stormwater trunk drainage system for the site to accommodate the stormwater runoff up to and including 100 year ARI storm events without having adverse impact to adjoining properties,
- To maintain the post development site discharge levels to pre development (both piped and overland) for all storm events up to and including 100 year ARI storm events,
- To maintain maximum post development discharge to the available capacity of the downstream stormwater network, and
- To provide a functional Water Sensitive Urban Design (WSUD) measures for the site to improve the water quality system overall and achieves the pollutant removal targets set by Council's *Water Sensitive Urban design Technical Guidelines*.

2. SITE DESCRIPTION

2.1. Location

The proposed development is located on the Picton High School Campus, 480 Argyle Street, Picton. The Campus is bordered by Argyle Street to the west and Wonga Road to the east. The proposed site is located within Wollondilly Shire Council Local Government Area (LGA). The locality map of the site is shown in [Figure 2-1](#) below.



Figure 2-1: Aerial View of Picton High School (Source: Google Maps)

2.2. Topography

The Campus generally slopes from South to North. The site gently grade to a centrally located south-north oriented sag, draining to a 1050diameter pipe in a northern easement connecting to Coachwood Crescent that ultimately drains to Redbank Creek. In major storm events, any overland flow generally flows northwards towards the easement linking the campus to Coachwood Crescent, following the existing topography.

2.3. Existing Documentation

The following relevant existing documentation has been referenced for the proposed design:

- Detail Survey including in ground services by CMS Surveyors, 2 March 2017,
- Geotechnical Investigation (Ref: 34252.02) by Douglas Partners Pty Ltd, 15 August 2017, and
- Tahmoor Coal Flood Impact Assessment (Ref: 34252.02) by WRM, 3 December 2014.

3. PROPOSED DEVELOPMENT

The proposed development comprises of the demolition of a number of existing buildings, construction or new buildings and refurbishing of the remainder of the existing buildings to provide permanent facilities for 1500 students, with core facilities for 2000 students, new school bus stop configuration on Argyle Street, new Wonga Road cul-de-sac and associated infrastructure. The Architectural site plan for the school is shown in [Figure 3-1](#) below.

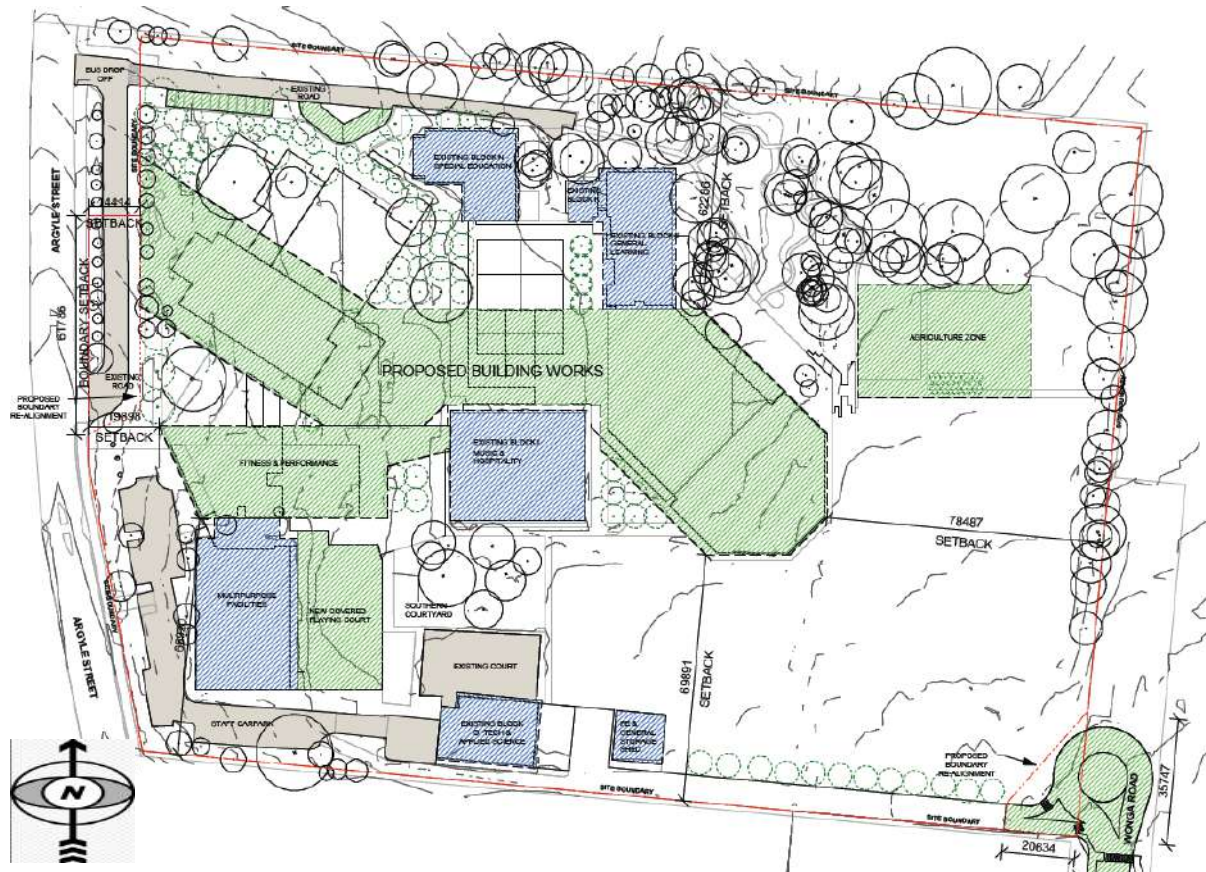


Figure 3-1: The Architectural Site Plan (by Billard Leece Architects)

3.1. Flood Impact Assessment

A flood impact assessment “Tahmoor Coal Flood Impact Assessment (Ref: 34252.02) by WRM, 3 December 2014” has been produced on behalf of Wollondilly Shire Council. This assessment identifies that the site does not experience flooding in major storm events.

As a result, the stormwater drainage network and surface levels are designed to protect the direct surface runoff away from building entry points.

The Tahmoor Coal Flood Impact Assessment by WRM is provided in **Appendix D**.

3.2. Stormwater Drainage

3.2.1. Catchment Delineation

The Proposed Site is located within the existing Redbank Creek catchment. The campus is approximately 5.7 hectares and the catchment for the downstream 1050 diameter pipe is approximately 8 hectares.

A stormwater pit and pipe drainage system is proposed to service the site to replace the existing redundant drainage system, to service the school buildings and associated infrastructure post development.

As early works, prior to demolition works, a new stormwater drainage line will be constructed to service the retained buildings in the south-eastern quadrant of the campus. The stormwater strategy for the site is shown in Drawing C030.

3.2.2. Hydrology and Hydraulics

The stormwater drainage systems have been designed to cater for design storms up to and including 100 year ARI (1% AEP) storm events as per Wollondilly Shire Council DCP 2016, Design Specifications and Standard Drawings, and Water Sensitive Urban design Technical Guidelines.

The hydrology and hydraulic analysis for the proposed site was established using a DRAINS (computer program for hydrological and hydraulic assessment) model. The hydrological parameters used in DRAINS are in accordance with Wollondilly Shire Council's "*Design Specifications for Subdivision and Engineering Standard, 2016*".

The intensity-frequency-duration (IFD) data for the site was extracted from Australian Rainfall and Runoff Volume 1, 1987 (Also provided in D5 of *Design Specifications for Subdivision and Engineering Standard, 2016*) and is provided in **Appendix B**.

The DRAINS model was adopted to obtain permissible site discharge (PSD) for existing scenarios in accordance with "D5 of *Design Specifications for Subdivision and Engineering Standard, 2016*" and as well as to design the on-site detention tank. The Drains model flows were obtained for 5 year, 20 year and 100 year ARI storm events.

3.2.3. Permissible Site Discharge (PSD)

The proposed site is approximately 5.7ha in area. The impervious area of proposed site has decreased to 45% whereas the impervious area for the existing site is 47.5%. There is no formal on-site stormwater detention system on the current site. There does exist a depression immediately upstream from the headwall of the 1050 diameter Council pipe resulting in a theoretical storage volume of approximately 75m³.

The proposed development results in the reduction of total impervious area by 1430m². The proposed catchment plan is provided in **Appendix A**.

The stormwater concept plans are shown in Drawing C030. A minimum 5 minutes time of concentration (t_c) has been adopted for existing impervious areas in the DRAINS model. The kinematic wave equation was used to determine the time of concentration for existing pervious areas. The kinematic wave equation in accordance with AR&R is set out below:

$$t_c = 6.94 * \frac{(L \times n^*)^{0.6}}{(I^{0.4} \times S^{0.3})}$$

where

L is the flow path length (m)

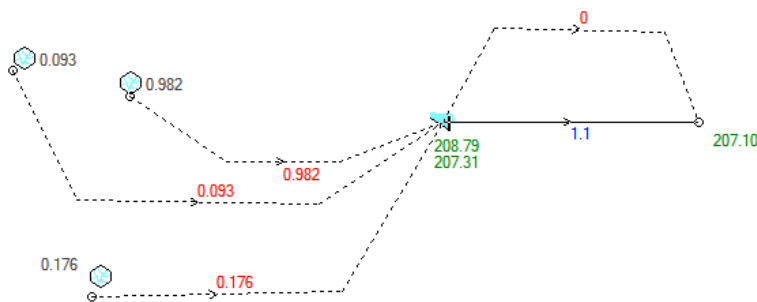
n^* is the surface roughness or retardance coefficient

I is the rainfall intensity (mm/hr)

S gradient of the flow path (m/m)

Tc is time of concentration (hrs)

To determine the PSD, the existing site has been divided into 3 main catchments: one for the existing school buildings (near west of the site), one for the existing grass field to the east of the site and one for the southern grassed areas. This has been modelled in DRAINS and a schematic diagram of DRAINS model (for the 5 year ARI) for existing scenario is shown below.



The permissible site discharge for the site are summarised in a tabular format below.

Table 3-1: Summary of PSD for the Site

Nodes	Location	Area (ha)	PSD (Permissible Site Discharge) (m3/s)			Impervious Time of Concentration (t_c) minutes
			5yr	20yr	100yr	
Ex. Outlet Discharge Level	Coachwood Crescent	5.76	1.1	1.54	1.89	5

3.2.4. Stormwater Analysis and Design

The proposed stormwater drainage network was designed using DRAINS software. All stormwater runoff from the school, associated infrastructure and landscape areas was captured and directed into the proposed new stormwater pit and pipe system. DRAINS was used to model the proposed network and to correctly size the inlet pits and the network pipes. A schematic diagram of DRAINS model for developed is shown below. The pits and pipes are design for 5% AEP for minor storms storm events. Overland flow paths were designed for 1% AEP for major storm events.

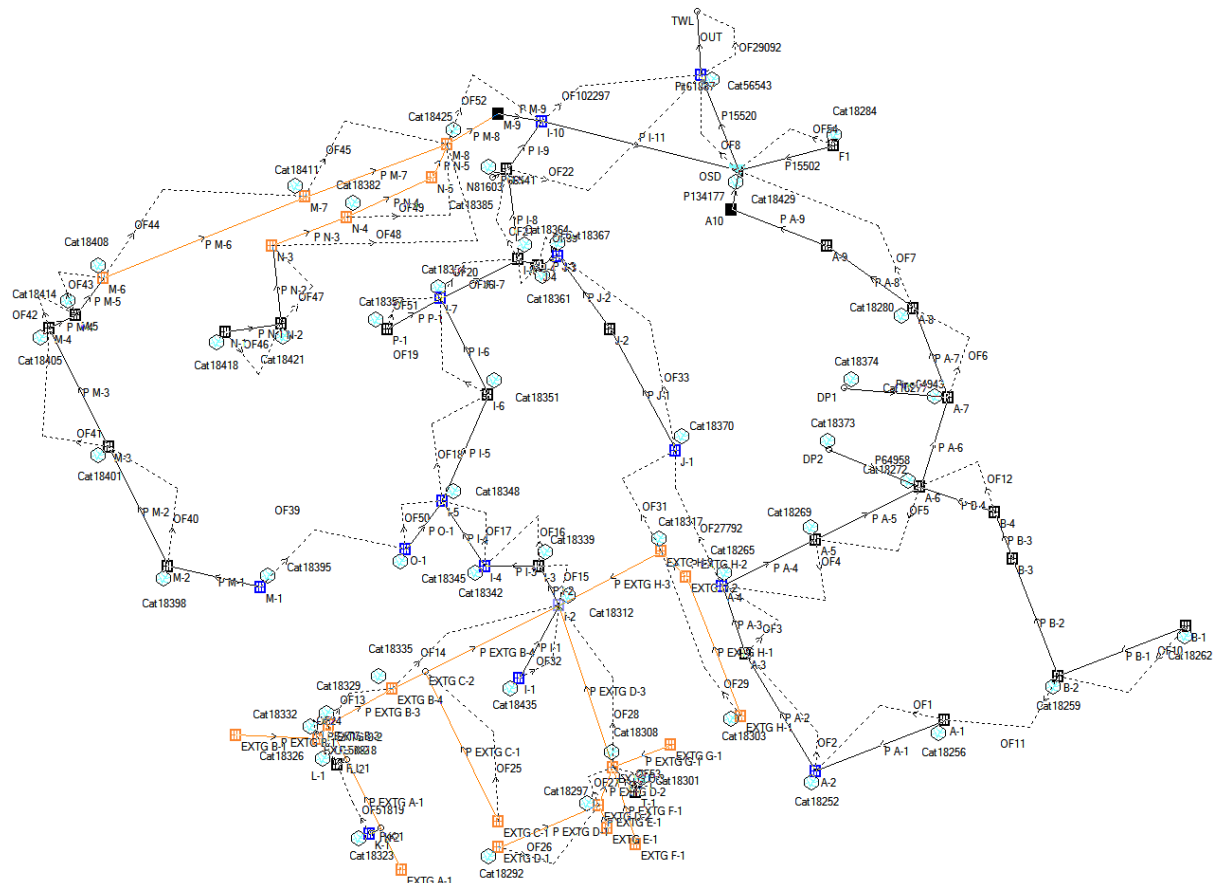


Figure 3-2: A Schematic Diagram of DRAINS (Hydrology and Hydraulics) Model for Developed Scenario

In order to meet pre-development flow requirements, the pit and pipe system shall be connected into a 500m³ on site detention (OSD) tank as shown in drawing C030. The OSD design has been based on an assumed tail water level of RL209 at the outlet of the existing 1050mm stormwater pipe for the 100 year ARI event. This level is assumed to be at top of grate level on Coachwood Crescent. Survey confirmation of this level is required for detailed design. The tail water level for 5 and 20 year ARI events are assumed to be free discharge. The details of the OSD design are summarised in table below:

Items		Design Storm Events (ARI)		
		5 years	20 years	100 years
Total Discharge from Site (m ³ /s)		1.1m ³ /s	1.20m ³ /s	1.22m ³ /s
Permissible Site Discharge (Refer Table 3-1) (m ³ /s)		1.1m ³ /s	1.54m ³ /s	1.89m ³ /s
Total Volume Provided (m ³)		500		
Water Levels (mAHD)		211.07	211.32	211.51
Discharge Control Outlets	Primary	580mm orifice		
High Early Discharge Weir Level (m)		RL211.00		
Tailwater Level in 100ARI		RL209.00		
OSD Surcharge level		RL211.60		

The model demonstrates that post development flows are less than permissible site discharge and therefore complies with Council's requirements. The stormwater strategy also demonstrates compliance to Council's requirement of ensuring that flows are within the capacity of the existing 1050mm stormwater pipe. This is seen in the DRAINS schematic below where there are no overflow from the existing headwall (which is to be demolished and reconstructed as a grated inlet pit) down the pedestrian walkway onto Coachwood Crescent in the 100 year ARI rainfall event.

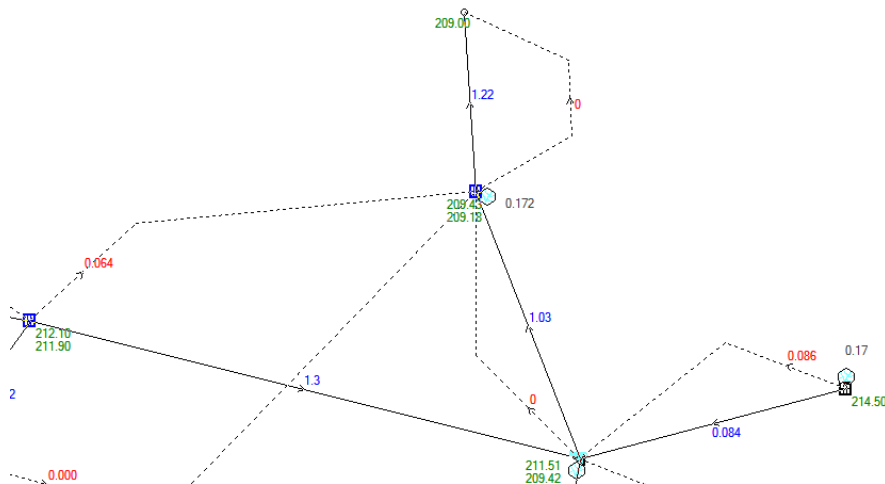


Figure 3-3 No overflow in the 100ARI event

3.3. Water Quality

The water quality treatment measure for the proposed for Picton High School is designed to satisfy all the requirements set by “Wollondilly Shire Council’s Water Sensitive Urban Design Policy” and “Australian Runoff Quality – a Guide to Water Sensitive Urban Design”. The water quality targets set by Wollondilly Shire Council’s WSUD policy are provided below:

- *Reduction of Mean annual Load of Gross Pollutants – 70% (greater than 5mm)*
- *Reduction of Mean annual Load of Total Coarse Sediment – 80% (0.1mm to 5mm)*
- *Reduction of Mean annual Load of Total Fine Sediment – 50% (less than 0.1mm)*
- *Reduction of Mean annual Load of Total Phosphorous –45%*
- *Reduction of Mean annual Load of Total Nitrogen – 45%*

Currently the site does not have any stormwater quality treatment measures. The proposed strategy provides water quality measures specifically for the new school and associated infrastructure. The proposed water quality strategy for the site is described in detail below.

3.3.1. Water Quality Strategy

The water quality treatment measures for the site are provided to reduce pollutant loads due to the proposed development. Even though the total impervious area is reduced, as the works constitute a new development, the above water quality targets set by Wollondilly Shire Council will be adhered to.

The water quality strategy for Picton High School incorporates a combination of swales, enviropods, stormwater filters and a bio-retention basin. Each stormwater drainage inlet pit within the school has been fitted with an enviropod. The stormwater runoff originating from the sportsfields is treated by passing through a swale before draining into the site OSD. All the roof and hard pavement runoff towards the west part of the site is treated by passing through enviropods and then draining into the site bio-retention basin, before draining into the site OSD.

Table 3-2: Summary of Sub-catchments and Water Quality Measures for overall Site

Sub-catchments	Area (ha)	Impervious Fraction (%)	WSUD Treatment Measures	Comments
NW ROAD	0.508	40	Enviropods, Bioretention	
SW ROAD	0.336	55	Enviropods, Bioretention	
NE GRASS	0.548	0	N/A	
SPORTSFIELD 1	0.458	0	Swale, Enviropods	
SPORTSFIELD 2	0.310	0	Swale, Enviropods	
SPORTSFIELD 3	0.651	0	Enviropods	
SPORTSFIELD 4	0.241	0	N/A	
SE ROAD	0.212	100	Enviropods	
Main School	2.500	70	Enviropods, Bioretention	
Total	5.764			

The properties of the individual WSUD measures are provided in **Appendix C**.

3.3.2. Water Quality Model

The water quality strategy for the proposed site was established using *MUSIC* [Version 6.2] model. The *MUSIC* model rainfall and evapotranspiration is determined from Bureau of Meteorology for Picton site. The Catchment summary along with WSUD measures for the site are already summarised in

Table 3-1 above. A screen shot of Music [version 6.2] model representing the site is provided in the figure below.

The Pollutant generation parameters for the site is attached in **Appendix C**.

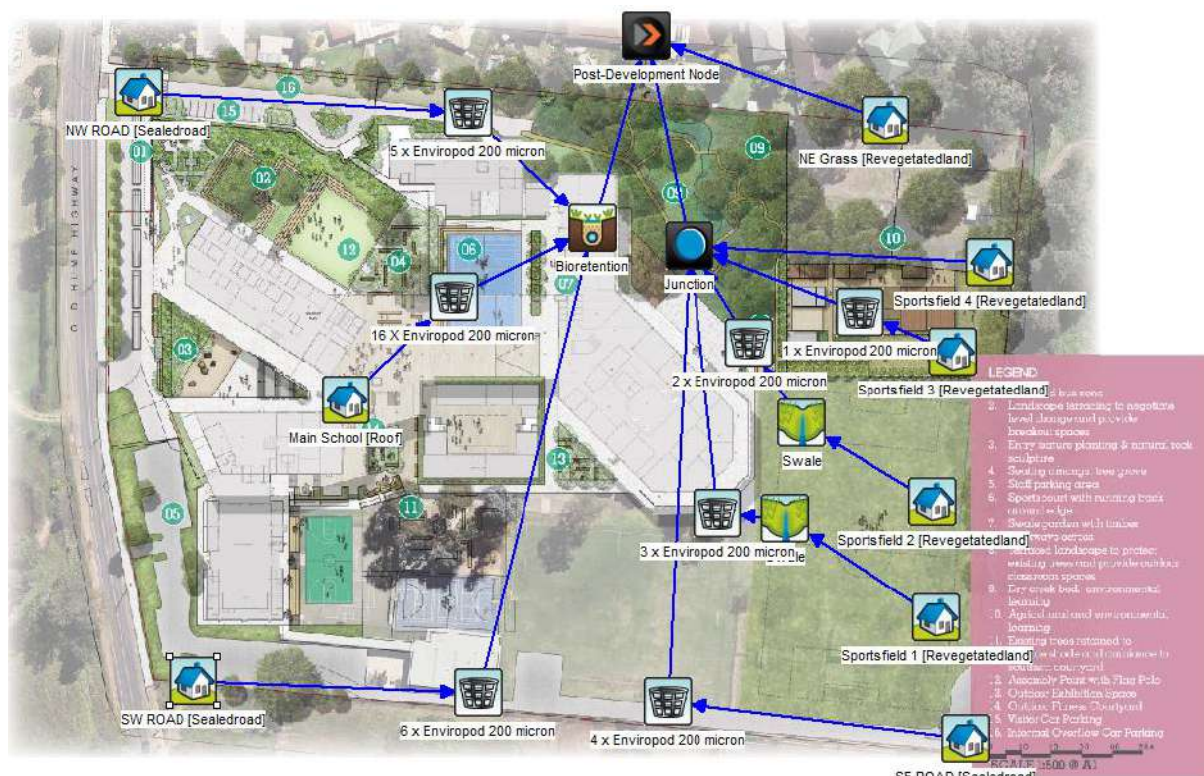
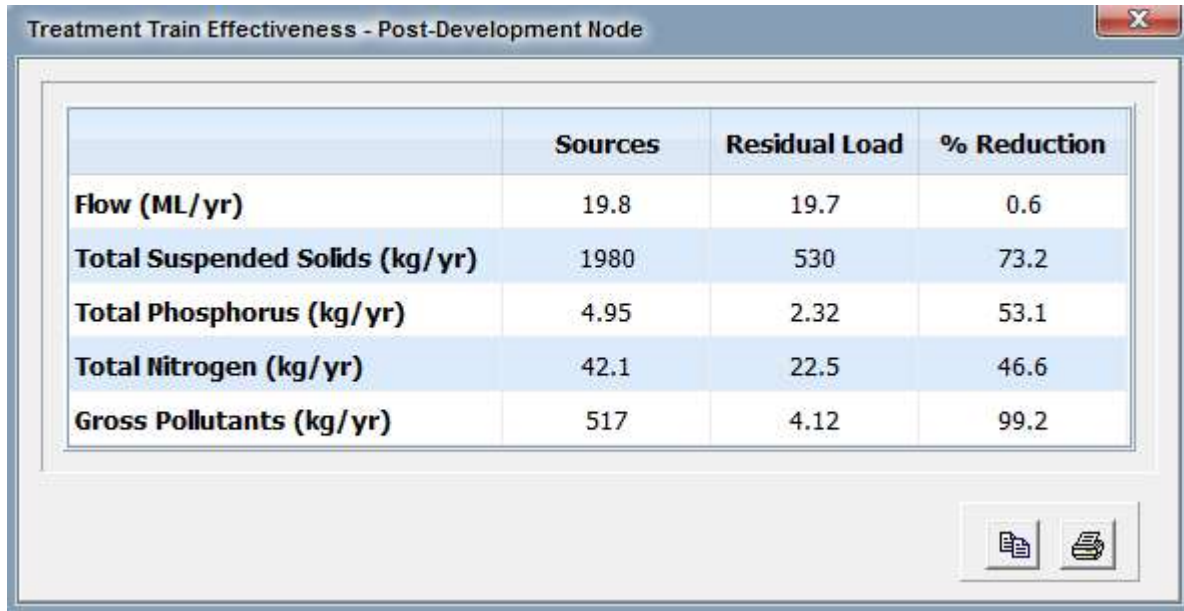


Figure 3-4: A Schematic Diagram of the Music Model.

3.3.3. Water Quality Results

The results of MUSIC modelling show that the pollutant removal rate achieves pollutant reduction targets provided in [Section 0](#) . The results from the MUSIC model are shown as a screen shot below.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	19.8	19.7	0.6
Total Suspended Solids (kg/yr)	1980	530	73.2
Total Phosphorus (kg/yr)	4.95	2.32	53.1
Total Nitrogen (kg/yr)	42.1	22.5	46.6
Gross Pollutants (kg/yr)	517	4.12	99.2

Figure 3-5: Music model Results

3.4. Soil and Water Management

The Soil and water management of the proposed site will be implemented during construction. The design of these measures is in accordance with the Landcom “Blue Book”. Refer to drawings C005, C007 and C008 for the Soil and Water Management plan, Typical Detailing and the RUSLE Soil Loss calculation sheets.

For soil and water management of the site, the following measures are provided to minimise the risk of sediments being washed into neighbourhood property and erosion of the site.

- *A sediment fence/catch drain (or diversion bund) around the site,*
- *Temporary access to site with shaker pad,*
- *An indicative stockpile area with sediment fence around it during construction. The stockpile must be located out of water flow paths (and be protected by earth banks/drains as required), and*
- *Field inlet sediment traps.*

4. SUMMARY

The civil design described in this report complies with Wollondilly Shire Council's *Wollondilly Shire Council DCP 2016, Design Specifications and Standard Drawings*, and *Water Sensitive Urban design Technical Guidelines* and "*Australian Runoff Quality – a Guide to Water Sensitive Urban Design*", Australian Standards and best-practiced principles.

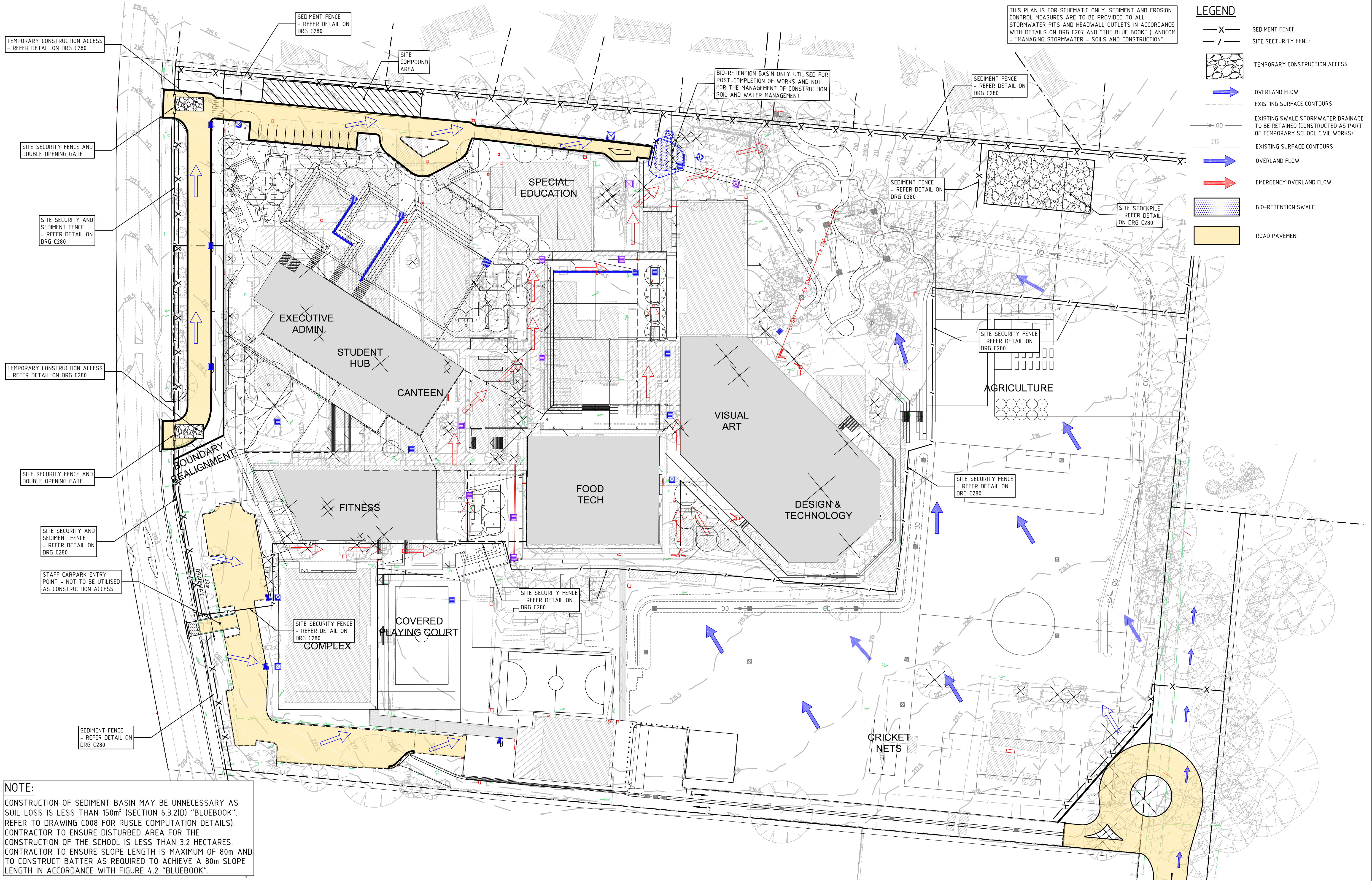
The proposed stormwater strategy for this State Significant Development Application (SSDA) demonstrates compliance with Wollondilly Shire Council water quantity requirements by limiting stormwater discharge to PSD up to and including 100 year ARI storm events and maintaining maximum post development discharge to the available capacity of the downstream stormwater network.

The proposed water quality improvement measures (demonstrated in [Section 3.3](#)) improve the existing stormwater quality conditions and fulfil all the requirements of Wollondilly Shire Council's *Water Sensitive Urban Design (WSUD) Technical Guidelines*.

The proposed stormwater management strategy for the SSDA stated in this report demonstrate that it improves the existing stormwater drainage system by significantly reducing stormwater pollution and improving the overall water quality for the site.

Appendix A – Civil and Stormwater Drawings

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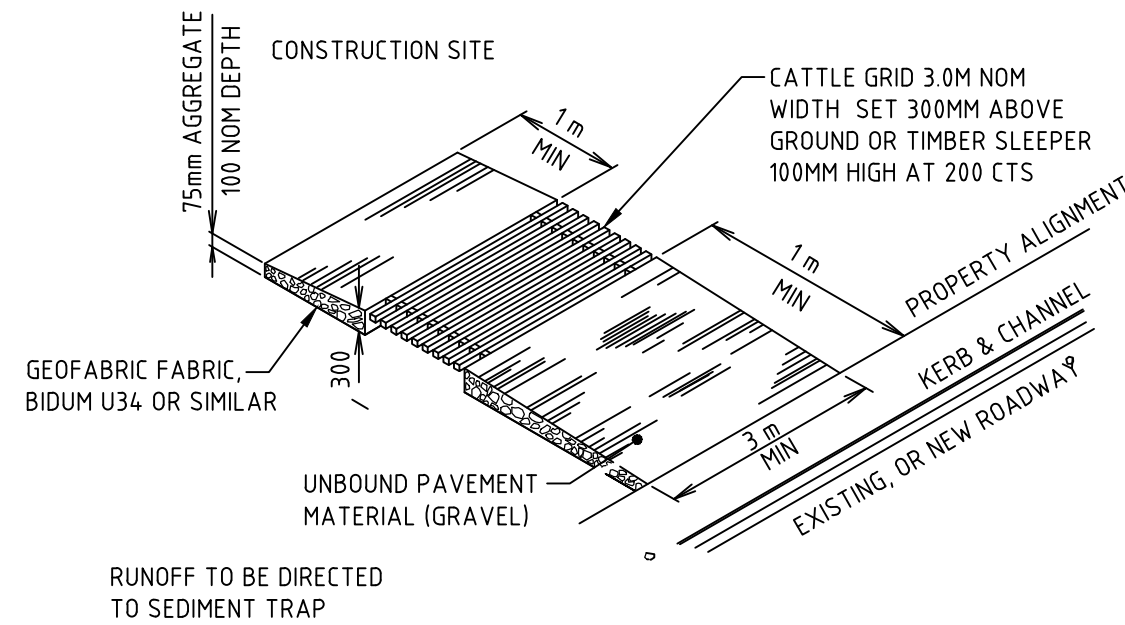
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P1	100% SCHEMATIC DESIGN	09.02.18	CS	-

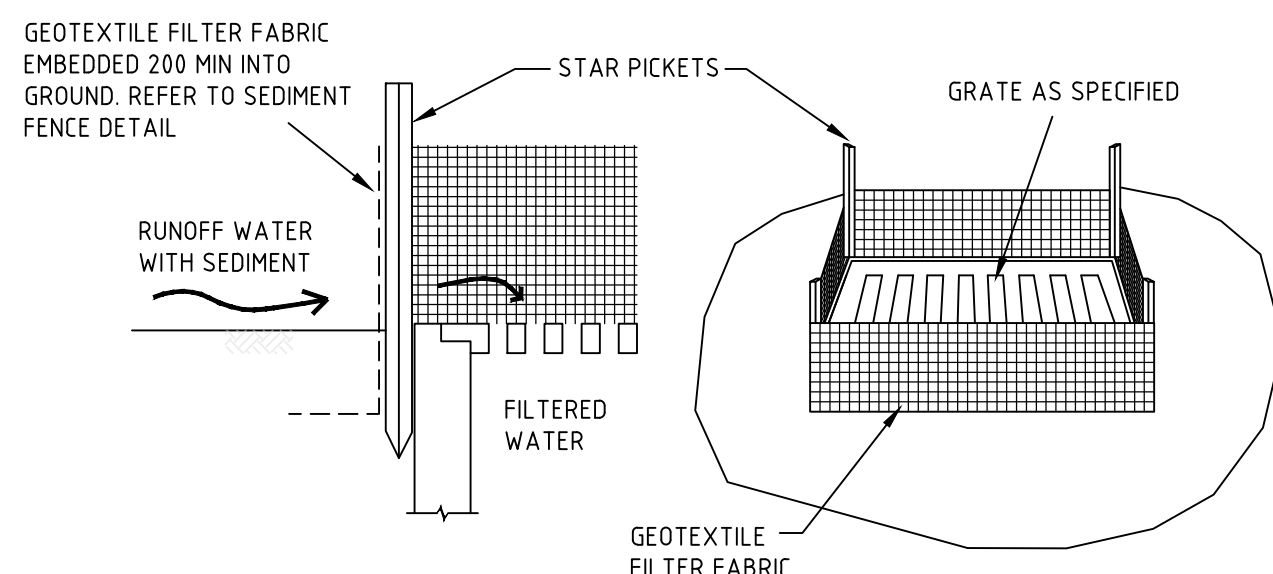
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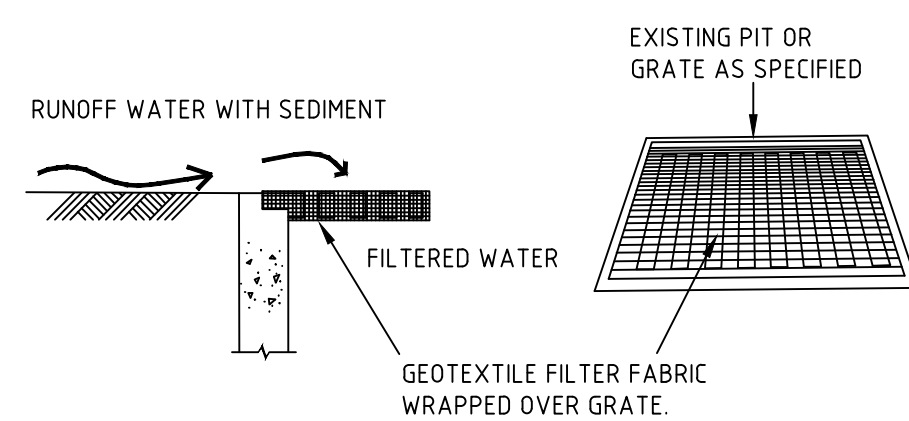
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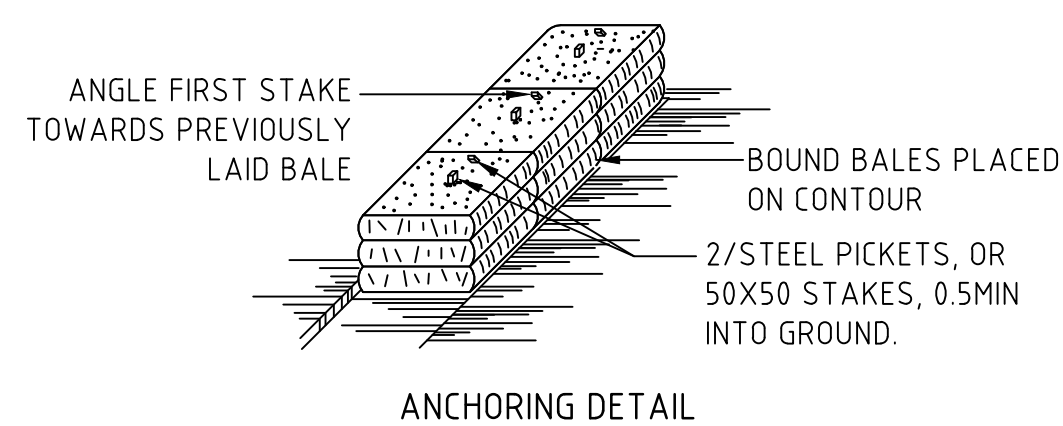


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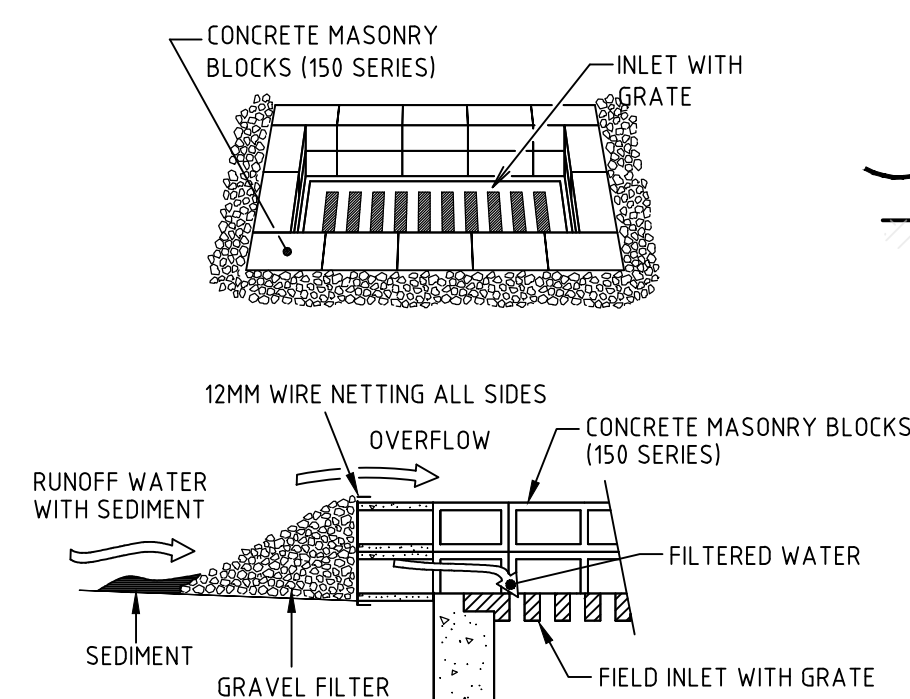
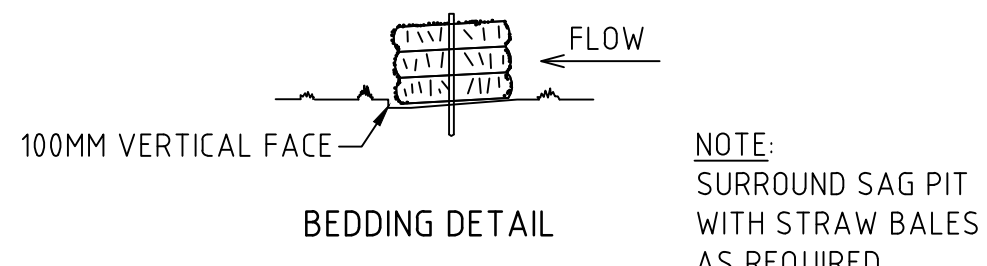
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- ### ALTERNATIVE SEDIMENT FENCE NOTES

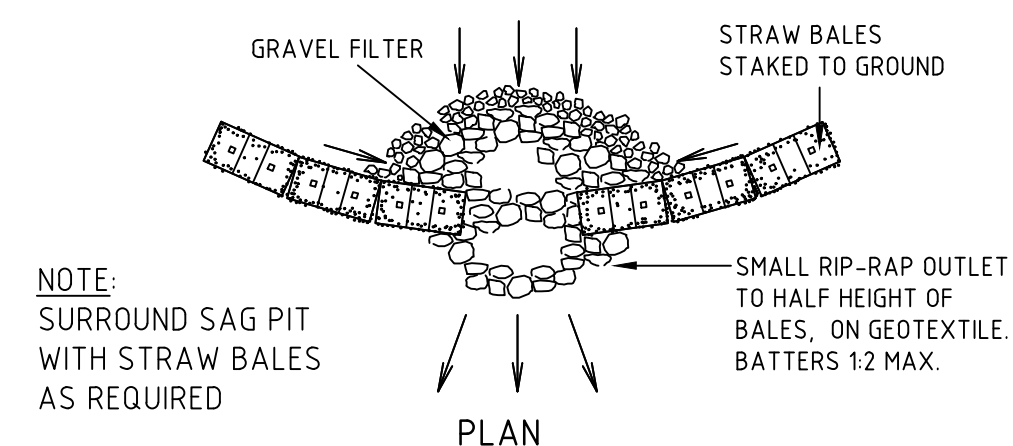
1. INSTALL THIS TYPE SEDIMENT FENCE WHEN USE OF SUPPORT POSTS IS NOT DESIRABLE OR NOT POSSIBLE. SUCH CONDITIONS MIGHT APPLY, FOR EXAMPLE, WHEN APPROVAL IS GRANTED FROM THE APPROPRIATE AUTHORITIES TO PLACE THESE FENCES IN HIGHLY SENSITIVE ESTUARINE AREAS.
2. USE BENT TRENCH MESH TO SUPPORT THE F82 WELDED MESH FACING AS SHOWN ON THE DRAWING ABOVE. ATTACH THE JUTE MESH TO THE WELDED MESH FACING USING UV-RESISTANT CABLE TIES.
3. STABILISE THE WHOLE STRUCTURE WITH SANDBAG OR ROCK ANCHORING OVER THE TRENCH MESH AND THE LEADING EDGE OF THE JUTE MESH. THE ANCHORING SHOULD BE SUFFICIENTLY LARGE TO ENSURE STABILITY OF THE STRUCTURE IN THE DESIGN STORM EVENT, USUALLY THE 10 YEAR EVENT.



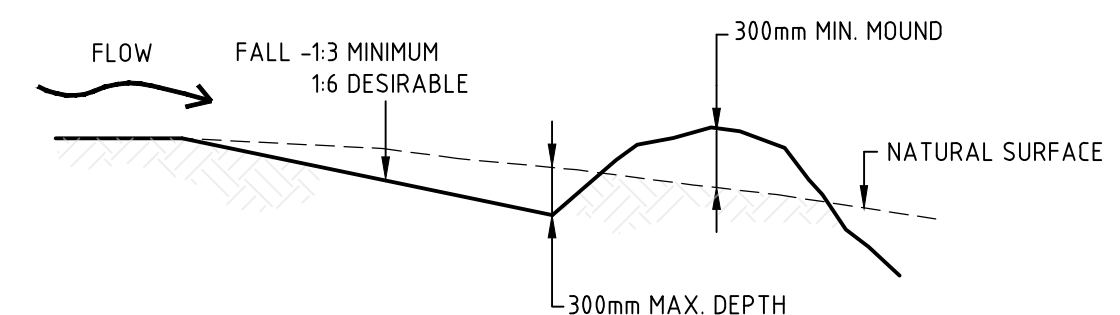
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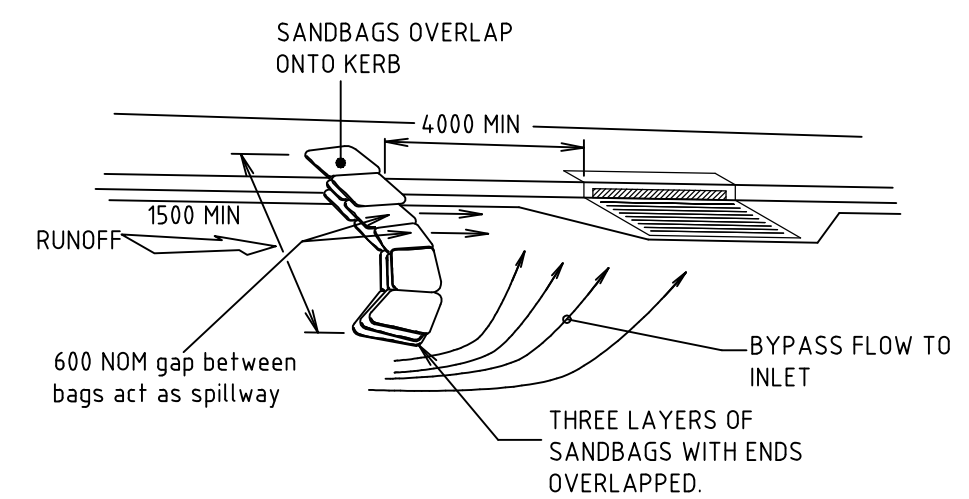
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NOTES:

1. K-FACTOR AND GROUP C HYDROLOGIC GROUP BASED ON TABLE C21 "BLUEBOOK" PICTON LANDSCAPE.
2. 5-DAY 85% RAINFALL DEPTH OF 34.1mm CHOSEN AS THE AVERAGE OF CAMDEN AND MITTAGONG LANDSCAPE IN TABLE 6.3a "BLUEBOOK" AS PICTON IS LOCATED IN BETWEEN THESE LOCATIONS.
3. ANNUAL SOIL LOSS AS COMPUTED BY THE RUSLE EQUATION IS 114m³ PER YEAR DUE TO RELATIVELY FLAT SLOPE ON SITE (ASSUMED NOMINALLY 2% AS PROPOSED CONSTRUCTION WILL REQUIRE FLAT SURFACE FOR BUILDING SLAB). CONSEQUENTLY, CONSTRUCTION OF A SEDIMENT BASIN MAY BE UNNECESSARY FOR THE ULTIMATE SCHOOL CONSTRUCTION WORKS AS THE SOIL LOSS IS LESS THAN 150m³/YR (REFER TO SECTION 6.3.2(D) OF THE "BLUEBOOK"). CONTRACTOR IS TO USE ALTERNATE SEDIMENT CONTROL MEASURES SUCH THAT QUALITY OF RUNOFF IS OF AN ACCEPTABLE STANDARD PRIOR TO DISCHARGE.

SWMP Commentary, Detailed Calculations

Note: These "Detailed Calculation" spreadsheets relate only to high erosion hazard lands as identified in figure 4.6 or where the designer chooses to use the RUSLE to size sediment basins. The "Standard Calculation" spreadsheets should be used on low erosion hazard lands as identified by figure 4.6 and where the designer chooses not to run the RUSLE in calculations.

1. Site Data Sheet

Site Name: Picton High School

Site Location: Picton High School

Precinct:

Description of Site: Existing Picton High School (area nominally 3.2ha) to be demolished. Temporary School to be non disturbed during demolition of existing school

Site area	Site					Remarks
	Basin					
Total catchment area (ha)	3.2					
Disturbed catchment area (ha)	3.2					

Soil analysis

% sand (fraction 0.02 to 2.00 mm)						Soil texture should be assessed through mechanical dispersion only. Dispersing agents (e.g. Calgon) should not be used
% silt (fraction 0.002 to 0.02 mm)						
% clay (fraction finer than 0.002 mm)						
Dispersion percentage						E.g. enter 10 for dispersion of 10%
% of whole soil dispersible						See Section 6.3.3(e)
Soil Texture Group						See Section 6.3.3(c), (d) and (e)

Rainfall data

Design rainfall depth (days)	5					See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	85					See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	34.1					See Section 6.3.4 (h)
Rainfall intensity: 2-year, 6-hour storm	10.6					See IFD chart for the site

RUSLE Factors

Rainfall erosivity (<i>R</i> -factor)	2460							Automatic calculation from above data
Soil erodibility (<i>K</i> -factor)	0.034							
Slope length (m)	80							
Slope gradient (%)	2							
Length/gradient (<i>LS</i> -factor)	0.41							RUSLE data can be obtained from Appendices A, B and C
Erosion control practice (<i>P</i> -factor)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (<i>C</i> -factor)	1	1	1	1	1	1	1	

Calculations

Soil loss (t/ha/yr)	45					
Soil Loss Class	1					See Section 4.4.2(b)
Soil loss (m ³ /ha/yr)	34					
Sediment basin storage volume, m ³	19					See Sections 6.3.4(i) and 6.3.5 (e)

180209 Ultimate School Sed basin Spreadsheet Detailed edi~t2.xls

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Project Name	PICTON HIGH SCHOOL REDEVELOPMENT PICTON, NSW 2571		SCHEMATIC DESIGN		
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P3	100% SCHEMATIC DESIGN	19.01.17	CS	-															
P2	95% SCHEMATIC DESIGN	15.12.17	CS	-															
P1	70% SCHEMATIC DESIGN	22.11.17	JF	-															
Rev	Description	Date	By	App	Rev	Description	Date	By	App	Rev	Description	Date	By	App					

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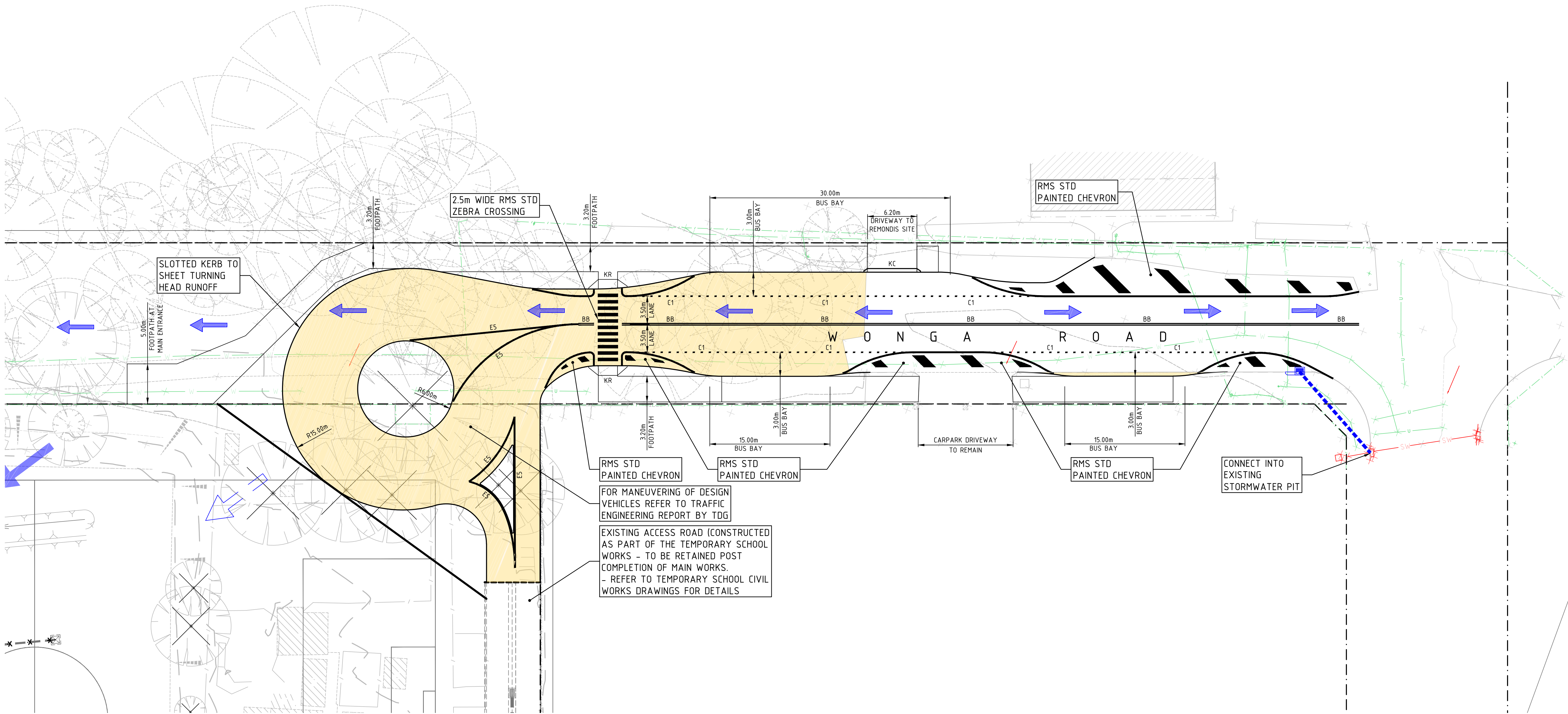


Drawing Title CONCEPT STORMWATER
MANAGEMENT PLAN

Designed	JF	Project Director Approved	Date	North
Drawn	JF			
Scale	1:500			
Date	NOV 2017	Project Ref	Drawing No	Rev
Sheet	A1	20 21888 01	C030	P5

LEGEND

- STORMWATER LINE
- SURFACE INLET PIT
- KERB INLET PIT
- EXISTING STORMWATER DRAINAGE TO BE RETAINED (CONSTRUCTED AS PART OF TEMPORARY SCHOOL CIVIL WORKS)
- EXISTING SURFACE CONTOURS
- EXISTING STORMWATER DRAINAGE
- OVERLAND FLOW
- ROAD PAVEMENT



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Rev	Description	Date	By	App
P1	100% SCHEMATIC DESIGN	22.02.18	CS	-

Rev	Description	Date	By	App

Rev	Description	Date	By	App

SCALE 1:250



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Project Name
PICTON HIGH SCHOOL
REDEVELOPMENT
PICTON, NSW 2571

Drawing Title
CONCEPT
SITEWORKS PLAN

SCHEMATIC DESIGN

Designed	JF	Project Director Approved	Date	North
Drawn	JF			
Scale	1:500	Project Ref	Drawing No	Rev
Date	NOV 2017	20 21888 01	C031	P1
Sheet	A1			

Appendix B – Design Rainfall Data and DRAINS Results

Design Rainfall Data

Location	2I_1	$^2I_{12}$	$^2I_{72}$	$^{60}I_1$	$^{60}I_{12}$	$^{60}I_{72}$	F2	F50	G
Picton	30	7.2	2	61	14	4.6	4.29	15.75	0
Appin	25	5.6	1.7	61.6	13.7	4.6	4.29	15.75	0
Tahmoor	30	7.2	2.1	62	14.2	4.7	4.29	15.75	0.01
Buxton	29	7.4	2	60	14	4.7	4.29	15.75	0.04
Camden South	32	6.0	1.8	60	12	4.1	4.29	15.75	0.00
Thirlmere	29.5	7	2	60	14	4.5	4.29	15.75	0.02
Warragamba	30	7	2.15	60	14.2	5	4.29	15.75	0.01
Bargo	31	7.7	2.2	64	15	4.8	4.29	15.75	0.02
Oakdale	29	6.6	1.9	58	13.8	4.5	4.29	15.75	0.04
Wilton	33.5	7.8	2.5	67	16	5.4	4.29	15.75	0
Mount Hunter	30	6.1	1.8	59	12.4	4.4	4.29	15.75	0
Menangle	32.5	6	1.8	62	13.4	4	4.29	15.75	0
Theresa Park	30	6.3	1.85	60	13	4.2	4.29	15.75	0

Intensity-Frequency-Duration Table

Location: 34.200S 150.600E Issued: 9/2/2018

Rainfall intensity in mm/h for various durations and Average Recurrence Interval

Average Recurrence Interval

Duration	1 YEAR	2 YEARS	5 YEARS	10 YEARS	20 YEARS	50 YEARS	100 YEARS
5Mins	75.2	97.4	127	145	168	199	222
6Mins	70.4	91.2	119	136	158	187	209
10Mins	57.6	74.6	97.6	111	129	153	171
20Mins	41.8	54.2	70.9	80.8	93.6	111	124
30Mins	33.9	44.0	57.5	65.5	76.0	89.9	101
1Hr	23.1	29.9	39.2	44.7	51.8	61.3	68.6
2Hrs	15.5	20.1	26.2	29.8	34.6	40.8	45.6
3Hrs	12.3	15.9	20.6	23.4	27.1	32.0	35.7
6Hrs	8.20	10.6	13.7	15.5	17.9	21.1	23.5
12Hrs	5.41	6.99	9.06	10.3	11.9	14.0	15.6
24Hrs	3.44	4.48	5.92	6.78	7.90	9.40	10.5
48Hrs	2.08	2.75	3.75	4.36	5.15	6.23	7.05
72Hrs	1.52	2.02	2.80	3.28	3.91	4.75	5.42

(Raw data: 29.94, 7.04, 2.02, 60.95, 13.89, 4.73, skew=0.02, F2=4.29, F50=15.77)

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Drains Results

100 year ARI results

DRAINS results prepared from Version 2017.07

PIT / NODE DETAILS				Version 8				Min	OverflowConstraint
Name	Max HGL	HGL	Max Pond Flow Arriving (cu.m/s)	(cu.m)	Max Surface Volume (m)	Freeboard	Max Pond (cu.m/s)		
A-1	215.71		0.020		1.21	0.002	Inlet Capacity		
A-2	214.64	215.71	0.066	4.7	1.00	0.000	Inlet Capacity		
A-3	214.38		0.000		0.62	0.000	None		
A-4	214.36	215.01	0.097	8.2	0.54	0.000	Inlet Capacity		
A-5	214.19		0.027		0.99	0.001	Inlet Capacity		
A-6	214.11		0.019		1.33	0.000	Inlet Capacity		
A-7	213.94		0.042		1.93	0.004	Inlet Capacity		
A-8	213.67		0.054		1.95	0.006	Inlet Capacity		
A-9	212.16		0.000		0.74		None		
A10	211.60		0.000		0.15		None		
Pit61887	209.18	209.43	0.193	0.8	0.12	0.000	Inlet Capacity		
TWL	209.00		0.000						
B-1	217.64		0.023		0.92	0.003	Inlet Capacity		
B-2	216.81		0.022		1.15	0.003	Inlet Capacity		
B-3	215.68		0.000		1.21		None		
B-4	215.45		0.000		0.95	0.000	None		
EXTG A-1	215.50		0.000		1.07		None		
EXTG B-3	215.33		0.092		1.25	0.051	Inlet Capacity		
EXTG B-4	215.13		0.082		1.39	0.014	Inlet Capacity		
I-2	213.44	214.53	0.114	0.9	0.99	0.031	Inlet Capacity		
I-3	212.95		0.071		1.46	0.011	Inlet Capacity		
I-4	212.82	214.29	0.049	0.7	1.38	0.000	Inlet Capacity		
I-5	212.67	213.99	0.044	0.6	1.23	0.000	Inlet Capacity		
I-6	212.55		0.081		1.30	0.014	Inlet Capacity		
I-7	212.46	213.80	0.056	0.9	1.24	0.000	Inlet Capacity		
I-8	212.27		0.043		1.06	0.004	Inlet Capacity		
I-9	212.04		0.004		0.27	0.000	None		
I-10	211.90	212.10	0.190	1.7	0.10	0.064	Inlet Capacity		
EXTG B-1	217.39		0.000		1.09		None		
EXTG B-2	216.47		0.069		0.82	0.037	Inlet Capacity		
EXTG C-1	215.50		0.000		1.06	0.000	None		
EXTG C-2	215.06		0.000						
EXTG D-1	215.91		0.072		0.81	0.026	Inlet Capacity		
EXTG D-2	215.64		0.053		0.00	0.057	Outlet System		
EXTG D-3	215.43		0.064		0.01	0.028	Inlet Capacity		
EXTG E-1	215.72		0.000		0.47		None		
EXTG F-1	215.49		0.000		1.01		None		
EXTG G-1	215.58		0.000		0.05		None		
EXTG H-1	214.88		0.035		0.92	0.008	Inlet Capacity		
EXTG H-2	213.70		0.000		1.13		None		
EXTG H-3	213.56		0.091		0.40	0.017	Inlet Capacity		
I-1	215.01	215.39	0.061	0.9	0.28	0.006	Inlet Capacity		
J-1	212.99	213.50	0.120	0.9	0.41	0.064	Inlet Capacity		
J-2	212.72		0.000		0.64		None		
J-3	212.66	213.45	0.073	0.9	0.69	0.018	Inlet Capacity		
J-4	212.36		0.044		0.98	0.004	Inlet Capacity		
K-1	217.25	217.34	0.046	0.9	0.00	0.025	Outlet System		

K-2	215.87		0.000				
M-1	217.41	218.08	0.044	0.7	0.59	0.000	Inlet Capacity
M-2	217.14		0.015		1.25	0.001	Inlet Capacity
M-3	217.05		0.060		0.47	0.019	Inlet Capacity
M-4	216.61		0.043		0.02	0.011	Inlet Capacity
M-5	216.43		0.097		0.11	0.040	Inlet Capacity
M-6	216.10		0.070		0.00	0.060	Outlet System
M-7	214.26		0.139		0.00	0.107	Inlet Capacity
M-8	212.46		0.186		0.00	0.190	Outlet System
M-9	212.00		0.000		0.00		Outlet System
N-1	215.46		0.013		0.60	0.000	None
N-2	214.84		0.013		0.61	0.000	None
N-3	213.55		0.000		1.22	0.000	None
N-4	213.11		0.035		1.00	0.008	Inlet Capacity
N-5	212.61		0.000		1.02		None
O-1	212.80	215.87	0.037	0.5	2.99	0.000	Inlet Capacity
P-1	214.49		0.034		0.13	0.002	Inlet Capacity
T-1	215.73		0.013		0.01	0.004	Inlet Capacity
F1	214.50		0.170		0.86	0.086	Inlet Capacity
DP1	215.13		0.124				
DP2	215.36		0.062				
L-1	217.24		0.039		0.01	0.018	Inlet Capacity
L-2	215.88		0.000				
N81603	212.04		0.047				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Paved Max Q (cu.m/s)	Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Cat18256 average 221 mm/h, Zone 1		0.017	0.017	0.000	5.00	5.00	5.00 AR&R 100 year, 5 minutes storm,
Cat18252 average 221 mm/h, Zone 1		0.064	0.064	0.000	5.00	5.00	5.00 AR&R 100 year, 5 minutes storm,
Cat18265 68.0 mm/h, Zone 1		0.096	0.000	0.096	5.00	16.00	5.00 AR&R 100 year, 1 hour storm, average
Cat18269 average 123 mm/h, Zone 1		0.027	0.000	0.027	5.00	14.10	5.00 AR&R 100 year, 20 minutes storm,
Cat18272 average 123 mm/h, Zone 1		0.019	0.000	0.019	5.00	11.00	5.00 AR&R 100 year, 20 minutes storm,
Cat18277 average 123 mm/h, Zone 1		0.042	0.000	0.042	5.00	13.50	5.00 AR&R 100 year, 20 minutes storm,
Cat18280 45.4 mm/h, Zone 1		0.051	0.000	0.051	5.00	18.70	5.00 AR&R 100 year, 2 hours storm, average
Cat18429 average 123 mm/h, Zone 1		0.088	0.007	0.084	5.00	12.80	5.00 AR&R 100 year, 20 minutes storm,
Cat56543 68.0 mm/h, Zone 1		0.172	0.000	0.172	5.00	14.90	5.00 AR&R 100 year, 1 hour storm, average
Cat18262 average 221 mm/h, Zone 1		0.023	0.023	0.000	5.00	5.00	5.00 AR&R 100 year, 5 minutes storm,
Cat18259 average 221 mm/h, Zone 1		0.019	0.019	0.000	5.00	5.00	5.00 AR&R 100 year, 5 minutes storm,
Cat18329 average 221 mm/h, Zone 1		0.038	0.038	0.000	5.00	5.00	5.00 AR&R 100 year, 5 minutes storm,
Cat18335 average 221 mm/h, Zone 1		0.032	0.032	0.000	5.00	5.00	5.00 AR&R 100 year, 5 minutes storm,
Cat18312 average 123 mm/h, Zone 1		0.078	0.017	0.060	5.00	5.00	5.00 AR&R 100 year, 20 minutes storm,
Cat18339 average 123 mm/h, Zone 1		0.041	0.028	0.013	5.00	5.00	5.00 AR&R 100 year, 20 minutes storm,

Cat18342	0.042	0.042	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18348	0.044	0.044	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18351	0.081	0.081	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18354	0.042	0.005	0.037	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18364	0.042	0.042	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18332	0.069	0.065	0.004	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18292	0.072	0.066	0.006	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18297	0.028	0.015	0.013	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18308	0.005	0.005	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18303	0.035	0.035	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18317	0.084	0.037	0.047	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18435	0.061	0.061	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18370	0.103	0.055	0.048	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18367	0.009	0.000	0.009	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18361	0.027	0.027	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18323	0.046	0.039	0.006	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18395	0.044	0.005	0.039	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18398	0.015	0.014	0.001	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18401	0.059	0.057	0.002	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18405	0.025	0.023	0.002	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18414	0.087	0.087	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18408	0.031	0.023	0.008	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18411	0.080	0.020	0.060	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18425	0.075	0.025	0.050	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18418	0.013	0.001	0.011	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18421	0.013	0.002	0.012	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18382	0.035	0.035	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm,
average 221 mm/h, Zone 1							
Cat18345	0.037	0.029	0.008	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							
Cat18357	0.034	0.004	0.030	5.00	5.00	5.00	AR&R 100 year, 20 minutes storm,
average 123 mm/h, Zone 1							

Cat18301	0.013	0.013	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
Cat18284	0.170	0.036	0.150	5.00	23.00	5.00	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
Cat18374	0.124	0.124	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
Cat18373	0.062	0.062	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
Cat18326	0.014	0.013	0.001	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
Cat18385	0.047	0.047	0.000	5.00	5.00	5.00	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
Sth (out of site)	0.321	0.000	0.321	5.00	15.20	5.00	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1
South (out of site)	0.123	0.000	0.123	5.00	15.00	5.00	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1

Outflow Volumes for Total Catchment (2.59 impervious + 4.64 pervious = 7.23 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1	1332.08	828.83 (62.2%)	451.87 (94.6%)	376.96 (44.1%)
AR&R 100 year, 10 minutes storm, average 169 mm/h, Zone 1	2037.30	1445.38 (70.9%)	704.82 (96.4%)	740.56 (56.7%)
AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1	2965.53	2240.05 (75.5%)	1037.78 (97.6%)	1202.28 (63.2%)
AR&R 100 year, 30 minutes storm, average 100 mm/h, Zone 1	3616.50	2758.21 (76.3%)	1271.28 (98.0%)	1486.93 (64.1%)
AR&R 100 year, 45 minutes storm, average 80.0 mm/h, Zone 1	4339.80	3337.05 (76.9%)	1530.71 (98.3%)	1806.34 (64.9%)
AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1	4918.50	3800.82 (77.3%)	1738.29 (98.5%)	2062.53 (65.4%)
AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1	6567.57	5106.32 (77.8%)	2329.78 (98.9%)	2776.54 (65.9%)
AR&R 100 year, 3 hours storm, average 35.7 mm/h, Zone 1	7746.73	6014.14 (77.6%)	2752.80 (99.1%)	3261.34 (65.6%)
AR&R 100 year, 6 hours storm, average 23.5 mm/h, Zone 1	10198.53	7723.29 (75.7%)	3632.14 (99.3%)	4091.15 (62.6%)
AR&R 100 year, 9 hours storm, average 18.5 mm/h, Zone 1	12043.31	8818.75 (73.2%)	4293.83 (99.4%)	4524.92 (58.6%)
AR&R 100 year, 12 hours storm, average 15.5 mm/h, Zone 1	13452.66	9761.02 (72.6%)	4799.61 (99.5%)	4961.41 (57.5%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P A-1	0.017	1.67	215.636	214.635	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P A-2	0.072	1.42	214.546	214.384	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P A-3	0.068	0.57	214.365	214.362	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P A-4	0.155	1.65	214.231	214.188	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1
P A-5	0.181	1.24	214.145	214.106	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1
P A-6	0.267	1.70	213.990	213.940	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
P A-7	0.390	3.66	213.738	213.666	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
P A-8	0.445	4.10	213.470	212.157	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
P A-9	0.436	4.05	211.939	211.600	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
P134177		0.437	0.99	211.544	211.509 AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
P15520	1.034	2.66	209.417	209.176	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1

OUT	1.222	1.36	209.040	209.000	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
P B-1	0.020	1.37	217.558	216.983	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P B-2	0.039	2.16	216.770	215.679	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P B-3	0.038	1.65	215.661	215.453	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P B-4	0.037	2.31	215.405	214.548	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG A-1	0.000	0.00	215.503	215.325	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG B-3	0.071	1.73	215.192	215.132	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P EXTG B-4	0.139	3.16	214.986	213.438	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-2	0.454	1.37	212.971	212.946	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-3	0.507	1.40	212.809	212.824	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-4	0.538	1.32	212.714	212.666	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-5	0.594	1.14	212.604	212.547	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-6	0.650	1.02	212.489	212.458	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-7	0.725	1.14	212.300	212.269	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-8	0.891	1.40	212.089	212.042	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-9	0.932	1.46	211.932	211.899	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P I-11	1.300	2.04	211.665	211.509	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P EXTG B-1	0.000	0.00	217.393	216.472	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG B-2	0.032	3.22	216.276	215.695	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG C-1	0.000	0.00	215.500	215.063	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG D-1	0.049	1.18	215.716	215.639	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG D-2	0.075	1.89	215.503	215.434	AR&R 100 year, 10 minutes storm, average 169 mm/h, Zone 1
P EXTG D-3	0.090	2.28	214.895	213.557	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG E-1	0.006	0.15	215.716	215.639	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P EXTG F-1	0.014	0.36	215.489	215.434	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG G-1	0.010	0.25	215.579	215.434	AR&R 100 year, 10 minutes storm, average 169 mm/h, Zone 1
P EXTG H-1	0.028	1.80	214.698	213.803	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG H-2	0.028	2.92	213.612	213.557	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P EXTG H-3	0.108	0.68	213.466	213.438	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P I-1	0.055	2.65	214.552	213.692	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P J-1	0.062	0.87	212.809	212.723	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1
P J-2	0.074	1.05	212.717	212.660	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P J-3	0.112	1.59	212.417	212.362	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1
P J-4	0.150	1.36	212.293	212.269	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P K-1	0.021	2.72	216.592	215.866	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P M-1	0.043	1.47	217.271	217.137	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P M-2	0.055	1.07	217.068	217.050	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P M-3	0.092	1.31	216.898	216.613	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P M-4	0.121	1.10	216.461	216.430	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P M-5	0.176	1.59	216.211	216.098	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P M-6	0.189	2.67	215.816	214.264	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P M-7	0.222	3.14	213.899	212.455	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P M-8	0.345	3.12	212.184	212.000	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P M-9	0.340	2.14	211.977	211.899	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1

P N-1	0.013	1.73	215.387	214.841	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P N-2	0.026	1.97	214.752	214.075	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P N-3	0.026	10.25	213.433	213.155	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P N-4	0.052	1.86	212.944	212.614	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P N-5	0.057	0.81	212.476	212.455	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P O-1	0.037	1.47	212.683	212.666	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P P-1	0.032	2.47	213.946	213.172	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
P T-1	0.012	1.58	215.613	215.434	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P15502	0.084	3.94	214.281	211.783	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
Pipe64943	0.124	3.92	215.127	213.940	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P64958	0.062	3.18	215.363	214.106	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
P L-1	0.021	2.70	216.583	215.877	AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1
P66541	0.049	0.08	212.041	212.042	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q	U/S	Max Q	D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF1	0.002	0.002	206.680	0.012	0.00	1.23	0.30	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1		
OF2	0	0	0.000	0	0	0	0			
OF3	0	0	0.000	0	0	0	0			
OF27792	0	0	0	206.680	0	0	0	0		
OF4	0.001	0.001	0.000	0.009	0.00	0.94	0.24	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1		
OF5	0	0	206.967	0	0	0	0			
OF6	0.004	0.004	206.931	0.014	0.01	1.43	0.35	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1		
OF7	0.006	0.006	0.000	0.017	0.01	1.73	0.40	AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1		
OF8	0	0	106089349120.000		0	0	0	0		
OF29092	0	0	0	0.000	0	0	0	0		
OF10	0.003	0.003	0.000	0.013	0.00	1.33	0.32	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1		
OF11	0.003	0.003	206.831	0.012	0.00	1.23	0.34	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1		
OF12	0	0	206.742	0	0	0	0			
OF13	0.051	0.051	78708318208.000		0.034	0.02	4.00	0.67	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1	
OF14	0.014	0.014	16683621376.000		0.024	0.01	4.00	0.38	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1	
OF15	0.031	0.031	0.000	0.029	0.02	4.00	0.56	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1		
OF16	0.011	0.011	0.000	0.022	0.01	4.00	0.38	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1		
OF17	0	0	0.000	0	0	0	0			
OF18	0	0	206.680	0	0	0	0			
OF19	0.014	0.014	0.000	0.024	0.01	4.00	0.38	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1		
OF20	0	0	0.000	0	0	0	0			
OF21	0.004	0.004	0.000	0.014	0.01	1.43	0.37	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1		
OF22	0	0	0.000	0	0	0	0			
OF102297	0.064	0.064	0.000	0.037	0.03	4.00	0.72	AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1		

OF24	0.037	0.037	68614578176.000			0.031	0.02	4.00	0.57	AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF25	0	0	19810750464.000			0	0	0	0	
OF26	0.026	0.026	206.690	0.027	0.01	4.00	0.53			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF27	0.057	0.057	0.000	0.035	0.02	4.00	0.71			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF28	0.028	0.028	206.680	0.028	0.01	4.00	0.53			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF29	0.008	0.008	0.000	0.019	0.01	1.92	0.42			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF31	0.017	0.017	0.000	0.025	0.01	4.00	0.43			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF32	0.006	0.006	0.000	0.017	0.01	1.73	0.42			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF33	0.064	0.064	0.000	0.037	0.03	4.00	0.73			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF35	0.018	0.018	0.000	0.025	0.01	4.00	0.45			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF36	0.004	0.004	206.880	0.014	0.01	1.43	0.38			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF51819		0.025	0.025	0.000	0.027	0.01	4.00	0.51		AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF39	0	0	206.890	0	0	0	0			
OF40	0.001	0.001	0.000	0.008	0.00	0.84	0.23			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF41	0.019	0.019	206.883	0.025	0.01	4.00	0.46			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF42	0.011	0.011	0.000	0.022	0.01	4.00	0.38			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF43	0.040	0.040	0.000	0.031	0.02	4.00	0.62			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF44	0.060	0.060	207.023	0.036	0.03	4.00	0.71			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF45	0.107	0.107	0.000	0.045	0.04	4.00	0.90			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF52	0.190	0.190	206.803	0.057	0.06	4.00	1.14			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF46	0	0	0.000	0	0	0	0			
OF47	0	0	0.000	0	0	0	0			
OF48	0	0	206.780	0	0	0	0			
OF49	0.008	0.008	0.000	0.019	0.01	1.92	0.42			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF50	0	0	0.000	0	0	0	0			
OF51	0.002	0.002	206.721	0.011	0.00	1.13	0.31			AR&R 100 year, 20 minutes storm, average 123 mm/h, Zone 1
OF53	0.004	0.004	207.006	0.014	0.01	1.43	0.36			AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1
OF54	0.086	0.086	0.220	0.041	0.03	4.00	0.83			AR&R 100 year, 2 hours storm, average 45.4 mm/h, Zone 1
OF51818		0.018	0.018	0.000	0.025	0.01	4.00	0.43		AR&R 100 year, 5 minutes storm, average 221 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD	210.99	475.3	1.034	1.034	0.000

CONTINUITY CHECK for AR&R 100 year, 1 hour storm, average 68.0 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage (cu.m)	Change %	Difference
A-1	20.62	20.53	0.00	0.4	
A-2	94.57	94.03	0.00	0.6	
A-3	94.03	94.38	0.00	-0.4	
A-4	238.35	239.90	0.11	-0.7	
A-5	277.69	278.52	0.00	-0.3	
A-6	419.01	419.62	0.00	-0.1	
A-7	620.41	619.32	0.00	0.2	
A-8	699.35	700.17	0.00	-0.1	
A-9	694.89	695.27	0.00	-0.1	
A10	695.27	696.02	0.00	-0.1	
OSD	2831.63	2910.64	0.00	-2.8	
Pit61887	3161.85	3161.99	0.00	-0.0	
TWL	3161.99	3161.99	0.00	0.0	
B-1	26.26	26.22	0.00	0.2	
B-2	48.26	48.14	0.00	0.3	
B-3	47.22	47.19	0.00	0.1	
B-4	47.19	47.17	0.00	0.0	
EXTG A-1		0.00	0.00	0.00	0.0
EXTG B-3		126.36	126.04	0.00	0.3
EXTG B-4		162.89	162.87	0.00	0.0
I-2	570.70	570.30	0.00	0.1	
I-3	616.50	616.30	0.00	0.0	
I-4	664.55	664.17	0.00	0.1	
I-5	757.82	757.16	0.00	0.1	
I-6	850.29	849.97	0.00	0.0	
I-7	924.71	925.87	0.00	-0.1	
I-8	1134.44	1136.19	0.00	-0.2	
I-9	1190.73	1192.27	0.00	-0.1	
I-10	1710.51	1707.55	0.00	0.2	
EXTG B-1		0.00	0.00	0.00	0.0
EXTG B-2		80.33	80.31	0.00	0.0
EXTG C-1		0.00	0.00	0.00	0.0
EXTG C-2		0.00	0.00	0.00	0.0
EXTG D-1		83.64	83.55	0.00	0.1
EXTG D-2		114.84	114.97	0.00	-0.1
EXTG D-3		135.09	135.23	0.00	-0.1
EXTG E-1		0.00	-0.02	0.00	0.0
EXTG F-1		0.00	0.00	0.00	0.0
EXTG G-1		0.00	0.00	0.00	0.0
EXTG H-1		40.87	40.83	0.00	0.1
EXTG H-2		37.39	37.39	0.00	0.0
EXTG H-3		131.03	130.95	0.00	0.1
I-1	70.35	70.27	0.00	0.1	
J-1	120.47	120.32	0.00	0.1	
J-2	104.35	104.40	0.00	-0.1	
J-3	128.94	128.98	0.00	-0.0	
J-4	160.47	160.40	0.00	0.0	
K-1	53.18	53.17	0.00	0.0	
K-2	45.88	45.88	0.00	0.0	
M-1	43.27	43.35	0.00	-0.2	
M-2	60.19	60.13	0.00	0.1	
M-3	128.66	128.90	0.00	-0.2	
M-4	157.40	157.26	0.00	0.1	
M-5	257.10	257.00	0.00	0.0	
M-6	292.61	292.52	0.00	0.0	
M-7	374.02	373.33	0.00	0.2	

M-8	518.05	518.01	0.00	0.0	
M-9	487.01	487.24	0.00	-0.0	
N-1	12.70	12.71	0.00	-0.1	
N-2	25.88	25.87	0.00	0.0	
N-3	25.87	26.19	0.00	-1.2	
N-4	67.06	66.69	0.00	0.6	
N-5	63.26	63.30	0.00	-0.1	
O-1	43.26	43.21	0.00	0.1	
P-1	33.86	33.87	0.00	-0.0	
T-1	14.74	14.75	0.00	-0.1	
F1	303.37	303.39	0.00	-0.0	
DP1	143.38	143.31	0.00	0.1	
DP2	71.69	71.64	0.00	0.1	
L-1	23.49	23.50	0.00	-0.1	
L-2	21.67	21.67	0.00	0.0	
N81603	54.27	54.54	0.00	-0.5	
N165195		472.00	472.00	0.00	0.0
N165196		180.36	180.36	0.00	0.0

Run Log for Wollondilly Council Rev 12 run at 11:27:58 on 9/2/2018

Upwelling occurred at M-8 EXTG D-2

Freeboard was less than 0.15m at Pit61887 L-1 T-1 P-1 M-7 M-6 M-5 M-4 K-1 I-10 EXTG G-1
EXTG D-3

Flows were safe in all overflow routes.

5 year ARI results

DRAINS results prepared from Version 2017.07

PIT / NODE DETAILS				Version 8			Min	Overflow	Constraint
Name	Max HGL	HGL	Max Pond Flow Arriving (cu.m/s) (cu.m)	Max Surface Volume	Freeboard	Max Pond (cu.m/s)			
A-1	215.68		0.011	1.24	0.001	Inlet Capacity			
A-2	214.55	215.69	0.038 3.2	1.09	0.000	Inlet Capacity			
A-3	214.25		0.000	0.75	0.000	None			
A-4	214.22	214.98	0.052 5.7	0.68	0.000	Inlet Capacity			
A-5	214.05		0.015	1.13	0.000	None			
A-6	213.94		0.010	1.50	0.000	None			
A-7	213.79		0.023	2.08	0.001	Inlet Capacity			
A-8	213.54		0.026	2.08	0.001	Inlet Capacity			
A-9	212.03		0.000	0.87		None			
A10	211.17		0.000	0.57		None			
Pit61887	207.55	209.38	0.096 0.4	1.75	0.000	Inlet Capacity			
TWL	207.12		0.000						
B-1	217.61		0.013	0.95	0.001	Inlet Capacity			
B-2	216.78		0.012	1.18	0.001	Inlet Capacity			
B-3	215.65		0.000	1.24		None			
B-4	215.42		0.000	0.98	0.000	None			
EXTG A-1	215.50		0.000	1.07		None			
EXTG B-3	215.25		0.041	1.33	0.020	Inlet Capacity			
EXTG B-4	215.05		0.038	1.47	0.003	Inlet Capacity			
I-2	212.91	214.50	0.047 0.5	1.52	0.000	Inlet Capacity			
I-3	212.61		0.023	1.80	0.001	Inlet Capacity			
I-4	212.43	214.26	0.025 0.4	1.77	0.000	Inlet Capacity			
I-5	212.19	213.96	0.026 0.4	1.71	0.000	Inlet Capacity			
I-6	211.88		0.047	1.96	0.005	Inlet Capacity			
I-7	211.65	213.77	0.028 0.4	2.05	0.000	Inlet Capacity			
I-8	211.42		0.024	1.91	0.001	Inlet Capacity			
I-9	211.25		0.001	1.06	0.000	None			
I-10	211.19	212.01	0.007 0.1	0.81	0.000	Inlet Capacity			
EXTG B-1	217.39		0.000	1.09		None			
EXTG B-2	216.38		0.040	0.91	0.019	Inlet Capacity			
EXTG C-1	215.50		0.000	1.06	0.000	None			
EXTG C-2	215.06		0.000						
EXTG D-1	215.74		0.041	0.99	0.010	Inlet Capacity			
EXTG D-2	214.71		0.026	0.93	0.004	Inlet Capacity			
EXTG D-3	214.47		0.006	0.98	0.000	None			
EXTG E-1	214.72		0.000	1.47		None			
EXTG F-1	214.86		0.000	1.64		None			
EXTG G-1	214.56		0.000	1.06		None			
EXTG H-1	214.79		0.021	1.02	0.002	Inlet Capacity			
EXTG H-2	213.66		0.000	1.16		None			
EXTG H-3	213.05		0.051	0.91	0.005	Inlet Capacity			
I-1	214.70	215.37	0.036 0.5	0.59	0.000	Inlet Capacity			
J-1	212.50	213.50	0.065 0.9	0.90	0.009	Inlet Capacity			
J-2	212.06		0.000	1.30		None			
J-3	211.89	213.39	0.015 0.2	1.46	0.000	Inlet Capacity			
J-4	211.76		0.016	1.58	0.000	None			
K-1	217.25	217.34	0.026 0.9	0.00	0.005	Outlet System			
K-2	215.87		0.000						
M-1	217.33	218.06	0.025 0.4	0.67	0.000	Inlet Capacity			
M-2	217.02		0.008	1.36	0.000	None			
M-3	216.67		0.034	0.85	0.007	Inlet Capacity			

M-4	215.90		0.021		0.74	0.002	Inlet Capacity
M-5	215.78		0.052		0.76	0.015	Inlet Capacity
M-6	215.32		0.032		0.77	0.006	Inlet Capacity
M-7	213.47		0.052		0.79	0.014	Inlet Capacity
M-8	211.63		0.059		0.82	0.007	Inlet Capacity
M-9	211.27		0.000		0.37		None
N-1	215.43		0.007		0.63	0.000	None
N-2	214.80		0.008		0.65	0.000	None
N-3	213.51		0.000		1.26	0.000	None
N-4	213.03		0.021		1.08	0.002	Inlet Capacity
N-5	212.22		0.000		1.41		None
O-1	212.73	215.85	0.021	0.3	3.07	0.000	Inlet Capacity
P-1	214.12		0.020		0.50	0.000	Inlet Capacity
T-1	215.12		0.007		0.62	0.000	None
F1	214.41		0.074		0.95	0.026	Inlet Capacity
DP1	215.11		0.073				
DP2	215.35		0.036				
L-1	216.68		0.013		0.57	0.001	Inlet Capacity
L-2	215.84		0.000				
N81603	211.25		0.027				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Paved Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm	
Cat18256 average 71.0 mm/h, Zone 1		0.010	0.010	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18252 average 71.0 mm/h, Zone 1		0.037	0.037	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18265 26.4 mm/h, Zone 1		0.052	0.000	0.052	5.00	16.00	5.00	AR&R 5 year, 2 hours storm, average
Cat18269 26.4 mm/h, Zone 1		0.015	0.000	0.015	5.00	14.10	5.00	AR&R 5 year, 2 hours storm, average
Cat18272 26.4 mm/h, Zone 1		0.010	0.000	0.010	5.00	11.00	5.00	AR&R 5 year, 2 hours storm, average
Cat18277 26.4 mm/h, Zone 1		0.023	0.000	0.023	5.00	13.50	5.00	AR&R 5 year, 2 hours storm, average
Cat18280 26.4 mm/h, Zone 1		0.026	0.000	0.026	5.00	18.70	5.00	AR&R 5 year, 2 hours storm, average
Cat18429 26.4 mm/h, Zone 1		0.049	0.004	0.047	5.00	12.80	5.00	AR&R 5 year, 2 hours storm, average
Cat56543 26.4 mm/h, Zone 1		0.096	0.000	0.096	5.00	14.90	5.00	AR&R 5 year, 2 hours storm, average
Cat18262 average 71.0 mm/h, Zone 1		0.013	0.013	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18259 average 71.0 mm/h, Zone 1		0.011	0.011	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18329 average 71.0 mm/h, Zone 1		0.022	0.022	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18335 average 71.0 mm/h, Zone 1		0.019	0.019	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18312 26.4 mm/h, Zone 1		0.045	0.010	0.035	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
Cat18339 26.4 mm/h, Zone 1		0.023	0.016	0.007	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
Cat18342 average 71.0 mm/h, Zone 1		0.024	0.024	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
Cat18348 average 71.0 mm/h, Zone 1		0.026	0.026	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,

Cat18351	0.047	0.047	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18354	0.024	0.003	0.021	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18364	0.024	0.024	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18332	0.040	0.038	0.003	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18292	0.041	0.039	0.004	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18297	0.016	0.009	0.008	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18308	0.003	0.003	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18303	0.021	0.021	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18317	0.049	0.021	0.027	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18435	0.036	0.036	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18370	0.059	0.032	0.027	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18367	0.005	0.000	0.005	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18361	0.016	0.016	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18323	0.026	0.022	0.005	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18395	0.025	0.003	0.022	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18398	0.008	0.008	0.001	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18401	0.034	0.034	0.001	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18405	0.014	0.013	0.001	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18414	0.051	0.051	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18408	0.018	0.013	0.005	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18411	0.046	0.011	0.035	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18425	0.043	0.014	0.029	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18418	0.007	0.001	0.007	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18421	0.008	0.001	0.007	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18382	0.021	0.021	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18345	0.021	0.017	0.005	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18357	0.020	0.002	0.018	5.00	5.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							
Cat18301	0.007	0.007	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm,
average 71.0 mm/h, Zone 1							
Cat18284	0.074	0.023	0.069	5.00	23.00	5.00	AR&R 5 year, 2 hours storm, average
26.4 mm/h, Zone 1							

Cat18374	0.073	0.073	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
Cat18373	0.036	0.036	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
Cat18326	0.008	0.008	0.001	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
Cat18385	0.027	0.027	0.000	5.00	5.00	5.00	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
Sth (out of site)	0.178	0.000	0.178	5.00	15.20	5.00	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
South (out of site)	0.069	0.000	0.069	5.00	15.00	5.00	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1

Outflow Volumes for Total Catchment (2.59 impervious + 4.64 pervious = 7.23 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1	765.49	296.92 (38.8%)	48.29 (9.8%)	248.63 (90.6%)
AR&R 5 year, 10 minutes storm, average 98.0 mm/h, Zone 1	1181.39	605.19 (51.2%)	207.38 (27.4%)	397.81 (93.9%)
AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1	1711.81	1011.63 (59.1%)	423.56 (38.6%)	588.07 (95.8%)
AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1	2097.57	1266.82 (60.4%)	540.38 (40.2%)	726.44 (96.6%)
AR&R 5 year, 45 minutes storm, average 46.2 mm/h, Zone 1	2506.17	1542.90 (61.6%)	669.90 (41.7%)	873.01 (97.1%)
AR&R 5 year, 1 hour storm, average 39.2 mm/h, Zone 1	2835.40	1760.37 (62.1%)	769.27 (42.3%)	991.10 (97.4%)
AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1	3819.08	2391.33 (62.6%)	1047.39 (42.8%)	1343.94 (98.1%)
AR&R 5 year, 3 hours storm, average 20.8 mm/h, Zone 1	4513.39	2847.94 (63.1%)	1254.95 (43.4%)	1592.99 (98.4%)
AR&R 5 year, 6 hours storm, average 13.9 mm/h, Zone 1	6032.68	3746.41 (62.1%)	1608.47 (41.6%)	2137.94 (98.8%)
AR&R 5 year, 9 hours storm, average 10.9 mm/h, Zone 1	7095.57	4330.31 (61.0%)	1811.14 (39.8%)	2519.17 (99.0%)
AR&R 5 year, 12 hours storm, average 9.2 mm/h, Zone 1	8019.59	4907.22 (61.2%)	2056.58 (40.0%)	2850.65 (99.1%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P A-1	0.010	1.43	215.623	214.546	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P A-2	0.045	1.78	214.489	214.249	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P A-3	0.042	0.89	214.223	214.217	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P A-4	0.076	2.22	214.109	214.054	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P A-5	0.091	1.32	214.013	213.943	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P A-6	0.138	1.86	213.849	213.794	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P A-7	0.207	3.93	213.652	213.535	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P A-8	0.238	3.60	213.404	212.026	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P A-9	0.228	3.36	211.878	211.172	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P134177	0.237	1.48	211.089	211.075	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P15520	1.002	5.91	209.106	207.550	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OUT	1.096	3.36	207.299	207.119	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P B-1	0.012	1.18	217.543	216.968	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P B-2	0.023	1.87	216.752	215.652	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P B-3	0.023	1.43	215.639	215.427	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P B-4	0.023	1.99	215.388	214.531	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1

P EXTG A-1	0.000	0.00	215.503	215.246	AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1
P EXTG B-3	0.043	1.80	215.148	215.052	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P EXTG B-4	0.073	2.54	214.950	213.308	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P I-2	0.270	1.89	212.664	212.608	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P I-3	0.291	2.55	212.465	212.430	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P I-4	0.311	3.51	212.254	212.192	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P I-5	0.371	2.93	212.064	211.884	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P I-6	0.390	2.43	211.763	211.648	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P I-7	0.427	2.54	211.459	211.423	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P I-8	0.519	2.44	211.253	211.247	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P I-9	0.530	1.03	211.204	211.195	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P I-11	0.731	1.15	211.124	211.075	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P EXTG B-1	0.000	0.00	217.393	216.383	AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1
P EXTG B-2	0.021	2.85	216.263	215.682	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P EXTG C-1	0.000	0.00	215.500	215.063	AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1
P EXTG D-1	0.031	2.16	215.623	214.712	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P EXTG D-2	0.050	1.27	214.551	214.466	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P EXTG D-3	0.059	1.58	214.242	213.535	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P EXTG E-1	0.000	0.00	214.716	214.712	AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1
P EXTG F-1	0.000	0.00	214.863	214.466	AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1
P EXTG G-1	0.000	0.00	214.563	214.466	AR&R 5 year, 5 minutes storm, average 127 mm/h, Zone 1
P EXTG H-1	0.018	1.61	214.680	213.784	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P EXTG H-2	0.018	2.58	213.599	213.049	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P EXTG H-3	0.063	0.88	212.926	212.909	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P I-1	0.035	2.35	214.525	213.666	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P J-1	0.055	23.70	212.305	212.069	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P J-2	0.055	1.56	212.039	211.887	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P J-3	0.067	2.15	211.759	211.760	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P J-4	0.081	1.78	211.696	211.647	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P K-1	0.021	2.72	216.592	215.866	AR&R 5 year, 1 hour storm, average 39.2 mm/h, Zone 1
P M-1	0.025	1.26	217.237	217.022	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P M-2	0.033	1.41	216.971	216.673	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P M-3	0.062	3.47	216.572	215.896	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P M-4	0.074	1.51	215.797	215.781	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P M-5	0.108	2.91	215.642	215.324	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P M-6	0.132	3.16	215.195	213.474	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P M-7	0.177	4.59	213.332	211.632	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P M-8	0.254	2.30	211.413	211.271	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P M-9	0.262	1.65	211.252	211.195	AR&R 5 year, 30 minutes storm, average 58.0 mm/h, Zone 1
P N-1	0.007	1.47	215.375	214.801	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P N-2	0.015	1.68	214.735	214.058	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P N-3	0.015	5.94	213.433	213.134	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P N-4	0.031	1.62	212.914	212.500	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P N-5	0.031	3.08	212.100	211.632	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P O-1	0.021	2.09	212.628	212.192	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P P-1	0.020	2.21	213.917	213.142	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
P T-1	0.008	1.95	215.068	214.785	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P15502	0.047	3.33	214.258	211.760	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
Pipe64943	0.072	3.33	215.108	213.794	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P64958	0.036	2.71	215.349	213.943	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
P L-1	0.013	2.66	216.446	215.842	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1

P66541 0.027 0.19 211.250 211.247 AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF1	0.001	0.001	206.680	0.007	0.00	0.74	0.20	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF2	0	0	0.000	0	0	0	0	
OF3	0	0	0.000	0	0	0	0	
OF27792	0	0	206.680	0	0	0	0	
OF4	0	0	0.000	0	0	0	0	
OF5	0	0	206.967	0	0	0	0	
OF6	0.001	0.001	206.932	0.008	0.00	0.84	0.21	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF7	0.001	0.001	0.000	0.008	0.00	0.84	0.27	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF8	0	0	-0.000	0	0	0	0	
OF29092	0	0	0.000	0	0	0	0	
OF10	0.001	0.001	0.000	0.009	0.00	0.94	0.24	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF11	0.001	0.001	206.831	0.008	0.00	0.84	0.24	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF12	0	0	206.742	0	0	0	0	
OF13	0.020	0.020	-0.000	0.026	0.01	4.00	0.44	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF14	0.003	0.003	-0.000	0.013	0.00	1.33	0.31	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF15	0	0	0.000	0	0	0	0	
OF16	0.001	0.001	0.000	0.008	0.00	0.84	0.21	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF17	0	0	0.000	0	0	0	0	
OF18	0	0	206.680	0	0	0	0	
OF19	0.005	0.005	0.000	0.015	0.01	1.53	0.40	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF20	0	0	0.000	0	0	0	0	
OF21	0.001	0.001	0.000	0.008	0.00	0.84	0.24	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF22	0	0	0.000	0	0	0	0	
OF102297	0	0	0.000	0	0	0	0	
OF24	0.019	0.019	-0.000	0.025	0.01	4.00	0.46	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF25	0	0	-0.000	0	0	0	0	
OF26	0.010	0.010	206.689	0.022	0.01	4.00	0.35	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF27	0.004	0.004	0.000	0.014	0.01	1.43	0.37	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF28	0	0	206.680	0	0	0	0	
OF29	0.002	0.002	0.000	0.012	0.00	1.23	0.32	AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF31	0.005	0.005	0.000	0.016	0.01	1.63	0.40	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF32	0	0	0.000	0	0	0	0	
OF33	0.009	0.009	0.000	0.022	0.01	4.00	0.33	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF35	0	0	0.000	0	0	0	0	

OF36	0	0	206.880	0	0	0	0		
OF51819		0.005	0.005	0.000	0.016	0.01	1.63	0.38	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF39	0	0	206.890	0	0	0	0		
OF40	0	0	0.000	0	0	0	0		
OF41	0.007	0.007	206.883	0.018	0.01	1.82	0.41		AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF42	0.002	0.002	0.000	0.011	0.00	1.13	0.28		AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF43	0.015	0.015	0.000	0.024	0.01	4.00	0.41		AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF44	0.006	0.006	207.023	0.017	0.01	1.73	0.42		AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF45	0.014	0.014	0.000	0.024	0.01	4.00	0.38		AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF52	0.007	0.007	206.803	0.018	0.01	1.82	0.42		AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF46	0	0	0.000	0	0	0	0		
OF47	0	0	0.000	0	0	0	0		
OF48	0	0	206.780	0	0	0	0		
OF49	0.002	0.002	0.000	0.012	0.00	1.23	0.32		AR&R 5 year, 20 minutes storm, average 71.0 mm/h, Zone 1
OF50	0	0	0.000	0	0	0	0		
OF51	0	0	206.720	0	0	0	0		
OF53	0	0	207.004	0	0	0	0		
OF54	0.026	0.026	0.221	0.028	0.01	4.00	0.50		AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1
OF51818		0.001	0.001	0.000	0.007	0.00	0.74	0.20	AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD	208.93	6.6	1.002	1.002	0.000

CONTINUITY CHECK for AR&R 5 year, 2 hours storm, average 26.4 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
A-1	15.33	15.28	0.00	0.3
A-2	72.52	72.01	0.00	0.7
A-3	72.01	72.43	0.00	-0.6
A-4	145.24	146.58	0.01	-0.9
A-5	165.76	166.31	0.00	-0.3
A-6	270.19	270.64	0.00	-0.2
A-7	410.62	410.07	0.00	0.1
A-8	450.78	454.22	0.00	-0.8
A-9	453.60	450.82	0.00	0.6
A10	450.82	450.63	0.00	0.0
OSD	1883.22	1878.83	0.00	0.2
Pit61887	2006.22	2005.58	0.00	0.0
TWL	2005.58	2005.58	0.00	0.0
B-1	20.31	20.29	0.00	0.1
B-2	37.33	37.23	0.00	0.3
B-3	37.13	37.17	0.00	-0.1
B-4	37.17	37.17	0.00	0.0
EXTG A-1		0.00	0.00	0.00
EXTG B-3		94.85	94.57	0.00
EXTG B-4		123.06	123.27	0.00

I-2	409.98	409.74	0.00	0.1
I-3	442.21	442.46	0.00	-0.1
I-4	479.76	479.05	0.00	0.1
I-5	549.38	548.97	0.00	0.1
I-6	620.98	620.68	0.00	0.0
I-7	661.40	662.39	0.00	-0.1
I-8	805.43	804.83	0.00	0.1
I-9	846.82	848.91	0.00	-0.2
I-10	1202.27	1201.57	0.00	0.1
EXTG B-1	0.00	0.00	0.00	0.0
EXTG B-2	60.63	60.62	0.00	0.0
EXTG C-1	0.00	0.00	0.00	0.0
EXTG C-2	0.00	0.00	0.00	0.0
EXTG D-1	62.80	62.75	0.00	0.1
EXTG D-2	83.62	83.61	0.00	0.0
EXTG D-3	99.16	99.25	0.00	-0.1
EXTG E-1	0.00	0.00	0.00	0.0
EXTG F-1	0.00	0.00	0.00	0.0
EXTG G-1	0.00	0.00	0.00	0.0
EXTG H-1	31.60	31.58	0.00	0.1
EXTG H-2	30.64	30.65	0.00	-0.0
EXTG H-3	89.30	89.28	0.00	0.0
I-1	54.39	54.36	0.00	0.1
J-1	77.18	77.02	0.00	0.2
J-2	76.13	76.23	0.00	-0.1
J-3	81.47	81.54	0.00	-0.1
J-4	105.88	105.79	0.00	0.1
K-1	39.09	39.10	0.00	-0.0
K-2	38.57	38.57	0.00	0.0
M-1	23.58	23.50	0.00	0.3
M-2	36.21	36.24	0.00	-0.1
M-3	88.60	88.49	0.00	0.1
M-4	110.00	110.32	0.00	-0.3
M-5	187.50	187.51	0.00	-0.0
M-6	212.93	212.88	0.00	0.0
M-7	260.64	260.38	0.00	0.1
M-8	353.68	353.30	0.00	0.1
M-9	350.95	351.01	0.00	-0.0
N-1	6.92	6.94	0.00	-0.2
N-2	14.11	14.09	0.00	0.2
N-3	14.09	14.17	0.00	-0.6
N-4	45.77	45.67	0.00	0.2
N-5	44.74	44.72	0.00	0.0
O-1	31.35	31.32	0.00	0.1
P-1	18.45	18.45	0.00	0.0
T-1	11.40	11.40	0.00	-0.0
F1	167.33	167.36	0.00	-0.0
DP1	110.85	110.82	0.00	0.0
DP2	55.43	55.41	0.00	0.0
L-1	12.75	12.77	0.00	-0.2
L-2	12.74	12.74	0.00	0.0
N81603	41.96	41.99	0.00	-0.1
N165195	239.65	239.65	0.00	0.0
N165196	91.57	91.57	0.00	0.0

Run Log for Wollondilly Council Rev 12 run at 11:47:40 on 9/2/2018

No water upwelling from any pit.

Freeboard was less than 0.15m at K-1

Flows were safe in all overflow routes.

Appendix C – MUSIC Model Source Parameters

MUSIC Rainfall – Runoff Parameters

Properties of Main School - Page 2 of 5

Rainfall-Runoff Parameters

Impervious Area Properties

Rainfall Threshold (mm/day) 1.40

Pervious Area Properties

Soil Storage Capacity (mm) 170

Initial Storage (% of Capacity) 30

Field Capacity (mm) 70

Infiltration Capacity Coefficient - a 210.0

Infiltration Capacity Exponent - b 4.70

Groundwater Properties

Initial Depth (mm) 10

Daily Recharge Rate (%) 50.00

Daily Baseflow Rate (%) 4.00

Daily Deep Seepage Rate (%) 0.00

Cancel Back Next

Characteristics of WSUD Measures for the Site:

Land-use category		Log10 TSS (mg/L)		Log10 TP (mg/L)		Log10 TN (mg/L)	
		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
Roof Areas	Mean	1.3	NA	-0.89	NA	0.3	NA
	Std Dev	0.32	NA	0.25	NA	0.19	NA*
Sealed Road Areas	Mean	2.43	1.2	-0.3	-0.85	0.34	0.11
	Std Dev	0.32	0.17	0.25	0.19	0.19	0.12
Revegetated Land Areas	Mean	1.95	1.15	-0.66	-1.22	0.3	-0.05
	Std Dev	0.32	0.17	0.25	0.19	0.19	0.12

****Baseflow not applicable to roof areas***

Enviropod

Properties of 1 x Enviropod 200 micron

X

Location

1 x Enviropod 200 micron

Products >>

Inlet Properties

Low Flow By-pass (cubic metres per sec)

0.00000

High Flow By-pass (cubic metres per sec)

0.02000

Transfer Functions

☒ Total Suspended Solids (mg/L)

☐ Total Nitrogen (mg/L)

☐ Total Phosphorus (mg/L)

☐ Gross Pollutants (kg/ML)

Total Suspended Solids (mg/L)

Transfer Functions

☒ Concentration Based Capture Efficiency

☐ Flow Based Capture Efficiency

☐ Both

Concentration Efficiency Transfer Function

Total Suspended Solids (mg/L)

Percentage Capture

Inflow (m ³ /s)	% Capture
0.0000	100.0000
1.0000	100.0000

Drag points on the graph to modify the transfer function

Fluxes...

Notes...

Cancel

Back

Finish

Swale

Properties of Swale

Location:

Inlet Properties

Low Flow By-Pass (cubic metres per sec):

Storage Properties

Length (metres)	40.0
Bed Slope (%)	1.00
Base Width (metres)	1.0
Top Width (metres)	5.0
Depth (metres)	0.50
Vegetation Height (metres)	0.250
Exfiltration Rate (mm/hr)	0.00

Calculated Swale Properties

Mannings N	0.118
Batter Slope	1:4
Velocity (m/s)	0.373
Hazard	0.186
Cross sectional Area (m ²)	1.5
Swale Capacity (cubic metres per sec)	0.559