



Universal Property Group Pty Ltd

Stormwater Management Report

182 Guntawong Road, Riverstone

July 2021

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Author	GL
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Approved	GJ

Rev No.	Status	Date	Comments
A	Issue for DA	18/10/19	
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F	Issue for Amend Contentions	15/07/21	

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Attachment A – CATCHMENT PLANS

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1 Introduction

This report has been prepared to detail the procedures, assumptions and parameters adopted in the preparation of a stormwater management design for a proposed residential subdivision and residential flat building at 182 Guntawong Road. *Barker Ryan Stewart* has been engaged to undertake the design to assist in the preparation of a development application for the proposed development.

In the preparation of the development application, the following stormwater management components have been considered:

1. The existing site conditions, stormwater runoff and downstream drainage system.
2. The extent and nature of any upstream catchment areas draining to the subject site.
3. The runoff from the proposed development area and the implementation of onsite detention and water quality measures capable of retarding flows and reducing the required pollutants loads back to Council's stated requirements.
4. The provision of basins to fit within the available areas and surrounding existing and developed topography.
5. Council's stormwater management requirements for on-site detention (OSD), water quality and access.

2 Site Location and Development Proposal

2.1 Site Location

The site of the proposed development is described as lot 47 in DP 30186. This lot is known as 182 Guntawong Road, Riverstone. The location of the site is shown in Figure 2.1 below.



Figure 2.1 Site location (NSW Land & Property Information SIX Maps 2018)

2.2 Existing Site

The area of the site proposed for the current development consists of one (1) lot and there are currently two residential dwellings on the site with associated outbuildings and structures. An electrical easement runs south-west to north-east across the centre of the site. A watercourse and dam are situated at the northern end of the site, with the watercourse flowing to the west. The topography of the site consists of a crest towards the southern end of the site and generally slopes at a relatively steep grade towards the north-western corner of the site which drains onto 184 Guntawong Road. The total area of development site is approximately 20,257 m².

2.3 Proposed Development

The proposed development consists of the subdivision of the site into one R3 lot, and five R2 Lots and associated public road reserves. The development has generally been divided into two overall catchments, the northern catchment consists of the R2 lots including Road 4, Road 1 and a portion of the R3 RFB Lot and the southern catchment consists of the rest of the R3 RFB lot. Splitting the site into two catchments is considered to be satisfactory given the topography of the existing site and the understanding that these catchments form part of the same overall catchment in the growth centre precinct plan.

Within the northern catchment, temporary on-site detention (OSD) has been proposed for the development in the form of one above ground basin located on the northern side of the existing transmission easement. The total bypass for this catchment is below Council's maximum of 15% as seen in the following calculations. Temporary water treatment has been provided within the temporary basin as bio-retention to treat all R2 lots, transmission easement area and the R2 side of Road 4. A permanent water quality treatment system has been provided within the R3 RFB lot draining to the northern basin in the form of a rainwater tank, Oceanguard pit inserts within the surface inlet pits in the landscaped and paved areas of the RFB development and a Jellyfish JF1200-2-1 filter chamber. Road 1 has been accounted for as OSD bypass from the northern basin. The OSD catchment area also includes land that drains into the site from the property at 172 Guntawong Road.

The R3 roads consisting of Road 1 and the southern half of Road 4 have been excluded from MUSIC modelling, as Oceanguard pit inserts are proposed as a deemed to comply measure.

Within the southern catchment, on-site detention has been proposed for the development in the form of an underground tank located in the area between the road and basement. The southern catchment, consisting of the remainder of the RFB, drains entirely to the OSD. Water quality treatment has been provided in the form of Stormfilter chambers and cartridges, and Oceanguard pit inserts are proposed within the surface inlet pits in the landscaped and paved areas of the RFB development. It is proposed to construct the proposed OSD underground tank at the time of the road construction to ensure the site always complies with Council's OSD requirements.

A catch drain is proposed to be constructed along the north eastern boundary of the site to reduce the amount of overland flow entering the temporary basin. Catch drains have also been incorporated into the RFB design to redirect flows around the development, with part of the catch drain system sending water out into the proposed drainage system in Guntawong Road and part into the temporary basin proposed for the northern catchment.

The configuration of the proposed development and its catchment plans are contained in Attachment A.

3 Council's Stormwater Management Requirements

3.1 Council's Policy

The following documents from Blacktown City Council were used in determining the requirements for stormwater drainage for the proposed site.

- Blacktown City Council's (BCC) Development Control Plan (DCP) 2015 Part J
- Blacktown City Council's Engineering Guide for Development 2005
- Blacktown City Council's Work Specification – Civil
- Blacktown City Council Growth Centre Precincts Development Control Plan 2016
- Blacktown City Council's Water Sensitive Urban Design Information Sheets (No.1 – No. 7)
- Blacktown City Council's Developer Handbook for Water Sensitive Urban Design 2013
- Blacktown City Council WSUD Standard Drawings 2017
- Blacktown City Council OSD Deemed to Comply Tool

3.2 On-site detention (OSD) Design Requirements

Based on Council's comments OSD is required at a rate of 455m³/ha in accordance with Council's Deemed to comply assessment tool. The OSD deemed to comply tool excel spreadsheet based on version 2.1 was used to design all OSD's within the development. The design of the OSD basin will be in accordance with Council's WSUD standard drawings.

3.3 Water Quality Design Requirements

Blacktown City Council's water quality objectives are summarised in the tables below, showing the minimum percentage reduction of the post development average annual load of pollutants and MUSIC modelling parameter requirements.

	WATER QUALITY % reduction in pollutant loads				ENVIRONMENTAL FLOWS Stream erosion control ratio ¹
	Gross Pollutants (>5mm)	Total suspended solids	Total phosphorous	Total nitrogen	
Stormwater management Objective	90	85	65	45	3.5-5.0: 1
'Ideal' stormwater outcome	100	95	95	85	1:1

Table 3.1 Blacktown Council Water Quality Objectives

4 On-site Detention (OSD) Design

4.1 General

The OSD storage required for the site is at a rate of 455m³/ha in accordance with councils deemed to comply tool.

Refer to the engineering plans for the OSD catchment plans and the accompanying spreadsheet for the OSD deemed to comply tool for the OSD provided with additional information such as bypasses, areas draining to the OSD, and basin details including water levels and design inputs.

4.2 Results

The two catchment areas have been calculated for use in Council's spreadsheet as shown below:

- Northern Catchment (Basin A)
 - Total catchment area 1.2854 ha
 - Area to basin 1.1248 ha
 - Road bypass 0.0917 ha
 - Total bypass 0.1606 ha (12% bypass)
- Southern Catchment (Lot 1)
 - Total catchment area 0.3154 ha
 - Area to tank 0.3130 ha
 - Total bypass 0.024 ha (0.8% bypass)

As per the tool, details of the OSD requirements can be found in the table below.

Name	100 Yr ARI Storage Volume (m ³)	1.5 Yr ARI Storage Volume (m ³)	100 Yr ARI Orifice (mm)	1.5 Yr ARI Orifice (mm)
OSD Basin A	584.9	385.6	244.5	137.5
OSD Tank - South	143.5	94.6	85.5	None

Table 4.2.1 OSD Details

5 Water Quality Modelling

5.1 General

The water quality for the site has been designed in accordance with Council's stormwater objectives as per Blacktown City Council's Water Sensitive Urban Design Information Sheets (No.1 – No. 7) and the Developer Handbook for Water Sensitive Urban Design. As previously described in Section 3.3 of this report the water quality objectives for this site is to reduce Gross Pollutants (GP), Total Suspended solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN) by 90%, 85%, 65% and 45% respectively.

To determine compliance with this requirement, a full analysis of the water quality of the stormwater discharge leaving the site was undertaken using The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software modelling package.

The analysis considered the use of the following devices to improve the quality of stormwater discharge leaving the site in the temporary case for the development:

- Northern catchment draining to Basin A (R2 Lots and Roads)
 - 60m² of bioretention within the temporary OSD basin

- R3 RFB Lot
 - Catchment A to Jellyfish Filter
 - 10 KL Rainwater Tank
 - Jellyfish JF1200-2-1 Filter Chamber
 - 3 x Oceanguard 200 micron pit inserts
 - Catchment B to Stormfilter Chamber
 - 10 KL Rainwater Tank
 - 17 x 690mm ZPG Stormfilters cartridges
 - 22 x Oceanguard 200 micron pit inserts
 - Basement/driveway Catchment
 - 1 x Oceanguard 200 micron pit insert

5.2 MUSIC Input Parameters

Input parameters representing urban catchment areas with varying fractions of effective impervious areas have been adopted in accordance with Blacktown City Council's requirements. Rainfall runoff parameters for each catchment area were modelled off the example source nodes provided by Blacktown Council. The individual lot areas were broken down into 3 different source type nodes to simulate the different pollutant loadings for roof, driveway and landscape. Table 5.2.1 shows the input values used for the source nodes in the MUSIC model.

Data Type	Source Nodes			
	Roof	Sealed Road	Unsealed Road	Revegetated Land
Rainfall Runoff Parameters				
Rainfall Threshold (mm/day)	1.4	1.4	1.4	1.4
Soil Storage Capacity (mm)	170	170	170	170
Initial Storage(%)	30	30	30	30
Field Capacity	70	70	70	70
Infiltration Capacity Factor (mm)	210	210	210	210
Infiltration Capacity Exponent	4.7	4.7	4.7	4.7
Stormwater Pollutants				
<i>Base Flow</i>				
TSS - μ	1.1	1.2	1.2	1.2
TSS - σ	0.17	0.17	0.17	0.17
TP - μ	-0.82	-0.85	-0.85	-0.85
TP - σ	0.19	0.19	0.19	0.19
TN - μ	0.32	0.11	0.11	0.11
TN - σ	0.12	0.12	0.12	0.12
<i>Stormflow</i>				
TSS - μ	1.3	2.43	2.15	2.15
TSS - σ	0.32	0.32	0.32	0.32
TP - μ	-0.89	-0.3	-0.6	-0.6
TP - σ	0.25	0.25	0.25	0.25
TN - μ	0.3	0.34	0.3	0.3
TN - σ	0.19	0.19	0.19	0.19

Table 5.2.1 MUSIC model Results for the Site

5.3 Results

The following figures and tables show the results of the MUSIC modelling for the northern catchment draining to Basin A and R3 RFB Lot catchment.

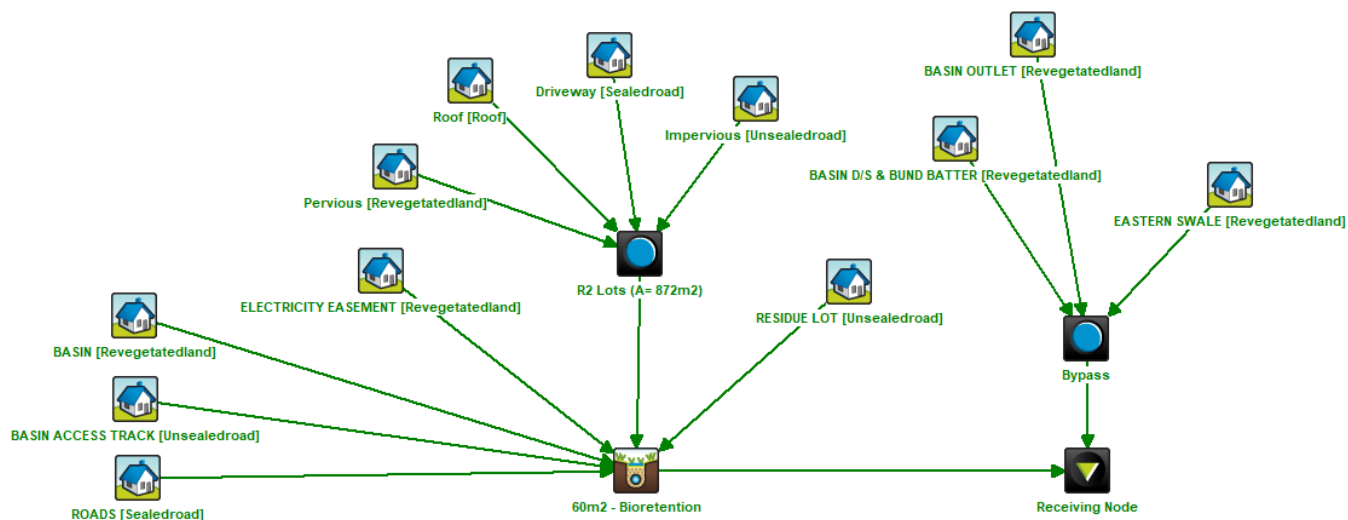


Figure 5.3.1 MUSIC model layout for the northern catchment to Basin A

	Source	Residual Load	% Reduction
Total Suspended Solids	533	78.9	85.2
Total Phosphorous	0.993	0.314	68.4
Total Nitrogen	6.82	3.21	52.9
Gross Pollutants	69.7	1.6	97.7

Table 5.3.2 MUSIC model results for the northern catchment to Basin A

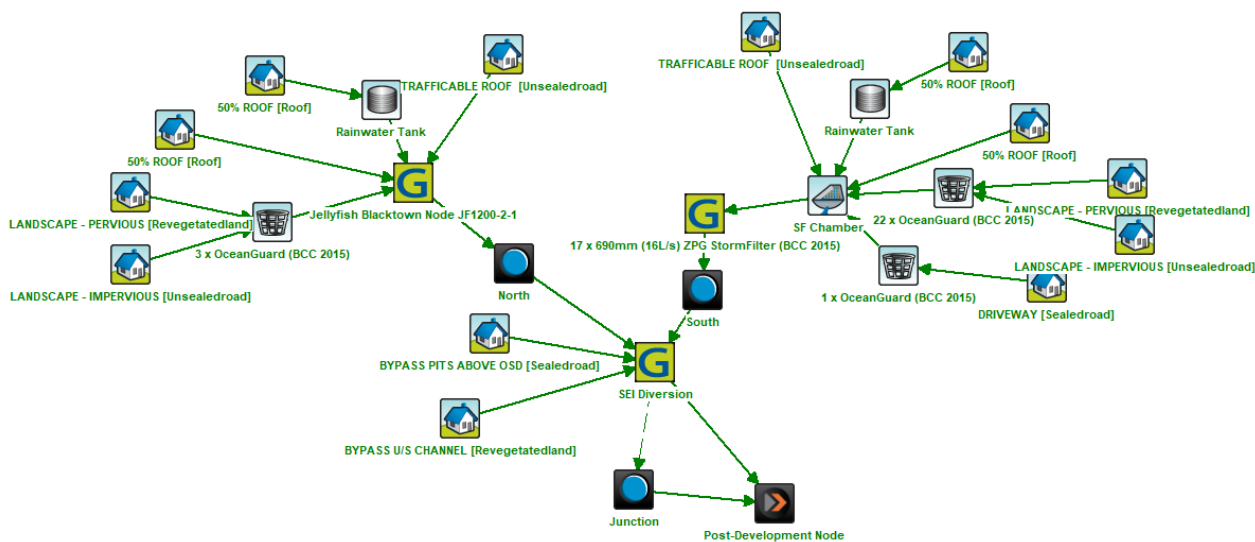


Figure 5.3.1 MUSIC model layout for the R3 RFB Lot

	Source	Residual Load	% Reduction
Total Suspended Solids	341	33.87	90.1
Total Phosphorous	0.705	0.247	65
Total Nitrogen	6.36	3.49	45.2
Gross Pollutants	72	3.21	95.5

Table 5.3.1 MUSIC model results for the R3 RFB Lot

5.4 SEI Calculations

The Stream Erosion Index (SEI) was calculated for the lot as prescribed in the Developer Handbook for Water Sensitive Urban Design. The critical flows for the ultimate case used to determine the SEI were calculated as follows:

Lot 1:

$$A = 0.450 \text{ Ha}$$

$$0.76 \times (0.45/100)^{0.38} = 0.098 \text{ hr} \quad t_c = 5.85 \text{ min}$$

$$I_2 = 93 \text{ mm/hr}$$

$$Q_2 = 0.278 \times 0.444 \times 93 \times (0.45/100) = 0.052 \text{ m}^3/\text{s}$$

$$Q_{\text{crit}} = 0.052 \times 0.25 = \mathbf{0.01291 \text{ m}^3/\text{s}}$$

$$Q_{\text{pre}} = 0.104 \text{ ML/yr}$$

$$Q_{\text{post}} = 0.33 \text{ ML/yr}$$

$$\text{SEI} = \mathbf{3.17}$$

The SEI for the proposed development is below Council's acceptable limit of 3.5 and therefore complies with Council's requirements.

6 Summary

The results show that there is a significant improvement in the water quality discharging from the site in the post development case. These improvements resulted from the use of a combination of water quality devices such as a bioretention basin, rainwater tanks, a Jellyfish filter, Stormfilter cartridges and Oceanguard pit inserts.

The on-site detention (OSD) basin has been designed in accordance with council's requirement and the OSD deemed to comply spreadsheet v1.9 was used for calculating the required storage and discharge requirements.

The models demonstrate improvement in water quality leaving the site and water quantity has been designed in accordance with Councils requirements.

7 References

Argue J, 2007, "Basic Procedures for 'source control' of stormwater", Engineering Education Australia, Melbourne

The Institution of Engineers Australia, 1987, "Australian Rainfall and Runoff : A guide to Flood estimation", The Institution of Engineers Australia, Canberra

Blacktown City Council Development Control Plan, 2015, "Part J Water Sensitive Urban Design and Integrated Water Cycle Management" & "Part A Introduction and General Guidelines" & "Part C Development within Residential Zones". <http://www.blacktown.nsw.gov.au>

Blacktown City Council's "Engineering Guide for Development", 2005 <http://www.blacktown.nsw.gov.au>

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<http://www.planning.nsw.gov.au/>

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<http://www.planning.nsw.gov.au/>

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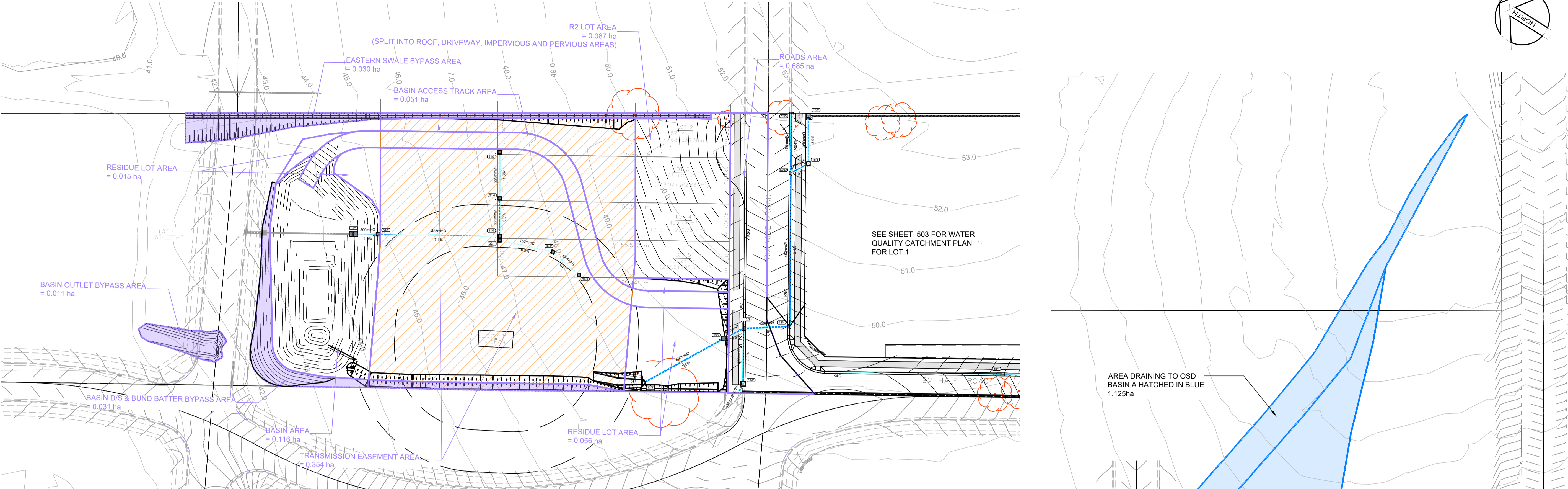
Music Development Team CRC for Catchment Hydrology, 2005, "Music User Guide", CRC for Catchment Hydrology, Australia, www.toolkit.net.au/music

Sydney Catchment Authority, 'A guide to the use of MUISC in Sydney's Drinking Water Catchments – draft training version', SCA, Penrith.

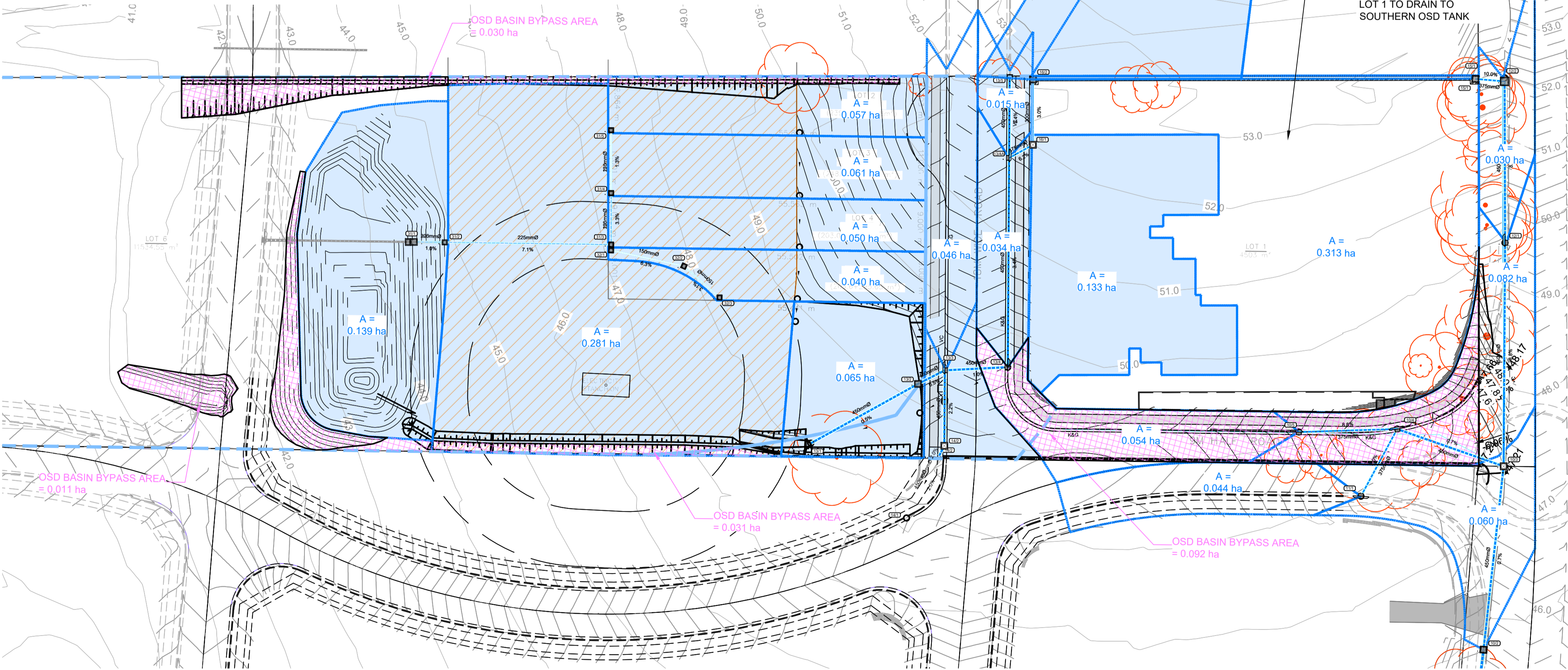
Stormwater 360, 2015, <http://www.stormwater360.com.au/products/stormwater-management/filtration/prod/stormfilter>

Stormwater 360, 2015, <http://www.stormwater360.com.au/products/stormwater-management/gross-pollutant-traps/prod/enviropod>

ATTACHMENT A
CATCHMENT PLANS




WATER QUALITY CATCHMENT PLAN
SCALE 1:500



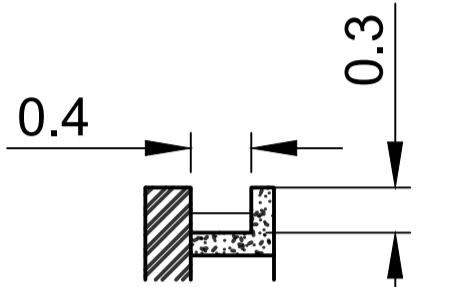
DRAINAGE CATCHMENT AND OSD CATCHMENT PLAN
SCALE 1:500



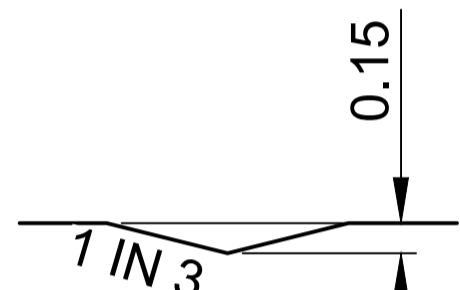
REV	AMENDMENT	ISSUED	DATE	 <div><div>BARKER RYAN STEWART</div><div>TOTAL PROJECT SOLUTIONS</div><div>ENGINEERING PLANNING PROJECT MANAGEMENT SURVEYING CERTIFICATION</div></div> <div><div>SYDNEY P: 02 9659 0005 CENTRAL COAST P: 02 4326 5255</div><div>HUNTER P: 02 4966 8388 S.E. QLD P: 07 5582 6555</div><div>www.brs.com.au mail@brs.com.au ABN: 26 134 067 842</div></div>	Client:	182 GUNTAWONG ROAD RIVERSTONE PROPOSED SUBDIVISION AND RFB DRAINAGE CATCHMENT PLAN	Designed: RW/GL Drawn: RW Checked: GJ	Scales: Plan 1:500 Horiz. 1:500 Vert. 1:100 X-Sect. - Datum: A.H.D.	Plan No. SY190192-01-501 File Ref. SY190192 REV. F
B	S34 CONFERENCE	RW	04/08/20		THE BATHLA GROUP				
C	S34 CONFERENCE	RW	15/01/21						
D	S34 CONFERENCE	RW	10/06/21						
E	JOINT REPORT AMENDMENTS	RW	18/06/21						
F	JOINT REPORT AMENDMENTS	RW	15/07/21						



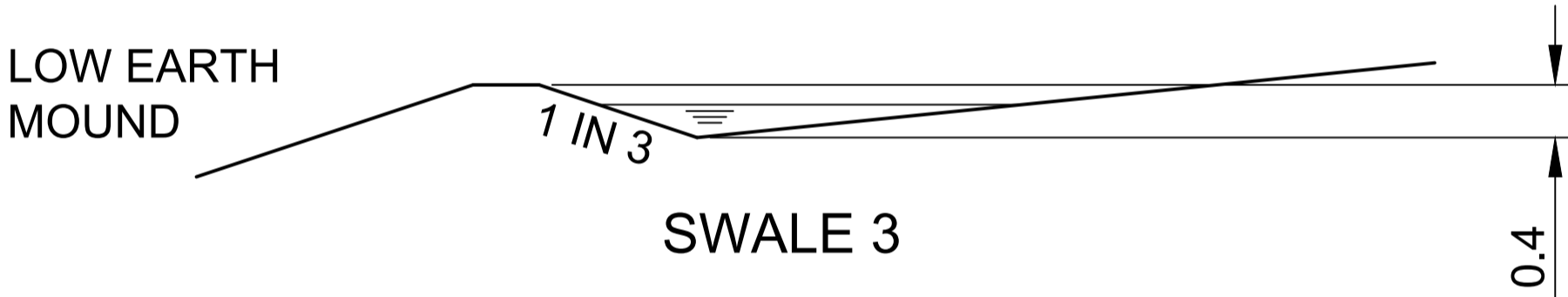
Swale Size Calculations												
	Time of Concentration					Flow Calculation			Mannings Calculation			
	n*	area ha	slope m/m	length m	time min	intensity	C 100yr	flow l/s	Mannings n	side slope	base width	depth
Channel 1	0.15	0.337	0.08	120	12	154	0.56	81	0.015	Rectangular	0.4	0.13
Swale 2	0.15	0.147	0.08	90	11	160	0.56	37	0.05	1 in 4	0	0.09
Swale 3	0.15	0.19 + 0.447	0.07	100	10	167	0.98	370	0.05	1 in 3/1 in 10	0	0.23



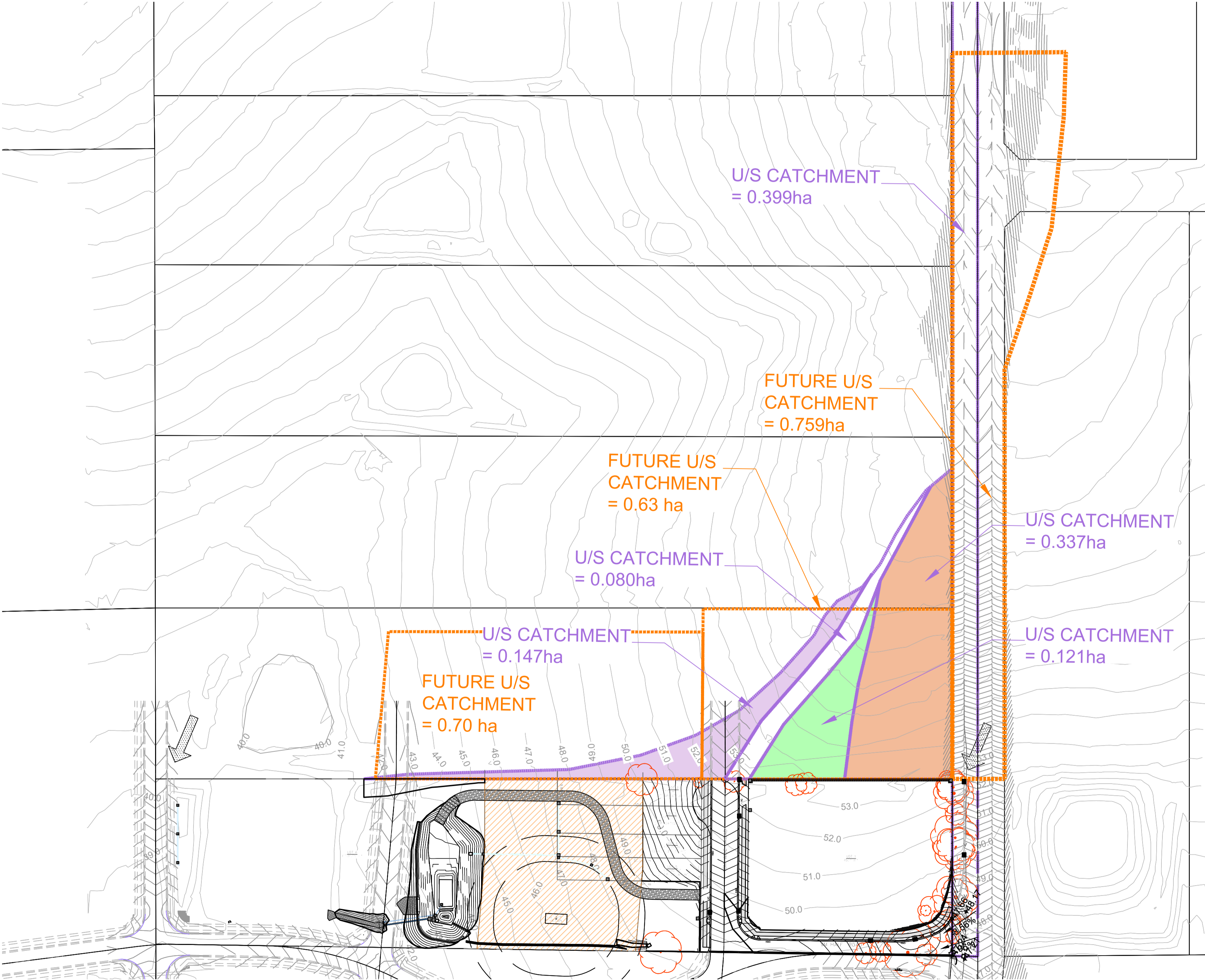
CHANNEL 1



SWALE 2



SWALE 3



PLAN
SCALE 1:1000



REV	AMENDMENT	ISSUED	DATE
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C	S34 CONFERENCE	RW	15/01/21
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182 GUNTAWONG ROAD RIVERSTONE
PROPOSED SUBDIVISION AND RFB

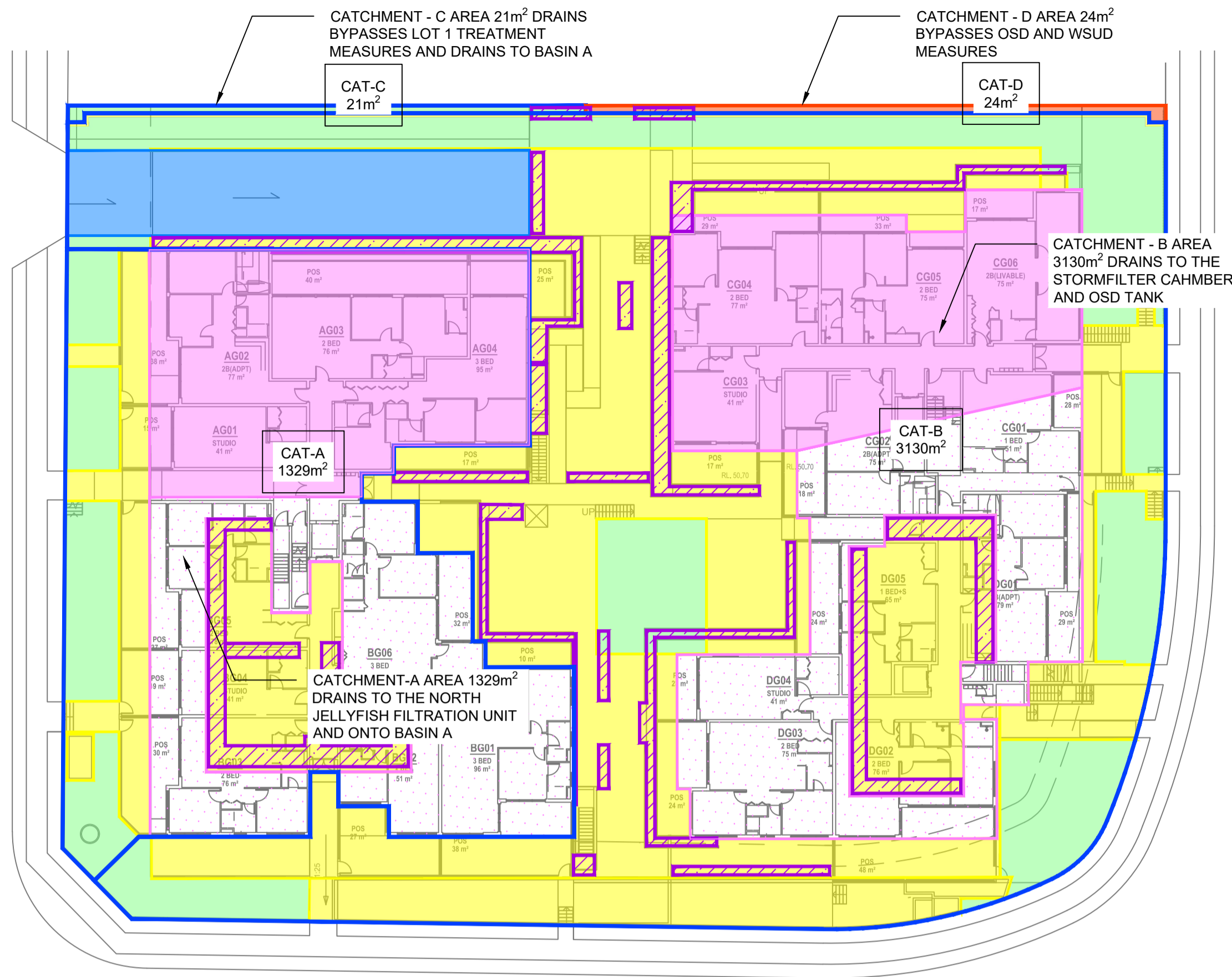
UPSTREAM CATCHMENT PLAN

Designed: RW/GL
Drawn: RW
Checked: GJ

Scales: Plan 1:500
Horiz. 1:500
Vert. 1:100
X-Sect. -

Datum: A.H.D.

Plan No.
SY190192-01-502
File Ref.
SY190192
REV.
F



OSD AND OVERALL MUSIC CATCHMENT PLAN
SCALE 1:300

LEGEND

- SITE BOUNDARY - OUTLINE
- TREATED AREA - OUTLINE
- ROOF AREA TO RAINWATER TANK
- ROOF AREA TO BYPASSING RAINWATER TANK
- DRIVEWAY / SEALED ROAD AREA
- LANDSCAPE AREA - PREVIOUS
- LANDSCAPE AREA - IMPERVIOUS
- BYPASS AREA
- LANDSCAPE RE-USE AREA

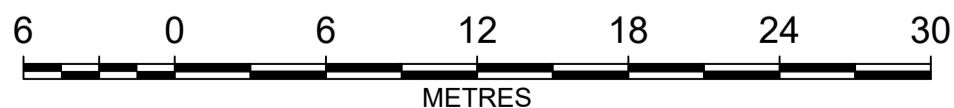
NOTE:

50% OF THE NON-TRAFFICABLE ROOFWATER FROM EACH BUILDING IS TO BE DIRECTED TO THE RESPECTIVE RAINWATER TANK AND THE REMAINING 50% DIRECTLY TO THE JELLYFISH FILTER/ STORMFILTER CHAMBER.

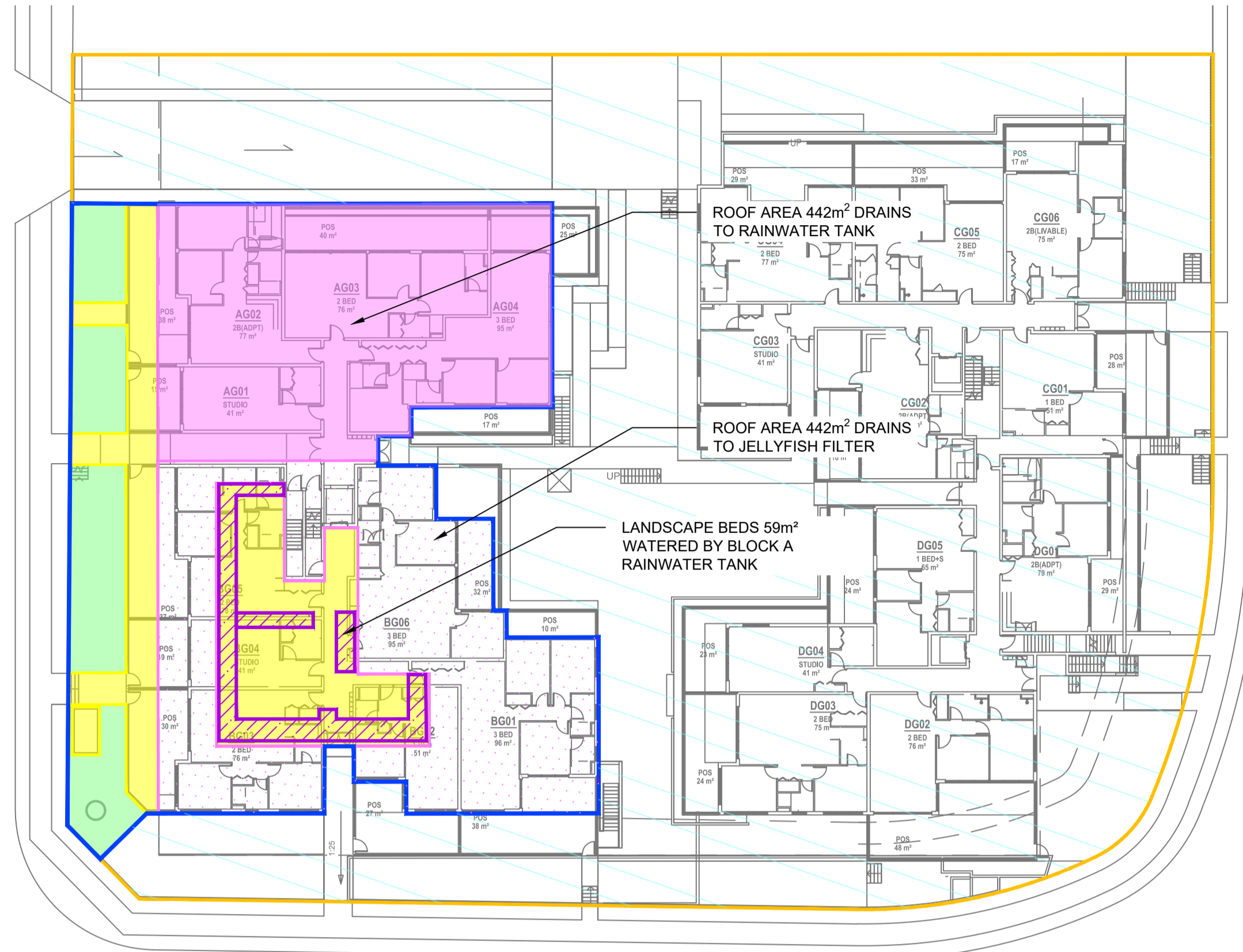
THE TOTAL IMPERVIOUSNESS OF LOT 1 IS 3812 / 4504 = 85%

THE CATCHMENT AREAS HAVE BEEN MODELLED USING BLACKTOWN CITY COUNCIL'S STANDARD NODES PROVIDED THROUGH MUSIC-LINK. THE FOLLOWING SOURCE NODES HAVE BEEN USED:

ROOF - ROOF AREAS
SEALED ROAD - DRIVEWAY AREAS
REVEGETATED LAND - PERVIOUS LANDSCAPED AREAS
UNSEALED ROAD - IMPERVIOUS AREAS (PATHS, TRAFFICABLE ROOF ETC.)



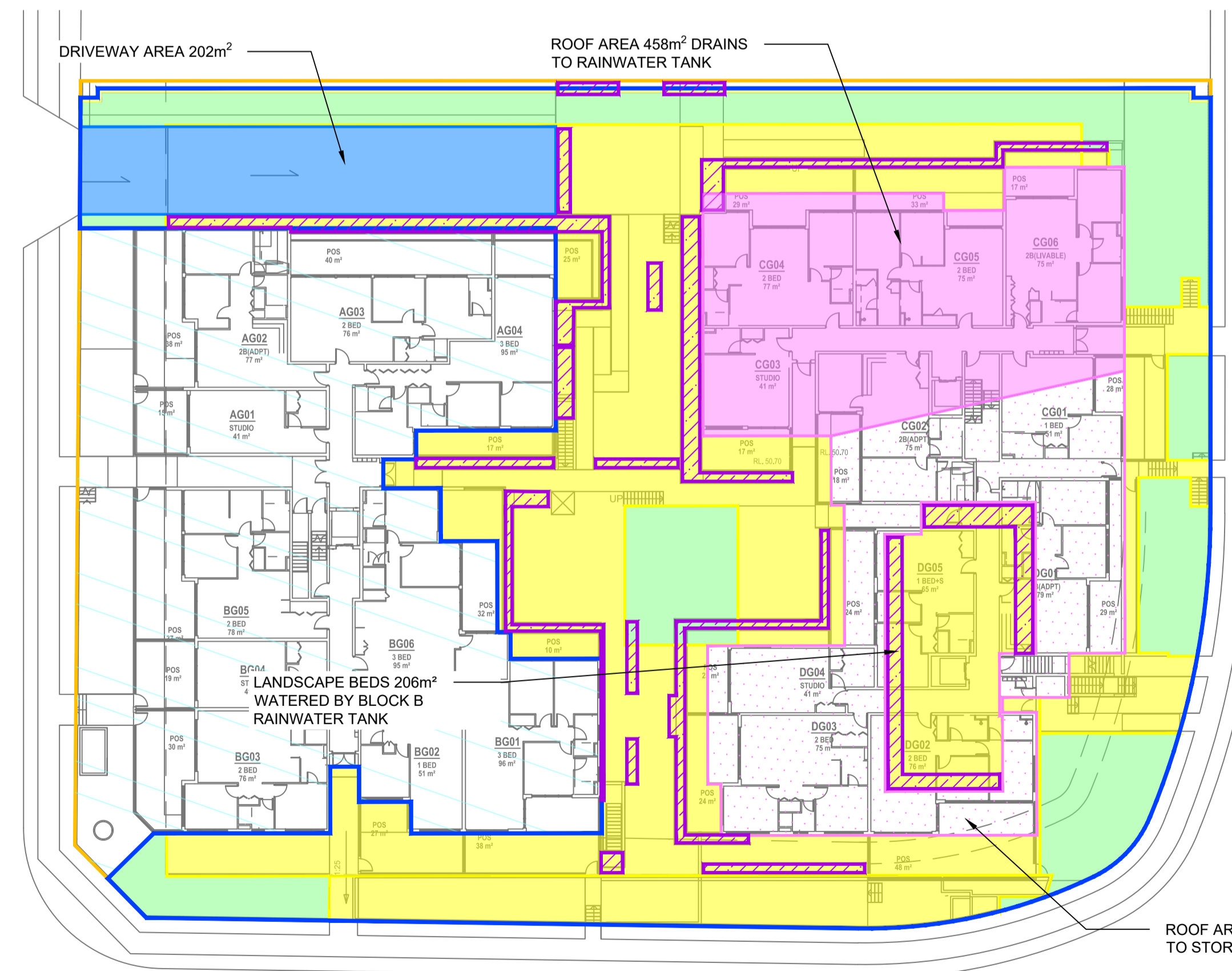
1:300



CATCHMENT - A MUSIC PLAN
SCALE 1:300

CAT-A SURFACE TYPE SUMMARY:

- ROOF AREA TO RAINWATER TANK: 442 m²
- ROOF AREA TO JELLYFISH FILTER: 442 m²
- DRIVEWAY / SEALED ROAD AREA: 0 m²
- LANDSCAPE AREA - PERVIOUS: 150 m²
- LANDSCAPE AREA - IMPERVIOUS: 295 m²
- LANDSCAPE RE-USE AREA: 59 m²



CATCHMENT - B MUSIC PLAN
SCALE 1:300

CAT-B SURFACE TYPE SUMMARY:

- ROOF AREA TO RAINWATER TANK: 458 m²
- ROOF AREA TO STORMFILTER TANK: 458 m²
- DRIVEWAY / SEALED ROAD AREA: 202 m²
- LANDSCAPE AREA - PERVIOUS: 542 m²
- LANDSCAPE AREA - IMPERVIOUS: 1470 m²
- LANDSCAPE RE-USE AREA: 206 m²

REV	AMENDMENT	ISSUED	DATE
B	S34 CONFERENCE	RW	04/08/20
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Client:

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182 GUNTAWONG ROAD RIVERSTONE
PROPOSED SUBDIVISION AND RFB

LOT 1 CATCHMENT PLANS

Designed: RW/GL
Drawn: RW
Checked: GJ

Scales: Plan 1:300
Horiz.
Vert.
X-Sect. -

Datum: A.H.D.

Plan No.
SY190192-01-503
File Ref.
SY190192
REV.
F

ATTACHMENT B
MUSIC-LINK REPORTS

MUSIC-*link* Report

Project Details		Company Details	
Project:	182 Guntawong Rd - Basin A	Company:	Barker Ryan Stewart
Report Export Date:	15/07/2021	Contact:	
Catchment Name:	SY190192_BASIN_F	Address:	
Catchment Area:	0.82ha	Phone:	
Impervious Area*:	37.73%	Email:	
Rainfall Station:	67035 LIVERPOOL(WHITLAM		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1967 - 31/12/1976 11:54:00 PM		
Mean Annual Rainfall:	857mm		
Evapotranspiration:	1261mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	Blacktown		
Scenario:	Blacktown Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	Reduction	Node Type	Number	Node Type	Number
Flow	4.22%	Bio Retention Node	1	Urban Source Node	12
TSS	85.2%				
TP	68.4%				
TN	52.9%				
GP	97.7%				

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	60m2 - Bioretention	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	60m2 - Bioretention	PET Scaling Factor	2.1	2.1	2.1
Receiving	Receiving Node	% Load Reduction	None	None	4.22
Receiving	Receiving Node	GP % Load Reduction	90	None	97.7
Receiving	Receiving Node	TN % Load Reduction	45	None	52.9
Receiving	Receiving Node	TP % Load Reduction	65	None	68.4
Receiving	Receiving Node	TSS % Load Reduction	85	None	85.2
Urban	BASIN	Area Impervious (ha)	None	None	0
Urban	BASIN	Area Pervious (ha)	None	None	0.116
Urban	BASIN	Total Area (ha)	None	None	0.116
Urban	BASIN ACCESS TRACK	Area Impervious (ha)	None	None	0.051
Urban	BASIN ACCESS TRACK	Area Pervious (ha)	None	None	0
Urban	BASIN ACCESS TRACK	Total Area (ha)	None	None	0.051
Urban	BASIN D/S & BUND BATTER	Area Impervious (ha)	None	None	0
Urban	BASIN D/S & BUND BATTER	Area Pervious (ha)	None	None	0.031
Urban	BASIN D/S & BUND BATTER	Total Area (ha)	None	None	0.031
Urban	BASIN OUTLET	Area Impervious (ha)	None	None	0
Urban	BASIN OUTLET	Area Pervious (ha)	None	None	0.011
Urban	BASIN OUTLET	Total Area (ha)	None	None	0.011
Urban	Driveway	Area Impervious (ha)	None	None	0.009
Urban	Driveway	Area Pervious (ha)	None	None	0
Urban	Driveway	Total Area (ha)	None	None	0.009
Urban	EASTERN SWALE	Area Impervious (ha)	None	None	0.004
Urban	EASTERN SWALE	Area Pervious (ha)	None	None	0.025
Urban	EASTERN SWALE	Total Area (ha)	None	None	0.03
Urban	ELECTRICITY EASEMENT	Area Impervious (ha)	None	None	0.053
Urban	ELECTRICITY EASEMENT	Area Pervious (ha)	None	None	0.300
Urban	ELECTRICITY EASEMENT	Total Area (ha)	None	None	0.354
Urban	Impervious	Area Impervious (ha)	None	None	0.013
Urban	Impervious	Area Pervious (ha)	None	None	0
Urban	Impervious	Total Area (ha)	None	None	0.013
Urban	Pervious	Area Impervious (ha)	None	None	0
Urban	Pervious	Area Pervious (ha)	None	None	0.013
Urban	Pervious	Total Area (ha)	None	None	0.013
Urban	RESIDUE LOT	Area Impervious (ha)	None	None	0.060
Urban	RESIDUE LOT	Area Pervious (ha)	None	None	0.010
Urban	RESIDUE LOT	Total Area (ha)	None	None	0.071
Urban	ROADS	Area Impervious (ha)	None	None	0.065
Urban	ROADS	Area Pervious (ha)	None	None	0.003
Urban	ROADS	Total Area (ha)	None	None	0.069

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Node Type	Node Name	Parameter	Min	Max	Actual
Urban	Roof	Area Impervious (ha)	None	None	0.052
Urban	Roof	Area Pervious (ha)	None	None	0
Urban	Roof	Total Area (ha)	None	None	0.052

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MUSIC-*link* Report

Project Details		Company Details	
Project:	182 Guntawong Rd - Lot 1	Company:	Barker Ryan Stewart
Report Export Date:	14/07/2021	Contact:	
Catchment Name:	SY190192_LOT 1_E	Address:	
Catchment Area:	0.449ha	Phone:	
Impervious Area*:	168.3%	Email:	
Rainfall Station:	67035 LIVERPOOL(WHITLAM		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1967 - 31/12/1976 11:54:00 PM		
Mean Annual Rainfall:	857mm		
Evapotranspiration:	1261mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.32		
Study Area:	Blacktown		
Scenario:	Blacktown Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Post-Development Node	Reduction	Node Type	Number	Node Type	Number
Flow	3.31%	Rain Water Tank Node	2	Urban Source Node	14
TSS	90%	Sedimentation Basin Node	1		
TP	65%	Generic Node	4		
TN	45.2%	GPT Node	3		
GP	95.5%				

Comments

Proprietary nodes provided by the manufacturer.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard (BCC 2015)	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	22 x OceanGuard (BCC 2015)	Hi-flow bypass rate (cum/sec)	None	None	0.44
GPT	3 x OceanGuard (BCC 2015)	Hi-flow bypass rate (cum/sec)	None	None	0.06
Post	Post-Development Node	% Load Reduction	None	None	3.31
Post	Post-Development Node	GP % Load Reduction	90	None	95.5
Post	Post-Development Node	TN % Load Reduction	45	None	45.2
Post	Post-Development Node	TP % Load Reduction	65	None	65
Post	Post-Development Node	TSS % Load Reduction	85	None	90
Pre	Pre-Development Node	% Load Reduction	None	None	3.29E
Pre	Pre-Development Node	GP % Load Reduction	None	None	0
Pre	Pre-Development Node	TN % Load Reduction	None	None	5.06E
Pre	Pre-Development Node	TP % Load Reduction	None	None	7.57E
Pre	Pre-Development Node	TSS % Load Reduction	None	None	4.63E
Rain	Rainwater Tank	% Reuse Demand Met	80	None	100
Rain	Rainwater Tank	% Reuse Demand Met	80	None	89.18
Sedimentation	SF Chamber	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Chamber	Notional Detention Time (hrs)	None	None	0.0314
Urban	50% ROOF	Area Impervious (ha)	None	None	0.044
Urban	50% ROOF	Area Impervious (ha)	None	None	0.044
Urban	50% ROOF	Area Impervious (ha)	None	None	0.046
Urban	50% ROOF	Area Impervious (ha)	None	None	0.046
Urban	50% ROOF	Area Pervious (ha)	None	None	0
Urban	50% ROOF	Area Pervious (ha)	None	None	0
Urban	50% ROOF	Area Pervious (ha)	None	None	0
Urban	50% ROOF	Area Pervious (ha)	None	None	0
Urban	50% ROOF	Total Area (ha)	None	None	0.044
Urban	50% ROOF	Total Area (ha)	None	None	0.044
Urban	50% ROOF	Total Area (ha)	None	None	0.046
Urban	50% ROOF	Total Area (ha)	None	None	0.046
Urban	BCC Pervious Areas	Area Impervious (ha)	None	None	0
Urban	BCC Pervious Areas	Area Pervious (ha)	None	None	0.45
Urban	BCC Pervious Areas	Total Area (ha)	None	None	0.45
Urban	BYPASS PITS ABOVE OSD	Area Impervious (ha)	None	None	0.001
Urban	BYPASS PITS ABOVE OSD	Area Pervious (ha)	None	None	0
Urban	BYPASS PITS ABOVE OSD	Total Area (ha)	None	None	0.001
Urban	BYPASS U/S CHANNEL	Area Impervious (ha)	None	None	0
Urban	BYPASS U/S CHANNEL	Area Pervious (ha)	None	None	0.002
Urban	BYPASS U/S CHANNEL	Total Area (ha)	None	None	0.002
Urban	DRIVEWAY	Area Impervious (ha)	None	None	0.02
Urban	DRIVEWAY	Area Pervious (ha)	None	None	0

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Node Type	Node Name	Parameter	Min	Max	Actual
Urban	DRIVEWAY	Total Area (ha)	None	None	0.02
Urban	LANDSCAPE - IMPERVIOUS	Area Impervious (ha)	None	None	0.129
Urban	LANDSCAPE - IMPERVIOUS	Area Impervious (ha)	None	None	0.012
Urban	LANDSCAPE - IMPERVIOUS	Area Pervious (ha)	None	None	0
Urban	LANDSCAPE - IMPERVIOUS	Area Pervious (ha)	None	None	0
Urban	LANDSCAPE - IMPERVIOUS	Total Area (ha)	None	None	0.129
Urban	LANDSCAPE - IMPERVIOUS	Total Area (ha)	None	None	0.012
Urban	LANDSCAPE - PERVIOUS	Area Impervious (ha)	None	None	0
Urban	LANDSCAPE - PERVIOUS	Area Impervious (ha)	None	None	0
Urban	LANDSCAPE - PERVIOUS	Area Pervious (ha)	None	None	0.054
Urban	LANDSCAPE - PERVIOUS	Area Pervious (ha)	None	None	0.015
Urban	LANDSCAPE - PERVIOUS	Total Area (ha)	None	None	0.054
Urban	LANDSCAPE - PERVIOUS	Total Area (ha)	None	None	0.015
Urban	TRAFFICABLE ROOF	Area Impervious (ha)	None	None	0.018
Urban	TRAFFICABLE ROOF	Area Impervious (ha)	None	None	0.018
Urban	TRAFFICABLE ROOF	Area Pervious (ha)	None	None	0
Urban	TRAFFICABLE ROOF	Area Pervious (ha)	None	None	0
Urban	TRAFFICABLE ROOF	Total Area (ha)	None	None	0.018
Urban	TRAFFICABLE ROOF	Total Area (ha)	None	None	0.018

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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber	Total Nitrogen - k (m/yr)	40	40	0
Sedimentation	SF Chamber	Total Phosphorus - k (m/yr)	300	300	0
Sedimentation	SF Chamber	Total Suspended Solids - k (m/yr)	400	400	0

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