STORMWATER MANAGEMENT STRATEGY

for

35 Honeysuckle Dr, Newcastle

Job No: NL172990

Job No: NL172990
Revision: B
Date:

	BY	DATE
Prepared	SC	4/05/2018
Checked	CP	4/05/2018
Admin	BM	4/05/2018

NORTHROP

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1. Introduction

Northrop Consulting Engineers have prepared a stormwater management strategy for the proposed development of 35 Honeysuckle Drive, Newcastle (proposed Lot 3 as part of Lot 1 DP1236735). The proposed lot has an area of approximately 0.52Ha, which includes a 20-metre-wide public domain pedestrian link on the eastern side, as shown in the attached plan of subdivision (Appendix A). It is bordered by Honeysuckle Drive to the south and the Foreshore Promenade to the north, and is currently vacant land. The development area is hereafter referred to as 'the site'.

Approximately 30% of the existing site falls towards Honeysuckle Drive, while the remaining 70% falls towards the Foreshore Promenade. Grades vary up to approximately 3%. An existing Council owned Stormwater line currently fronts the site in Honeysuckle Drive, and drains to Throsby Basin via a 1.0m diameter pipe adjacent the western boundary. A review of Council Asset register does not appear to show any Stormwater infrastructure within the site boundary. A site inspection identified a number of isolated inlet pits associated with the previous land use. These do not appear to be connected to any external network and were filled with sediment on inspection.

As noted in the Waterfront and Cottage Creek Flood Management Plan, the HWC Floodway sits adjacent the eastern boundary within the proposed public domain pedestrian link. Additionally, the steel street floodway sits adjacent the western boundary.

The proposed development consists primarily of two basement carparks, a mixed-use ground floor level, a single-level retail building and two eight-level residential buildings. The development also includes one new vehicular access point to Honeysuckle Drive, a pedestrian linkage path through the middle of the development from Honeysuckle Drive to the Foreshore Promenade, pedestrian pavement and landscaping.

This stormwater design has been developed in accordance with the Newcastle City Council (NCC) Development Control Plan (DCP) 2012 and the NCC Technical Manual (2013). This report intends to discuss stormwater issues relating to the site at a level appropriate for a Development Application submission and should be read in conjunction with drawings C01DA-C60DA (Rev A).

2. Proposed Stormwater Management Strategy

The proposed stormwater management strategy for the 0.52ha development site can be summarised as follows:

- Removal of the existing pit and pipe networks located within the development footprint to facilitate the construction of the proposed basement level carparks;
- Runoff from 60% of new roof areas will be collected and diverted to a below ground re-use tank of minimum 15m^3 storage volume. This will enable the re-use of water through internal uses and irrigation connections;
- All downpipes reporting to the tank will be connected to a first flush device located prior to the tank inlet;
- The remaining roof areas, overflow from the re-use tank and a portion of the pedestrian pavement, driveways and landscaping will be collected and conveyed through a proprietary water quality treatment system, before connecting to the existing stormwater line in Honeysuckle Drive;
- Approximately 660m^2 of the public domain area will be collected and conveyed to an above-ground bioretention basin (rain garden). An outlet sub-soil drainage pipe from the basin will be directed to the existing stormwater line in Honeysuckle Drive. Overflow from the basin will flow to the surrounding landscaped area and into the Newcastle Harbour;

- Approximately 625m^2 of pedestrian pavement and landscaping from various parts of the site will by-pass the treatment system and pit and pipe networks, and sheet onto the adjacent lots;
- Pit and pipe networks shall be designed to convey all storms up to and including the 1% Annual Exceedance Probability (AEP) event;

Site Data:

- Site Area: 5,238 m^2
- Roof Area to Re-Use: 1,550 m^2
- Roof Area directly to Water Quality Treatment: 1,008 m^2 (80% Impervious)
- Ground Level Catchment: 1,396 m^2 (98% Impervious)
- Public Domain Catchment: 776 m^2 (Assume 65% Impervious)
- Treated Catchment: 4,730 m^2 (Refer to Appendix B for sketch of treated catchment extent)
- Un-treated Catchment: 508 m^2 (83% Impervious)

3. Stormwater Quantity Assessment

As per discussions with Council's Senior Development Officer Rajnesh Prakash on January 30th, 2018, no detention storage has been proposed for this development due to the proximity of the site to the harbour (Throsby Basin). However, re-use storage volume is proposed to be provided (see Section 4 below for detail).

We note the current site is approximately 85% impervious (15% dirt/grass from detailed survey), and to our knowledge no detention storage is currently provided. This further justifies our proposal.

4. Stormwater Quality Assessment

Stormwater quality on-site is proposed to be managed through a treatment train approach to minimise any adverse impacts on the ecology of downstream watercourses and to meet the pollutant removal efficiency targets outlined in Council's DCP 7.06 (2012). These targets are reproduced in Table 1.

The performance of the proposed stormwater management strategy was assessed against these targets using the conceptual software MUSIC (Version 6.3.0). The MUSIC model was developed in accordance with the "NSW MUSIC Modelling Guidelines" (BMT WBM, 2015) and the NCC Technical Manual (2013), using the NCC MUSIC-link. The NCC MUSIC-link was used to set up all default source node data, rainfall data and evapotranspiration data.

The MUSIC model catchment area was broken down into six sub-catchments to effectively simulate the proposed treatment measures along the treatment train. A schematic of the MUSIC model can be seen below in Figure 1.

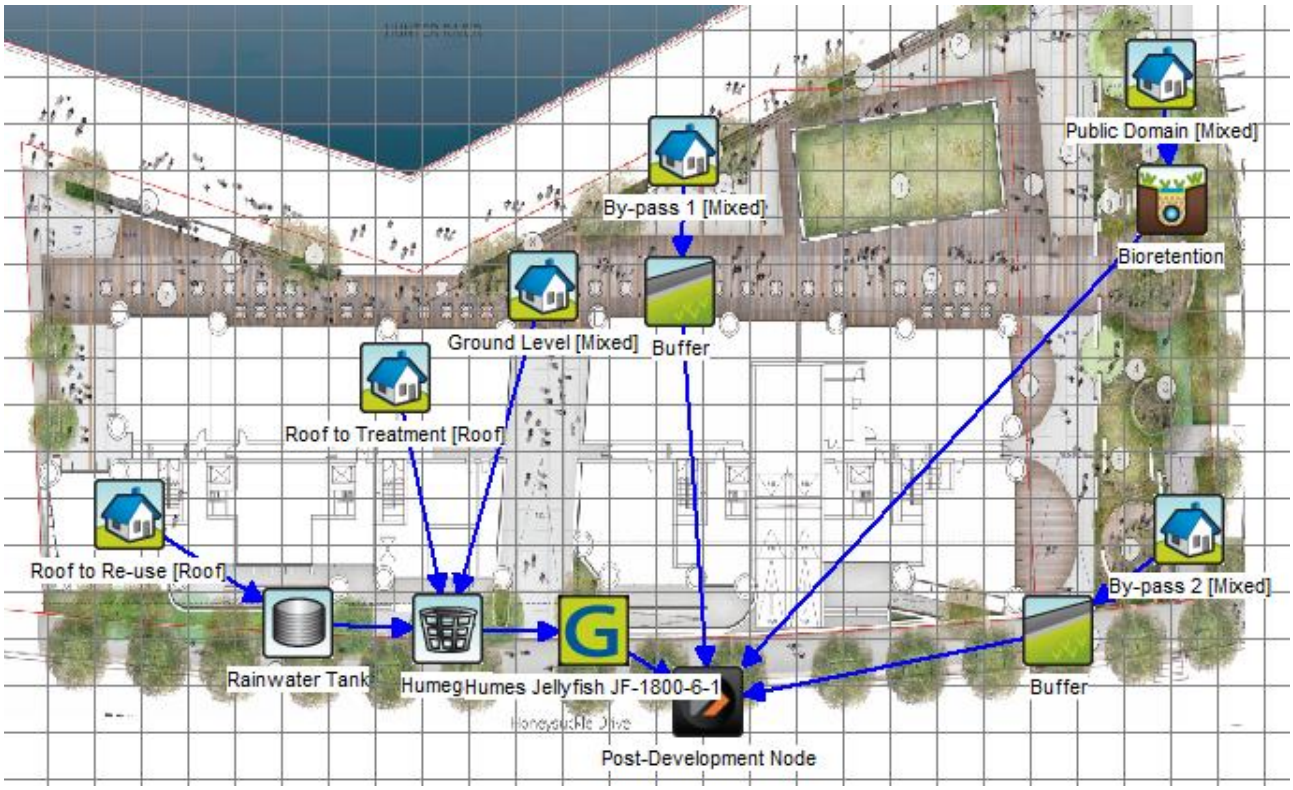


Figure 1 – MUSIC Model Layout Schematic

The source nodes adopted to represent the development were the Urban Mixed node and the Urban Roof node. The impervious percentage of the nodes was estimated from the architectural drawings.

The stormwater treatment train incorporates the following:

- Primary treatment via a rainwater tank and gross pollutant trap (Humes Humegard or approved equivalent); and
- Tertiary treatment via a bioretention basin and a proprietary cartridge treatment system (Humes Jellyfish JF-1800-6-1 or approved equivalent).

It has been assumed that the areas of the site by-passing the treatment train will sheet across adjacent vegetated public domain areas.

Descriptions of the non-proprietary treatment measures are detailed below:

Rainwater Tank

A 15kL below ground rainwater tank is proposed to be located on the southern boundary of the site, near the vehicular driveway. It has been assumed within the MUSIC model that 60% of the roof areas will be connected to the tank, excluding the terraces.

The internal and external re-use demands in the model were based on the data presented in the "NSW MUSIC Modelling Guidelines" (WBM, 2015). Internal re-use for the retail toilets on the ground floor of the development was modelled as 0.38kL/day. The pervious area of the development is approximately 580m^2 which is approximately equal to two residential dwelling. The guidelines suggest a re-use of 122kL/yr/dwelling for a residential dwelling, therefore a re-use demand of 244kL/yr was adopted. The proposed system satisfies 83% of re-use demand which is considered an acceptable design outcome.

Bioretention Basin

A bioretention basin (rain garden) is proposed to be located on the north-eastern corner of the site in the public domain. The basin has been modelled with a filter area of 30m^2, a filter depth of 0.4m and an extended detention depth of 0.2m. Parameters for the bioretention basin were adopted in accordance with the "NSW MUSIC Modelling Guidelines" (WBM, 2015).

Note, a sensitivity analysis was performed on the hydraulic conductivity of the filter media, with simulations run at 50mm/hr and100mm/hr.

Results

The results from the MUSIC modelling are presented in Table 1.

Table 1 – MUSIC Model Result Summary (outlet node)

	Source Load (kg/yr)	Residual Loads (kg/yr)	Percentage Reduction	Target Objectives
Total Suspended Solids (TSS)	577	68.7	87.7	85 %
Total Phosphorous (TP)	1.41	0.348	75.3	65 %
Total Nitrogen (TN)	12.8	5.79	54.7	45 %
Gross Pollutants	141	12.9	90.8	90 %

Table 1 shows that the proposed stormwater management strategy is predicted to achieve the load reduction targets set out in the NCC DCP 2012, as estimated by MUSIC.

MUSIC data files have been included with this report in Appendix C. The Music Model can be provided upon request.

5. Stream Erosion Index Determination

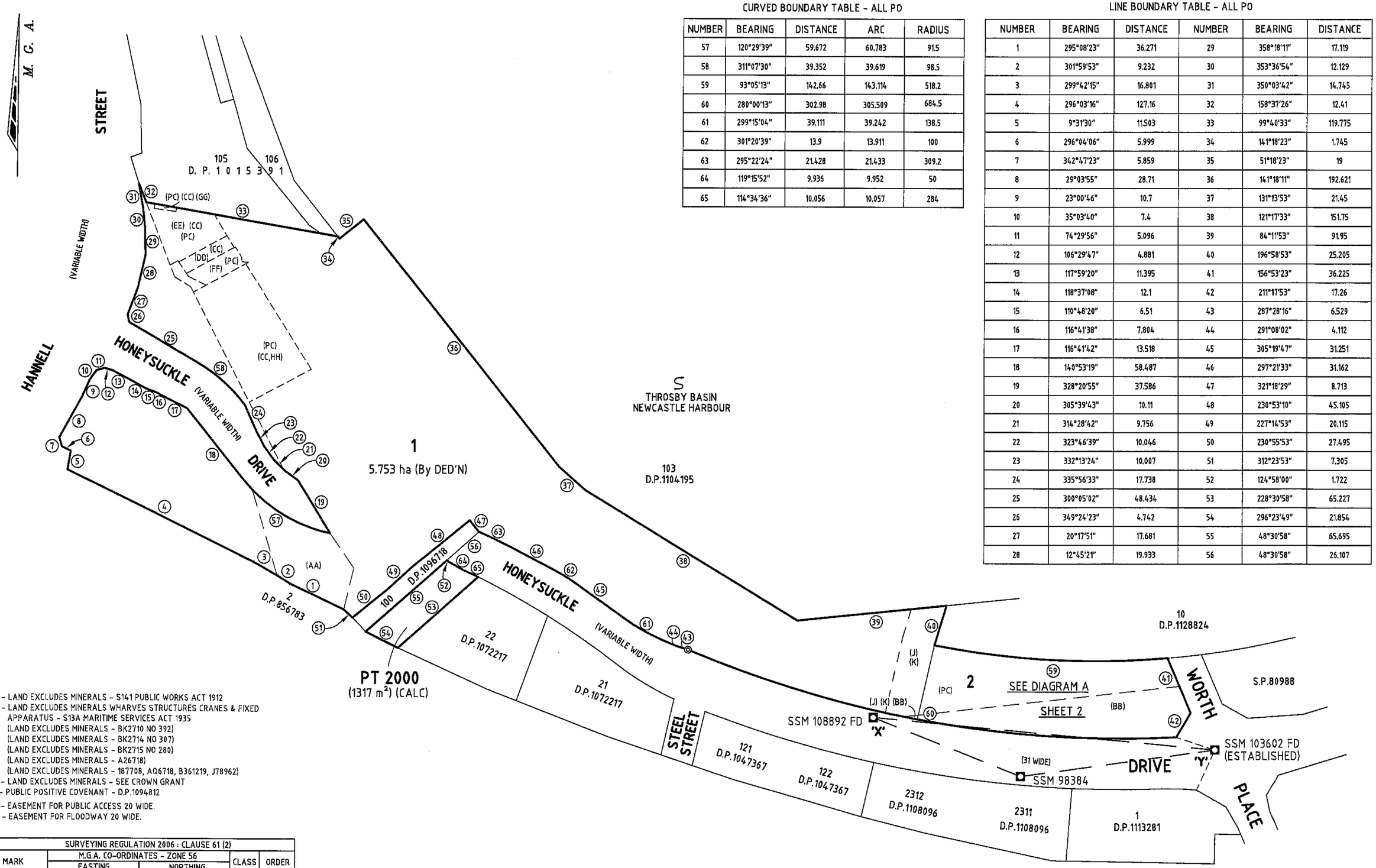
The Stream Erosion Index (SEI) has not been quantified for this development due to the close proximity to the harbour. We note the proposed system will connect to in-ground stormwater infrastructure which drain directly to the harbour, therefore the SEI calculation has been deemed irrelevant in this application.

6. Conclusions

Given the results of the above investigations, it is reasoned that the development meets NCC's requirements. In particular:

- No detention storage is proposed due to the close proximity to the harbour and the existing site having an impervious fraction of approximately 85%;
- The treatment of stormwater runoff for waterborne pollutants is achieved through the proposed treatment train. This includes the use of a rainwater tank, a proprietary gross pollutant trap, cartridge treatment and bioretention treatment; and
- The stream erosion index for the site was not quantified due to the site discharging to an existing stormwater network which connects directly to the harbour.

APPENDIX A – PLAN OF SUBDIVISION



CURVED BOUNDARY TABLE - ALL PO

NUMBER	BEARING	DISTANCE	ARC	RADIUS
57	120°29'39"	59.672	60.783	91.5
58	311°07'30"	39.352	39.619	98.5
59	93°05'13"	142.66	143.114	518.2
60	280°00'13"	302.98	305.509	684.5
61	299°15'04"	39.111	39.242	138.5
62	301°20'39"	13.9	13.911	100
63	295°22'24"	21.428	21.433	309.2
64	119°15'52"	9.936	9.952	50
65	114°34'36"	10.056	10.057	284

LINE BOUNDARY TABLE - ALL PO

NUMBER	BEARING	DISTANCE	NUMBER	BEARING	DISTANCE
1	295°08'23"	36.271	29	358°18'11"	17.119
2	301°59'53"	9.232	30	353°36'54"	12.129
3	299°42'15"	16.801	31	350°03'42"	14.745
4	296°03'16"	127.16	32	158°37'26"	12.41
5	9°31'30"	11.503	33	99°40'33"	119.775
6	296°04'06"	5.999	34	141°18'23"	1.745
7	342°47'23"	5.859	35	51°18'23"	19
8	29°03'55"	28.71	36	141°18'11"	192.621
9	23°00'46"	10.7	37	131°13'53"	21.45
10	35°03'40"	7.4	38	121°17'33"	151.75
11	74°29'56"	5.096	39	84°11'53"	91.95
12	106°29'47"	4.881	40	196°58'53"	25.205
13	117°59'20"	11.395	41	156°53'23"	36.225
14	118°37'08"	12.1	42	211°17'53"	17.26
15	110°48'20"	6.51	43	287°28'16"	6.529
16	116°41'38"	7.804	44	291°08'02"	4.112
17	116°41'42"	13.518	45	305°19'47"	31.251
18	140°53'19"	58.487	46	297°21'33"	31.162
19	328°20'55"	37.586	47	321°18'29"	8.713
20	305°39'43"	10.11	48	230°53'10"	45.105
21	314°28'42"	9.756	49	227°14'53"	20.115
22	323°46'39"	10.046	50	230°55'53"	27.495
23	332°13'24"	10.007	51	312°23'53"	7.305
24	335°56'33"	17.738	52	124°58'00"	1.722
25	300°05'02"	48.434	53	228°30'58"	65.227
26	349°24'23"	4.742	54	296°23'49"	21.854
27	20°17'51"	17.681	55	48°30'58"	65.695
28	12°45'21"	19.933	56	48°30'58"	26.107

(BB) - LAND EXCLUDES MINERALS - S141 PUBLIC WORKS ACT 1912
(CC) - LAND EXCLUDES MINERALS WHARVES STRUCTURES CRANES & FIXED APPARATUS - S13A MARITIME SERVICES ACT 1935
(LAND EXCLUDES MINERALS - BK2710 NO 392)
(LAND EXCLUDES MINERALS - BK2714 NO 307)
(LAND EXCLUDES MINERALS - BK2715 NO 280)
(LAND EXCLUDES MINERALS - A26718)
(LAND EXCLUDES MINERALS - 187708, AQ6718, B361219, J78962)
(AA) - LAND EXCLUDES MINERALS - SEE CROWN GRANT
(PC) - PUBLIC POSITIVE COVENANT - D.P.1094812
(J) - EASEMENT FOR PUBLIC ACCESS 20 WIDE.
(K) - EASEMENT FOR FLOODWAY 20 WIDE.

SURVEYING REGULATION 2006 : CLAUSE 61 (2)				
MARK	M.G.A. CO-ORDINATES - ZONE 56		CLASS	ORDER
	EASTING	NORTHING		
SSM 77150	384 505.832	6 356 295.541	B	2
SSM 103602	384 791.108	6 356 244.843	C	3
SSM 108892	384 582.243	6 356 264.334	C	3
SSM 98384	384 638	6 356 231	U	N/A
COMBINED SCALE AND SEA LEVEL CORRECTION - 0.999764				
SOURCE	M.G.A. CO-ORDINATES ADOPTED FROM S.C.I.M.S. AS AT 17th JULY 2006			

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Table of mm

Surveyor: STEVEN WAYNE WHITE
DE WITT CONSULTING, CHARLESTOWN
Date of Survey: 17/11/16
Surveyor's Reference: 6582 "2016M7100(1497)"

PLAN OF SUBDIVISION OF LOT 2000 D.P.1145678

LGA: NEWCASTLE
Locality: NEWCASTLE
Subdivision No: N/A
Lengths are in metres. Reduction Ratio 1:1500

Registered

D.P.

M. C. A.

S
THROSBY BASIN
NEWCASTLE HARBOUR

4
D.P.1193181

1
5.753 ha
(By Deduction)

2
D.P.1167364

2
7292m²

122
D.P.1047367

2312
D.P.1108096

2311
D.P.1108096

1
D.P.1113281

S.P.80988

HONEYSUCKLE DRIVE (31 WIDE)

WORTH PLACE

SSM 108892 FD 'X'

SSM 98384

SSM 103602 FD (ESTABLISHED) 'Y'

84° 12' 00" 91.95 (21.693)

R.M.D.H & W.FD 76°59'-161 (D.P.1128824)

196° 59' 25.205

(17.505)

(47.52)

74°55'19"-68.917 BY D.P.883474

321°33'44" 75.021 (D.P.1167364)

R.M.D.H & W's GONE (D.P.883474)

193°32'50" 31.238

R.M.D.H & W's FD: 195°32'50" 4.214 & 26.621

CH 146.426
106°39'07"
A 146.787
RAD. 684.5

(J) (K) (BB)

R.M.D.H & W GONE
R.M.BOLT IN BIT.
142°27'-11.37

12° 58' 25" 46.253

93° 05' 20"
CH 142.66
RAD. 518.2
A 143.114

R.M.D.H & W.FD 318°18'24"-18.795 (D.P.1167364)

R.M.D.H & W. IN CONC. PATH FD. 148°45'-2.335 (D.P.1167364)

CH 20.93
84°01'10"
A 20.93
RAD. 518.2

156° 53' 30" 36.225

32.525

R.M.D.H & W.FD 73°55'15"-4.75 (D.P.883474)

CH 158.447
273° 51' 56"
A 158.803
RAD. 684.5

R.M.D.H & W 71°51'30"-8.93

300°14'52"-64.923 M.G.A. GND.
300°15'00"-64.932 BY ME

95°19'53"-209.823 MGA GND.
95°19'53"-209.817 BY ME.

265°03'29"-153.393 MGA GND.
265°03'27"-153.389 BY ME.

17.26 211° 18' 00"

R.M.D.H & W 254°12'45"-5.605

107°58'-24.94 (D.P.883474)

DIAGRAM "A"
(NOT TO SCALE)

(BB) - LAND EXCLUDES MINERALS - S141 PUBLIC WORKS ACT 1912
(J) - EASEMENT FOR PUBLIC ACCESS 20 WIDE.
(K) - EASEMENT FOR FLOODWAY 20 WIDE.

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Table of mm

Surveyor: STEVEN WAYNE WHITE, DE WITT CONSULTING, CHARLESTOWN Date of Survey: 17/11/16 Surveyor's Reference: 6582 "2016M7100(1497)"	PLAN OF SUBDIVISION OF LOT 2000 D.P.1145678	LGA: NEWCASTLE Locality: NEWCASTLE Subdivision No: N/A Lengths are in metres. Reduction Ratio N.T.S	Registered D.P.

APPENDIX B – CATCHMENT PLAN

NORTHROP CONSULTING ENGINEERS
01.05.18

DENOTES CATCHMENT TREATED BY WATER QUALITY SYSTEM

HUNTER RIVER

HONEYSUCKLE DRIVE

TREATED 4052 sq m

Nominated Architects: Adam Haddow-7188 | John Pradel-7004

FOR INFORMATION

Rev	Date	Revision	By	Chk.

Structural Engineer
Northrop Consulting Engineers

Mechanical / Hydraulic Engineer
S4B / WPFD

Electrical Engineer
S4B

Fire Engineer
WPFD

Access Consultant
Phillip Chun

Basix
David Gradwell

Client
DOMAGROUP

Project
35 Honeysuckle

35 Honeysuckle Drive
Newcastle, NSW 2300

Drawing Name
Floor Plan - Ground Floor

Date	Scale	Sheet Size
	1 : 200	@ A1

Drawn	Chk.
MJL	EW

Job No.	Drawing No.	Revision
5711	DA-0203	

SJB Architects
Level 2
490 Crown Street
Surry Hills NSW
2010 Australia
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F 61 2 9380 9922
www.sjb.com.au

APPENDIX C – MUSICLINK REPORT

THE CITY OF NEWCASTLE

MUSIC-*link* Report

Project Details		Company Details	
Project:	35 Honeysuckle Drive	**Company:**	Northrop
Report Export Date:	4/05/2018	**Contact:**	Chris Piper
Catchment Name:	NL172990 MUSIC DA_180503	**Address:**	Level 1, 215 Pacific Highway, Charlestown 2290
Catchment Area:	0.525ha	**Phone:**	
Impervious Area*:	88.85%	**Email:**	cpiper@northrop.com.au
Rainfall Station:	61078 WILLIAMTOWN		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1995 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1735mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.30		
Study Area:	Newcastle		
Scenario:	Newcastle		

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

Treatment Train Effectiveness

Node: Post-Development Node	Reduction
Flow	7.98%
TSS	87.6%
TP	75.6%
TN	54.8%
GP	90.8%

Treatment Nodes

Node Type	Number
Rain Water Tank Node	1
Bio Retention Node	1
Buffer Node	2
GPT Node	1
Generic Node	1

Source Nodes

Node Type	Number
Urban Source Node	6

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention	PET Scaling Factor	2.1	2.1	2.1
Buffer	Buffer	Proportion of upstream impervious area treated	None	None	0.9
Buffer	Buffer	Proportion of upstream impervious area treated	None	None	0.65
GPT	Humegard	Hi-flow bypass rate (cum/sec)	None	None	0.07
Post	Post-Development Node	% Load Reduction	None	None	7.98
Post	Post-Development Node	GP % Load Reduction	90	None	90.8
Post	Post-Development Node	TN % Load Reduction	45	None	54.8
Post	Post-Development Node	TP % Load Reduction	65	None	75.6
Post	Post-Development Node	TSS % Load Reduction	85	None	87.6
Rain	Rainwater Tank	% Reuse Demand Met	70	None	83.36
Urban	By-pass 1	Area Impervious (ha)	None	None	0.032
Urban	By-pass 1	Area Pervious (ha)	None	None	0.003
Urban	By-pass 1	Total Area (ha)	None	None	0.036
Urban	By-pass 2	Area Impervious (ha)	None	None	0.009
Urban	By-pass 2	Area Pervious (ha)	None	None	0.005
Urban	By-pass 2	Total Area (ha)	None	None	0.015
Urban	Ground Level	Area Impervious (ha)	None	None	0.137
Urban	Ground Level	Area Pervious (ha)	None	None	0.002
Urban	Ground Level	Total Area (ha)	None	None	0.14
Urban	Public Domain	Area Impervious (ha)	None	None	0.050
Urban	Public Domain	Area Pervious (ha)	None	None	0.027
Urban	Public Domain	Total Area (ha)	None	None	0.078
Urban	Roof to Re-use	Area Impervious (ha)	None	None	0.155
Urban	Roof to Re-use	Area Pervious (ha)	None	None	0
Urban	Roof to Re-use	Total Area (ha)	None	None	0.155
Urban	Roof to Treatment	Area Impervious (ha)	None	None	0.080
Urban	Roof to Treatment	Area Pervious (ha)	None	None	0.020
Urban	Roof to Treatment	Total Area (ha)	None	None	0.101

Only certain parameters are reported when they pass validation