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Date: 16 June 2022

Integrated Water Management Plan for No. 2a Gregory Place Harris Park

Summary

The Planning Secretary has issued their Environmental Assessment Requirements (SSD-31179510) for a concept proposal for an affordable housing and build-to-rent comprising approximately 483 dwellings within three freestanding four to eight storey buildings.

The key issues and relevant assessment requirements of the issued State Significant Development Guidelines are listed below:

Stormwater and Wastewater

- *Provide an Integrated Water Management Plan for the development that:*
  - *is prepared in consultation with the local council and any other relevant drainage or water authority.*
  - *details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures and the nominated discharge points.*
  - *demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties.*
- *Where drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority.*

The efficacy of incorporating on-site detention was hydrologically modelled. It was determined that the incorporation of an OSD system would increase the peak discharge, therefore having a negative impact on downstream flooding. The City of Parramatta Councils Stormwater Disposal Policy (December 2020) provides the framework around stormwater disposal and OSD. Multiple objectives and fundamental principles listed within the policy identify that in certain circumstances the provision of OSD is hydrologically not the desired outcome. In keeping with the policy, the provision of an OSD on this project was determined not to be the desired outcome.

A stormwater management strategy based on collection and re-use of roof and surface water was developed. This incorporates a Stormwater tank providing irrigation water for the site satisfying 89% of the irrigation demand, and a rainwater tank providing water for toilet flushing satisfying 80% of the demand. A First flush tank is proposed to separate the contaminated surface runoff prior to collecting it in the Stormwater Tank. The First flush tank is emptied into the channel after treatment together with the overfalows from both the Stormwater Tank and the Rainwater tank.

The proposed water cycle management strategy meets Councils pollutants reduction targets.

Consultation with Council was sought though at the date of compiling this plan it hadn't been successful. It is proposed that as this is a concept application, the following stage detailed design process shall occur with Councils feedback.

The proposed development does not necessitate the incorporation of drainage infrastructure works required to be handed over to the local council or other authority.

Introduction

It is proposed develop the site for affordable housing and build-to-rent comprising approximately 483 dwellings within three freestanding four to eight storey buildings.

The key issues and relevant assessment requirements of the issued State Significant Development Guidelines are listed below:

- Provide an Integrated Water Management Plan for the development that:
    - is prepared in consultation with the local council and any other relevant drainage or water authority.
    - details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures and the nominated discharge points.
    - demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties.
- Where drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority.

The site is located next to an open channel (Figure 1). The Channel drains to Parramatta River. The catchment area upstream of the site is some 245 ha (Figure 2). The catchment is approximately 3.5 km long. The site area is some 1.95ha.

Figure 1, Location

Figure 2, Catchment Map

OSD requirement

Parramatta Council's Stormwater Disposal Policy requires an On Site Detention. The site is located at the bottom of a large catchment and the effectiveness of the OSD was assessed by hydrological modelling. The 245 ha catchment was subdivided into 7 sub-catchments. The rainfall runoff was simulated using DRAINS hydrological model with the design rainfall determined in accordance with the recommendations of ARR2019. The layout of the model is shown on Figure 3, while the results of the hydrological modelling are presented in Table 1.

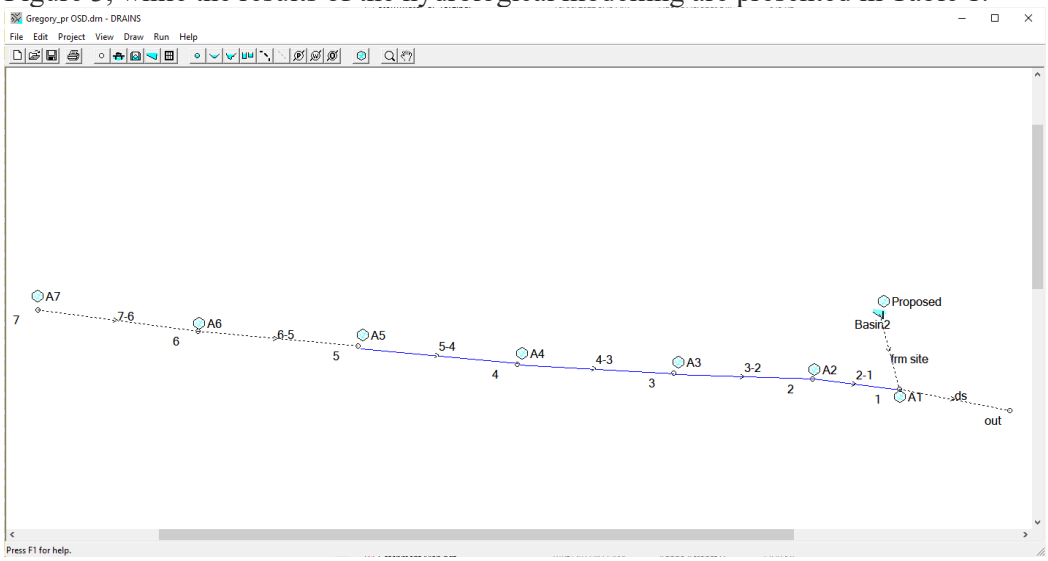


Figure 3, DRAINS model layout

Table 1, DRAINS summary

Sub catchment	area	Tc	d/s channel				Q 5% AEP (m3/s)			Q 1% AEP (m3/s)		
	(ha)	(min)	L (m)	S (%)	width (m)	depth (m)	Exist	pr with OSD	Pr no OSD	Exist	pr with OSD	Pr no OSD
7	38.7	8.3	500	1.3	NA	NA	13.4	13.4	13.4	17.8	17.8	17.8
6	45.6	10	806	1.1	NA	NA	14.5	14.5	14.5	19.2	19.2	19.2
5	63.4	18.2	440	1.36	4.5	3	15.4	15.4	15.4	20.3	20.3	20.3
4	26.7	9.3	490	0.61	5	3	8.92	8.92	8.92	11.8	11.8	11.8
3	24.8	10.8	430	0.47	6	3	7.52	7.52	7.52	10.1	10.1	10.1
2	31.8	15.7	460	0.98	6	3	8.25	8.25	8.25	10.8	10.8	10.8
site	1.95	5					0.834	0.337	0.839	1.07	0.394	1.07
1	12.55	11.9					3.7	3.7	3.7	4.9	4.6	4.9
d/s of site							35.7	36.2	35.7	46	46.3	46

The OSD parameters were determined from Table 1 of the Council's development engineers design guidelines as: SSR=215 m3/ha and PSD = 235 l/s/ha (Clay Cliff Creek Catchment). The results of the hydrological modelling indicate that the provision of the OSD would result in an increase in the peak discharge values downstream of the site from 46 m3/s for existing conditions to 46.3 m3/s with the proposed development with an OSD. The peak discharge values for proposed conditions would remain the same as for existing conditions.

An OSD, in this particular case, would have a negative impact on flooding downstream of the site and therefore was not applied. A stormwater management strategy based on collection and re-use of the roof and surface water was developed instead.

Water Sensitive Urban Design WSUD

The aim of the WSUD strategy is to intercept the runoff from the site and re-use it for irrigation and toilet flushing. The layout of the proposed stormwater drainage system is shown on Figure 4 and Drawing C-3709-01.

A system of pits, grates and pipes is proposed to intercept the surface runoff and collect it into 58m3 First Flush Tank. The FFT would be emptied via 8 "Ocean Protect" Stormfilters before discharging to the Creek. The overflow from the first flush tank would be directed to a 310 m3 Stormwater Tank. The water from the SWT would be used for irrigation of some 5500 m2 of landscaped area. 250 mm /a/m2 were used as irrigation demand or 1400 KL/a.

The SWT would supply 89% of the irrigation demand.

All roof runoff would be collected into a 620 m3 Rainwater Tank. The collected water would be used for toilet flushing in 480 units (25l/U/day). The RWT would satisfy some 80% of the demand.

The overflow from the FFT and RWT would be directed to the concrete lined channel via a 600 mm diameter pipe.

The proposed WSUD strategy was simulated using MUSIC model in accordance with Council's guidelines.

The layout of the catchments used for MUSIC modelling is shown on Figure 5 and Drawing C-3709-02, while the effectiveness of the proposed treatment train is provided in Table 2. The schematic layout of the MUSIC model is shown on Figure 6.

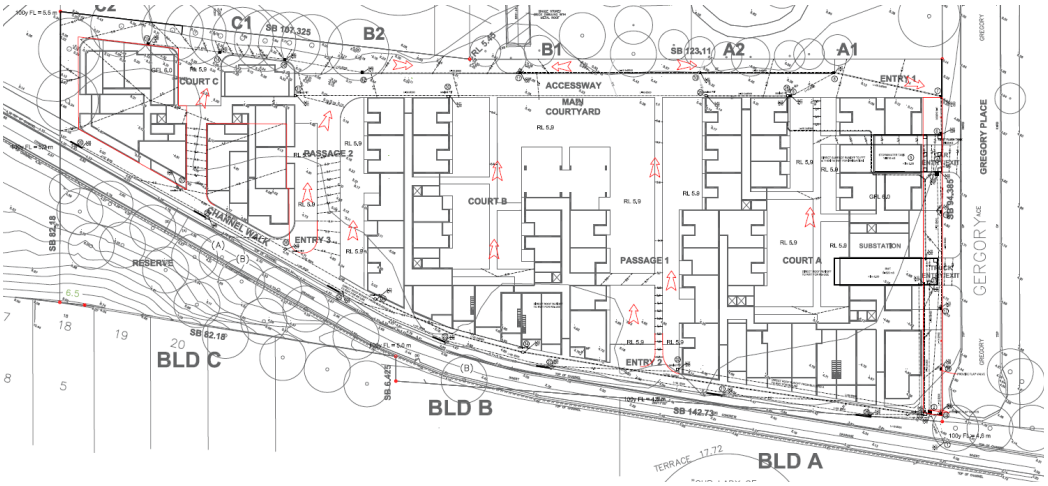


Figure 4, Stormwater drainage system layout (see drawing C-3709-01)(Appendix 1)

Figure 5, MUSIC catchments (Appendix 2)

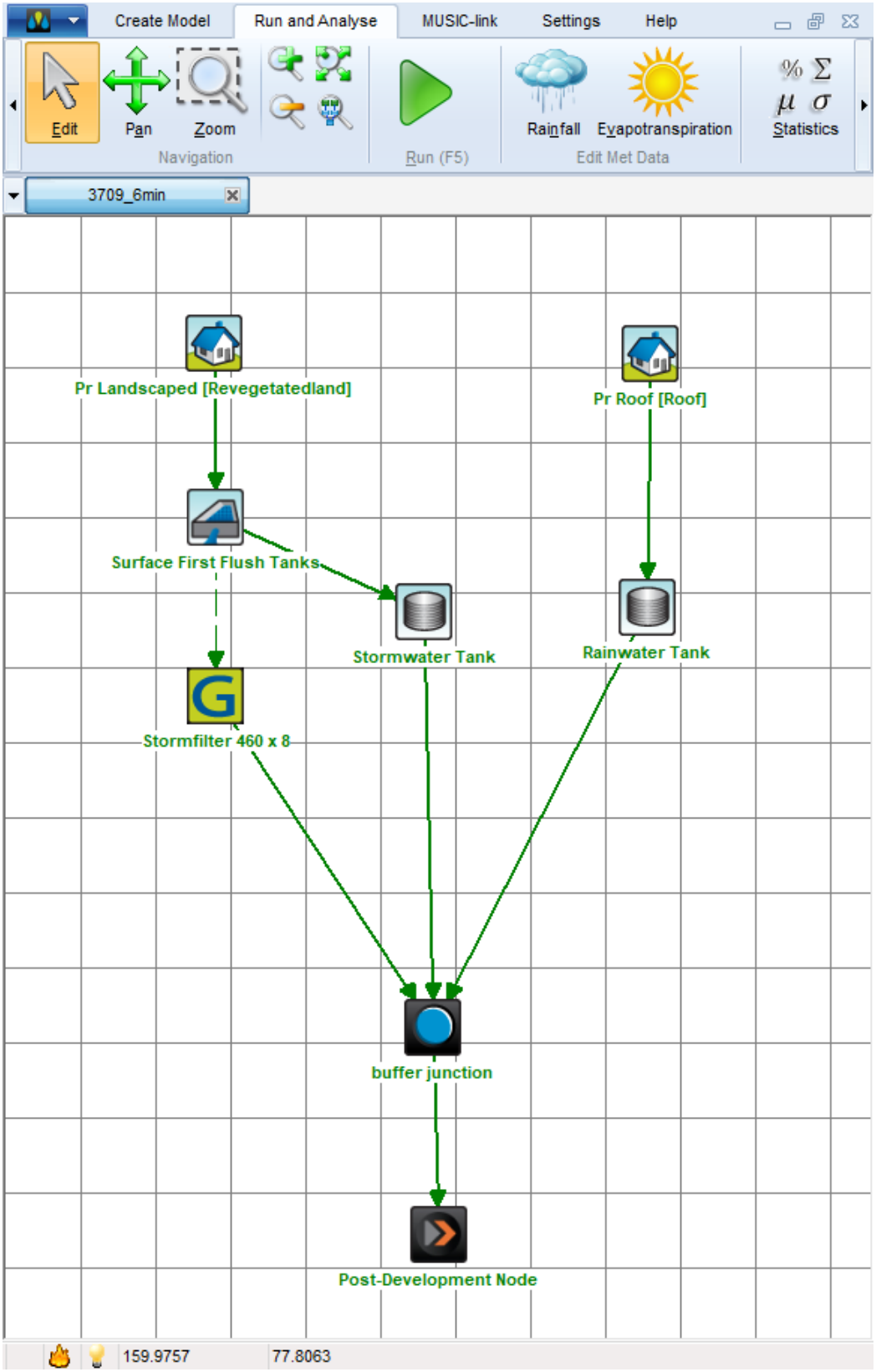


Figure 6, MUSIC schematic layout

Table 2, MUSIC results

	Sources	Residual Load	% Reduction
Flow (ML/yr)	10.7	6	44.1
Total Suspended Solids (kg/yr)	730	105	85.6
Total Phosphorus (kg/yr)	2.14	0.588	72.6
Total Nitrogen (kg/yr)	23.2	8.87	61.7
Gross Pollutants (kg/yr)	302	0	100

The Council's pollutants' reduction targets are defined in Table 3.30 of the Council's DCP and are repeated in Table 3 for clarity.

Table 3 Reduction Targets

Pollutant	Performance Target reduction loads[1]
Gross Pollutants	90% reduction in the post development mean annual load of total gross pollutant load (greater than 5mm)
Total Suspended Solids	85% reduction in the post development mean annual load of Total Suspended Solids (TSS)
Total Phosphorus	60% reduction in the post development mean annual load of Total Phosphorus (TP)
Total Nitrogen	45% reduction in the post development mean annual load of Total Nitrogen (TN)
Hydrocarbons, motor oils, oil and grease	No visible oils for flows up to 50% of the one-year ARI peak flow specific for service stations, depots, vehicle body repair workshops, vehicle repair stations, vehicle sales or hire premises, car parks associated with retail premises, places of public worship, tourist and visitor accommodation, registered clubs and pubs

It can be seen from the MUSIC results that the proposed water cycle management strategy would meet the Council's pollutants' reduction targets.

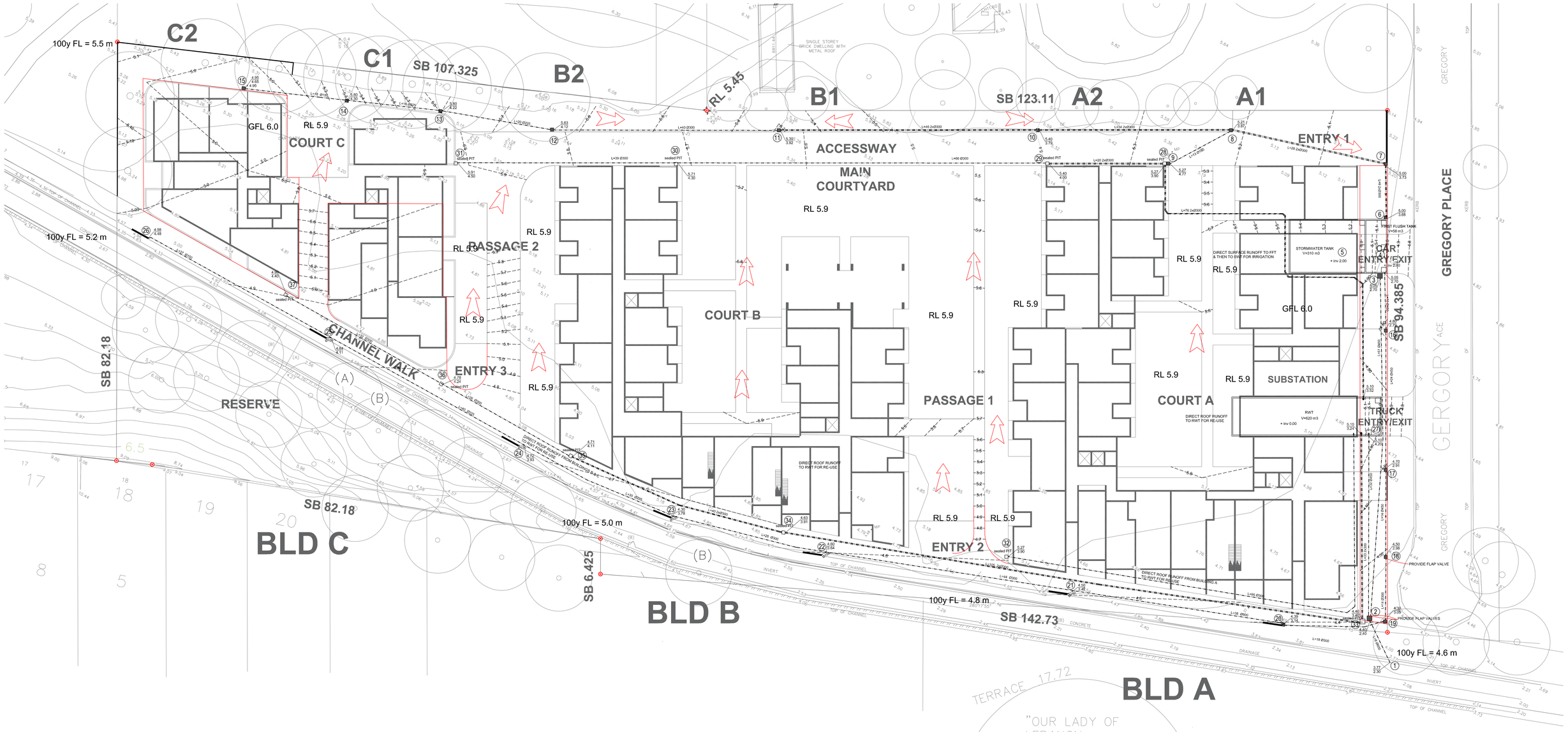
Council Consultation

The author sought to consult with the development engineers within the City of Parramatta. On the 3rd June 2022, the author discussed the proposal with development engineer Luke (surname not recorded) in an attempt to review the OSD and WSUD parameters. The author was informed that the proposal was out of this particular development engineers level of expertise and that he would revert with the appropriate contact once discussed with his manager. At the time of finalising this report the contact details haven't been provided.

This proposal is a multi-staged development currently at the concept stage. This presents multiple opportunities to engage with Council moving forward.

Pavel Kozarovski, MIEAust, CPEng, NER

Appendix 1 – Stormwater Drainage System Layout



LEGEND	
● SDP ● DP	SEALED PVC DOWNPIPE 90 Ø DOWNPIPE
22	EXISTING CONTOUR (m) PROPOSED CONTOUR (m)
Fp● FW◎	SUB_SOIL DRAIANGE FLUSH POINT FLOOR WASTE 250x250 min
L=9 Ø100	STORMWATER DRAINAGE PIPE DIAMETER = 100 mm, 9 m LONG
	SUBSOIL DRAINAGE PIPE (default Ø100mm, min. slope 1%)
23.00 22.50	FINISHED GROUND LEVEL=23.0(m) PIPE INVERT LEVEL=22.5 (m)
+23.17	EXISTING GROUND LEVEL (m)
△23.20	PROPOSED GROUND LEVEL (m)
⊖23.20	TOP OF WALL (m)

NORTH LABEL

Amendments

Issue	Date	Comments
1	8/5/22	for discussion
2	16/06/22	Final
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

CONCEPT STORMWATER DRAINAGE PLAN FOR PROPOSED DEVELOPMENT AT No. 2a GREGORY PLACE HARRIS PARK

GROUND FLOOR

DESIGNED BY: PAVEL KOZAROVSI MIEAus, CPEng, NER 541528

DRAWN BY: P.K.

DRAWING No.C-3709-01

SCALE: 1:250 on A0, 1:500 on A2

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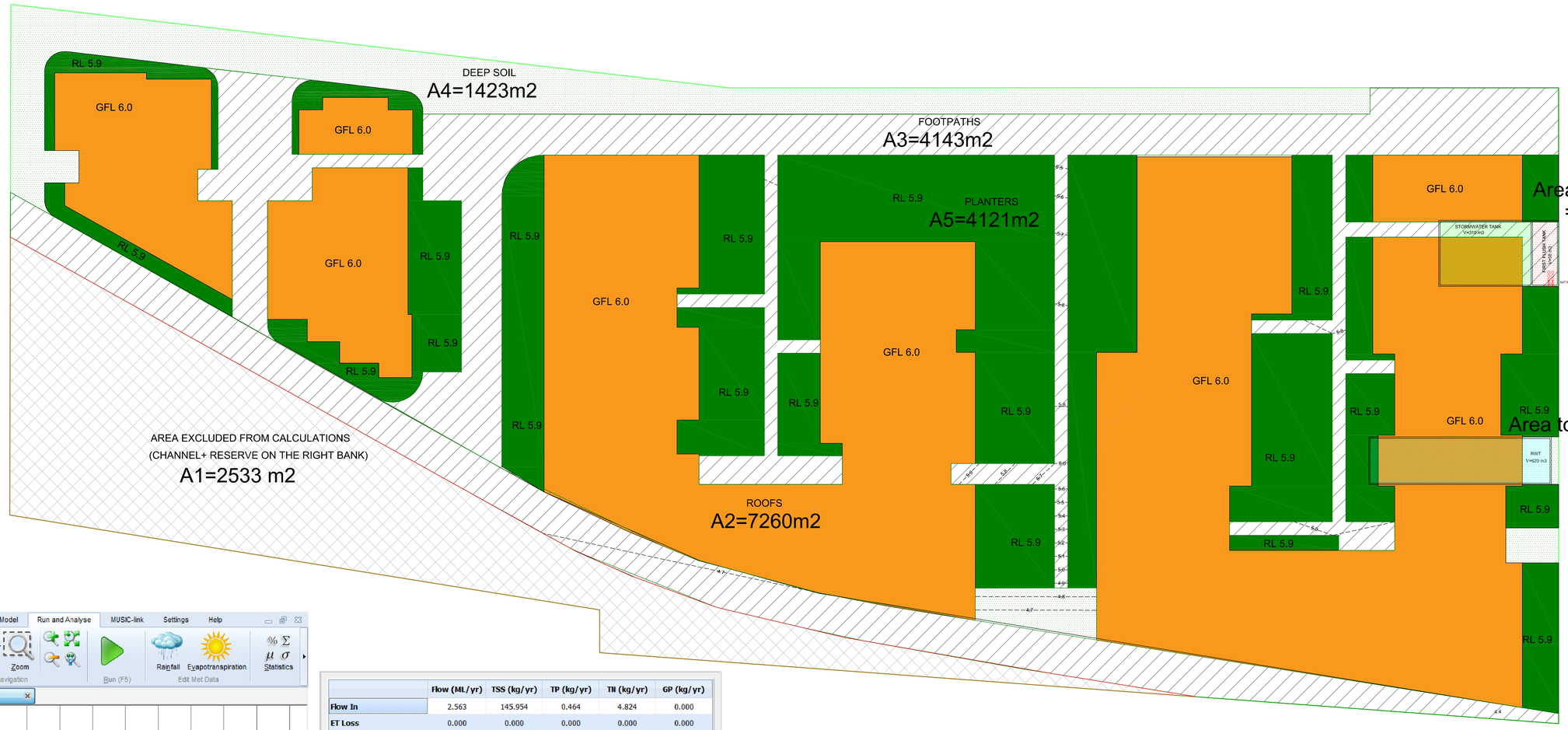
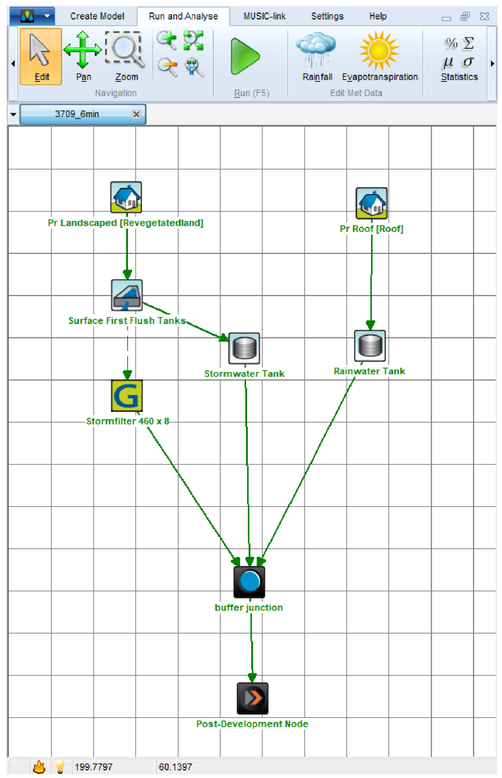
Appendix 2 – MUSIC Catchments

Atotal=19480m2
A1=2533m2
A2=7260m2
A3=4143m2
A4=1423m2
A5=4121m2



Area to SWT=A3+A4+A5=
=9687 m2, 64% IMP.

Area to RWT=A2=7260 m2



	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	2.563	145.954	0.464	4.824	0.000
ET Loss	0.000	0.000	0.000	0.000	0.000
Infiltration Loss	0.000	0.000	0.000	0.000	0.000
Low Flow Bypass Out	0.000	0.000	0.000	0.000	0.000
High Flow Bypass Out	0.000	0.000	0.000	0.000	0.000
Pipe Out	1.332	51.340	0.214	2.422	0.000
Weir Out	0.000	0.000	0.000	0.000	0.000
Transfer Function Out	0.000	0.000	0.000	0.000	0.000
Reuse Supplied	1.242	15.840	0.163	1.873	0.000
Reuse Requested	1.399	0.000	0.000	0.000	0.000
% Reuse Demand Met	88.814	0.000	0.000	0.000	0.000
% Load Reduction	48.008	64.825	53.813	49.789	0.000

Decimal Places 3

	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	5.521	146.485	0.844	12.109	146.518
ET Loss	0.000	0.000	0.000	0.000	0.000
Infiltration Loss	0.000	0.000	0.000	0.000	0.000
Low Flow Bypass Out	0.000	0.000	0.000	0.000	0.000
High Flow Bypass Out	0.000	0.000	0.000	0.000	0.000
Pipe Out	2.054	36.049	0.287	4.085	0.000
Weir Out	0.000	0.000	0.000	0.000	0.000
Transfer Function Out	0.000	0.000	0.000	0.000	0.000
Reuse Supplied	3.483	44.277	0.460	5.927	0.000
Reuse Requested	4.355	0.000	0.000	0.000	0.000
% Reuse Demand Met	79.987	0.000	0.000	0.000	0.000
% Load Reduction	62.787	75.391	65.976	66.267	100.000

Decimal Places 3

	Sources	Residual Load	% Reduction
Flow (ML/yr)	10.7	6	44.1
Total Suspended Solids (kg/yr)	730	105	85.6
Total Phosphorus (kg/yr)	2.14	0.588	72.6
Total Nitrogen (kg/yr)	23.2	8.87	61.7
Gross Pollutants (kg/yr)	302	0	100

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-	-	-
-	-	-
-	-	-
-	-	-

WSUD PLAN FOR
PROPOSED DEVELOPMENT AT
No. 2a GREGORY PLACE HARRIS PARK

DRAWN BY: P.K.

DRAWING No.C-3709-02

SCALE: 1:250 on A0, 1:500 on A2

DESIGNED BY: PAVEL KOZAROVSI
MIEAus, CPEng, NER 541528

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