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17 May 2023

Wu Properti	es		
Charles Hong C/O Bureau S	g SRH	Our Ref:	LTR-001-01-Stormwater Letter.docx
4 Minna Clos	e		
Belrose NSW	2085		
Attention:	Emmy Omagari	Email:	eo@bureausrh.com
Dear Emmy,			

## **RE: 4 MINNA CLOSE, BELROSE – STORMWATER MANAGEMENT**

# 1. Stormwater Management

# 1.1. OSD Requirement

As per Northern Beaches Council's (NBC) Development Control Plan (DCP), On-Site Detention (OSD) is required for the proposed development. The subject site falls within 'Stormwater Region 2' – as per the DCP the requirement within this region is that the site discharge from post-developed site shall not exceed the site discharge from the pre-developed 'state of nature' site for the 20% AEP, 5% AEP and 1% AEP storm events. The table below presents the results of the DRAINS analysis, showing that this requirement is satisfied with the proposed OSD (volume 56m<sup>3</sup>). OSD details are provided in Drawing DAC042 within Appendix A.

Storm Event (AEP)	Pre-Development Site Discharge (m <sup>3</sup> /s)	Post-Development Site Discharge (m <sup>3</sup> /s)
20%	81	79
5%	132	100
1%	193	124

### **Table 1: DRAINS Results**

# 1.2. Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design (WSUD) encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management. WSUD is intended to minimise the impacts of development upon the water cycle and to achieve more sustainable forms of urban development.

The majority of stormwater runoff from the landscape, building and hardstand areas will be directed into water quality treatment devices.

Proprietary treatment devices will treat the water to satisfy NBC's water quality requirements. These devices have been modelled as Ocean Protect Stormfilters and Ocean Protect Oceanguards. By utilising these treatment



devices, stormwater draining from the development will meet the required NBC water quality treatment rates before discharging into Council's stormwater network on Minna Close.

A summary of the required number and position of the treatment devices is indicated within the stormwater drainage plans within Appendix A.

### 1.2.1. WSUD Modelling - Music Model

The MUSIC Model for Urban Stormwater Improvement Conceptualisation (MUSIC X) was used to evaluate pollutants loads from the site.

A conceptual view of the MUSIC model used in this report can be found in Appendix B.

#### **Catchment Areas and Music Parameters**

MUSIC model input parameters for this site included rainfall-runoff, base-flow concentration and storm-flow concentration parameters. The parameters used for the catchment area(s) can be seen in Table 2.

		Urban Mixed	Urban Sealed Road	Urban Roof
Parameter	Unit	Figure	Figure	Figure
Rainfall Threshold	mm/day	0.30	1.50	0.30
Soil Storage Capacity	mm	187.00	187.00	187.00
Initial Storage	% of Capacity	30.00	30.00	30.00
Field Capacity	mm	127.00	127.00	127.00
Infiltration Capacity Coefficient	а	135.00	135.00	135.00
Infiltration Capacity Coefficient	b	4.00	4.00	4.00
Initial Depth (Ground Water)	mm	10.00	10.00	10.00
Daily Recharge Rate	%	10.000	10.000	10.000
Daily Baseflow Rate	%	10.0.00	10.0.00	10.0.00
Daily Seepage Rate	%	0.00	0.00	0.00

Table 2 - Rainfall-Runoff Parameters

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.150	0.320
Phosphorus	-0.850	0.190	-0.600	0.250
Nitrogen	0.110	0.120	0.300	0.190

Table 3: Base Flow/Stormflow Concentration Parameters – Urban Mixed Areas



Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.430	0.320
Phosphorus	-0.850	0.190	-0.300	0.250
Nitrogen	0.110	0.120	0.340	0.190

Table 4: Base Flow/Stormflow Concentration Parameters – Urban Sealed Road Areas

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.430	0.320
Phosphorus	-0.850	0.190	-0.300	0.250
Nitrogen	0.110	0.120	0.340	0.190

Table 5: Base Flow/Stormflow Concentration Parameters – Urban - Roof

## **MUSIC model properties**

MUSIC model input parameters for the SF Chamber and StormFilter are shown in below.
Properties of SF Chamber
Properties of StormFilter
Properties of StormFilter

Location SF Manhole DN2250 (1.6m <sup>2</sup> )	Location 4 x 690 PSorb Stor	nFilter		
Inlet Properties	Inlet Properties			
Low Flow By-pass (cubic metres per sec) 0.00000	Low Flow By-pass (cubic metres per	sec) 0.00000		
High Flow By-pass (cubic metres per sec) 100.0000	High Flow By-pass (cubic metres per	sec) 0.00360		
Storage Properties	STO			
Surface Area (square metres) 0.8				
Extended Detention Depth (metres) 0.77	STORMFILTER TREATMENT CAPACITY VA     THE STANDARD CONFIGURATION IS SHO	RIES BY NUMBER OF FILTER CARTRIDGES WN. ACTUAL CONFIGURATION OF THE SP	ECIFIED STRUCTURE(S)	PER CERTIFYING
Permanent Pool Volume (cubic metres) 0.0	FILTER CARTRIDGES SHALL BE MEDIA-FIL	AL DRAWING(S). .LED, PASSIVE, SIPHON ACTUATED, RADIA	L FLOW, AND SELF-CLE	ANING. RADIAL
Initial Volume (cubic metres)	MEDIA DEPTH SHALL BE 178mm.			1
Exfiltration Rate (mm/br)	CARTRIDGE NAME / SIPHON HEIGHT	(mm) 690	460	310
Evaporative Loss as % of PET 0.00	CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
	TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
Estimate Parameters	CARTRIDGE FLOW RATE FOR 2PG M	EDIA (L/s) 1.6	1.1	0.7
	CARTRIDGE FLOW RATE FOR PSORE	SIMEDIA (L/S) 0.9	0.40	0.59
Outlet Properties				
Equivalent Pipe Diameter (mm) 47	<u>г</u>			
Overflow Weir Width (metres) 2.0				
Notional Detention Time (hrs) 87.9E-3				
Use Custom Outflow and Storage Relationship	T H N STORMALTER			
Define Custom Outflow and Storage Not Defined				
Re-use Fluxes Notes More				
		* FALSE	FLOOR	
		PIT BA	SE	
X Cancel <> Back ✓ Finish	STORMFILTER CARTRIDGE DETAIL			
		OTTAIL DE DE TAIL		

Figure 1: OceanGuard StormFilter Properties

Civil & Structural Engineers | Project Managers | Water Servicing Coordinators

X



### Results

MUSIC modelling results for each stage are presented as mean annual loads at the receiving node indicate that adopted target reductions (as per the NBC DCP) are achieved, as shown in Table 6.

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	Target Reduction (%)
Total Suspended Solids	398.6	53.56	86.56	85
Total Phosphorus	1.071	0.362	66.21	65
Total Nitrogen	10.31	5.222	49.37	45
Gross Pollutants	95.78	1.955	97.96s	90

Table 6 – Overall Site Pollutant Loads

In conclusion, the proposed development at 4 Minna Close, Belrose will meet Council's stormwater management requirements by limiting site discharge to under pre-development flows, and by satisfying the water quality targets as specified in the DCP.

Should you have any questions, please don't hesitate to contact the undersigned.

Yours sincerely,

Suzanne Mustafa Senior Civil Engineer



# APPENDIX A CIVIL DEVELOPMENT APPLICATION DRAWINGS



# APPENDIX B MUSIC X SNAPSHOT AND RESULTS

