XAVIER KNIGHT

STORMWATER MANAGEMENT REPORT

For

East End Stage 3&4, Newcastle

Project Number 220901
Date 31/03/2023

Prepared for: Iris Capital

QUALITY CONTROL REGISTER
This report has been prepared and checked as per below.

	Name	Signature	Date
Report Author:	Ali Akel		31/03/23
Checked by:	Scott Sharma		31/03/23
Authorised by:	Scott Sharma		31/03/23

DOCUMENT SUMMARY

Project Number: 220901
Project Name: East End Stage 3&4
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XK Project Director: Scott Sharma

Status	Issue	Date	Prepared By	Approved By
Development Application	A	31.03.2023	Ali Akel	Scott Sharma

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1 INTRODUCTION

1.1 BACKGROUND

This Stormwater management Report has been prepared by Xavier Knight Consulting Engineers (XK) to accompany the Development Application (DA) for the proposed East End Stages 3 & 4 on behalf of Iris Capital.

1.2 PROPOSED DEVELOPMENT

The existing building within the development site will be demolished and replaced with proposed multi-story mixed used developments.

The stage 3 development includes 3 shared Basement levels, a shared podium an 8 Storeys on building 3W , 10 Storeys on the building 3S and 2 Storeys on the building 3N.

The stage 4 development consists of 9 Storeys and 3 Basement levels on the building 4S and 8 Levels with no basement on building 4N.
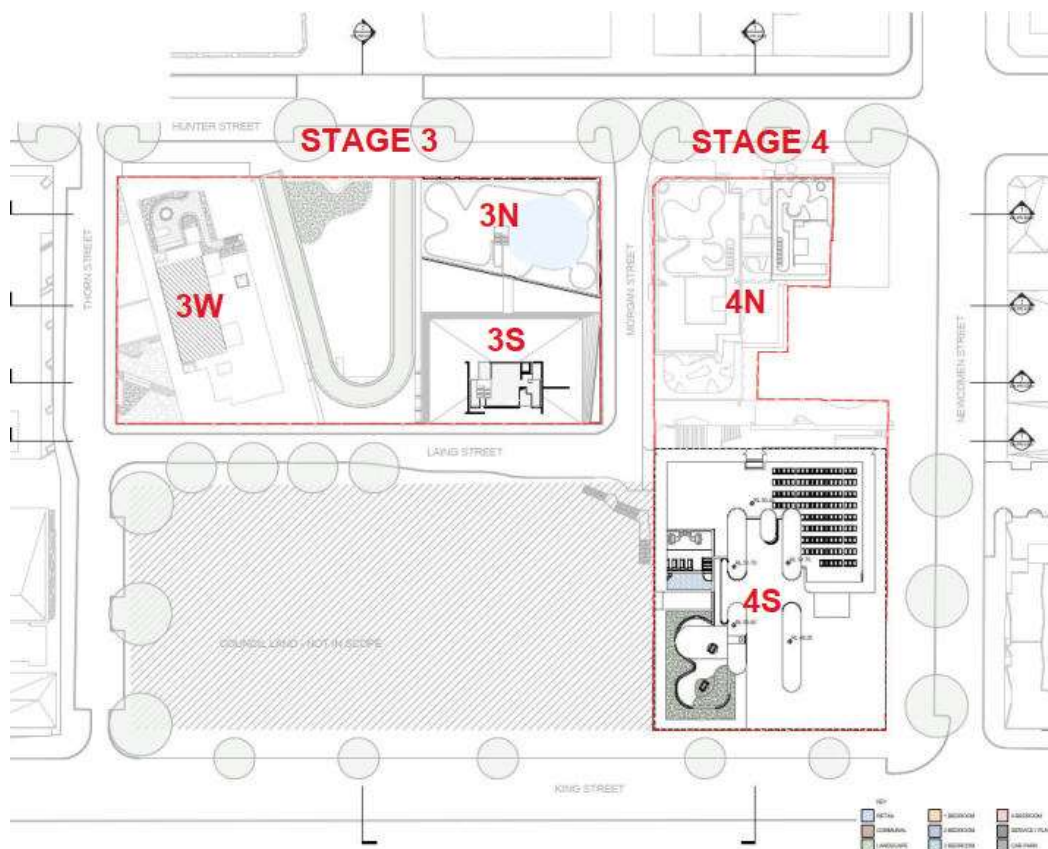

Figure 1 - Site Plan

2 STORMWATER MANAGEMENT

Storm water design has been carried out in accordance with Newcastle City Council (NCC) DCP 2012 Section 7.06 and the Stormwater and Water Efficiency for Development Technical Manual (April 2019).

2.1 BUILDING DRAINAGE

For ground floor levels and above, the design intent is to collect stormwater through rainwater outlets located on roofs, balconies and the podium levels. Runoff from non-trafficable areas will be discharged into stormwater tanks sized in accordance with DCP Section 7.06. Refer to Section 2.2 of this report for further details on tank sizing.

Nuisance stormwater in the basement levels will be collected using pits and rainwater outlets. Basement levels that are not able to discharge to the street system through gravity will be taken to pump-outs located in the lowest basement levels which will discharge rainwater to a boundary silt arrestor pit before being discharged to Council's stormwater system.

New stormwater is also being proposed on streets to connect the building runoff to Council's underground system. Refer to the "Infrastructure Services Report" for further discussion on street stormwater drainage.

2.2 STORMWATER STORAGE

Three tanks have been proposed have been proposed. Tank 1 will store the required rainwater volume for the Stage 3 Development, Tanks 2 and 3 will store the requires volumes for 4S and 4N respectively in accordance with DCP Section 7.06:

	Site Area (m²)	Percent Impervious (%)	Rainfall Storage Required (mm)	Storage Required (m³)	Storage Provided (m³)
Tank 1	3375	100	25	84.4	90
Tank 2	2144	100	25	53.6	60
Tank 3	1042	94	23.4	24.4	30

Rainwater stored in the tanks will be re-used for retail toilet flushing and irrigation purposes.

2.3   WATER QUALITY

Rainwater captured from the ground floor level and above will undergo water quality treatment while basement nuisance runoff will bypass water quality treatment before being discharged to Council's stormwater system.

The water quality treatment train for stages 3 and 4 consist of Oceanprotect OceanGuard® baskets as a primary treatment as well as Oceanprotect StormFilter® Cartridges as tertiary treatment.

In accordance with DCP Section 7.06, the water quality targets for the developments are as follows:

- 85% reduction in the average annual load of Total Suspended Solids.
- 45% reduction in the average annual load of Total Nitrogen.
- 65% reduction in the average annual load of Total Phosphorus.
- 90% reduction in the average annual load of Gross Pollutants (>5mm).
- 100% Hydrocarbons removal.

The stormwater treatment trains were modelled in MUSIC 6.3 and are displayed in the figures below:

Treatment Train Effectiveness - Receiving Node [TSS 85% TP 65% TN 45%]			
	Sources	Residual Load	% Reduction
Flow (ML/yr)	3.31	3.26	1.4
Total Suspended Solids (kg/yr)	455	47.9	89.5
Total Phosphorus (kg/yr)	1.05	0.366	65
Total Nitrogen (kg/yr)	8.72	4.35	50.1
Gross Pollutants (kg/yr)	89.7	0	100
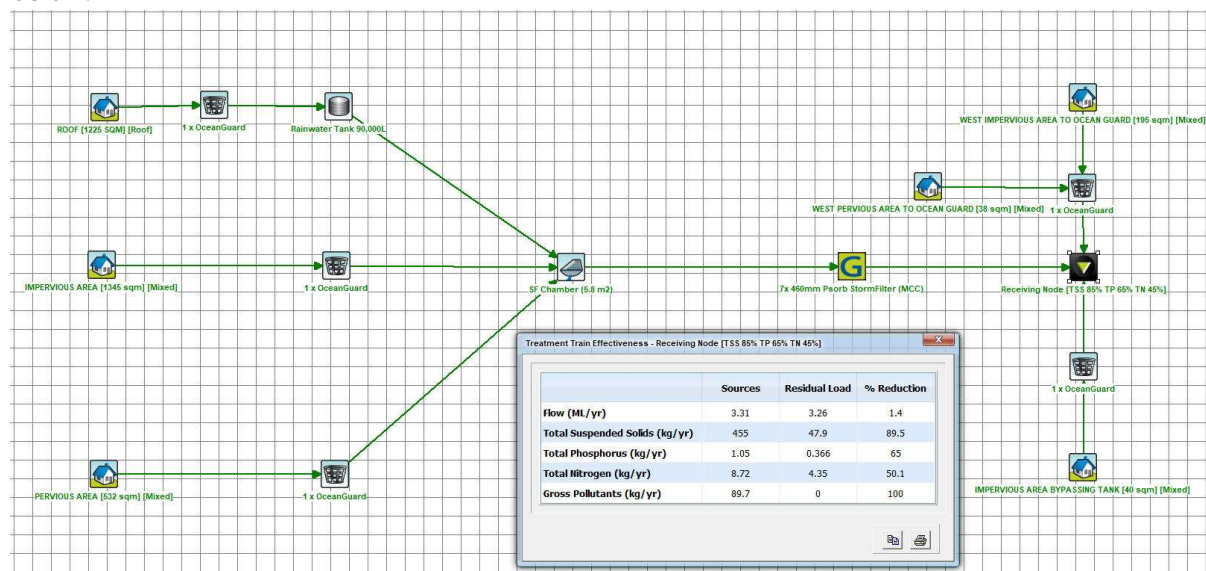
Figure 2 - Stage 3 Treatment Train

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.821	0.793	3.4
Total Suspended Solids (kg/yr)	122	11.3	90.7
Total Phosphorus (kg/yr)	0.273	0.0608	77.7
Total Nitrogen (kg/yr)	2.18	0.908	58.3
Gross Pollutants (kg/yr)	21.8	0.819	96.3

Figure 3- Stage 4N Treatment Train

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.37	2.37	0.3
Total Suspended Solids (kg/yr)	277	26.5	90.4
Total Phosphorus (kg/yr)	0.677	0.209	69.1
Total Nitrogen (kg/yr)	6.03	2.62	56.6
Gross Pollutants (kg/yr)	64.3	0.342	99.5

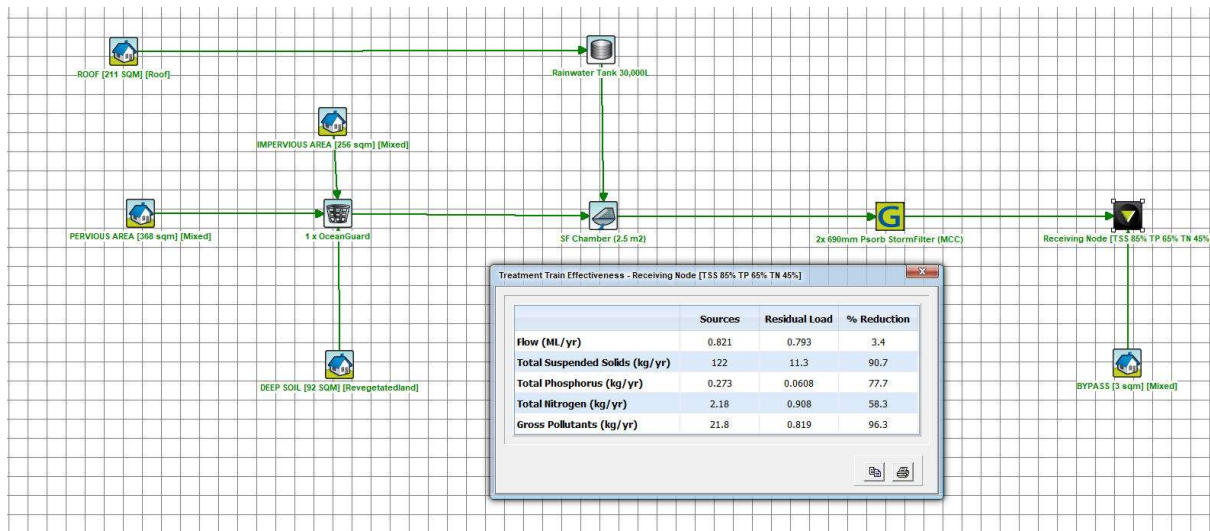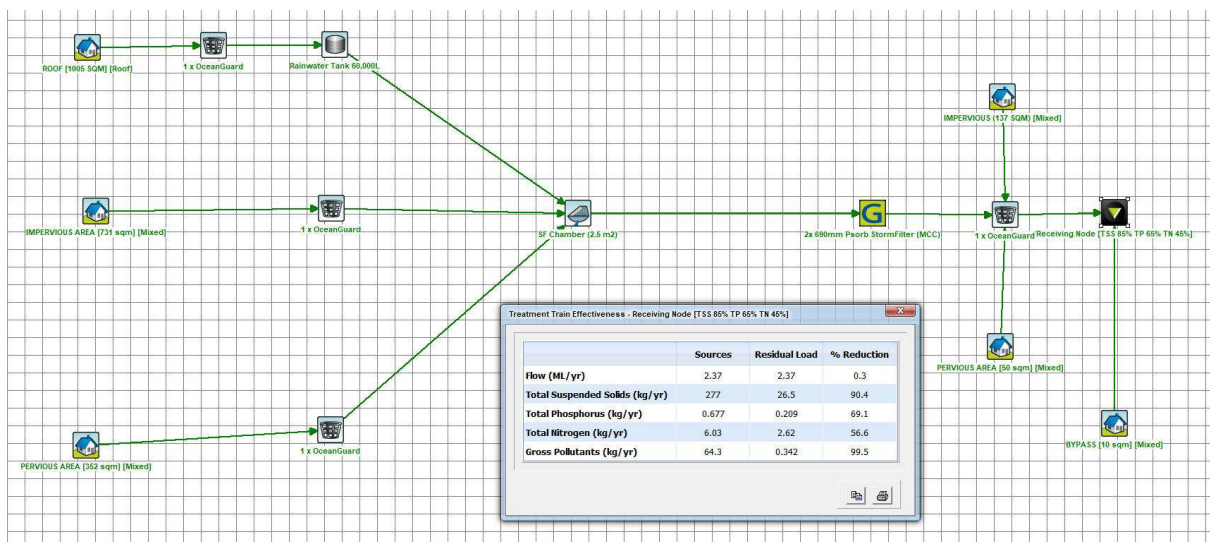**Figure 4 - Stage 4S Treatment Train**

MUSIC-Link reports have been generated for each of the models showing compliance with Council requirements and are presented in Appendix A of this report

2.4   FLOODING

For a discussion of the catchment context and upstream catchment flow analysis, refer to the "Upstream Catchment Report" Issue A prepared by Xavier Knight for this DA.

3 CONCLUSION

Building drainage is being collected from the buildings through gravity and from the basements through pump out systems.
Three stormwater tanks have been provided to collect roof rainwater and sized in accordance with Newcastle DCP Section 7.06. Stormwater further undergoes water quality treatment to meet Council's targets before being discharged into the street system.

Disclaimer
Xavier Knight Consulting Engineers gives notice that the particulars set out in this report are for the exclusive use of Client and that no responsibility or liability is accepted as a result of the use of this report by any other party. This report shall not be construed as a certificate or warranty.

For and on behalf of the Xavier Knight team.
Kind regards,

Scott Sharma
PROJECT DIRECTOR

APPENDIX A – MUSICLINK REPORTS

THE CITY OF NEWCASTLE

MUSIC-*link* Report

Project Details		Company Details	
Project:	EAST END STAGE 3	**Company:**	XAVIER KNIGHT
Report Export Date:	30/03/2023	**Contact:**	ALI AKEL
Catchment Name:	220901- 3W&E-460PSORB - MUSIC	**Address:**	210 CLARENCE STREET, SYDNEY, NSW 2000
Catchment Area:	0.338ha	**Phone:**	02 8810 5800
Impervious Area*:	95.02%	**Email:**	info@xavierknight.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:	6.34		
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		Treatment Nodes		Source Nodes	
Node: Receiving Node [TSS 85% TP 65% TN 45%]	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	1.44%	Sedimentation Basin Node	1	Urban Source Node	6
TSS	89.5%	Rain Water Tank Node	1		
TP	65%	GPT Node	5		
TN	50.1%	Generic Node	1		
GP	100%				

Comments

The Sedimentation Basin Node used is the default node supplied by OceanProtect for the modelling of the Storm Filter Cartridges.

NOTE: A successful self-validation check of your model does not constitute an approved model by The City of Newcastle
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Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
Rain	Rainwater Tank 90_000L	% Reuse Demand Met	70	None	100
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	% Load Reduction	None	None	1.44
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	GP % Load Reduction	90	None	100
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TN % Load Reduction	45	None	50.1
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TP % Load Reduction	65	None	65
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TSS % Load Reduction	85	None	89.5
Sedimentation	SF Chamber (5.8 m2)	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber (5.8 m2)	Hi-flow bypass rate (cum/sec)	None	None	100
Sedimentation	SF Chamber (5.8 m2)	High Flow Bypass Out (ML/yr)	None	None	0
Urban	IMPERVIOUS AREA [1345 sqm]	Area Impervious (ha)	None	None	0.135
Urban	IMPERVIOUS AREA [1345 sqm]	Area Pervious (ha)	None	None	0
Urban	IMPERVIOUS AREA [1345 sqm]	Total Area (ha)	None	None	0.135
Urban	IMPERVIOUS AREA BYPASSING TANK [40 sqm]	Area Impervious (ha)	None	None	0.004
Urban	IMPERVIOUS AREA BYPASSING TANK [40 sqm]	Area Pervious (ha)	None	None	0
Urban	IMPERVIOUS AREA BYPASSING TANK [40 sqm]	Total Area (ha)	None	None	0.004
Urban	PERVIOUS AREA [532 sqm]	Area Impervious (ha)	None	None	0.037
Urban	PERVIOUS AREA [532 sqm]	Area Pervious (ha)	None	None	0.015
Urban	PERVIOUS AREA [532 sqm]	Total Area (ha)	None	None	0.053
Urban	ROOF [1225 SQM]	Area Impervious (ha)	None	None	0.122
Urban	ROOF [1225 SQM]	Area Pervious (ha)	None	None	0
Urban	ROOF [1225 SQM]	Total Area (ha)	None	None	0.122
Urban	WEST IMPERVIOUS AREA TO OCEAN GUARD [195 sqm]	Area Impervious (ha)	None	None	0.02
Urban	WEST IMPERVIOUS AREA TO OCEAN GUARD [195 sqm]	Area Pervious (ha)	None	None	0
Urban	WEST IMPERVIOUS AREA TO OCEAN GUARD [195 sqm]	Total Area (ha)	None	None	0.02
Urban	WEST PERVIOUS AREA TO OCEAN GUARD [38 sqm]	Area Impervious (ha)	None	None	0.002
Urban	WEST PERVIOUS AREA TO OCEAN GUARD [38 sqm]	Area Pervious (ha)	None	None	0.001
Urban	WEST PERVIOUS AREA TO OCEAN GUARD [38 sqm]	Total Area (ha)	None	None	0.004

Only certain parameters are reported when they pass validation

NOTE: A successful self-validation check of your model does not constitute an approved model by The City of Newcastle
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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber (5.8 m2)	Notional Detention Time (hrs)	8	12	0.164
Sedimentation	SF Chamber (5.8 m2)	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber (5.8 m2)	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber (5.8 m2)	Total Suspended Solids - k (m/yr)	8000	8000	1

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THE CITY OF NEWCASTLE

MUSIC-*link* Report

Project Details

Project:	EAST END STAGE 4N
Report Export Date:	30/03/2023
Catchment Name:	220901- 4N-MUSIC
Catchment Area:	0.095ha
Impervious Area*:	78.87%
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:	6.34
Study Area:	Newcastle
Scenario:	Newcastle

Company Details

Company:	XAVIER KNIGHT
Contact:	ALI AKEL
Address:	210 CLARENCE STREET, SYDNEY, NSW 2000
Phone:	02 8810 5800
Email:	info@xavierknight.com.au

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

Treatment Train Effectiveness

Node: Receiving Node [TSS 85% TP 65% TN 45%]	Reduction
Flow	3.41%
TSS	90.7%
TP	77.7%
TN	58.3%
GP	96.3%

Treatment Nodes

Node Type	Number
Sedimentation Basin Node	1
Rain Water Tank Node	1
GPT Node	1
Generic Node	1

Source Nodes

Node Type	Number
Urban Source Node	5

Comments

The Sedimentation Basin Node used is the default node supplied by OceanProtect for the modelling of the Storm Filter Cartridges.

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Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
Rain	Rainwater Tank 30_000L	% Reuse Demand Met	70	None	100
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	% Load Reduction	None	None	3.41
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	GP % Load Reduction	90	None	96.3
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TN % Load Reduction	45	None	58.3
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TP % Load Reduction	65	None	77.7
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TSS % Load Reduction	85	None	90.7
Sedimentation	SF Chamber (2.5 m2)	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber (2.5 m2)	Hi-flow bypass rate (cum/sec)	None	None	100
Sedimentation	SF Chamber (2.5 m2)	High Flow Bypass Out (ML/yr)	None	None	0
Urban	BYPASS [3 sqm]	Area Impervious (ha)	None	None	0.003
Urban	BYPASS [3 sqm]	Area Pervious (ha)	None	None	0
Urban	BYPASS [3 sqm]	Total Area (ha)	None	None	0.003
Urban	DEEP SOIL [92 SQM]	Area Impervious (ha)	None	None	0
Urban	DEEP SOIL [92 SQM]	Area Pervious (ha)	None	None	0.009
Urban	DEEP SOIL [92 SQM]	Total Area (ha)	None	None	0.009
Urban	IMPERVIOUS AREA [256 sqm]	Area Impervious (ha)	None	None	0.025
Urban	IMPERVIOUS AREA [256 sqm]	Area Pervious (ha)	None	None	0
Urban	IMPERVIOUS AREA [256 sqm]	Total Area (ha)	None	None	0.025
Urban	PERVIOUS AREA [368 sqm]	Area Impervious (ha)	None	None	0.025
Urban	PERVIOUS AREA [368 sqm]	Area Pervious (ha)	None	None	0.011
Urban	PERVIOUS AREA [368 sqm]	Total Area (ha)	None	None	0.037
Urban	ROOF [211 SQM]	Area Impervious (ha)	None	None	0.021
Urban	ROOF [211 SQM]	Area Pervious (ha)	None	None	0
Urban	ROOF [211 SQM]	Total Area (ha)	None	None	0.021

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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber (2.5 m2)	Notional Detention Time (hrs)	8	12	0.211
Sedimentation	SF Chamber (2.5 m2)	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber (2.5 m2)	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber (2.5 m2)	Total Suspended Solids - k (m/yr)	8000	8000	1

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MUSIC-*link* Report

Project Details		Company Details	
Project:	EAST END STAGE 4S	**Company:**	XAVIER KNIGHT
Report Export Date:	30/03/2023	**Contact:**	ALI AKEL
Catchment Name:	220901- 4S-MUSIC	**Address:**	210 CLARENCE STREET, SYDNEY, NSW 2000
Catchment Area:	0.242ha	**Phone:**	02 8810 5800
Impervious Area*:	95.11%	**Email:**	info@xavierknight.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:	6.34		
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		Treatment Nodes		Source Nodes	
Node: Receiving Node [TSS 85% TP 65% TN 45%]	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	0.283%	Sedimentation Basin Node	1	Urban Source Node	6
TSS	90.4%	Rain Water Tank Node	1		
TP	69.1%	GPT Node	4		
TN	56.6%	Generic Node	1		
GP	99.5%				

Comments

The Sedimentation Basin Node used is the default node supplied by OceanProtect for the modelling of the Storm Filter Cartridges.

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Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
Rain	Rainwater Tank 60_000L	% Reuse Demand Met	70	None	100
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	% Load Reduction	None	None	0.283
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	GP % Load Reduction	90	None	99.5
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TN % Load Reduction	45	None	56.6
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TP % Load Reduction	65	None	69.1
Receiving	Receiving Node [TSS 85% TP 65% TN 45%]	TSS % Load Reduction	85	None	90.4
Sedimentation	SF Chamber (2.5 m2)	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber (2.5 m2)	Hi-flow bypass rate (cum/sec)	None	None	100
Sedimentation	SF Chamber (2.5 m2)	High Flow Bypass Out (ML/yr)	None	None	0
Urban	BYPASS [10 sqm]	Area Impervious (ha)	None	None	0.001
Urban	BYPASS [10 sqm]	Area Pervious (ha)	None	None	0
Urban	BYPASS [10 sqm]	Total Area (ha)	None	None	0.001
Urban	IMPERVIOUS (137 SQM)	Area Impervious (ha)	None	None	0.014
Urban	IMPERVIOUS (137 SQM)	Area Pervious (ha)	None	None	0
Urban	IMPERVIOUS (137 SQM)	Total Area (ha)	None	None	0.014
Urban	IMPERVIOUS AREA [731 sqm]	Area Impervious (ha)	None	None	0.073
Urban	IMPERVIOUS AREA [731 sqm]	Area Pervious (ha)	None	None	0
Urban	IMPERVIOUS AREA [731 sqm]	Total Area (ha)	None	None	0.073
Urban	PERVIOUS AREA [352 sqm]	Area Impervious (ha)	None	None	0.024
Urban	PERVIOUS AREA [352 sqm]	Area Pervious (ha)	None	None	0.010
Urban	PERVIOUS AREA [352 sqm]	Total Area (ha)	None	None	0.035
Urban	PERVIOUS AREA [50 sqm]	Area Impervious (ha)	None	None	0.003
Urban	PERVIOUS AREA [50 sqm]	Area Pervious (ha)	None	None	0.001
Urban	PERVIOUS AREA [50 sqm]	Total Area (ha)	None	None	0.005
Urban	ROOF [1005 SQM]	Area Impervious (ha)	None	None	0.114
Urban	ROOF [1005 SQM]	Area Pervious (ha)	None	None	0
Urban	ROOF [1005 SQM]	Total Area (ha)	None	None	0.114

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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber (2.5 m2)	Notional Detention Time (hrs)	8	12	0.211
Sedimentation	SF Chamber (2.5 m2)	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber (2.5 m2)	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber (2.5 m2)	Total Suspended Solids - k (m/yr)	8000	8000	1

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