



# Integrated Water Cycle Management Report

Sutherland Entertainment Centre

30 Eton Street, Sutherland NSW 2232

## Revision History

REVISION	DATE	BY	CHECKED	COMMENTS
A	2020.01.15	SD	BM	DRAFT
B	2020.02.19	SD	SMcM	Final

The recipient of the latest issue as noted above will be responsible for superseding/destroying all previous documents.

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# 1. Introduction

JN has been engaged to complete the Stormwater Drainage Design and Documentation for the proposed refurbishment of the Sutherland Entertainment Centre.

This report outlines the Water Sensitive Urban Design (WSUD) measures and controls implemented in the design of the stormwater infrastructure servicing the proposed development to meet the requirements of Sutherland Shire Council's Stormwater Management DCP and SEARs requirements item 9.

The proposed development is intended to connect to Council's stormwater system via the existing connection to a kerb inlet pit on Merton Street as shown on Stormwater plans prepared by JN. WSUD targets specified by Sutherland Shire Council therefore need to be adhered to.

JN has completed MUSIC modelling of the proposed development and its associated integrated water cycle management measures to demonstrate that the design includes water conservation and management measures.



## 2. Existing Site

The existing site is approximately 4050m<sup>2</sup> in area and is situated between Eton Street to the West and Merton Street to the East. In its current state, the site is occupied by the existing Sutherland Entertainment Centre building.



Figure 1. Existing Site (Nearmap January 2020)

### 3. Proposed Development

The proposed development consists of a major refurbishment of the existing building, along with landscaping to the existing neighbouring Peace Park. The works include:

- refurbished main theatre with reconfigured fixed seating for 700
- improved wings, stage and new staging system suitable for major theatrical productions
- improved back of house
- new flexible teaching and rehearsal space
- fresh foyer and front of house with improved customer experience
- new entry forecourt and flexible outdoor event space
- new cafe/restaurant for 75 diners (can be expanded to 150)
- enhanced accessibility
- upgrade of building fabric and services including BCA compliance works
- improved energy performance and ecological sustainability
- enhanced interaction with the adjoining park and the public domain



Figure 2. Proposed Development

## 4. Integrated Water Cycle Management

The following IWCM strategies have been implemented in design:

- Water collection and recycling system for capturing and reusing roof water for irrigation.
- Control of the quantity of stormwater discharge through design of an adequate On-Site Detention (OSD) system
- Control of the quality of stormwater discharge through design of an adequate water quality treatment system

Stormwater drainage plans have been prepared by JN. These plans outline the extent and details of the above strategies including, but not limited to:

- Stormwater pits and pipes
- Subsoil drainage
- OSD system
- Rainwater tank
- Water quality treatment devices
- Basement pump-out system
- Roof drainage collection system
- Connection to Council's stormwater system

### 4.1. Water Collection and Reuse

The proposed development is to achieve water usage targets by using a minimum of AAA rated water fixtures and appliances which are all to have a minimum 5-star water rating.

The collection of 1500m<sup>2</sup> of roof drainage in a 25kL rainwater tank serves as both a WSUD treatment measure as well as a water usage control. Rainwater is to be collected and used for irrigation of the communal landscaped areas and neighbouring Peace Park. The rainwater tank size has been determined through MUSIC modelling, using a standard reuse rate of 0.4kL/m<sup>2</sup>/year for irrigation of approximately 1500m<sup>2</sup> of area in the neighbouring Peace Park. Using this combination of reuse, roof area and tank storage an efficiency of approximately 70% has been achieved, satisfying DCP targets.

### 4.2. Stormwater Quality

The site stormwater runoff is collected and conveyed through a series of pipes to a treatment chamber that houses a system of filters. Details on the proposed water treatment filters can be found in Appendix B. Drainage is then stored in an OSD tank before being released at a controlled rate into Council's stormwater system. The Peace Park stormwater system is to remain in line with existing, separate from the main entertainment centre building system.

Modelling of the proposed system has been undertaken in MUSIC. The results of this modelling are outlined in Figure 3 and Table 1 below.



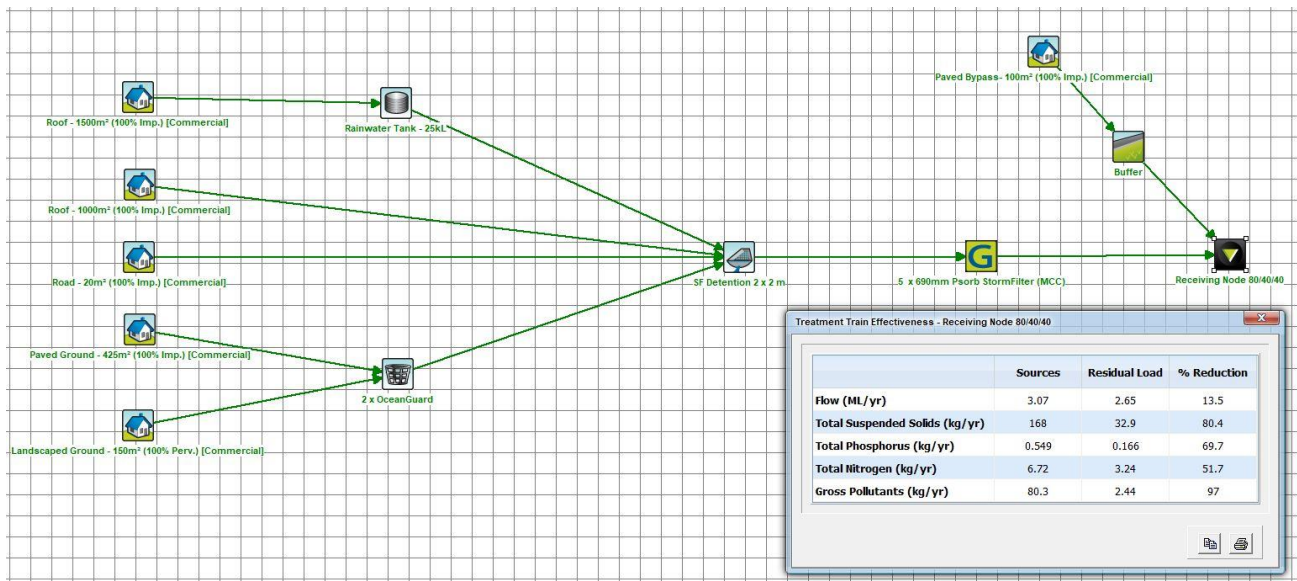


Figure 3. MUSIC Model

Table 1. MUSIC Model Results

	SOURCE LOAD	RESIDUAL LOAD	% REDUCTION ACHIEVED	% REDUCTION REQUIRED	COMPLIANCE WITH TARGETS
TOTAL SUSPENDED SOLIDS (TSS KG/YR)	168	32.9	80.4	80	YES
TOTAL PHOSPHOROUS (TP KG/YR)	0.549	0.166	69.7	40	YES
TOTAL NITROGEN (TN KG/YR)	6.72	3.24	51.7	40	YES

### 4.3. Wastewater

All existing sanitary drainage within the building is to be made redundant and removed and replaced with a new sanitary drainage system. The drainage system shall discharge via a gravity drainage system through the building's internal sewer system, and shall make connection to the existing Sydney Water Sewer system main in Merton Street. No on-site wastewater treatment is proposed or deemed necessary due to the location and nature of the site.



## 4.4. Stormwater Quantity

Sutherland Shire Council DCP (2015) – Chapter 37 *Stormwater Management* requires that stormwater runoff be collected and stored in an OSD system before being released at a controlled rate to Council stormwater system. The OSD is to be sized for all events through to 100yr ARI.

A DRAINS model has been completed to size the OSD system using ARR2019 methods and rainfall data. The results are outlined in Table 2.

Table 2. OSD Design - DRAINS

Pre Development Site Discharge	190 L/s
Post Development Site Discharge without OSD	197 L/s
Volume Required in DRAINS	4.5 m <sup>3</sup>
Volume Provided	5.8 m <sup>3</sup>
Controlled Post Development Site Discharge (100yr ARI)	189 L/s
OSD Depth (internal)	1.7 m
Outlet Pipe Size	300mm RCP @ 1% min.
Orifice Size	NA (no orifice)

## 5. Conclusion

Based on the information presented in this report, it has been demonstrated that the principles of integrated water cycle management have been incorporated into the design and operation of the proposed refurbishment of the Sutherland Entertainment Centre at 30 Eton Street Sutherland in accordance with Sutherland Shire Council DCP 2015. The development achieves reductions in water usage through the use of efficient fixtures and appliances as well as the capture and reuse of rainwater. The development also achieves water quality targets through adequate stormwater treatment and sufficiently controls the discharge of stormwater into Councils system through an appropriately sized OSD in accordance with the requirements of the DCP.

For and on behalf of JN,

**Prepared by:**



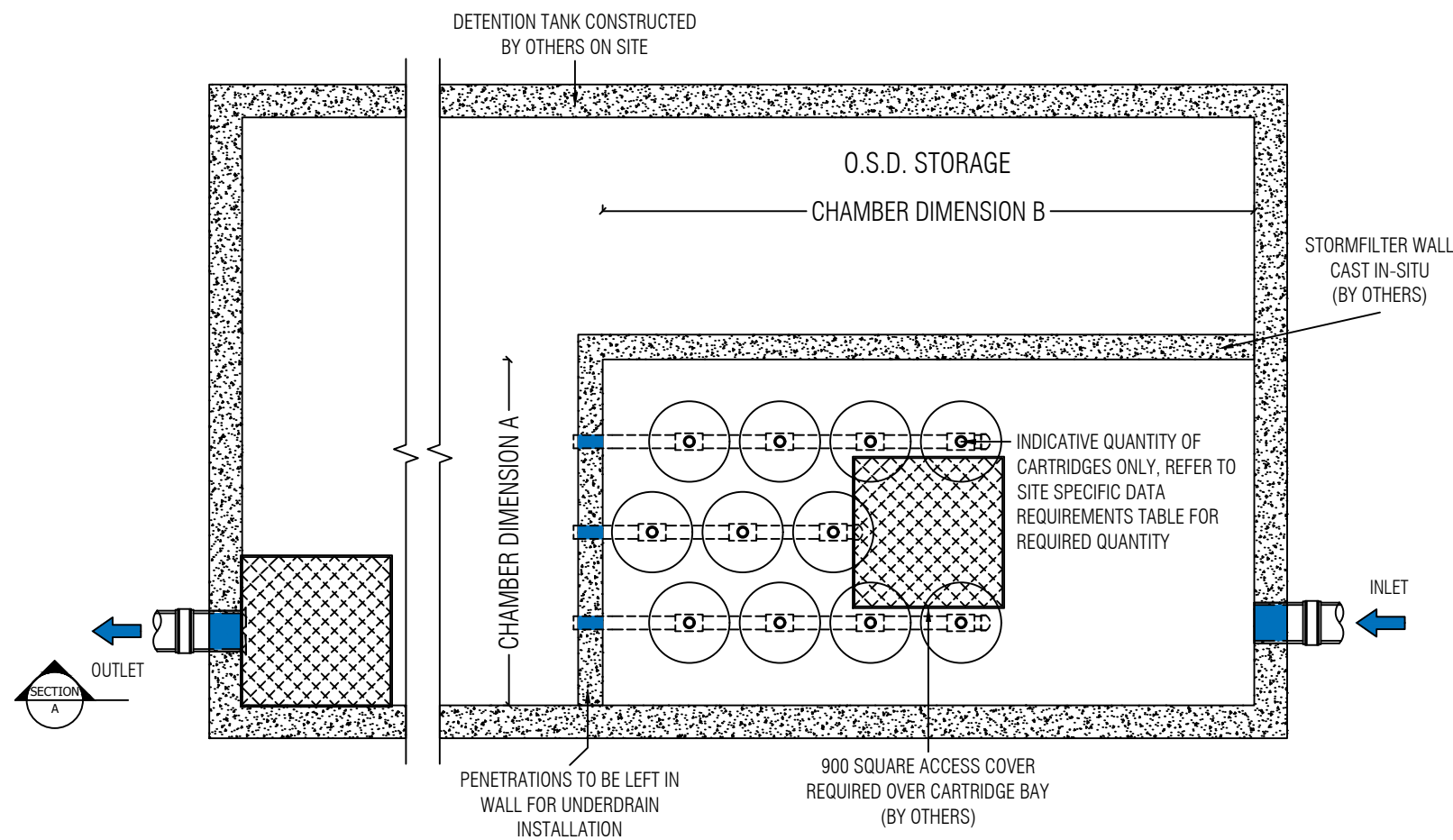
Stephanie Dahan  
Civil Engineer

**Reviewed by:**

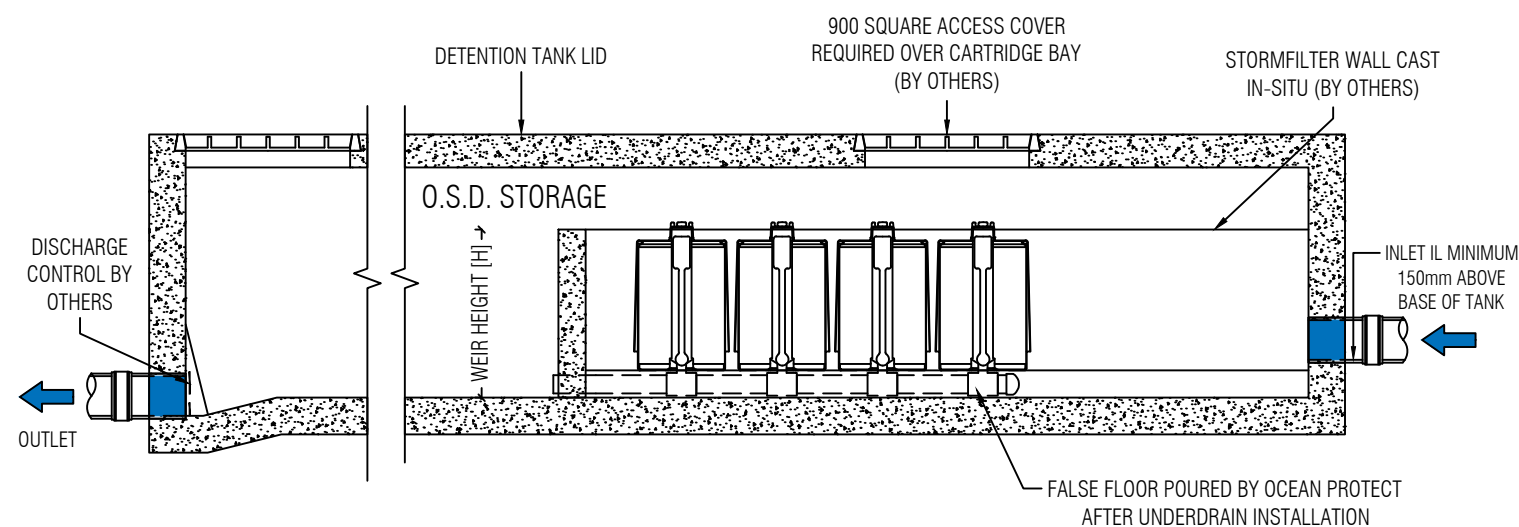


Bradley Morgan  
Civil Project Engineer

## Appendix B – Water Treatment Devices



PLAN LAYOUT

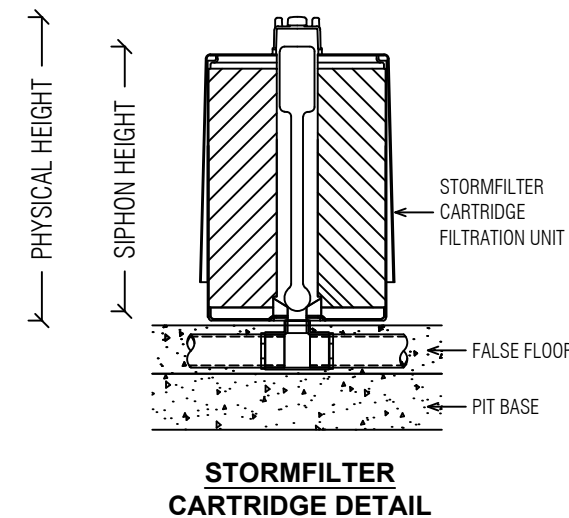


SECTION A

STORMFILTER DESIGN TABLE

- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING. RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690	460	310
CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	1.6	1.1	0.7
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9	0.46	0.39



SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	[ ]
NUMBER OF CARTRIDGES REQ'D	[ ]
SIPHON HEIGHT (310 / 460 / 690)	[ ]
MEDIA TYPE (ZPG / PSORB)	[ ]
WATER QUALITY FLOW RATE (L/S)	[ ]
DIMENSION A	[ ]
DIMENSION B	[ ]
TOTAL CARTRIDGE BAY AREA (A x B) TO MATCH AREA REQUIRED BY MUSIC MODELLING OR COUNCIL SPECIFIC REQUIREMENTS	

GENERAL NOTES

1. INLET AND OUTLET PIPES TO BE IN ACCORDANCE WITH APPROVED PLANS.
2. A HIGH FLOW BYPASS ARRANGEMENT OR DISSIPATION STRUCTURE MAY BE REQUIRED TO MINIMISE RE-SUSPENSION OF SOLIDS OR ANY SIGNIFICANT INERTIAL FORCES ON THE CARTRIDGES.
3. ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
4. SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
5. THE INVERT LEVEL OF THE INLET PIPE MUST BE GREATER THAN THE RL OF THE FALSE FLOOR WITHIN THE CARTRIDGE CHAMBER.
6. CONCRETE STRUCTURE AND ACCESS COVERS DESIGNED AND PROVIDED BY OTHERS. ACCESS COVERS TO BE A MINIMUM 900 X 900 ABOVE CARTRIDGES. OH&S REGARDING ACCESS COVERS AND TANK ACCESS TO BE ASSESSED BY OTHERS ON SITE.
7. THE STRUCTURE THICKNESSES SHOWN ARE FOR REPRESENTATIONAL PURPOSES.
8. DRAWINGS NOT TO SCALE.

INSTALLATION NOTES

1. UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.



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www.oceanprotect.com.au

OCEAN PROTECT  
STORMFILTER SYSTEM  
DETENTION TANK ARRANGEMENT  
SPECIFICATION DRAWING



