Low Impact Development Consulting

Stormwater Management

Water Sensitive Urban Design assessment for:

39 Ceres Drive, Thrugoona

Prepared for: Vincent Jarvis Studio
Prepared by: Low Impact Development Consulting

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e: info@lidconsulting.com.au
p: 03 9016 9486
a: Level 6, 114 Flinders St, Melbourne 3000
w: www.lidconsulting.com.au

Version	Date	Description	Drawings	Prepared	Checked
1.0	20/11/2024	DA Issue	CD02 – 24/10/2023	JN	CH

Disclaimer

The content of this document represents the entirety of work output or recommendations offered by LID Consulting for this particular project. This content supersedes all other verbal discussions undertaken by LID Consulting representatives in relation to this project.

Contents

 LID acknowledges and pays respect to the Australian Aboriginal and Torres Strait Islander people, to their ancestors and elders, past, present and emerging, as the traditional custodians of the lands upon which we work and live. We recognise Aboriginal and Torres Strait Islander people's deep cultural and spiritual relationships to the water, land and sea, and their rich contribution to society.

1 Introduction

Low Impact Development (LID) Consulting was engaged by Vincent Jarvis Studio to assess the proposed development at 39 Ceres Drive, Thrugoona and prepare a Stormwater Management (Water Sensitive Urban Design) response addressing the Best Practice Environmental Management (BPEM) Guidelines (CSIRO, 1999) stormwater quality objectives.

A MUSIC modelling assessment has been conducted to validate stormwater pollutant removal rates.

This report is based on the drawing set provided by Vincent Jarvis Studio, identified as CD02 (24/10/2023).

The site area can be seen below in Figure 1.

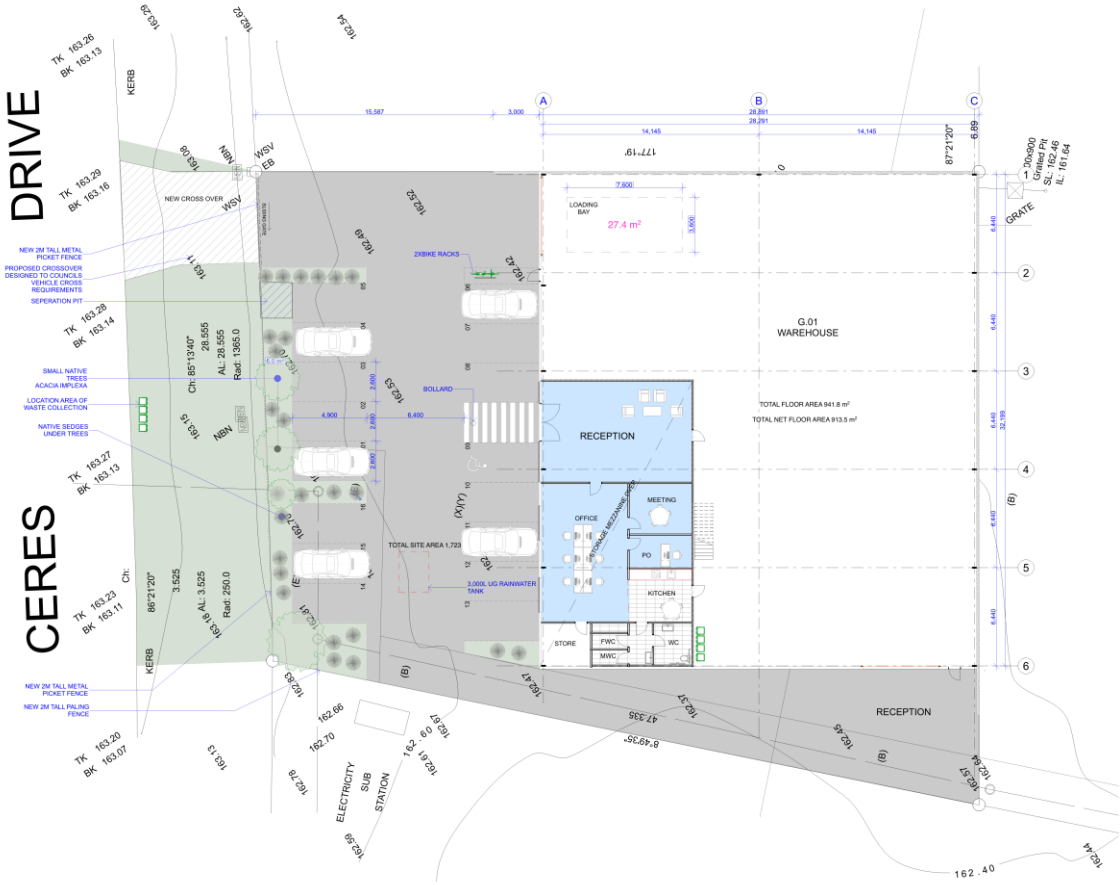


Figure 1 - Site Area

The following documents informed the WSUD recommendations of this report:

1. Best Practice Environmental Management Guidelines for Urban Stormwater (CSIRO 1999) (BPEMG)
2. WSUD Engineering Procedures: Stormwater (CSIRO 2005 EPS)
3. WSUD Maintenance Guidelines – A guide for asset managers (Melbourne Water)

1.1 Development Summary

Address: **39 Ceres Drive, Thrugoona**
Type: **Industrial site**
Site area: **1,724 m²**
Occupants: **13***

*Note occupancy rates are derived from the InSite Water tool, which adopts weighted occupancy rates based on NCC Table D2D18. Rainwater reuse rates are calculated at 15L/person/day for toilet flushing.

1.2 Response Summary

The chosen response is to direct a minimum of 50% of roof area runoff to a retention tank serving all toilets within the proposed development. Tank overflow, as well as runoff from the remaining roof areas and ground level hardstand will be filtered via a Jellyfish filter (or equivalent treatment and reliability) prior to discharge via the LPD.

MUSIC catchment areas are summarised as follows:

Table 1 – MUSIC Catchment Summary

Catchment	Area (m²)
Roof	941.7
Carpark	702.7
Landscape	79.6

2 Site Layout

Refer to Appendix 2 for site layout plan.

3 Proposed Response

3.1 Response

The proposed development satisfies the Best Practice Environmental Management (BPEM) Guidelines objectives for stormwater quality, with provision of the following:

3.1.1 Rainwater retention tanks

- Rainwater shed from 50% of roof areas (minimum 470m²) will be collected in rainwater tank of minimum 3000L retention capacity. The rainwater tank is proposed to be underground.
- Rainwater tank to be connected to all toilets within the proposed development, with an estimated reuse demand of 195L/day based on a calculated weighted

occupancy of 13pax and 15L/person/day (3no. 3.5L half flushes and 1no. 4.5L full flush).

3.1.2 Jellyfish filter pit

- A Jellyfish filter pit (or equivalent treatment and reliability) with minimum treatable flow-rate of 7.5L/s will be installed immediately upstream of the LPD for filtration of tank overflow, runoff from remaining roof areas and surface runoff from carpark and landscape areas.
- Note the Jellyfish filter sizing must consider mass sediment load. Manufacturer guidance is to be provided to determine the final filter cartridge numbers required to the greater of the treatment flow rate and maintenance interval sediment load sizing.
- The Jellyfish filter has been modelled in accordance with manufacturer stated pollutant removal rates, per Stormwater Australia approved figures as seen below.

Table 3-1 Applied stormwater treatment performances for Jellyfish® in Queensland and NSW

Reviewing authority	% Reduction				Comments
	GPs	TSS	TP	TN	
Stormwater Australia	100%	92.6%	57%	46.8%	

(https://oceanprotect.com.au/wp-content/uploads/2024/08/Review-of-Jellyfish-Application-in-Australia.pdf)

3.2 MUSIC Model

Table 2 - MUSIC model pollutant removal rates

Pollutant	Required Removal Rate from Typical Urban Load	Observed Pollutant Removal Rate
Total Suspended Solids (TSS)	80%	90.1%
Total Phosphorus (TP)	45%	59.5%
Total Nitrogen (TN)	45%	48.8%
Gross Pollutants (GP)	70%	99.0%

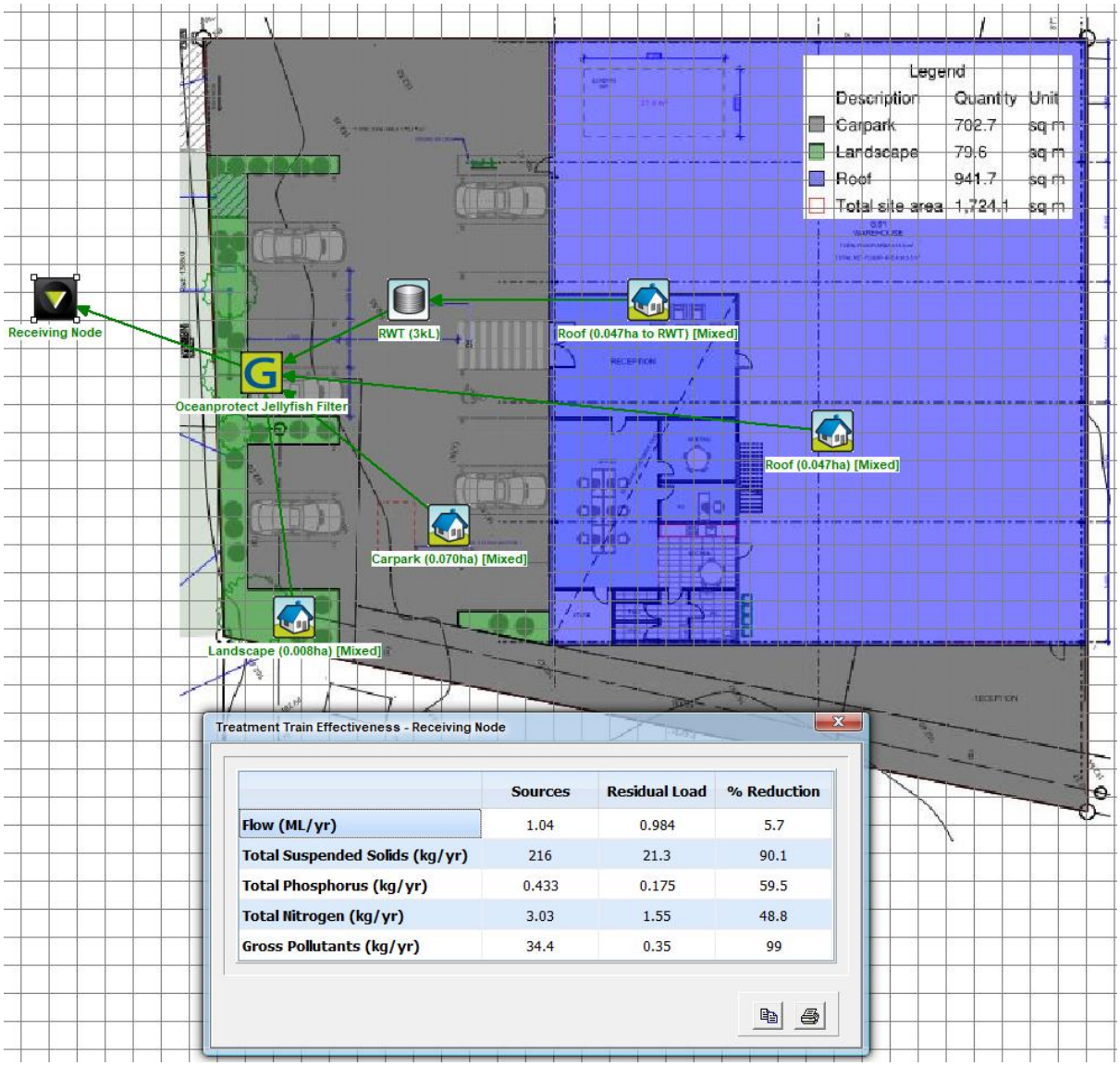


Figure 2 - MUSIC model schematic

4 Site Management

The following is intended to inform the site management plan in matters relating to stormwater management during construction. Relevant principles per the EPA Civil Construction, Building and Demolition Guide[1], and measures as per Urban Stormwater Best Practice Environmental Management Guidelines Section 6.3 are shown below.

The site management plan should restrict runoff to adjoining properties and ensure minimal earth disturbance occurs during construction. Additionally, building waste, dangerous chemicals and food waste must be managed to prevent damage to flora and fauna, or build up or blockage in drains and nearby creeks.

[1] *EPA Civil Construction, Building and Demolition Guide, Publication 1834 (2020)* https://www.epa.vic.gov.au/about-epa/publications/1834

Item	Potential issues	Control Measure
Fences	Porous fences allow stormwater runoff to carry sediment across the site and discharge into the stormwater network.	Mesh fabric and silt fences to be installed on fences where site includes slopes greater than 1:20. Hay bales may also be suitable for larger sites.
Pit inlets	Without sediment filters, pit inlets allow sediment to enter the stormwater network causing sediment build-up downstream.	Sediment traps or drain filters should be installed on all pit inlets, particularly those in the street that are the first to receive water from the site.
Downpipes	Localised flooding due to lack of site drainage.	Temporary downpipes to be installed as soon as roofing is installed to minimise overland flow across the site (see plastic tube roll image below). These should be connected to the rainwater tank where possible, or alternatively the stormwater pipes.
Vehicle traffic on site	Areas of vehicle traffic are subject to disturbance of soil.	Use stabilised vehicle entrances and paths, with crushed rock or other suitable material. Include rumble grates, track mats (where access is over sand), and physically remove mud from tyres of vehicles prior to leaving the site.
Mounded earth	Unsecured mounds create significant issues with sedimentation after rainfall.	Use erosion control blankets for mounded earth. Ensure correct installation, and incorporate secondary measures such as silt fences on steep sites.
Bins	Where suitable bins are not provided, litter can be washed from the site.	Ensure appropriate bins are provided for construction workers and staff. Ensure bins for lightweight food packaging and construction waste have lids to stop waste blowing away.
Waste material	Pollution of stormwater can occur where appropriate disposal methods for waste materials are not established on site.	Provide separate bins for paints and solvents to allow safe removal and disposal at accredited locations. Ensure all staff are aware of correct disposal methods.
Stockpiles	Incorrect stockpiling can lead to stormwater contamination, and site pollution.	Locate stockpiles away from drainage paths, and construct stockpiles with gentle slopes (max 1:2).

In addition, the contractor will be required to:

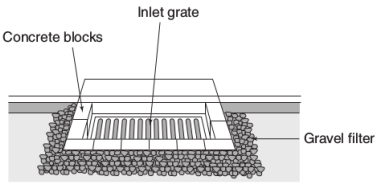
- **Identify and document,** prior to construction commencing, where these measures will be installed, and how erosion and loose waste will be managed.
- **Install tarps on site waste bins** every night.
- **Avoid overfilling vehicles** or cover all soil loads being taken offsite.
- **Sweep up the site** every day when works occur on site to ensure loose waste does not

blow around the site and into the surrounding streets.

- **Ensure erosion and sediment control measures are maintained** through daily checks – maintenance measures may include removing sediment trapped in filters and topping up gravel on the vehicle entry path.

Figure 3 - Temporary Downpipes

Figure 4 - Sediment Trap



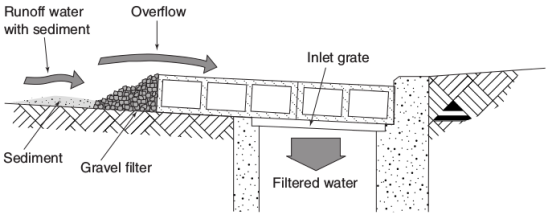


Figure 5 - Block and Gravel Filter (CSIRO)

Figure 6 - Sediment Trap

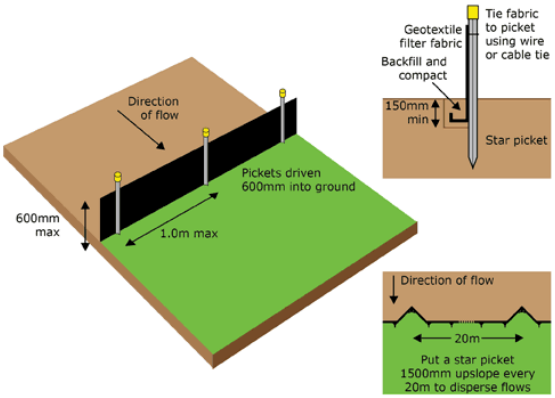


Figure 7 - Silt Fence (EPA 2004, Publication 960 p.30)

Figure 8 - Silt Fence (US EPA 2008)

5 Maintenance Plan

5.1 Rainwater Tanks

The following maintenance schedule is to be used as a guide for rainwater tank maintenance. It is based on average maintenance requirements for rainwater tanks in NSW, and timings may need to be adjusted to suit specific site assets. Regular inspections should be undertaken every three months. Inspection and maintenance of all rainwater tanks will be the responsibility of the site operator/management.

Refer to the Melbourne Water WSUD Maintenance Guidelines for further details.

Item	What to check for	Action	Frequency
Tank inlet	Tank inlet is not blocked by accumulated debris	Physically remove debris build up	1-3 months
First flush device and filters	First flush device and filters are not blocked and flow is not limited by litter or sediment accumulation	Physically remove litter and sediment from first flush device, or if it contains a flush-out valve, use water to remove sediment.	1-3 months
Tank outlet	Tank outlet is not restricted by sediment.	Flush tank as required.	1-3 months
Mosquito screens	Mosquito screens are not torn or loose	Replace mosquito screens if necessary. Put screens back carefully, ensuring they are tightly refitted.	1-3 months
Pumps	Water around pump equipment. Water pressure.	Replace seals where leaks are noted. Clean pumps as required to maintain pump pressure. Refer to pump manufacturer's maintenance requirements.	1-3 months
Roof and gutters	Accumulated debris in gutters. Discolouration of tank water, or notable odours.	Physically remove accumulated debris, including leaf and other plant material. More regular maintenance may be required where there are overhanging trees.	3-6 months
Overhanging trees	Vegetation overhanging roof and gutters	Prune overhanging trees where possible to reduce vegetation build up and chance of blockages in tank network.	3-6 months
Tank	Tank defects or damage. Sediment and sludge build up in tank, or sulphide/rotten egg odours.	Replace defect or damaged tank as necessary. Remove accumulated sediment and sludge from tank. Clean tank if required.	2-3 years

5.2 Jellyfish Filter

Maintenance of proprietary treatment systems is to be conducted in accordance with manufacturer guidelines.

https://oceanprotect.com.au/wp-content/uploads/2022/12/Jellyfish-Filter-Operations-Maintenance-Manual.pdf

Appendix 1 - Policy Objectives

To achieve the best practice water quality performance objectives set out in the Urban Stormwater Best Practice Environmental Management Guidelines (BPEMG), CSIRO 1999 (or as amended). The BPEMG objectives are outlined in the following table:

Table 3 - BPEMG Objectives

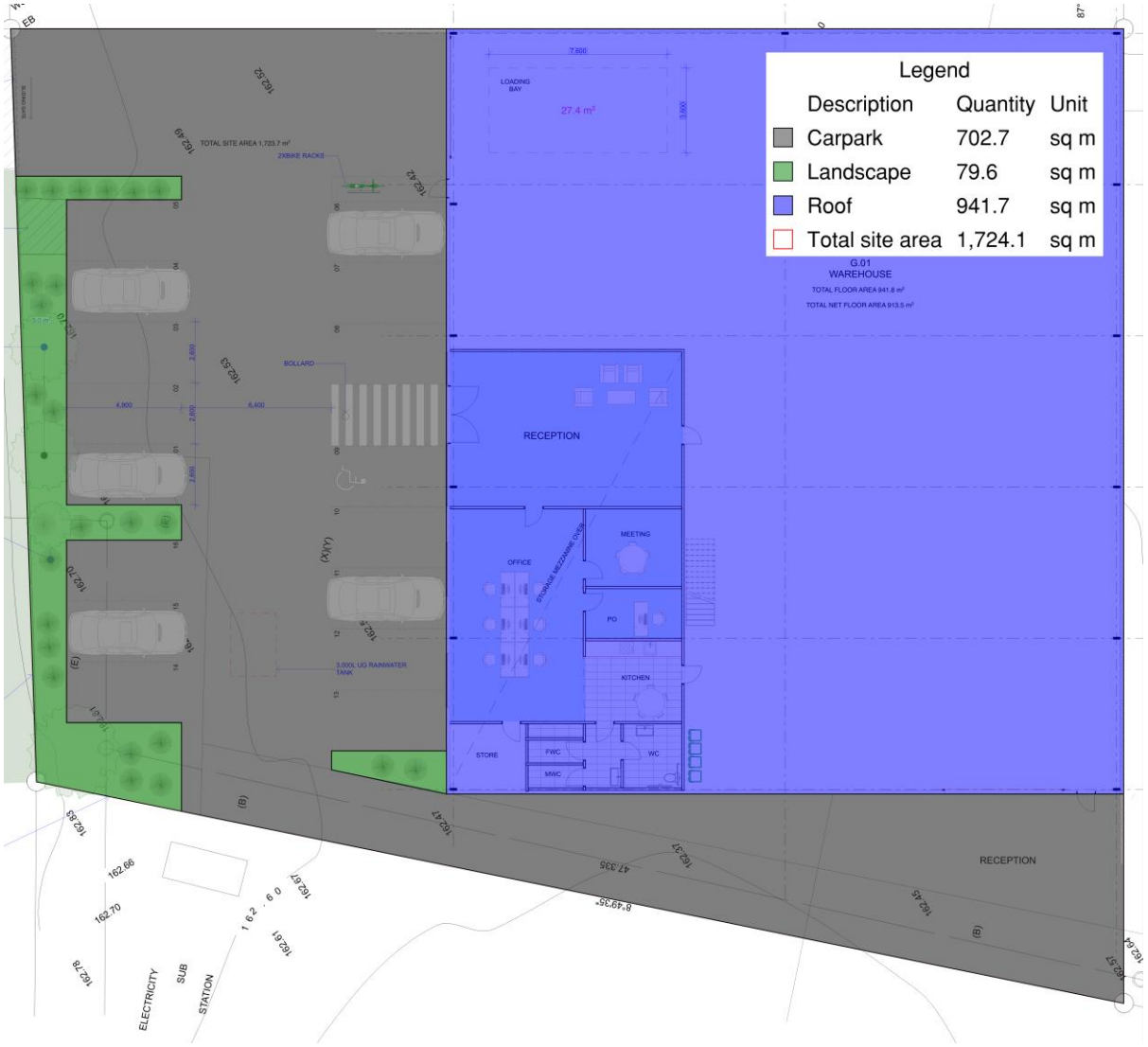
Pollutant	**Required Removal Rate from Typical Urban Load**
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	45%
Total Nitrogen (TN)	45%
Gross Pollutants (GP)	70%

To promote the use of water sensitive urban design, including stormwater re-use.

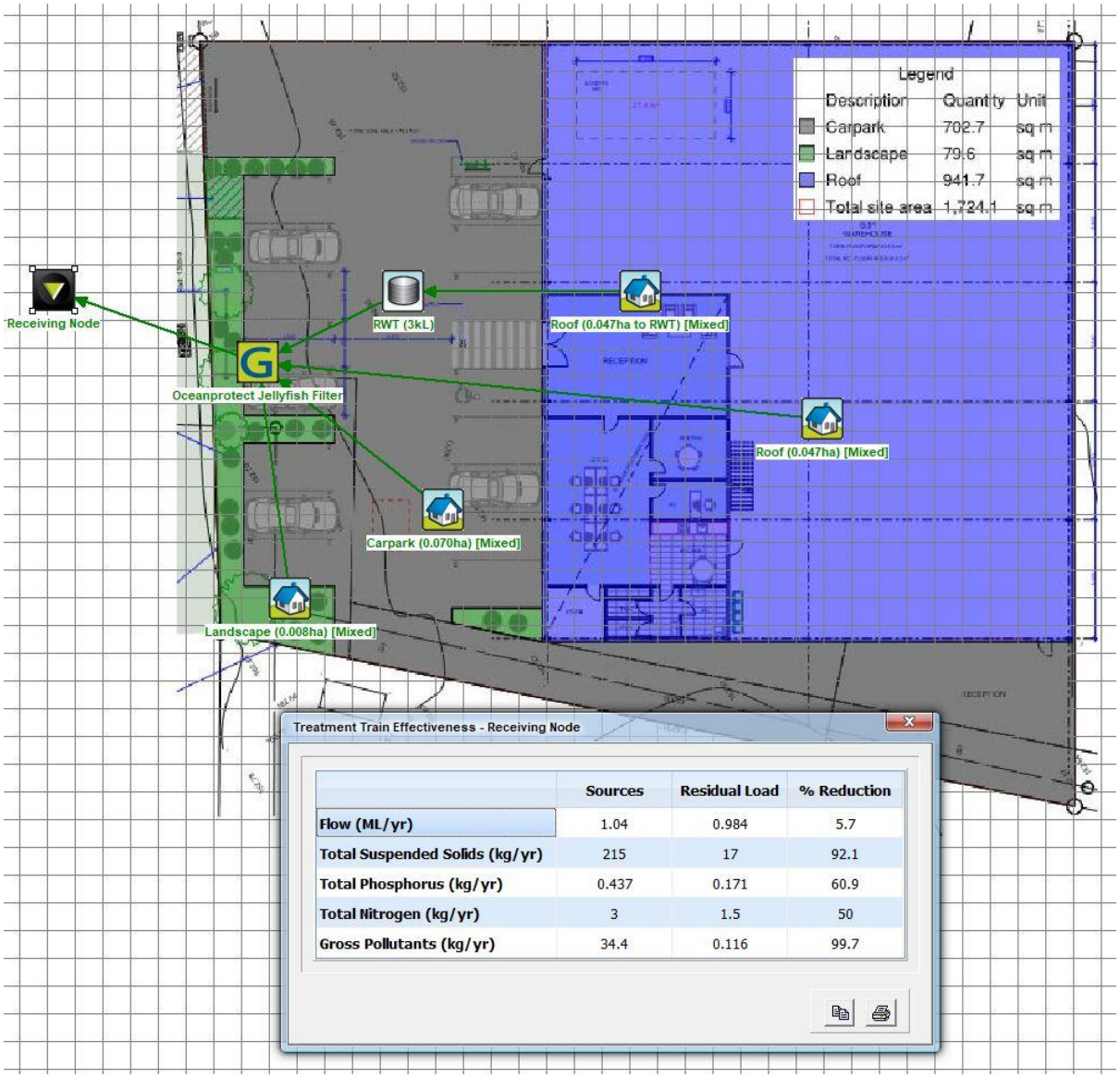
To mitigate the detrimental effect of development on downstream waterways, by the application of best-practice stormwater management through water sensitive urban design for new development.

To minimize peak stormwater flows and stormwater pollutants to improve the health of water bodies including creeks, rivers and bays.

Appendix 2 - Site Layout Plan



Appendix 3 - MUSIC Model



	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.04	0.984	5.7
Total Suspended Solids (kg/yr)	215	17	92.1
Total Phosphorus (kg/yr)	0.437	0.171	60.9
Total Nitrogen (kg/yr)	3	1.5	50
Gross Pollutants (kg/yr)	34.4	0.116	99.7

MUSIC model files (.sqz) are available upon request.

Table 3-1 Applied stormwater treatment performances for Jellyfish® in Queensland and NSW

Reviewing authority	% Reduction				Comments
	GPs	TSS	TP	TN	
Stormwater Australia	100%	92.6%	57%	46.8%	
Blacktown City Council	75%	89%	54%	45%	
Brisbane City Council	99%	90%	65%	54%	
Gold Coast City Council	100%	86.7%	52.2%	45.8%	
Logan City Council	99%	87%	55%	43%	
All other Councils in Queensland	99%	93%	57%	50%	*: Jellyfish currently not approved in Noosa Shire Council.

https://oceanprotect.com.au/wp-content/uploads/2024/08/Review-of-Jellyfish-Application-in-Australia.pdf

Appendix 4 - Jellyfish Filter Design Guidelines

Design guidelines can be accessed via the following link:

https://oceanprotect.com.au/wp-content/uploads/2022/12/Jellyfish-Filter-Technical-Design-Guide.pdf