



**Eastlakes Town Centre Redevelopment
Evans Avenue and Barber Street
Eastlakes**

'MUSIC' Water Quality Report

**Prepared By
Date**

**Nathan Taufer
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VDM Consulting
ACN: 009 351 400

Level 5, 35-37 Chandos Street
St. Leonards NSW 2065

Telephone: +61 2 9438 7700
Facsimile: +61 2 9436 1370

Web: www.vdmgroup.com.au

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1. Introduction

This report has been prepared to supplement the Eastlakes Town Centre redevelopment application. The purpose is to assess the water quality and nutrient control treatments for the proposed Town Centre. The development consists of two sites located approximately 200m west of Southern Cross Drive off Gardeners Road.

This report demonstrates that for the development, the proposed implementation of water quality treatment measures will meet current recommended reduction targets for urban development in Botany Bay Catchment as specified in the Botany Bay Catchment Quality Improvement Plan.

2. Existing Site Details

2.1 Location

The proposed development is situated off Gardeners Road approximately 200m West of Southern Cross Drive. It is comprised of 2 no. sites. The northern site (Site 1) is located adjacent to Gardeners Road and Evans Avenue and the southern site (Site 2) is bordered by Evans Avenue, Barber Avenue and Eastlakes Reserve.



Figure 1 - Site Location

2.2 Site Characteristics

Site 1 is 0.6 ha in area and consists of a number of small shops along the northern boundary with the remainder of the site a carpark grading towards Evans Avenue. The site is graded from approximately RL 20.1 in the north eastern corner of the carpark to RL 18.0 in the south west at approximately 2.5%.

Site 2 is 1.8 ha in area and consists of a medium to large shopping centre. The primary structure on the site is a single story trading floor with underground parking and a small portion of rooftop parking. The remainder of the site is a small single story structure with an outdoor carpark adjacent to Evans Ave and Eastlakes Reserve. The site grades from northeast to southwest from RL 18.6 to RL 16.4 respectively.

Site 1 will be discharging into an existing 375 diameter pipe and site 2 an existing 825 diameter pipe. Locations are shown on drawing DA011 and DA013 in Appendix 1.

3. Proposed Development

The proposed development consists of a single level trading floor shopping centre with 2 levels of basement parking. The levels above the shopping centre include numerous apartment blocks of varying sizes surrounding a central courtyard.

3.1 Stormwater Drainage

All roofwater will be captured, directed and stored in a rainwater tank on each site. The hardstand surface water will be directed to pits fitted with enviropods and the stormwater will be further treated with a GPT before discharging into the public system.

3.2 Pollutant Removal

All flows exiting the development shall pass through a GPT. The majority of the hardstand will be initially treated with enviropods to remove gross pollutants and also help reduce suspended solids and nutrients such as phosphorus and nitrogen.

Table 1 and table 2 illustrate the water quality characteristics for the Ecosol RSF Series and the Enviropods

Description	Removal %
Gross Pollutants	95
Total Suspended Solids	91
Total Phosphorus	30
Total Nitrogen	13

Table 1 – Ecosol RSF Music Inputs

Description	Removal %
Gross Pollutants	100
Total Suspended Solids	54
Total Phosphorus	30
Total Nitrogen	21

Table 2 – Enviropods Music Input

3.3 Rainwater Reuse

Rainwater tanks will be provided for the proposed development. Roof area stormwater runoff is directed by gutters, downpipes and pipes to the rainwater tanks. The rainwater reuse tanks have a size of 40 and 100 kL for sites 1 and 2 respectively. Daily consumption for site 1 is assumed at 20 kL/day and 50kL/day for site 2 primarily for toilet flushing and irrigation in the courtyard.

4. Erosion & Sediment Control Plan

During construction, water quality control is achieved by deposition and trapping of silts and clays which often have nutrients such as phosphorus and nitrogen attached to their surfaces. Sediment control by way of silt fences will be erected prior to the construction process to reduce and isolate sediments and particulate matter.

A soil and water management plan will be required prior to any construction activities in accordance with Landcom's handbook "Managing Urban Stormwater: Soils and Construction". The implementation of a soil and water management plan for the site will ensure a significant portion of nutrients can be removed from stormwater runoff during construction.

A copy of the preliminary erosion and sediment control plan is shown in Appendix 1.

5. Pollutant Loading

Water quality modeling was conducted using the software program MUSIC. This program is used to establish the effectiveness of the water quality treatment proposed for the development site. MUSIC has been developed by the Cooperative Research Centre for Catchment Hydrology, and is designed as a planning tool for water quality treatment trains for catchment runoff. The program MUSIC is able to model pollutant loads present in stormwater runoff from a catchment and assess the effectiveness of different treatment devices in terms of pollutant load reduction. This computer model is widely accepted as an accurate water quality assessment tool.

The default urban catchment derived in the MUSIC program was used as a basis for establishing the post developed pollutant loading. Some modification of the loads was undertaken to more closely mimic the developed conditions. The values used in the model were taken from Chapter 3 of Australian Runoff Quality – A Guide to Water Sensitive Urban Design.

The rainfall data used was the six minute intervals for the Sydney Airport region.

The development of the default pollutant loading in MUSIC is a culmination of long term data collection of varying sites, and will produce a good representation of the above expressed catchments. Details as to the reduction of pollutant loads produced by the above catchments can also be seen in Chapter 3 of Australian Runoff Quality – A Guide to Water Sensitive Urban Design.

The pollutant removal rates in Table 3 are recommended values for the City of Botany Bay and have been obtained from Botany Bay Catchment Water Quality Improvement Plan (Part R, 4.4 Stormwater, Water Quality and Waterway Stability).

Pollutant	% Post Development Average Annual Load Reduction Percentage Reduction
Gross Pollutants	90%
Total Suspended Solids	80%
Total Phosphorus	55%
Total Nitrogen	40%

Table 3 – Botany Bay Catchment Stormwater Quality Reduction Targets

6. Water Quality Treatment Proposal

The water quality treatment train will consist of the following treatment devices:

- 2 No. Rainwater reuse tanks;
- 2 No. gross pollutant trap;
- 18 No. Enviropods.

The treatment train is diagrammatically shown in the following Music screen layout.

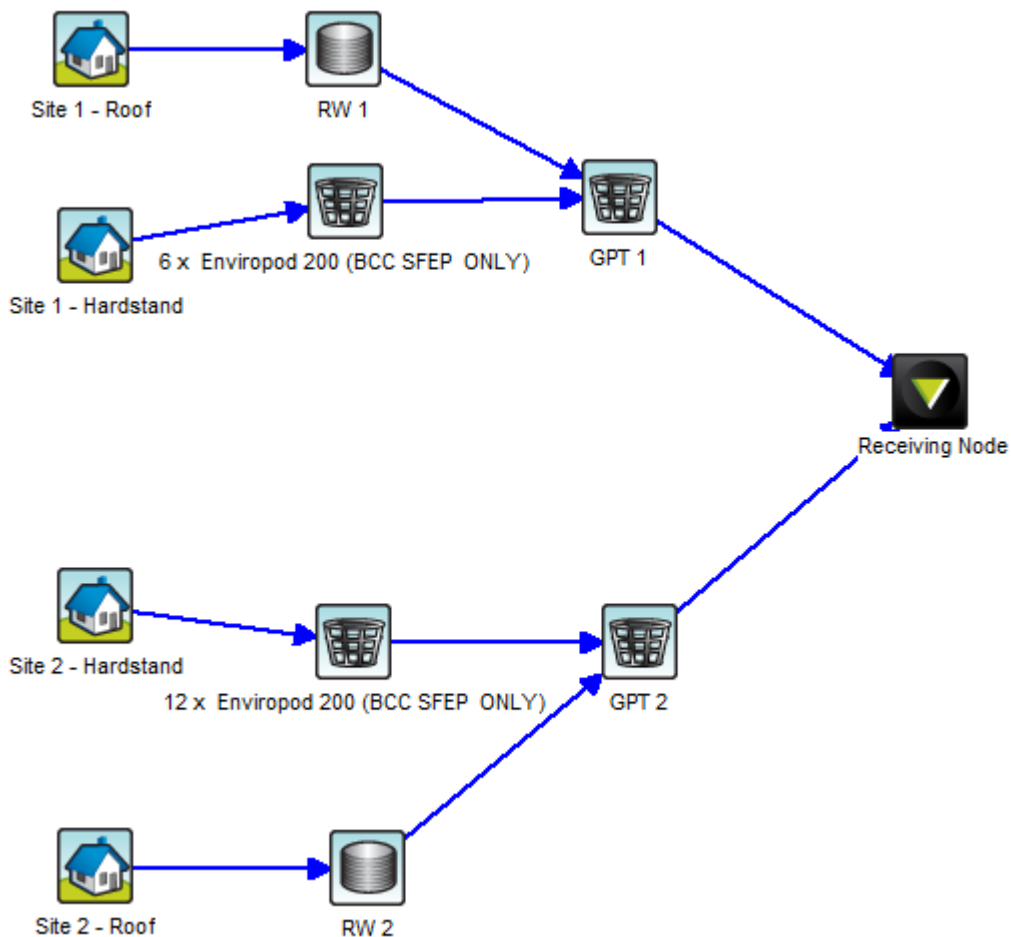


Figure 2 - Music Model Treatment Train

7. Music Modelling

MUSIC modelling was conducted on the proposed treatment devices to establish that the proposed devices will provide adequate reduction of pollutants on site. Although there will be landscaping on the courtyard on level 1, it has been assumed for the purposes of this report that the site is 100% impervious.

Table 4 details the various land use areas of the post development used in the MUSIC model.

Land Use / Surface Type	Area (ha)	% Impervious
Site 1 Hardstand To Enviropods	0.250	100
Site 1 Roof to Reuse Tank	0.356	100
Site 2 Hardstand To Enviropods	0.450	100
Site 2 Roof to Reuse Tank	1.327	100
Total	2.383	100

Table 4 - Surface Areas

Table 5 below shows the calculated mean annual loads for the proposed site conditions both pre and post treatment. The table also shows the percentage reduction achieved by the implementation of such treatments. The model demonstrates that the treatment train reduces pollutants by a value in excess of the target reduction rates as specified in Table 3

Pollutants	Source Loads	Residual Loads	% Red.
Total Suspended Solids (kg/yr)	1960	73.1	96.3%
Total Phosphorus (kg/yr)	4.68	2.06	55.9%
Total Nitrogen (kg/yr)	38.9	20.5	47.3%
Gross Pollutants (kg/yr)	513	0	100%

Table 5 - Treatment Train Effectiveness

8. Conclusion

The proposed development will undoubtedly have some impact on the existing stormwater runoff characteristics of a site due to changes in impervious areas and landform. However the implementation of an adequate stormwater management practice will minimize the impact of the staged development on the existing stormwater system.

The MUSIC modeling results show that the proposed treatment measures will reduce the transportation of pollutants offsite by stormwater and thereby greatly improve the quality of stormwater discharge from the site.

It can be seen that the proposed development and the proposed water quality treatment devices comply with requirements of City of Botany Bay Council.

Appendix 1 Civil Plans
