

ATTACHMENT E

STORMWATER MANAGEMENT PLAN



BALLINA HOMEMAKERS CENTRE

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Document Control					
Version	Date	Author		Reviewer	
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4	14 th August 2009	S Walter		R Barry	
3	February 2008	S Walter	SW	R Barry	RB
2	April 2007	K Pither	KP	R Barry	RB

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EXECUTIVE SUMMARY

A Stormwater Management Plan (SWMP) has been prepared for a proposed commercial development over part of Lot 11 on DP 1011575 in response to the *Ballina Shire Combined Development Control Plan; Chapter 13 – Stormwater Management*. The SWMP provides strategies for the management of stormwater quality during the operational phase of the development.

A treatment train has been proposed for the removal of pollutants from stormwater prior to discharge from the site. The proposed treatment train includes rainwater tanks, rubbish bins and bioretention areas. Calculations provided in the report demonstrate compliance with Ballina Shire Pollutant Treatment Objectives.

This SWMP provides management strategies for monitoring, maintenance and corrective actions to ensure the treatment train meets the intended performance criteria.

1. INTRODUCTION

1.1 Purpose

This Stormwater Management Plan (SWMP) has been prepared on behalf of The Condon Group Pty Ltd for the proposed Ballina Homemakers Centre development to be located on part of Lot 11 on DP 1011575. The aim of this management plan is to provide detailed policies, procedures and performance criteria to minimise the impact of the development on the natural and social environment. In particular, the SWMP provides monitoring and reporting mechanisms whereby the performance of the development can be measured and that agreed corrective actions are implemented in a timely manner if problems occur.

This Stormwater Management Plan intends to address the operational phase of the development, covering the ongoing operation, maintenance and control of the works.

It is possible that some procedures may require modification or clarification to suit detailed requirements of the Contractor(s) and Council for the construction and operational phases.

1.2 Implementation

This management plan responds to the Ballina Shire Combined Development Control Plan and is in accord with the requirements of Chapter 13 – Stormwater Management. The proposed release criteria for discharge are in compliance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines).

2. DESCRIPTION OF PROJECT

The proposed Ballina Highway Service Centre development is to be located on the western portion of Lot 11 on DP1011575 and will comprise of a fast food centre, a service centre, commercial buildings and the associated roadways and infrastructure, totalling approximately 4.2 hectares.

The proposed site is a 'greenfield site' located in western Ballina, to the north of the Pacific Highway. The existing site and the surrounding area is very flat, with grades less than 1%. Existing farmers drains run past the site and through the surrounding land. These drains were constructed to help with the drainage of the site and discharge south, under the Pacific Highway into Emigrant Creek. The layout of the western drain may have been altered recently due to the construction of the Ballina Bypass to the west of the site.

The existing surface levels on the site range from RL 0.4 up to RL 1.8. The Q_{100} flood level for the area is approximately RL 2.00 (obtained from BMT-WBM, Flooding for Ballina Bypass – Improved Concept Design Report, May 2007) and it is proposed to fill the site to above this level to ensure all floor levels are above this flood level. An allowance has been made for a floodway to run through the centre of the lot, to the east of the proposed development (Refer Cardno Drawing GCE1022-Sketch No.2). This floodway will be revised once the motorway adjacent to the site has been completed, as it is expected the earthworks involved will affect the catchment that discharges through the site.

As the development will include substantial roadway/parking areas, it is anticipated the amount of stormwater runoff generated during rainfall events will increase due to the increase in impervious areas on the site.

3. WATER QUALITY ASSESSMENT

3.1 Development Control Provisions

The Ballina Shire Combined Development Control Plan, Chapter 13 – Stormwater Management outlines performance objectives for the management of stormwater on new developments within Ballina Shire. The Development Control Plan allows for the adoption of stormwater management objectives as specified in **Table 1**.

Table 1 Pollutant Treatment Objectives – Operational Phase

Pollutant	Environmentally Sustainable Development Treatment Objective
Suspended Solids (TSS)	80% retention of the average annual load
Total Phosphorus (TP)	45% retention of the average annual load
Total Nitrogen (TN)	45% retention of the average annual load
Litter	Retention of litter greater than 5mm for flows up to 25% of the 1 year SRI peak flow
Course Sediment	Retention of sediment coarser than 0.125mm for flows up to 25% of the 1 year ARI peak flow
Oil and grease	In areas with concentrated hydrocarbon deposition, no visible oils for flows up to 25% of the 1 year ARI peak flow

To demonstrate compliance with the Development Control Plan, specific stormwater treatment is to be provided during the operational phase of the development.

Compliance during the operational phase includes on-site stormwater treatment and the implementation of water sensitive urban design practices.

3.2 Proposed Water Quality Treatment – Operational

It is proposed to implement a treatment train comprising of water sensitive urban design techniques to meet Ballina Shire pollutant treatment objectives during the operational phase of the development, as depicted on Cardno Drawing GCE1022-Sketch No.2. All runoff originating from roof areas, carparks, internal roads and other hard stand areas will be directed through treatment devices suitable to achieve the pollutant treatment objectives outlined in the Development Control Plan. Compliance with the pollutant treatment objectives is demonstrated in **Section 4** of this report.

To minimise the potential for litter to become entrained in stormwater, rubbish bins will be provided in the carparks and fast food shop frontages. Additionally, the ongoing management and maintenance of the site will provide for the collection of litter from within the site on a regular basis.

It is proposed to treat all carpark and hardstand surfaces with vegetated bioretention areas. These areas will first filter the coarse sediments through the vegetation filter strip and then remove the finer particles, nutrients and attached pollutants through the sand filter media.

Roof water tanks will be provided at a minimum ratio of 50 000 litres of storage per hectare of roof area. Efforts will be made to reuse roof water onsite. Any excess roof water or overflows from large events will be further directed through a bioretention area prior to discharge from the site.

The Service Centre will be required to meet any additional water quality requirements arising from site specific land uses such as fuel storage and transfer and car washing.

4. OPERATIONAL PHASE

4.1 Objective/Target

To implement the principles of environmentally sustainable development (ESD) by controlling the levels of contaminants (sediment and nutrients) entering local water courses or road stormwater drainage systems, and hence achieve the load based reduction objectives outlined in **Table 1**.

To avoid detrimental impact on the water quality and aquatic environment of the downstream catchment.

4.2 Performance Objectives

To avoid detrimental impact on the water quality and aquatic environment, as a result of the discharge of contaminated stormwater runoff.

To comply with the *Environmental Planning and Assessment Act 1979* and with the Ballina Shire Combined Development Control Plan pollutant treatment objectives.

4.3 Control Measures

The management measures installed to maintain the quality of runoff discharging from the proposed commercial centre development include rubbish bins, roofwater tanks and vegetated bio-retention areas. **Table 2** provides a summary of the treatment train efficiency, detailed calculations are provided in **Appendix B**.

The proposed treatment train for the site is as follows

Roof Area Runoff ⇒ Rainwater Tanks ⇒ Vegetated bioretention
trenches and basins (filter strip + sand filter)

Surface Area Runoff ⇒ Rubbish Bins ⇒ Vegetated bioretention
trenches and basins (filter strip + sand filter)

The Development Control Plan provides accepted pollutant reduction efficiencies for various treatment devices (DCP, Chapter 13 Appendix B). However, reduction efficiencies have not been provided for bioretention areas or rainwater tanks.

To determine the removal efficiencies for a vegetated bioretention device, the two components the vegetated filter and the sand filter area have been separated as outlined in **Table 2** and calculated in accord with DCP, Chapter 13 Appendix B.

To determine the removal efficiencies for rainwater tanks, a conceptual model was created in MUSIC (Model for Urban Stormwater Improvement Conceptualisation – CRC Catchment Hydrology). The model was based on a 50, 000 litre tank per 1 ha of catchment, with an impervious area of 100% with pollutant concentrations for commercial roofs (sourced from Gold Coast City Council MUSIC Modelling Guidelines 2006). The calculated removal efficiencies are provided below in **Table 2**.

Given that roof water is not subject to litter and the occurrence of sediment build up on the roof would be much lower than that of the carpark areas, it is considered that the removal efficiencies for rainwater tanks are suitable.

Table 2 Summary of Treatment Techniques and Efficiencies

TREATMENT TECHNIQUE	POLLUTANT REMOVAL EFFICIENCY (Ballina Shire DCP)					
	LITTER & GROSS POLLUTANTS	Course Sediments (>0.125mm)	Fine Sediments (Suspended Solids)	Total Phosphorus	Total Nitrogen	Hydrocarbons
Pollutant Treatment Objective	Retention of all litter for flows up to 25% of the 1 year ARI	Retention of all sediment for flows up to 25% of the 1 year ARI	80% retention of the average annual load	45% retention of the average annual load	45 % retention of the average annual load	No visible oils for flows up to 25% of the 1 year ARI peak flow
Rubbish Bins	30-75%	-	-	-	-	-
Rainwater tanks	-	20%	20%	3%	6%	-
Filter Strip	30-50%	50-75%	30-50%	10-50%	10-50%	10-30%
Sand Filter	-	30-75%	30-75%	30-50%	30-50%	30-50%
Achieved retention of annual load	81.25	87.78	81.625	73.8	73.9	73.75

4.4 Monitoring

A monitoring program will be established for the stormwater treatment devices as outlined below and shown in **Table 3**.

All monitoring activities associated with the operation of the vegetated bioretention areas including weed inundation, erosion, vegetation density and inappropriate access and wear should be included in the general monitoring of the condition of the landscaped areas, with the Developer the responsible party during the maintenance period and body corporate responsible following the maintenance period.

The emptying of rubbish bins and the removal of site litter will be included in the regular maintenance program for the site. The Developer will be the responsible party during the maintenance period and the body corporate following the maintenance period.

Table 3 Monitoring Program for Vegetated Bio-retention areas

TIME PERIOD (Following construction)	MONITORING ACTIVITY	FREQUENCY
0-6 months	Erosion/scour of swale/basin invert & batters	After major storm events > 25mm
	Weed inundation/litter accumulation	Every 3 months
	Excessive wear & damage	Every 3 months
	Build up of sediments	Every 3 months
>6 months	Erosion/scour of swale/basin invert & batters	Six monthly
	Weed inundation/litter accumulation	Six monthly
	Excessive wear & damage	Six monthly
	Build up of sediments	Six monthly

The Developer will be responsible for all monitoring activities associated with the operation of the vegetated bio-retention areas during the maintenance period with the body corporate responsible following the maintenance period.

4.5 Maintenance

The on-going performance of the treatment devices will be dependent on the maintenance conducted.

The maintenance program as outlined below and detailed in **Table 4** is to be implemented for the stormwater treatment devices.

All maintenance activities associated with the operation of the vegetated buffer shall be included in the general maintenance of the landscaped areas, with the Developer the responsible party during the maintenance period and the body corporate responsible following the maintenance period. These activities should include watering (depending on Council restrictions), erosion repair and ensuring sufficient vegetation cover.

Table 4 Maintenance Program for Vegetated Bioretention Areas

TIME FRAME	MAINTENANCE ACTIVITY	FREQUENCY
0-6 months	• Repairs to swale/basin profile	As required by monitoring
	• Watering, re-vegetating	As required by monitoring
	• Removal of litter, debris, weeds, excessive sediment build up and clogging of filter media	Monthly, as required
>6 months	• Repairs to swale/basin profile	As required by monitoring
	• Removal of litter, debris, weeds, excessive sediment build up and clogging of filter media	Quarterly

The Developer will be responsible for all maintenance activities associated with the operation of the vegetated bio-retention areas during the maintenance period with the body corporate responsible for maintenance following the maintenance period.

4.6 Corrective Action

When water quality objectives are not met investigation into cause and source of pollutants is to be investigated and remedial action taken.