
Stormwater Quality Management Plan

for

Plantation Retirement Resorts

Retirement Resort

at

Lot 8001 Baringa Dr, Baringa

Job Ref: SC-10130

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PLANS AND DOCUMENTS
referred to in the PDA
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INTRODUCTION

1.1. Background

This report is to accompany and be considered part of an application to Economic Development Queensland (EDQ) to gain a Development Approval for a proposed Retirement Resort development on Lot 8001 Baringa Dr, Baringa. This application seeks a PDA Development Permit for a Material Change of Use.

1.2. Scope

Empire Engineering Pty Ltd was commissioned by Plantation Retirement Resorts to develop a Stormwater Quality Management Plan to outline stormwater management strategies for the proposed development in accordance with the relevant Local and State Government standards. A stormwater quality management strategy has been developed in accordance with relevant Sunshine Coast Council (SCC) guidelines and the State Planning Policy (SPP, 2017) and PDA Guideline No. 13 Engineering standards - Stormwater quality. The requirements are met through modelling the pollutant export generated by the proposed development and appropriately implementing stormwater quality improvement devices (SQID's).

1.3. Proposed Development

Preliminary architectural drawings prepared by OGE Group Architects depict a proposed mixed residential and commercial use development with associated ground floor parking and access driveways.

2.0 SITE CHARACTERISTICS

2.1. Location

The subject site is rectangular in shape, has an area of 0.772Ha with direct road frontage access off Baringa Dr and Patricia Lane.

2.2. Topography and Drainage

The site generally falls from west to east. There is approximately 1m of fall across the lot. Earthworks for the site were previously completed as part of the Aura Estate, as such the site is generally cleared of large vegetation with low growing grass coverage. Presently, a carpark and display room reside on the site.

The downstream receiving environment is Council's road reserve. The road has a developed storm water system in the form of an underground piped drainage system in accordance with *QUDM*. Two existing stormwater connections have been identified, one to the corner of Baringa Dr / Aura Bvd, and another at the mid-point frontage to Baringa Dr. Both connections are DN450 pipe (IL approx. 3.80), designed to convey the storm water minor event run-off from the development to the larger downstream drainage network. These are the lawful point(s) of discharge established for the site at the time of the estate subdivision.

There are no upslope external catchments traversing the subject site.



Figure 1.0 – Subject Site

(courtesy Nearmaps)

2.3. Design Objectives

Design objectives for stormwater quality management are that the development protects or enhances the environmental value and water quality of receiving waters within or downstream of the site prior to discharge. Triggers for development of lots exceeding 2,500m² or for urban purposes within population centres greater than 3000 persons require the application of Water Sensitive Urban Design (WSUD) load reduction targets. The scope typically encompasses the operational 'post construction' phase of the development however 'construction phase' water quality is briefly addressed in this report.

Development must incorporate the principles of Water Sensitive Urban Design (WSUD) in accordance with 'Urban Stormwater - Queensland Best Practice Environmental Management Guidelines' and current industry standards (e.g. Environmental Protection (Water) Policy, Queensland State Planning Policy 2017 – water quality).

Erosion and Sediment Control must be designed in accordance with the recommendations contained within the Environment Protection Agency's (EPA) 'Best Practice Urban Stormwater Management – Erosion and Sediment Control', International Erosion Control Association's (IECA) – 'Best Practice Erosion & Sediment Control' and 'Queensland Urban Drainage Manual' (QUDM).

3.0 STORMWATER QUALITY MANAGEMENT

3.1. Construction Phase

Table 3.1 has been adapted from Table C4.1 of Brisbane City Council's (BCC) *Stormwater Best Management Practices 2000* and details the typical stormwater pollutants which may be generated during the construction phase of the development.

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags and off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic Materials	Cement slurry, solvents, cleaning agents, wash waters
pH Altering Substances	Cement slurry, wash waters

Table 3.1 - Typical Construction Phase Pollutants

The following ESC measures should typically be implemented prior to the commencement of construction:

- Education of all site workers in sediment and erosion procedures;
- Specified storage areas for construction materials and plant that are bunded to prevent any spillages from escaping.

Table 3.2 illustrates the State Planning Policy objectives for construction phase stormwater quality that the erosion and sediment control plan to be submitted with the operational works approval is required to achieve.

Issue		Design objectives
Drainage control	Temporary drainage works	- Design life and design storm for temporary drainage works: - Disturbed area open for <12 months—1 in 2-year ARI event - Disturbed area open for 12–24 months—1 in 5-year ARI event - Disturbed area open for > 24 months—1 in 10-year ARI event - Design capacity excludes minimum 150 mm freeboard - Temporary culvert crossing—minimum 1 in 1-year ARI hydraulic capacity
Erosion control	Erosion control measures	- Minimise exposure of disturbed soils at any time - Divert water run-off from undisturbed areas around disturbed areas - Determine the erosion risk rating using local rainfall erosivity, rainfall depth, soil-loss rate or other acceptable methods - Implement erosion control methods corresponding to identified erosion risk rating
Sediment control	Sediment control measures Design storm for sediment control basins Sediment basin dewatering	- Determine appropriate sediment control measures using: - Potential soil loss rate, or - Monthly erosivity, or - Average monthly rainfall - Collect and drain stormwater from disturbed soils to sediment basin for design storm event: - Design storm for sediment basin sizing is 80th% five-day event or similar - Site discharge during sediment basin dewatering: - TSS < 50 mg/L TSS, and - Turbidity not >10% receiving waters turbidity, and - pH 6.5–8.5
Water quality	Litter and other waste, hydrocarbons and other contaminants	- Avoid wind-blown litter; remove gross pollutants - Ensure there is no visible oil or grease sheen on released waters - Dispose of waste containing contaminants at authorised facilities
Waterway stability and flood flow management	Changes to the natural waterway hydraulics and hydrology	For peak flow for the 1-year and 100-year ARI event, use constructed sediment basins to attenuate the discharge rate of stormwater from the site

Table 3.2 - Construction Phase Stormwater Quality Objectives

3.2. Operational Phase

During the operational stage of the development, the following impacts have been identified in relation to stormwater runoff and water quality of the receiving waterways:

- Gross pollutants which include human derived litter, coarse sediment and vegetation
- Sediment and suspended solids
- Nutrients such as phosphorous and nitrogen

To target these potential pollutants stormwater quality improvement devices (SQID's) are proposed to be incorporated within the design.

3.2.1. Water Quality Objectives

The water quality objectives (WQO's) for this site were determined in accordance with State Planning Policy (SPP, 2017) as follows

Pollutant	Minimum Reduction Targets
Total Suspended Sediments (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (>5mm)	90%

Table 3.3 - Water Quality Objectives

3.2.2. Pollutant Export Modelling

A compliant MUSIC model was generated to calculate pollutant loads from the proposed development and predict performance characteristics of the proposed treatment train. Modelling parameters used were adopted from the *Water by Design "Music Modelling Guidelines for South-East Queensland"*.

3.2.3. Treatment Nodes

The following devices have been used in the treatment train to reduce these pollutant loads to achieve WQO's for this site. Refer to Appendix B for MUSIC modelling results.

Atlan Filter – an underground cartridge filter system that incorporates an upflow treatment process that maximises surface treatment area. Flow through the filter cartridges utilises a self-regulating siphon which results in low maintenance and high performance stormwater treatment. The design proposed is:

- o Lot 1 - 7 x 850mm Tall Cartridges;
- o Lot 2 – 2 x 850mm Tall Cartridges

Atlan Stormsack GPT Baskets – A number of baskets installed to the top of field inlets to trap coarse sediment prior to entering the drainage system was modelled in line with the cartridge system. The design proposed is:

- o Lot 1 - 2 x Baskets;
- o Lot 2 - 4 x Baskets;

3.2.4. Effectiveness in Pollution Reduction

The water quality development model was set up with the incorporation of the above devices to reduce pollutant export to WQO levels. Table 3.4 indicates the predicted pollutant mean values of stormwater discharged from the site as calculated by MUSIC:

Pollutant	Percentage Load Reduction
	Catchment 'A'
Total Suspended Solids (TSS)	81.7
Total Phosphorus (TP)	63.6
Total Nitrogen (TN)	53.8
Gross Pollutants (>5mm)	100

Table 3.4 – Annual Load Based Pollutant Reduction

The MUSIC modelling results above indicate the proposed treatment train will adequately treat pollutants generated by stormwater runoff in accordance with the targets required of the Water Quality Objectives.

4.0 CONCLUSION

This report has outlined the stormwater management strategies to be adopted in the construction and operational works phase of the development which satisfies State and Council planning scheme policies.

Two existing stormwater lawful points of discharge have been identified, one to the corner of Baringa Dr / Aura Bvd, and another at the mid-point frontage to Baringa Dr.

Primary and Tertiary water quality improvement devices are proposed including proprietary filter cartridges and gross pollutant baskets to satisfy the Water Quality Objectives.

APPENDIX A – CONCEPT STORMWATER MANAGEMENT PLAN

APPENDIX B – MUSIC WATER QUALITY MODELLING

