







REFERENCES STORM WATER MANAGEMENT & HEALTHY WATERWAY REQUIREMENTS

The site based storm water management plan has been based on the following publications and quidelines:

- Healthy Waters Music Modeling Guidelines (HWMMG).
- State Planning Policy April 2016 (SPP)
- Queensland Urban Drainage Manual (QUDM)
- Water Sensitive Urban Design (WSUD)
- Storm water quality improvement devices are referred to as SQUID's.

2. OPPORTUNITIES, CONSTRAINTS & PRECEDENTS

The type of development complies with the Council standards for Residential subdivisional works. This development is the continuation of a staged development.

The principal pollutants likely to be generated from the site development will be hydrocarbons, metals, sediment and nutrients such as nitrogen and phosphorus fixed to the sediments.

- Existing previously constructed stages include underground storm water drainage collection systems sized for a 1 in 10 year design storm incorporating in-line SQUIDs sized for the ultimate catchment area(s) (Humeceptors ®):
- Road and allotment layout and sizing, soil types and functionality requirements precludes the practical and feasible use of large scale above ground SQUIDs (vegetated swales; bioretention beds; wetlands) installed in the road verge area:
- Council in recent times have indicated a preference for the use of low maintenance self sustaining natural storm water quality improvement devices such as swales. This stage discharges to an existing formed 'natural' channel constructed as part of the previous upstream stages. This channel is fully vegetated and includes an extensive reed bed within the base; and
- Council can adopt and set storm water quality targets different to the those recommended in the State Planning Policy if considered more appropriate to the the site and available opportunities and constraints.

3. RECEIVING WATERS

The nominated receiving waterway is is an existing formed 'natural' channel which is part of the Splitters Creek system. Although some infiltration of storm water is likely to occur at the site, use of groundwater does not occur downstream of the site. Consequently, only surface water Environmental Values (EVs) and water quality objectives (WQOs) have been identified.

4. PROPOSED STORM WATER TREATMENT

After consideration of the available opportunities & constraints & current Council preferences, the selected treatment train shall comprise the use of the existing channel reed bed.

In accordance with SPP Appendix 3's A01.1b, this is considered current best practice reflecting land use constraints in this case.

5. PROPOSED STORM WATER TREATMENT EVALUATION & SIZING

 $\frac{1}{2}$ The evaluation & sizing of the components proposed and/or adopted for the treatment train has been ₽ carried out using the MUSIC Version 6 computer package and 6 minute rainfall for the period from 1 January ₩ 1939 to 31 December 2010. The pollutant types and concentrations evaluated for removal are -

- ♀ gross pollutants (GP);
- sediments and dissolved soils, Total Suspended Solids (TSS);
- total dissolved nitrogen (TN); and
- total dissolved phosphorus (TP).

 $ec{ extsf{g}}$ All catchments have been modeled as 'Urban Residential' split catchments. The split catchment surface $\frac{1}{2}$ types & associated runoff generation parameters; pollutant concentrations and generation parameters applicable to these type of catchments and surface compositions recommended in Healthy Waters Music Modeling Guidelines have been adopted. Details of these areas are shown in Table 1.

¹ The existing reed bed has been adopted as the most appropriate SQUID to suit the site opportunities and constraints. The design parameters adopted for the treatment capacity of the have been selected from the HWMMG publication for swale drains plus a 3mm/hr exfiltration allowance for nutrient uptake by reeds within the treatment area.

. PERFORMANCE EVALUATION

Details of the catchments applicable to this stage are summarised in Table 1. Details of the SPP suggested target water quality objectives (WQO) for storm water discharging from the site to the receiving waters based on nutrient load reduction are summarised in Table 2. Details of performance of the treatment train measured at the nominated receiving water for the whole of the upstream catchments are summarised in Tables 3 to 5. Tables 3 and 4 provide a comparison between the pre and post development scenario. Table 5 provides details of the post development pollutant load reductions for the proposed treatment train and evaluation in relation to target objectives in Table 2

7. CERTIFICATION

An assessment has been carried out of the impact from this proposed development stage on storm water quality (comparison between pre and post development loads) and the effectiveness of the proposed site water quality management in meeting the suggested SPP water quality standards for storm water management and healthy waterways. Details of the nominated standards, comparison between pre and post development pollutant loads & evaluation of the effectiveness of the proposals in meeting the standards have been provided. Within the limits imposed by the available opportunities and constraints and existing precedents, the proposed storm water management should provide -

•	Treatment comparable to the Council appro ved proposals for existing constructed stages;	Tota
•	An acceptable water quality management strategick hain berowing to consider the angeneration	C IIL e

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with **Development Permit No.: D/135-2018**

Dated: 21 January 2019



ABLE 1: DESIGN AREAS (ha) (COLOUR CODED TO MATCH PLAN VIEW)							
Ou	tlet	Total	Roof	Roads	Ground leve		
1	\sim	1.352	0.300	0.425	0.627		
2	\sim	0.678	0.180	0.060	0.438		
3	\sim	0.915	0.180	0.282	0.453		
4		0.574	0.150	0.061	0.363		
5		0.714	0.180	0.209	0.325		
TOTAL		4.233 (100%)	0.990 (23%)	1.037 (24%)	2.206 (52%)		

ABLE 2: TARGET WATER QUALITY OBJECTIVES (WQO)

	Load Reduction (ref QWQG)
Indicator	% Reduction
Total Suspended Solids (TSS)	85
Total Nitrogen (TN)	45
Total Phosphorus (TP)	60
CINter, Gross Pollutants (GP)	90

TABLE 3: PERFORMANCE EVALUATION - POLLUTANT MEAN CONCs (mg/L)							
	TS	SS	TN				
PRE & POST COMPARISON	PRE	POST	PRE	POST	PRE		
At Nominated Receiving Waters combined wet & dry flows	8.26	0.652	0.245	0.066	0.028		

TABLE 4: PERFORMANCE EVALUATION - POLLUTANT MEAN ANNUAL LOAD (kg/yr)							
	T	SS	Т	N	Т	Ρ	
PRE & POST COMPARISON	PRE	POST	PRE	POST	PRE		
At Nominated Receiving Waters combined wet & dry flows	1690	132	17.90	14.10	3.49		

TABLE 5: PERFORMANCE EVALUATION - POLLUTANT REDUCTION (%)					
	TSS	TN	TP		
At Nominated Receiving Waters combined wet & dry flows	95	57	79		
	Complies with Table 2 frequency requirements.				

PROPERTY DESCRIPTION: LOT 821 SP262542 SURVEY DATUM: PM134434 E246136.104 N7418132.636 MGA ZONE 56; RL33.070 AHD

FIGURE 1120-ROL5:





POST

0.006

POST

1.21

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Storm Water Management - Quality 26/11/18 Rev 2





IMPORTANT NOTE

This plan was prepared to accompany an application to Rockhampton Regional Council and should not be used for any other purpose

The dimensions and areas shown hereon are subject to field survey and also to the requirements of council and any other authority which may have requirements under any relevant legislation.

In particular, no reliance should be placed on the information on this plan for any financial dealings involving the land.

This note is an integral part of this plan.

Colaaco Pty Ltd ABN 18 125 353 826

project

client

Forest Park Stage 16

(Stringybark Avenue, Norman Gardens)

Reconfiguration Plan

1 Lot into 37 Lots + PUL + Balance (Stage 16)

Lot 821 on SP262542

Rockhampton Regional Council

issue	date	details	authorised			
A	5-12-2018	Initial Issue	RJKF			
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