PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2016/776

Date: 06 October 2016

Queensland Government

PREPARED FOR COLES GROUP PROPERTY DEVELOPMENT
MAY 2016
15-003394.SMP01B
ORIGINAL
WATER & ENVIRONMENT

Coles Flagstone
Site-Based Stormwater Management Plan

COMMERCIAL IN CONFIDENCE

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DOCUMENT CONTROL

15-003394.SMP01

Issue	Date	Issue Details	Author	Checked	Approved
A	27/04/2016	Original submission	IP	MS (RPEQ 9485)	MS (RPEQ 9485)
B	18/05/2016	Minor changes for updates to layout	MS (RPEQ 9485)		

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FIGURES

APPENDICES

1 INTRODUCTION

Calibre Consulting (Qld) Pty Ltd has been commissioned to undertake a Site-Based Stormwater Management Plan to support the proposed Coles Flagstone Development Application (DA).

The proposed development comprises a building for retail, as well as open space areas, car parking facilities, fuel station, and internal roads. The proposed site layout is shown on the Powe Architects Masterplan drawing (248-17 DA-1-001 Revision C) included in **Appendix A**.

This report investigates and addresses the stormwater quality, quantity and waterway stability management requirements for the development in accordance with relevant Local and State Government Standards (*State Planning Policy 2014, SPP 2014*). The report is to address the Economic Development Queensland (EDQ) Development Condition No.13 (EDQ Approval No. DEV2014/637 dated 8 July 2015). Furthermore, the report provides a flood hazard assessment presenting flood constraints and minimum flood immunity levels for the new buildings. For clarity and consistency the development site that consists of three adjoining lots will herein be referred to as "the site". Scope of the report is provided in **Section 1.1**.

1.1 SCOPE OF THIS REPORT

The scope of this report incorporates the following:

- Stormwater quantity assessment to demonstrate no increase in peak flows will result from the development and therefore no adverse impact to neighbouring or downstream properties;
- Management of Waterway Stability required under *SPP* (2014);
- Stormwater quality analysis using MUSIC software to determine the adequacy of the proposed SQIDs to meet the Water Quality Objectives (WQO's) required under *SPP 2014*; and
- Addresses EDQ Development Condition No.13 outlined in **Section 1.2** below.

1.2 EDQ CONDITIONS

Details for EDQ's Conditions for Stage 7 of Greater Flagstone in which the Coles Flagstone is to be located and Calibre Consulting's responses are presented in **Table 1-1**.

Table 1-1: EDQ Approval DEV2014/637 dated 8 July 2015

Item	EDQ Development Conditions	Addressed in Section
Engineering		
13.	Submit Management (Quantity & Quality) a) Submit to EDQ Development Assessment, DILGP detailed design and hydraulic calculations certified by RPEQ for the proposed stormwater drainage reticulation system including detention basins and stormwater treatment devices generally in accordance with the PDA Guideline No. 13 Engineering Standards – Stormwater Quality and the following approved documents: i. Flagstone City – Masterplan Flooding Assessment, Document No. 721743/032/R1V6. Version. Dated 05 September 2014; ii. Flagstone City-Stage 7 Stormwater Management Report, Document No. 7217/43/R11V1, Version 2, dated 14 January 2015.	**Report No. B15-003394.SMP01**

Item	EDQ Development Conditions	Addressed in Section
	The drainage network adopted must demonstrate 'no worsening' or create actionable nuisance to upstream or downstream properties, including the adjoining rail network for storm flows up to a 1% AEP. *The report provides a Site-Based Stormwater Management Plan addresses the requirements of this Development Condition for the Greater Flagstone Development Stage 7.*	

2 SITE CHARACTERISTICS

2.1 LOCATION

The site is located at the corner of the roundabout on Homestead Drive, Jimboomba. The site is located within the Logan City Council (LCC) local government area, however it is understood that this report will be lodged as part of the DA package to Economic Development Queensland (EDQ). Coles Flagstone is to be located on Lot 25000 which shall be created after the operational works have been completed for Stage 7. The total development occupies 1.82ha. Figure 1 below indicates the approximate location of Coles Flagstone. Currently the site is located existing Lot 873 on SP166448.

Figure 2-1: Approximate Location of Coles Flagstone (source: QLD Globe 2016)

2.2 EXISTING TOPOGRAPHY AND DRAINAGE

The site has its highest point at its northern corner adjacent to Homestead Drive. From this high point, the site falls at grades between approximately 2.5% toward the existing farm dam on the site at approximately 2.5%. Elevations of existing ground surfaces range from approximately RL 48.2 fronting Homestead Drive to RL 44.4 to the dam. The site is currently undeveloped.

3 STORMWATER INVESTIGATION

The management of the stormwater quantity and site flooding is to be consistent with the EDQ approved stormwater reports as outlined in **Section 1.2**.

i. *Flagstone City – Masterplan Flooding Assessment*, Cardno Document No. 721743/032/R1V6. Version. Dated 05 September 2014; and
ii. *Flagstone City-Stage 7 Stormwater Management Report*, Cardno Document No. 7217/43/R11V1, Version 2, dated 14 January 2015.

Both documents have been approved as part of the PDA Development Approval (DEV2014/637 dated 8 December 2015).

The section below demonstrates the propose development is consistent with the approved documents.

3.1 STORMWATER QUANTITY

The stormwater management strategy for Stage 7 of the Flagstone City development is presented within the Cardno document *Flagstone City-Stage 7 Stormwater Management Report* (2015). This report identified that with the adoption of the local 1 Year ARI basins the Stage 7 development will not have any adverse flood impact external to the site. The Coles Flagstone site is to discharge runoff to the Waterway Stability and Bioretention Basin on the western side of the site, adjacent to Road No.6. This basin is designated as EC2 in the *Stormwater Management Report* (2015) and is to be constructed as part of the Stage 7 subdivision works. Refer to Drawing No. **15-003394-SK001** in **Appendix C** for the location of this basin.

An assessment has been undertaken to determine if the proposed Coles development layout is consistent with the hydrological analysis previously undertaken and documented in the *Stormwater Management Report* (2015).

Fraction impervious values for the proposed Coles development have been compared to the values adopted within the Cardno Stormwater Management Plan to ensure that the proposed development is consistent with previous analysis.

Table 3-1: Stormwater Quantity Parameter Comparison

Parameter	Approved Report No. 7217/43/R11V1 (January 2015)	This Report No. 15-03394.SMP01 (2016)
Fraction Impervious (%)	90%	88%

The fraction impervious for the proposed Coles Flagstone development is consistent with value adopted within the approved Stage 7 *Stormwater Management Plan* (2015).

3.2 INTERNAL DRAINAGE STRATEGY

Pipe drainage is proposed for conveying minor flows from the Coles Flagstone development to the Waterway Stability and Bioretention Basin (EC2) on the western side of the site. This basin is to provide peak flow mitigation for the 1 Year ARI and stormwater quality treatment before discharging downstream. An internal stormwater drainage strategy is required to ensure that runoff is managed effectively through the site during minor and major storm events.

The site stormwater network is to convey the major and minor storm events through the site to Basin EC2. Typically, underground piped drainage is designed to convey the minor storm only. Major flows will discharge overland similar to existing conditions.

3.3 FLOOD INVESTIGATION

A Flood Investigation was undertaken as part of the master planning for the overall Flagstone City development and for Stage 7. The flood investigations are documented within the approved Cardno documents *Flagstone City – Masterplan Flooding Assessment* (2014) and *Flagstone City-Stage 7 Stormwater Management Report* (2015).

The results of the flood investigations demonstrated that the cumulative development of Stage 7 and Stage 1 will not cause any significant adverse flooding impacts external to the overall Flagstone City development extent.

The Coles Flagstone development is consistent with the land use proposed on Lot 25000 as documented within the *Masterplan Flooding Assessment* (2014) and *Stormwater Management Report* (2015).

3.4 WATERWAY STABILITY ASSESSMENT

As part of the design objectives of the *SPP* (2014) for urban stormwater management, developments are required to achieve the waterway stability management criteria. The aim of the waterway stability management is to reduce the impacts of urban development on channel bed and bank erosion by limiting changes in flow rate and duration within receiving waters.

The Coles Flagstone site is to discharge runoff to the Waterway Stability and Bioretention Basin on the western side of the site. This basin is designated as EC2 in the *Stormwater Management Report* (2015) and is to be constructed as part of the Stage 7 subdivision works. Refer to Drawing No. **15-003394-SK001** in **Appendix C** for the location of this basin.

4 STORMWATER QUALITY

The proposed development has the potential to increase the export of pollutants in runoff and cause adverse impacts to downstream waterways. Measures therefore need to be implemented to mitigate the pollutant export increase and meet the water quality objectives (WQOs) identified for the site.

This section discusses:

- Key stormwater pollutants associated with the development;
- WQOs identified for the catchment;
- Proposed measures to mitigate the increase in pollutant concentrations; and
- Modelling of the proposed measures and comparison to the identified WQOs.

4.1 POLLUTANTS OF CONCERN

Typical key pollutants expected to be generated during the operational (post-construction) phase of the planned development are listed as follows, with those presented in capitals being the key pollutants to be targeted for treatment:

- LITTER
- SEDIMENT
- Oxygen demanding substances (possibly present)
- NUTRIENTS (N & P)
- Pathogens / Faecal coliforms
- Hydrocarbons
- HEAVY METALS (associated with fine sediments)
- Surfactants
- Organochlorines & organophosphates
- Thermal pollution
- pH altering substances

Only the key pollutants will be further addressed in this report; however, the treatment train developed will adequately mitigate the other pollutant loads. As heavy metals will predominately be associated with fine sediment, controls proposed to reduce total suspended solids will also adequately reduce loads of heavy metals.

4.2 WATER QUALITY OBJECTIVES

The proposed development triggers compliance with the *State Planning Policy 2014* (SPP 2014) with respect to stormwater quality. The appropriate load reduction WQO's are presented in **Table 4.1** have been sourced from the *SEQ Regional Plan 2009-2031 Implementation Guideline No.7* (2009).

Table 4-1: Water Quality Objectives

Pollutant	Total Suspended Solids (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Gross Pollutants (GP)
Load Reduction Target	80%	60%	45%	90%

4.3 WATER QUALITY MANAGEMENT STRATEGY

To mitigate the increase in pollutants generated by the proposed development a treatment train of SQIDs are proposed. Details are shown in Drawing No. **15-003394-SK001** in **Appendix C**.

The treatment train will involve the end-of-line Waterway Stability and Bioretention Basin to the western side of the site. This basin is designated as EC2 in the *Stormwater Management Report* (2015) and is to be constructed as part of the Stage 7 subdivision works. Refer to Drawing No. **15-003394-SK001** in **Appendix C** for the location of this basin.

The refuelling area on the western side of the site is likely to discharge concentrated pollutants, such as oils, grease, petrol and diesel fuels, heavy metals, motor vehicle liquids and general litter. As such, specialised treatment is required for this area. To ensure that pollutants from this area do not discharge into the site's stormwater drainage system, it is

proposed that the refuelling area is roofed, bunded and designed with an independent drainage system to capture and contain runoff from the area. This system is to incorporate a Gross Pollutant Trap (GPT) that can also capture hydrocarbons, such as a SPEL Puraceptor unit (or approved equivalent). Detailed design of the refuelling area, GPT and Hydrocarbon separator is to be undertaken by others.

4.4 MUSIC MODELLING

Water quality modelling of the proposed development has been undertaken using the Model for Urban Stormwater quality modelling of the proposed development has been undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6, developed by the Cooperative Research Centre for Catchment Hydrology (CRCCH). MUSIC enables the user to conceptualise the transfer of pollutants through a stormwater drainage system and provides an aid in quantifying the effectiveness of the proposed stormwater quality management strategy. MUSIC only provides quantitative modelling for Total Suspended Solids (TSS), Total Phosphorous (TP), Total Nitrogen (TN) and Gross Pollutants (GP).

The MUSIC model was setup generally in accordance with Water by Design *MUSIC Modelling Guidelines* (2010), with stormwater quality catchment boundaries defined as the development area as part of the Coles Flagstone Development. The development is part of a larger catchment of the Stage 7 proposal for the Greater Flagstone area, as specified in the Cardno *Stormwater Management Report* (2015).

The subsequent sections discuss the model configurations adopted for the analysis. Detailed MUSIC inputs are presented in **Appendix B**. MUSIC modelling parameters are consistent with previously approved reporting.

- **Site:** Coles Flagstone
- **Model:** 15-003394-Mitigated_160422.sqz

4.4.1 METEOROLOGICAL DATA

Six minute pluviographic data was sourced from the Bureau of Meteorology (BOM) for the Greenbank Thompson Road Station No. 40659, which is typically used for development proposals within the LCC Local Government Area. The duration of the simulation was from 1st January 1980 to 1st January 1989.

4.4.2 SOURCE NODES

Source nodes representing sub-catchments were defined for MUSIC modelling purposes. Catchments are presented in Drawing No. **15-03394-SK001** in **Appendix C.** These sub-catchments were then split into three types of source nodes: roof, road, and ground. **Table 4-2** below outlines the source model adopted.

Table 4-2: Source Node Data

Sub Catchment	Source Node	Surface Type	Area (ha)	% Impervious
A	A_Ind Roof	Roof	0.041	100
	A_Ind Road	Road (Car Park)	0.099	100
B	B -_com Roof	Roof	0.471	100
	B -_com Car Park	Road (Car Park)	0.980	100
	B -_com Ground	Ground	0.226	80
EXT	EXT -_com Roof	Roof	0.209	100
	EXT -_com Car Park	Road (Car Park)	0.273	100
	EXT -_com Ground	Ground	0.146	80
	EXT -_urb Road	Road	1.670	60

It should be noted that all catchments that discharge runoff to the Waterway Stability and Bioretention Basin (EC2) have been included in the model, not just the site. This is to confirm that basin EC2 will meet the required WQO's for its intended treatment, not just the Coles Flagstone development. All source nodes were configured in accordance with *Table 3.7* and *3.8* of the *MUSIC Modelling Guidelines* (2010) respectively.

Stochastic generation estimation and serial autocorrelation set to zero has been adopted for all source nodes. Refer to **Appendix B** for MUSIC model layout and additional details regarding MUSIC model set up.

4.4.3 DRAINAGE LINKS

No routing has been adopted for all drainage links within each model.

4.4.4 TREATMENT NODES

Bioretention treatment nodes have been utilised in the MUSIC model.

4.4.4.1 BIORETENTION TREATMENT NODE

A Bioretention treatment node was used to model the proposed Waterway Stability and Bioretention Basin. Default K and C* values were adopted for this treatment node. These treatment node was set up generally in accordance with the *MUSIC Modelling Guidelines* (2010) and *Interim MUSIC Bioretention Treatment Node* (2013). Refer to **Table 4.2** below.

The bioretention treatment node was configured based on the proposed proposed Waterway Stability and Bioretention Basin as documented within the Cardno *Stormwater Management Report* (2015). The basin will be designed and constructed as part of the Stage 7 works.

Table 4-3: Bioretention Basin Modelled Parameters

Parameter	Southern Basin
Surface Area (m2)	480
Filter Area (m2)	480
Ponding Depth (m)	0.3
Filter Depth (m)	0.5
Filter Media Type	Sandy Loam
Filter Median Particle Diameter (mm)	0.45
Saturated Hydraulic Conductivity of Filter Media (mm/hr)	200
TN Content of Filter Media (mg/kg)	400
Orthophosphate Content of Filter Media (mg/kg)	50
Overflow Weir Width Modelled (m)*	2

Refer to Drawing No. **15-03394-SK001** for the basin location.

4.4.5 MUSIC MODELLING RESULTS

Results for the proposed stormwater quality management strategy is presented in **Table 4.3** below.

Table 4-4: MUSIC Model Results

Description	TSS	TP	TN	GP
WQO (% Reduction)	80	60	45	90
Source Loads (kg/yr)	7,120	9.3	61.4	629
Residual Loads (kg/yr)	812	3.2	24.6	0
Pollutant Reduction Achieved (% Reduction)	89	65	60	100
WQO Achieved	Yes	Yes	Yes	Yes

The above results indicate that the proposed strategy is effective in treating pollutant loads from the proposed development to achieve the WQO's as required under the *SPP* (2014).

5 CONCLUSIONS

This Site-Based Stormwater Management Plan Report has been prepared to support the DA for Coles Flagstone. The outcomes of the investigations are listed below:

- The stormwater quantity strategy is consistent with previous reporting for Stage 7 of the Flagstone development.
- Management of Waterway Stability required under *SPP* (2014) will be addressed through the provision of the Waterway Stability and Bioretention Basin to be located west of the Coles Flagstone site;
- Stormwater quality management will be provided by the Waterway Stability and Bioretention Basin. MUSIC modelling demonstrates that the bioretention basin will reduce pollutants exported in runoff from the site to meet appropriate Water Quality Objectives (SPP 2014).
- The development is consistent with EDQ development conditions.

6 RECOMMENDATIONS

It is recommended that this Concept Site-Based Stormwater Management Plan Report be approved on the basis that acceptable outcomes will be provided for stormwater and flood management. The design strategies presented in this report are to be incorporated into future detailed design. Detailed design may result in changes to the proposed management strategies but the design objectives are to be maintained.

7 REFERENCES

- Australian Government (2006), *Healthy Waterways. Water Sensitive Urban Design. Technical Design Guidelines for South East Queensland*. Version 1 June 2006.
- Queensland Urban Drainage Manual (2013)
- *Flagstone City – Masterplan Flooding Assessment*, Document No. 721743/032/R1V6. Version. Dated 05 September 2014;
- *Flagstone City-Stage 7 Stormwater Management Report,* Document No. 7217/43/R11V1, Version 2, dated 14 January 2015.
- Department of Energy and Water Supply (2013), *Queensland Urban Drainage Manual*;
- Department of State Development, Infrastructure and Planning (2014), *State Planning Policy 2014*; and
- Department of Environment and Resource Management (2010), *Urban Stormwater Quality Planning Guidelines*.

APPENDICES

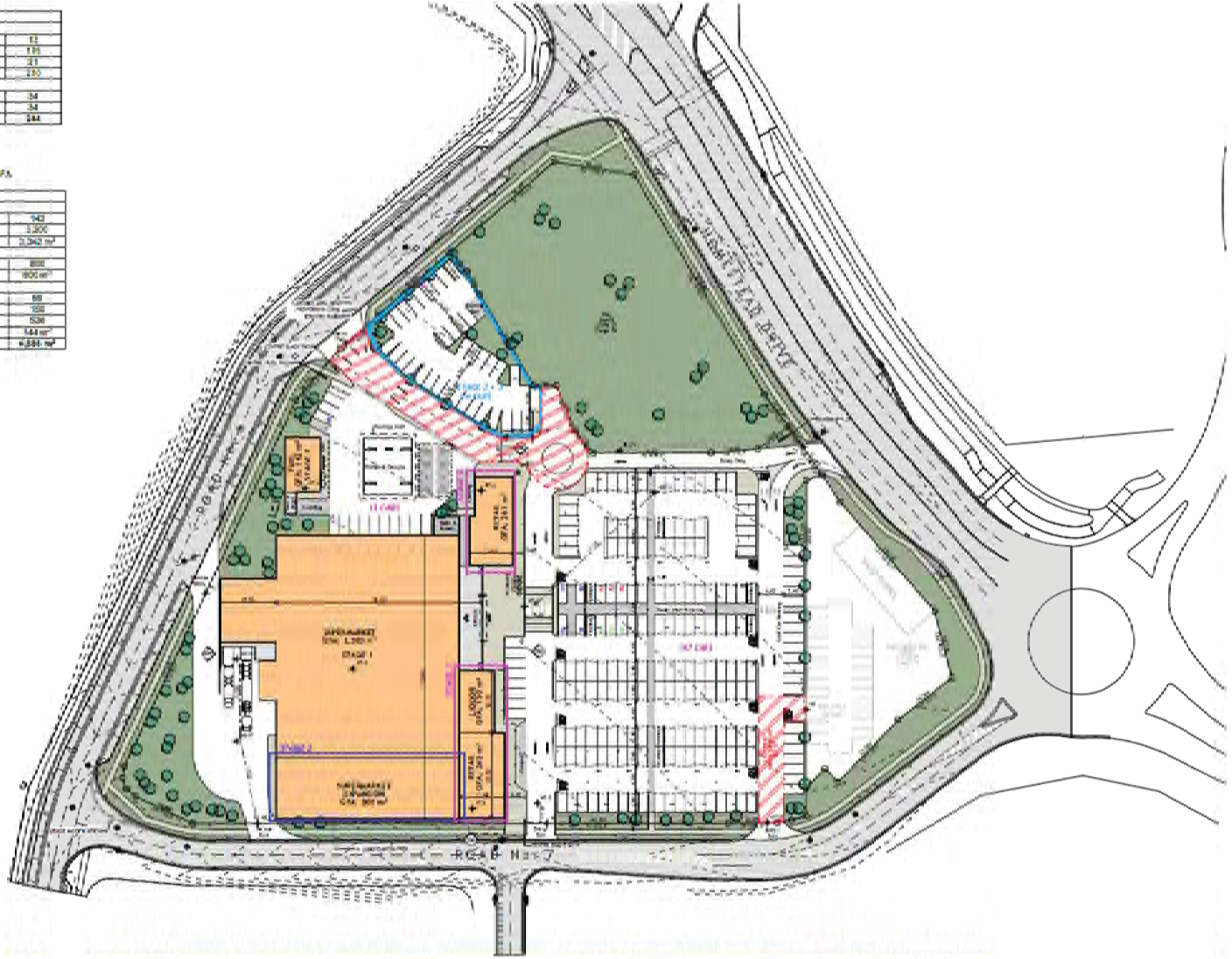
APPENDIX A SITE PLAN

Parking Schedule		
Stage 1		
	Fuel	12
	Supermarket	175
	Staff car park	23
		210
Stage 2 & 3		
	Retail	34
		34
		244

Car Park Ratio = 5.8 cars/100m² GFA

GFA Schedule		
Stage 1		
	Fuel	143
	Supermarket	3,200
		3,342 m²
Stage 2		
	Supermarket	800
		1800 m²
Stage 3		
	Amenities & BOH	88
	Liquor	100
	Retail	536
		144 m²
		4,884 m²

* STAGE 3 - 1 CARPARK PROPOSED AS OPTIONAL ADDITIONAL CARS THAT MAY BE BUILT WITH EITHER STAGE 3 OR STAGE 3 RETAIL.



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DISCLAIMER

PROJECT
Coles Flagstone
Coles Group Property Developments
LOT 8 Homestead Dr Undullah QLD 4305 and others
Lot 1 on SP111227 & Lot 3 on SP111228
Parish of Undullah

FOR APPROVAL
NOT FOR CONSTRUCTION

POWE ARCHITECTS

No.	DATE	DESCRIPTION	BY
A			AD
B			AD
C			AD

Coles Flagstone

DRAWING DESCRIPTION
Masterplan

DRAWING DETAILS

DRAWN	CHECKED	APPROVED
ME		ME
SCALE	SHEET	PRINT DATE
1:500	A1	13/05/2016

JOB #	DRAWING #	REVISION
248-17	DA-1-001	C

CALIBRE CONSULTING

APPENDIX B STORMWATER QUALITY ANALYSIS

E1: Source Node Inputs

Area	Industrial	Commercial	Ext Road	Ext Commercial
Road	0.099	0.980	1.67	0.273
Roof	0.041	0.471		0.209
Ground		0.226		0.146

Total Area (ha)	4.115
Total Check	4.115

Source Nodes Input	A ind_Roof	A_Ind_Road	B _Com - Roof	B -_com Car park	B_com_ Ground	EXT_Com - Roof	EXT -_com Car park	EXT_com_ Ground	EXT -_urb Road
Total Area (ha)	0.041	0.099	0.471	0.980	0.226	0.209	0.273	0.146	1.670
Area Impervious (ha)	0.041	0.099	0.471	0.980	0.181	0.209	0.273	0.117	1.002
Area Pervious (ha)	0.000	0.000	0.000	0.000	0.045	0.000	0.000	0.029	0.668
Field Capacity (mm)	80	80	80	80	80	80	80	80	80
Pervious Area Infiltration Capacity coefficient - a	243	243	243	243	243	243	243	243	243
Pervious Area Infiltration Capacity exponent - b	1	1	1	1	1	1	1	1	1
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1	1	1	1
Pervious Area Soil Storage Capacity (mm)	18	18	18	18	18	18	18	18	18
Pervious Area Soil Initial Storage (% of Capacity)	10	10	10	10	10	10	10	10	10
Groundwater Initial Depth (mm)	50	50	50	50	50	50	50	50	50
Groundwater Daily Recharge Rate (%)	0	0	0	0	0	0	0	0	0
Groundwater Daily Baseflow Rate (%)	31	31	31	31	31	31	31	31	31
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0	0	0	0
Stormflow TSS Mean (log mg/L)	1	2	1	2	2	1	2	2	2
Stormflow TSS Standard Deviation (log mg/L)	0	0	0	0	0	0	0	0	0
Stormflow TSS Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow TSS Serial Correlation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stormflow TP Mean (log mg/L)	-0.89	-0.30	-0.89	-0.30	-0.39	-0.89	-0.30	-0.39	-0.30
Stormflow TP Standard Deviation (log mg/L)	0.36	0.36	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Stormflow TP Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow TP Serial Correlation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stormflow TN Mean (log mg/L)	0.25	0.25	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Stormflow TN Standard Deviation (log mg/L)	0.32	0.32	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Stormflow TN Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow TN Serial Correlation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baseflow TSS Mean (log mg/L)	0.00	0.78	0.00	0.78	0.78	0.00	0.78	0.78	0.78
Baseflow TSS Standard Deviation (log mg/L)	0.00	0.45	0.00	0.39	0.39	0.00	0.39	0.39	0.39
Baseflow TSS Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow TSS Serial Correlation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baseflow TP Mean (log mg/L)	0.00	-1.11	0.00	-0.60	-0.60	0.00	-0.60	-0.60	-0.60
Baseflow TP Standard Deviation (log mg/L)	0.00	0.48	0.00	0.50	0.50	0.00	0.50	0.50	0.50
Baseflow TP Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow TP Serial Correlation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baseflow TN Mean (log mg/L)	0.00	0.14	0.00	0.32	0.32	0.00	0.32	0.32	0.32
Baseflow TN Standard Deviation (log mg/L)	0.00	0.20	0.00	0.30	0.30	0.00	0.30	0.30	0.30
Baseflow TN Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic

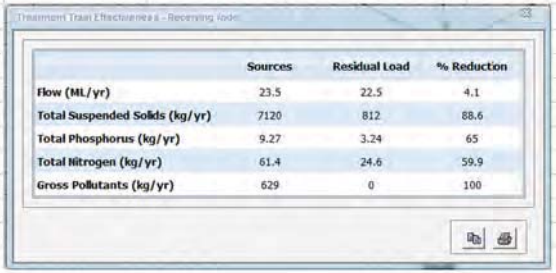
MUSIC Catchment Area	4.115

E2: TREATMENT NODES

Bioretention Treatment Node Parameters					
Bioretention Treatment Node Parameters	Surface Area (m2)	Extended Detention Depth (m)	Filter Media Area (m2)	Filter Depth (m)	Overflow Weir (m)
Bioretention Basin	480	0.3	200	0.5	2

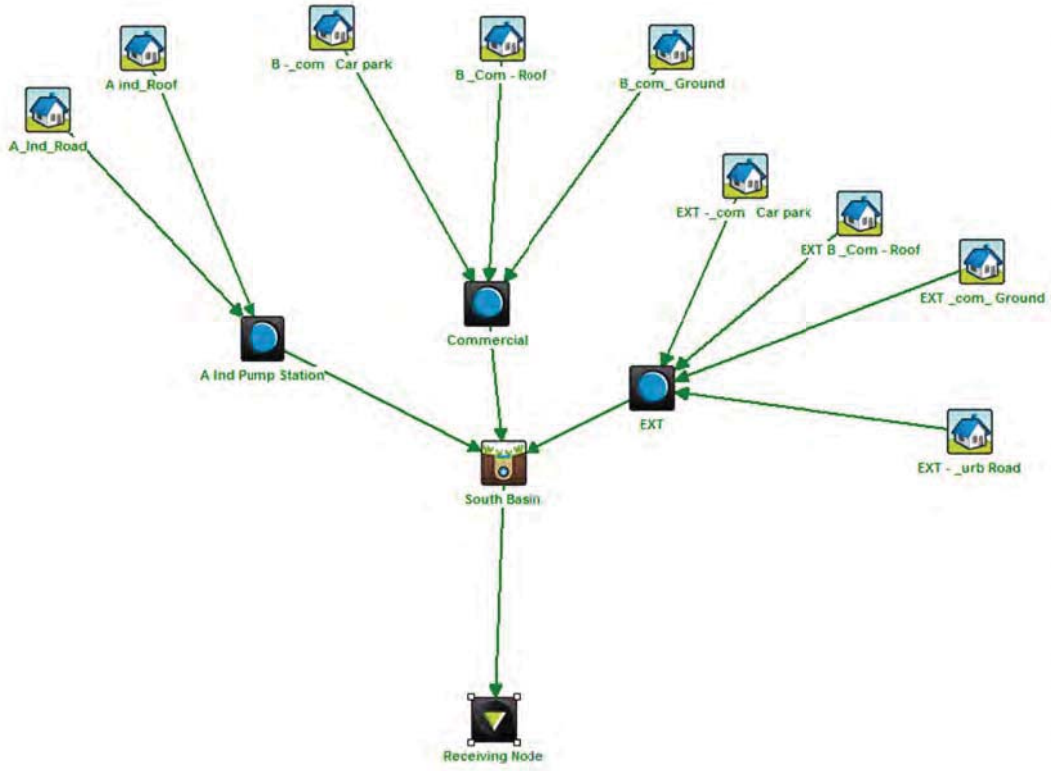
E3: MUSIC MODEL RESULTS

Developed Mitigated 1.sqz -			
	Sources	Residual Load	% Reduction
TSS (kg/yr)	7120	812	89%
TP (kg/yr)	9.3	3.2	65%
TN (kg/yr)	61.4	24.6	60%
Gross Pollutants (kg/yr)	629	0	100%

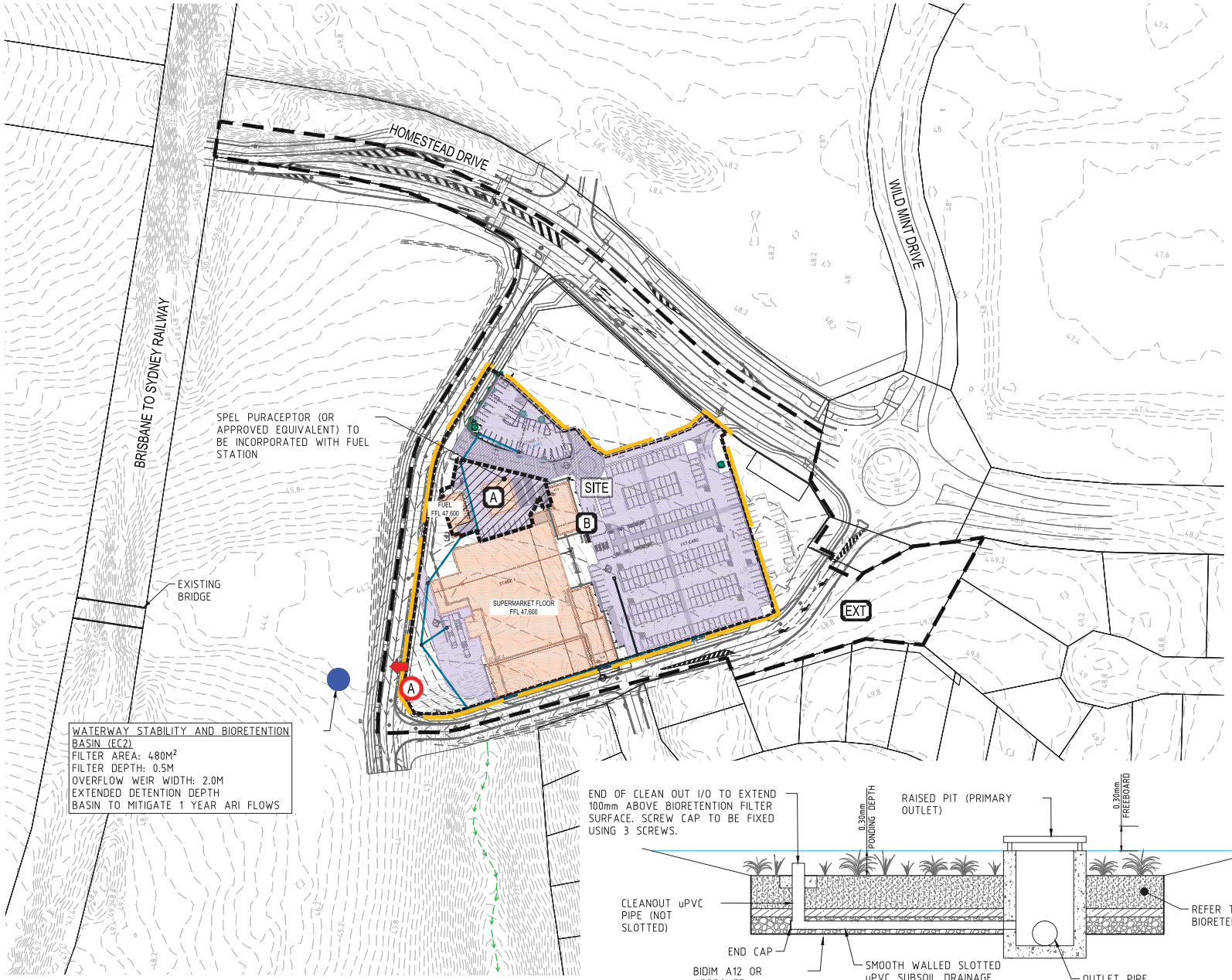


	Sources	Residual Load	% Reduction
Flow (ML/yr)	23.5	22.5	4.1
Total Suspended Solids (kg/yr)	7120	812	88.6
Total Phosphorus (kg/yr)	9.27	3.24	65
Total Nitrogen (kg/yr)	61.4	24.6	59.9
Gross Pollutants (kg/yr)	629	0	100

E4: MUSIC MODEL LAYOUT



APPENDIX C DRAWINGS



PLAN
SCALE 1:1000

N

LEGEND:

- SITE BOUNDARY
- SITE CATCHMENT BOUNDARY
- CATCHMENT TO BASIN SEE NOTE 2
- EXISTING CONTOURS
- INDICATIVE DESIGN CONTOURS
- MUSIC ROAD/CARPARK AREA
- MUSIC ROOF AREA
- MUSIC INDUSTRIAL AREA
- MUSIC CATCHMENT LABEL
- DISCHARGE FLOW ARROW
- DISCHARGE LOCATION
- WATERWAY STABILITY AND BIORETENTION BASIN LOCATION
- EXISTING FLOW PATH
- INTERNAL DRAINAGE

TYPICAL BIORETENTION DETAIL
SCALE 1:20 (A1)
SCALE 1:40 (A3)

CONCEPT PLAN ONLY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF CALIBRE CONSULTING REPORT No. 15-003394-SMP01.
2. THE WATERWAY STABILITY AND BIORETENTION BASIN IS CONSISTENT TO THAT PROVIDED IN THE EDQ REPORT CARDNO FLAGSTONE CITY - STAGE 7 STORMWATER MANAGEMENT REPORT, DOCUMENT No. 7217/43/R11V1 (2015).

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FIRST ISSUE	CALCS	DRAWN	DATE	AMENDMENT DETAILS
A	MS	MP	18.05.16	CHANGES TO LAYOUT
B				
C				
D				
E				
F				

DESIGN CHECK
DRAWN CHECK
SCALE (METRES) 1:1000 10 0 10 20 30 40 50 A1 1:2000 A3
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APPROVED MATTHEW HILRPEQ 11578 FOR & ON BEHALF OF CALIBRE CONSULTING (QLD) PTY LTD
CLIENT COLES GROUP PROPERTY DEVELOPMENT
PROJECT COLES FLAGSTONE
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ISSUE A