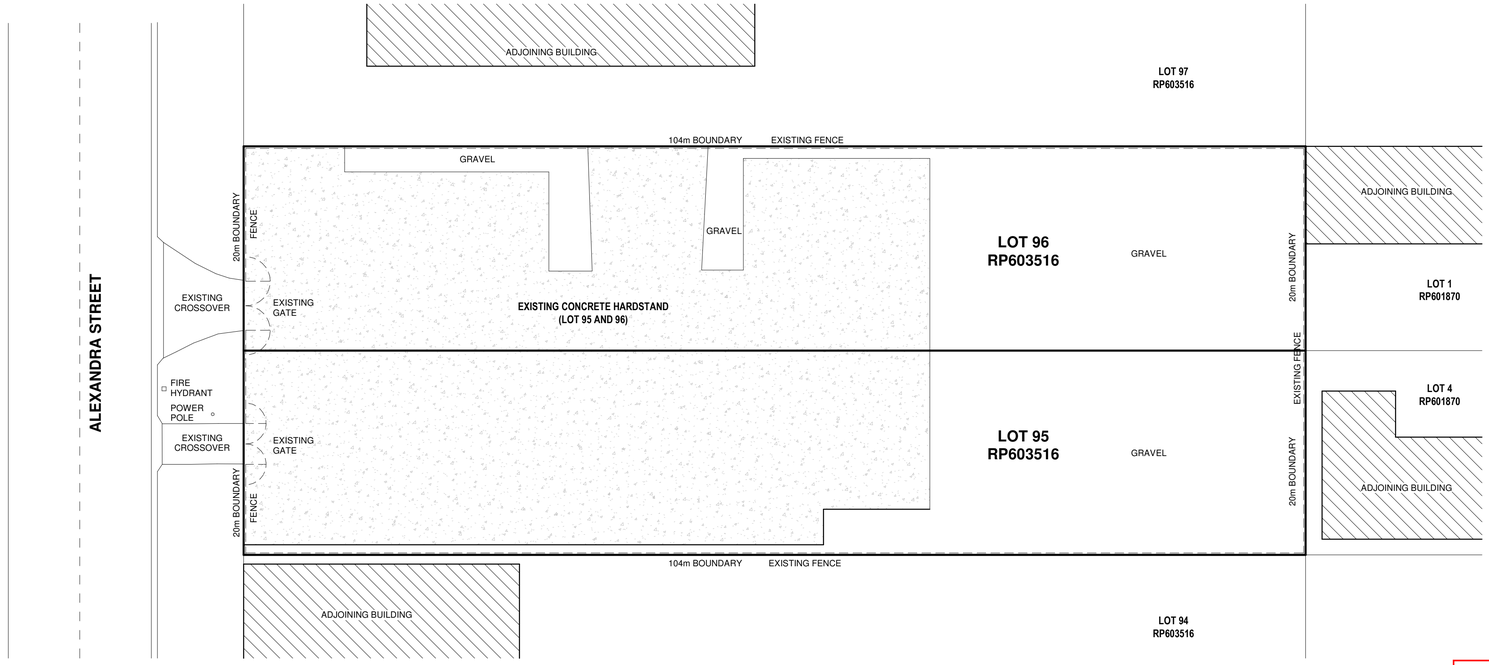

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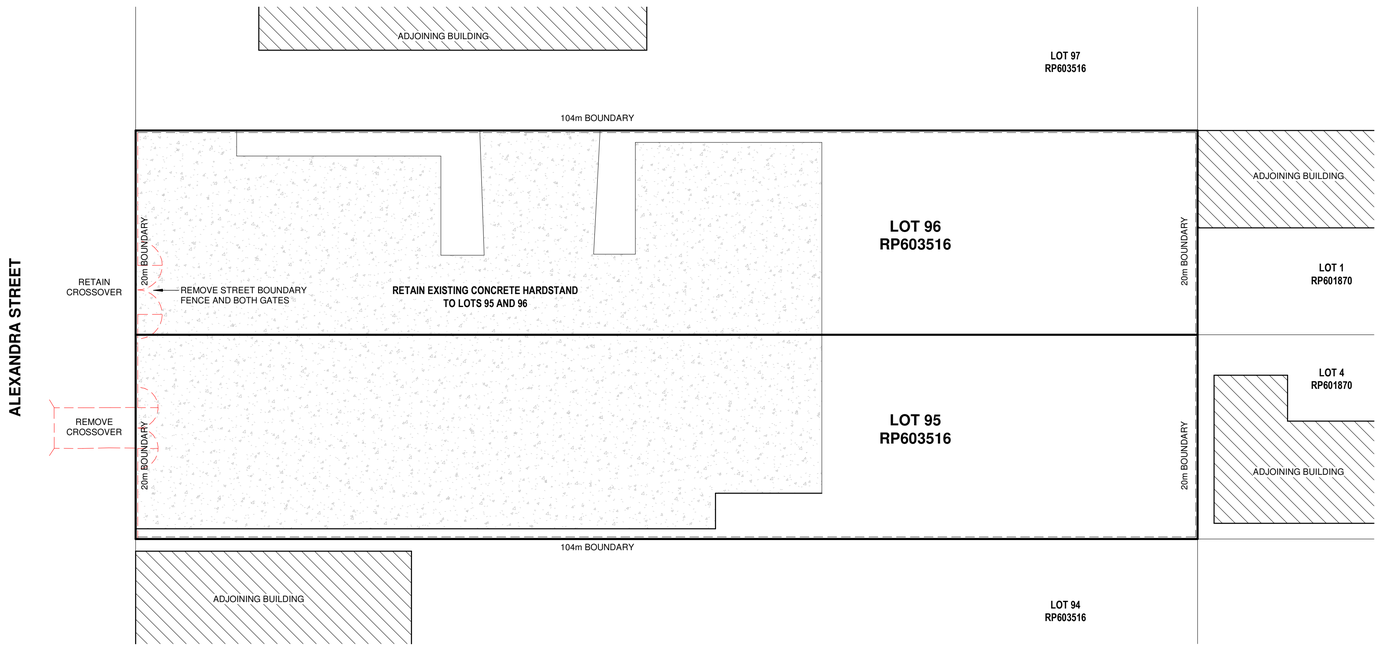

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ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/73-2022

Dated: 15 November 2022

NOTES

AMENDMENTS

REV	DATE	DESCRIPTION	DRN	CKD	STAGE

PRELIMINARY

Shop 5/10 Denham St,
Rockhampton,
QLD 4700

PO Box 3371, Red Hill,
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QLD 4701

designtek

Phone: 0749 222880
Email: mail@designtek.com.au

qbcc BDAQ MEM. NO #0000761

www.designtek.com.au

SITE: LOT 95 & 96 RP603516

PROJECT:
NEW INDUSTRIAL SHED
206 ALEXANDRA STREET
KAWANA Q4701

CLIENT:
FATZ FABRICATIONS

8/08/2022 9:43:41 AM

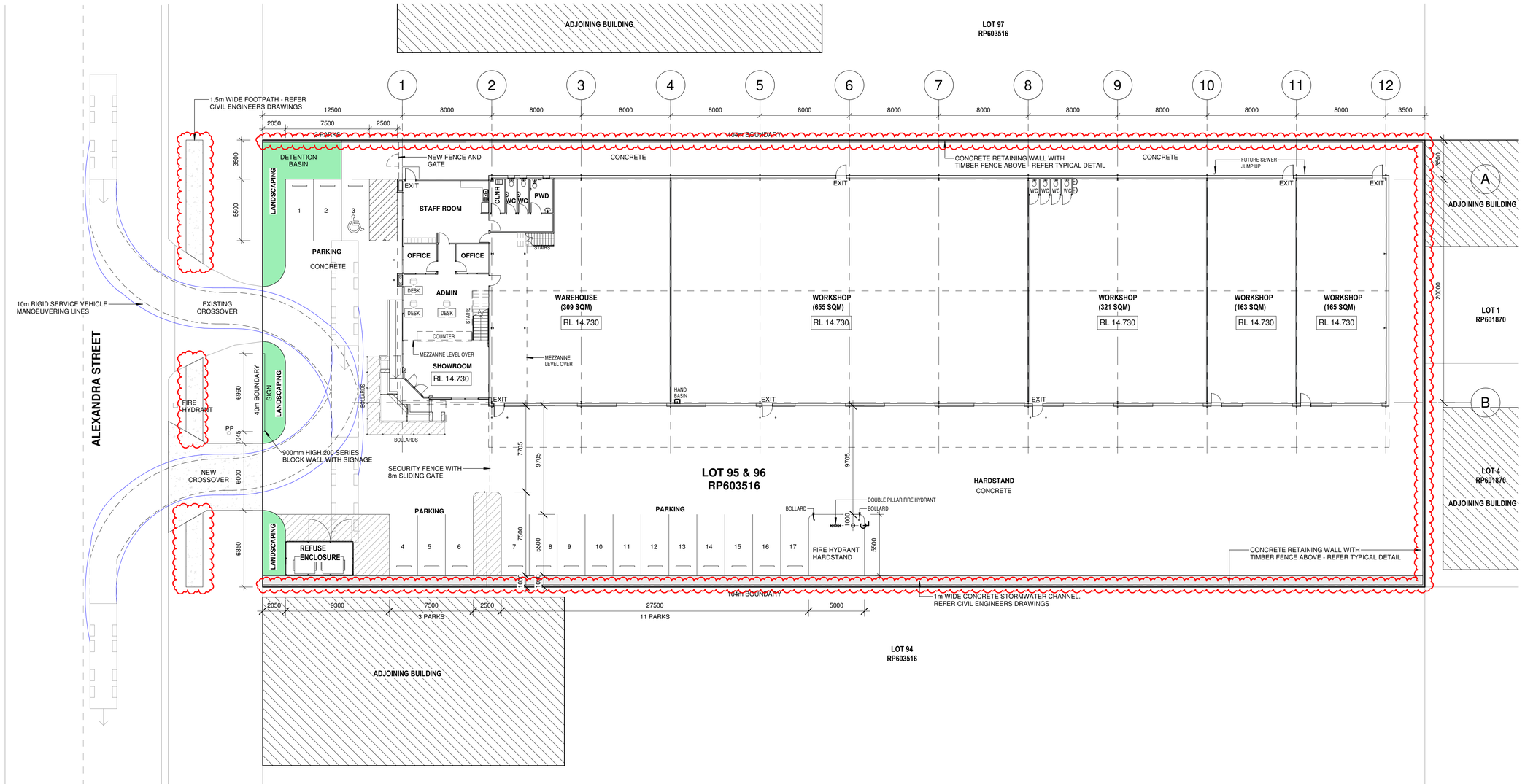
TITLE:
EXISTING AND DEMOLITION SITE PLANS

DATE:	SCALE:	DRAWN BY:
09/21/21	1 : 300 ON A1	EM

PROJECT NO.
2203-09

DRAWING NO.
A-02

REVISION:



1 / A-03 PROPOSED SITE PLAN
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AMENDMENTS

REV	DATE	DESCRIPTION	DRN	CKD	STAGE
1	14-09-2022	MCU AMENDMENTS			

PLANNING DATA - LOT 95 & 96 RP603516

SHED	= 1640 SQM
ADMINISTRATION	= 133 SQM
MEZZANINE LEVEL	= 110 SQM
GFA	= 1883 SQM
SITE	= 4160 SQM
COVERAGE	= 42.62 %
FLOOR LEVEL	= 14.730m AHD
PARKING PROVIDED	= 17 BAYS

ROCKHAMPTON REGIONAL COUNCIL

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SITE: LOT 95 & 96 RP603516

PROJECT:
NEW INDUSTRIAL SHED
206 ALEXANDRA STREET
KAWANA Q4701

CLIENT:
FATZ FABRICATIONS

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TITLE:
PROPOSED SITE PLAN

DATE:	SCALE:	DRAWN BY:
03/23/22	As indicated ON A1	EM

PROJECT NO.
2203-09

DRAWING NO.
A-03

REVISION:
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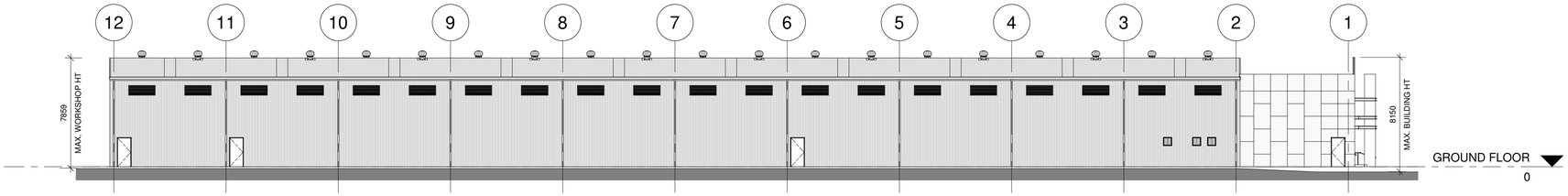

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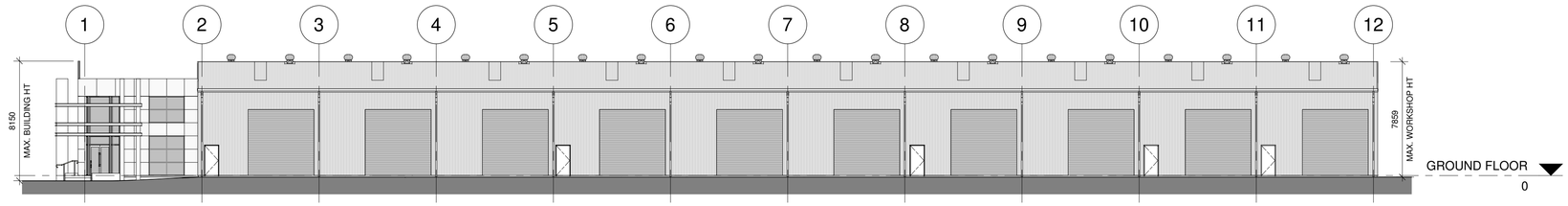

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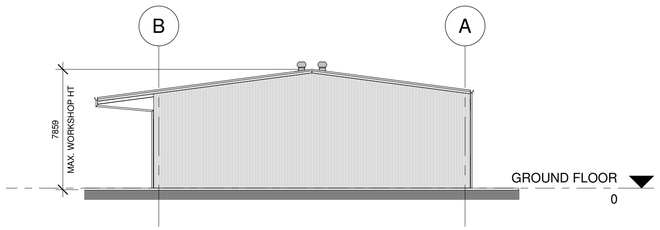

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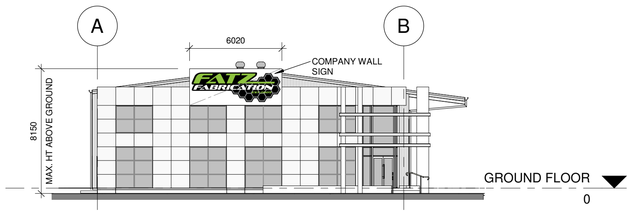

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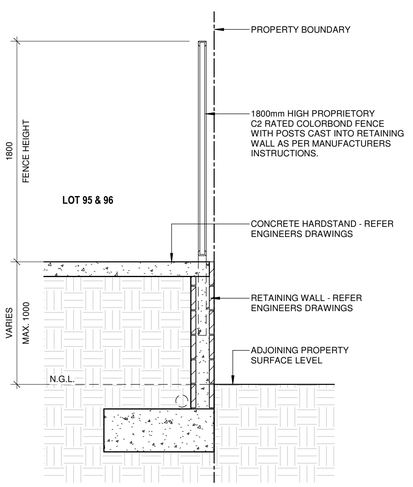

TYPICAL BOUNDARY RETAINING WALL AND FENCE DETAIL SECTION
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AMENDMENTS

REV	DATE	DESCRIPTION	DRN	CKD	STAGE
1	14-09-2022	MCU AMENDMENTS			

PRELIMINARY

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Phone: 0749 222880
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SITE: LOT 95 & 96 RP603516

PROJECT:
NEW INDUSTRIAL SHED
206 ALEXANDRA STREET
KAWANA Q4701

CLIENT:
FATZ FABRICATIONS

14/09/2022 12:17:06 PM

TITLE:
EXTERNAL ELEVATIONS

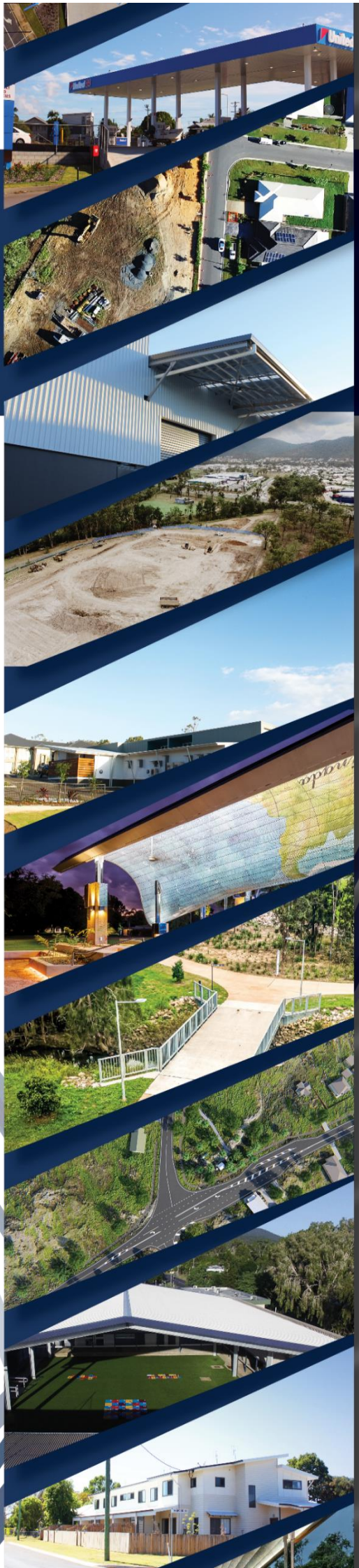
DATE:	SCALE:	DRAWN BY:
03/25/22	As indicated ON A1	EM

PROJECT NO.
2203-09

DRAWING NO.
A-10

REVISION:
1

MOLONEY & SONS™
ENGINEERING



ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Development Permit No.: D/73-2022

Dated: 15 November 2022

Fatz Fabrications P/L

Site Based Stormwater Management Plan

New Industrial Shed

206 Alexandra St, KAWANA Q

29 September 2022
FP/001.CE21131 Rev B
Contract No. CE21131

A/ PO BOX 3203 RED HILL ROCKHAMPTON Q 4701
MOLONEY & SONS
ABN: 39 133 970 689

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2022

DOCUMENT CONTROL:

Issue	*Date*	*Issue Description*	*Author*	*Checked*	*Approved*
A	*19/08/22*	*Operational Works*	*LM*	*DA*	*DA*
B	*29/09/22*	*Response to Information Request*	*LM*		 RPEQ 7637

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Moloney & Sons Engineering (MSE) have been engaged by Fatz Fabrications to prepare a Stormwater Management Plan suitable for submission to Rockhampton Regional Council for a proposed New Industrial Shed located at 206 Alexandra St KAWANA herein described as the subject site.

This report comprises of stormwater quantity and quality assessments to determine the need for onsite stormwater management measures.

The stormwater quantity objective was to demonstrate that there is a no net increase in peak discharges from the subject site. This objective included storm events up to and including the 1% AEP storm event. The purpose is to ensure that the existing infrastructure and/or downstream properties are not adversely affected. The above-mentioned objectives are achieved through the use of detention storage measures.

To achieve the water quantity objectives, the proposed strategy involves providing a total detention volume of 63.5m^3 for the site. The storage devices will have a sized outlet to detain stormwater flows generated from the development and will discharge to the respective Lawful Point of Discharge (LPD).

In addition to the stormwater quantity results, the report makes note that as a result of there being no underground stormwater network nearby or within the LPD (Alexandra St), it is unviable to achieve the regional water quality reduction targets. However, typical measures to reduce gross pollutants and some filtration through landscaping media to address the phosphorus and nitrogen targets has been implemented on the site. Therefore, this development has been designed to perform in an improved state and as a minimum a like-manner as per the pre-developed condition when considering water quality management.

All relevant standards and guidelines are addressed including criteria from Rockhampton Regional Council, Queensland Urban Development Manual and the State Planning Policy.

1. INTRODUCTION AND BACKGROUND

Moloney & Sons Engineering (MSE) have been engaged by Nathan Johannesen (Fatz Fabrications P/L) to prepare the following Site Based Stormwater Management Plan (SWMP) in support of Operational Works approval of the proposed New Industrial Shed at 206 Alexandra St Kawana, Q.

The intent of the SWMP is to provide guidelines and recommendations to be incorporated into Operational Works detailed design documentation, to minimise the impact of the development on the surrounding environment, infrastructure, and property owners.

Figure 1 Site Locality

1.1. Site Characteristics

The topography of the Low Impact industrial development site is based on Precise Positioning Surveying DTM, which details an existing developed site with a total area of 4160m^2 across two Lots (Lot 96 & 95 RP603516). Whereby the existing site pertains to approx. 66% of impervious concrete hardstand and roof area, when the remaining portion of the site is a gravel hardstand.

The site is currently split into two main catchments, whereby all existing roof and hardstand area falls to Alexandra St and the remaining gravel hardstand falls to neighbouring properties. All site stormwater runoff is currently conveyed via overland flow to the Alexandra St kerb and channel.

It is noted there is no pre-existing underground stormwater network in the Alexandra St frontage and Council is unable to advise of any future plan to extend the stormwater network to these properties. This will play a significant part in the post-developed stormwater management strategy of the site.

Refer APPENDIX A for the pre-developed site characteristics.

2. STORMWATER QUANTITY ASSESSMENT

The aim of the stormwater quantity assessment is to ensure that the development shall impose no adverse effects on downstream properties or receiving water bodies and that the conveyance of flows will be in a safe manner with minimal risk of human endangerment as well as the following objectives:

- Address the need for stormwater quantity control measures.
- Ensure there is no net increase in peak discharges from the subject site for events up to and including the 1% AEP event; and
- Ensure proposed quantity control measures detain and convey flows in accordance with QUDM minimum freeboard recommendations.

2.1. Proposed Development and Associated Issues

One of the implications of an increase in impervious area is that the total volume and flow rate of stormwater runoff from the catchment will increase. It is essential that these increases are mitigated such that post-developed peak flows do not exceed those for the pre-developed case.

2.2. Stormwater Mitigation

Stormwater runoff within the site will be directed to a detention system before being discharged via staged outlets to the respective Lawful Point of Discharge (LPD). Stormwater flow generated from the new development will be discharged to the LPDs at flow rates equal to or below predevelopment rates.

Major & Minor Systems have been classified and adopted in accordance with CMDG Stormwater Drainage Design Guidelines under “Industrial Zone” Table D05-04.1 as 1% AEP & 39% AEP (2yr ARI) respectively.

2.3. External Catchments

The site has no contributing external catchments, all stormwater runoff falls away from the subject site.

2.4. Lawful Point of Discharge

It is proposed that the existing LPD will be maintained as Alexandra St.

Refer to CE21131-107-DR within APPENDIX A for the post-developed site characteristics.

2.5. ICM1/XP-STORM Rainfall Parameters

An ICM One/XP-STORM Hydraulic and Runoff model was created to analyse the pre-development and post-development scenarios. The models include a typical 1D node-link connectivity identifying the catchments and hydraulic parameters.

IFD data for the Rockhampton Region produced by the Bureau of Meteorology (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?coordinate_type=dd&latitude=-23.339441&longitude=150.5059&user_label=206+Alexandra+Sr&design=ifds&sdmin=true&sdhr=true&sdday=true) Lat -23.339441 Long 150.505935) was used for the hydrologic analysis for the determination of the ICM One/XP-STORM.

In accordance with the AR&R & TMR Hydrologic & Hydraulic Modelling Guidelines, for each AEP event the full range of storm durations with associated temporal pattern ensembles were assessed in order to determine the critical durations, flow rates and temporal patterns.

2.6. Pre-Development Hydrology

The subject development site is made up of two lots, with a combined area of 4160m^2.

The subject site is advantaged by maintaining a topographic landfall whereby all stormwater runoff falls away from the site. Catchment A currently directs all stormwater runoff via overland flow towards Alexandra St, whereas the rear two Catchments B & C fall to Lot 97 & 94 of RP603516 respectively, refer below table for key catchment parameters.

The pre-development catchment plan (CE21131-106-DR) for the subject site is demonstrated in Appendix A of this report.

The hydrology of the pre-developed catchments has been assessed in accordance with QUDM Section 4.0 using the rational method. From QUDM Section 4.0, the theoretical calculated peak discharge for storm events ranging from the 63% to 1% AEP has been calculated.

The Coefficient of discharge (C_{10}) values were derived from QUDM Table 4.05.3 (a) and Table 4.05.3 (b).

Table 1 Pre-Development Catchment Parameters

Catchment ID	Area (ha)	Avg Slope (%)	Fraction Imp (f_i)	Co-efficient of Runoff (C_{10})	Time of Concentration (Tc)
A	0.257	0.3	1.00	0.90	7 min
B	0.067	0.6	0.00	0.70[1]	3 min
C	0.089	0.6	0.00	0.70[1]	3 min

[1]Gravel Hardstand with Low Soil Permeability

2.7. Post-Development Hydrology

The proposed development will in effect maintain the pre-development scenario catchment extents. The key difference is the increase in impervious areas resulting in an increase to the calculated runoff peak flows.

The post-development catchment plan (CE21131-106-DR) is attached within **Appendix A** for further information.

A standard inlet time of concentration of 10 minutes (QUDM Table 4.06.2) and additional pipe flow was obtained for the post-development time of concentration for each catchment.

Table 2 Post-Development Catchment Parameters

Catchment ID	Area (ha)	Avg Slope (%)	Fraction Imp (f_i)	Co-efficient of Runoff (C_{10})	Time of Concentration (Tc)
A1	0.413	1.0	0.98	0.90	10 min

2.8. Modelling Assumptions & Methodology

The following modelling assumptions were used to create the ICM One/XP-STORM Models

- Two (2) separate scenarios were generated, which were:
  - o Pre-Development (which included all points of discharge); and
  - o Post-Development (which included all points of discharge).
- Each model included runoff nodes for each contributing sub-catchment
- The sub-catchment areas were split into Rural Residential and Urban Residential Land Uses with absolute values adopted for percentages impervious as specified in the above Tables 1 & 2.
- Infiltration uniform losses were applied to the pervious areas of the sub-catchments
- The models were run at various durations for a constant ARI to determine the critical storm event.

2.9. Design Flow Verification

A comparison between the peak discharge values obtained for the 1% through to the 39% AEP storm events using the Rational Method and the ICM1/XP-STORM model is contained in Table 3. As can be seen, the peak discharges generated by the ICM1 model mostly compare well (~20% difference) to the values obtained from Rational Method calculations and are therefore considered appropriate for subsequent hydraulic analysis. It is noted that where higher differences occur this will result in a conservative approach.

Table 3 Rational Method vs ICM/XP-STORM Generated Peak Discharges

PRE-DEVELOPMENT							POST-DEVELOPMENT				
Event (ARI)	Event (AEP %)	Critical storm & temp pattern	Catch id	Rational method (m3/s)	ICM1/XP-Storm (m3/s)	Diff (%)	Critical storm & temp pattern	Catch id	Rational method (m3/s)	ICM1/XP-Storm (m3/s)	Diff (%)
100	1	ECN_1pct_10min_8	A	0.202	0.201	0%	ECN_1pct_10min_8	A1	0.350	0.318	-9%
50	2	ECN_2pct_10min_8	A	0.180	0.180	0%	ECN_2pct_10min_8	A1	0.262	0.284	7%
20	5	ECN_5pct_10min_3	A	0.145	0.153	5%	ECN_5pct_10min_3	A1	0.211	0.242	12%
10	10	ECN_10pct_10min_3	A	0.120	0.133	10 %	ECN_10pct_10min_3	A1	0.175	0.210	16%
5	20	ECN_20pct_10min_7	A	0.097	0.114	15 %	ECN_20pct_10min_7	A1	0.141	0.180	22%
2	39	ECN_0.5EY_10min_7	A	0.065	0.095	31 %	ECN_0.5EY_10min_7	A1	0.095	0.151	37%

2.10. Detention System

It is noted the current site has no underground stormwater network either within the subject site or within the Alexandra St Road reserve.

As a result of the 'flat' topography and need for the site to be managed via overland flow, it is proposed to have two detention storage devices within the proposed development in order to mitigate excessive site earthworks. These devices will collect all overland runoff from Catchment A1 (roof, ground and road). A partial portion of the catchment will have the minor stormwater flows conveyed to the northern storage device via pipe flow while major stormwater flows will be collected via overland flow.

Storage devices will discharge the Minor Event to the existing kerb and channel in Alexandra St, whilst the Major Event will discharge from the devices via weir control to the Alexandra St Road reserve also. Details of this are provided within APPENDIX A. This will ensure that runoff from the subject Catchment A1 are mitigated and discharge to the downstream network without causing a nuisance to surrounding properties. As previously mentioned, due to subject site maintaining a 'saddle' type topography, whereby all site and external catchments fall away from the site, there is no requirement for the proposed development to receive and managed the flow from external surrounding properties.

When modelling the proposed basins in ICM one/XP-STORM, the detention systems were modelled using a pond node with a depth area relationship. This is shown in the table for the relevant catchment basin below.

The storage volumes for the modelled detention system are presented in the table below.

Table 4 Detention System Volumes & Water Levels

I.D	Design Storm	Required Detention Volume (m^3)	Available Detention Volume (m^3)
Catchment A1	1%	63.5	68.3
	39%	30.0	30

A summary of the modelled outlet configuration is provided in the table below.

Table 5 Detention System Outlet Configuration

I.D	Pit Detail	Minor Event Outlet Pipe	Major Event Overflow Weir
Catchment A1	NA	NTH: 5/100mm uPVC @ 1% STH: 5/100mm uPVC @ 1%	NTH: 1.0m W x 0.10m D @ 0.85m above basin invert D*V = 0.11 STH: 0.7m W x 0.10m D @ 0.71m above basin invert D*V = 0.11

A pre-development versus post-development comparison of the peak discharge for all storm events for the proposed system is presented in the table below.

Table 6 ICM1/XP-STORM Modelling Results

EVENT (ARI)	EVENT (AEP %)	DESIGN STORM (AEP)	CATCH ID	PRE-DEV FLOWS ICM One (m3/s)	POST-DEV FLOWS (m3/s)	TOTAL POST-DEV MITIGATED FLOWS (m3/s)	FLOW DIFFERENCE (m3/s)
100	1	1pct	A1	0.201	0.318	0.188	-0.013
2	39	0.5EY	A1	0.095	0.151	0.090	-0.005

The proposed detention system successfully mitigates the post-development flows to below pre-development conditions at the basin outlet.

3. STORMWATER QUALITY ASSSESSMENT

3.1. Site Specific Objectives

Due to the site's proximity to the Splitters Creek and ultimately the Fitzroy River, it is important that the site attempts a no worsening in terms of water quality following development. As the development is industrial in character, the water quality parameters of relevance to the site are suspended solids, nutrients (nitrogen and phosphorus), litter and faecal coliforms.

Of these parameters, the detailed modelling of litter and faecal coliforms is not possible at present, using the industry standard analysis package (MUSIC – refer below) due to the lack of information regarding export rates.

The modelling of defined water quality objectives has therefore necessarily focused on suspended solids and nutrients (nitrogen and phosphorus).

In the absence of Rockhampton Regional Council water quality objectives, load reduction targets stated in the "State Planning Policy" were adopted and are stated below:

- 85% Reduction of Total Suspended Solids
- 60% Reduction in Total Phosphorus
- 45% Reduction in Total Nitrogen
- 90% Reduction in Gross Pollutants

These targets are measured against the pollutant load generated for the untreated developed scenario. Load reduction targets will be modelled as they more closely represent effects on the Splitters Creek contributories.

3.2. MUSIC Water Quality Analysis Methodology

In order to determine the effectiveness of different water quality treatment measures and meet the water quality objectives, a stormwater quality analysis was performed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6.3.

The models consist of three types of nodes:

- Source nodes representing different land uses and defining size of sub catchments
- Treatment Node representing different types of water quality treatment measures
- Receiving nodes represent the outlet point for the catchment under consideration. Each model only has one receiving node

The model requires the user to specify meteorological data (rainfall and evaporation), soil properties and pollutant loads for each catchment. Suitable parameters for the MUSIC model were adopted in accordance with the recommendations of Mackay Regional City Council MUSIC Modelling Guidelines Version 1.1. 2008 in the absence of Rockhampton Regional Council MUSIC Guidelines.

The hydrologic routing option for the modelling was the "No Routing" option. This option generates more conservative results from the treatment measures as the runoff is modelled reaching the treatment measure all at the same time rather than allowing for travel and detention stages as the runoff progresses through the catchment.

A MUSIC model was created to determine the post development scenario with Water Sensitive Urban Design (WSUD) treatments. Ultimately, the receiving node for sites' catchments is the Splitters Creek.

Table 7 Post Development Sub-Catchments Parameters

CATCHMENT	AREA (ha)	% IMPERVIOUS
R1 - Roof	0.181	100%
H1 – Roads/Parking	0.031	100%
H2 – Roads/Parking	0.134	100%
H3 – Roads/Parking	0.028	100%
H4 – Roads/Parking	0.017	100%

Refer to the Figure 2 for identification of sub catchment zones / areas for post development condition. The MUSIC model is based on a split catchment approach and will incorporate various treatment nodes.

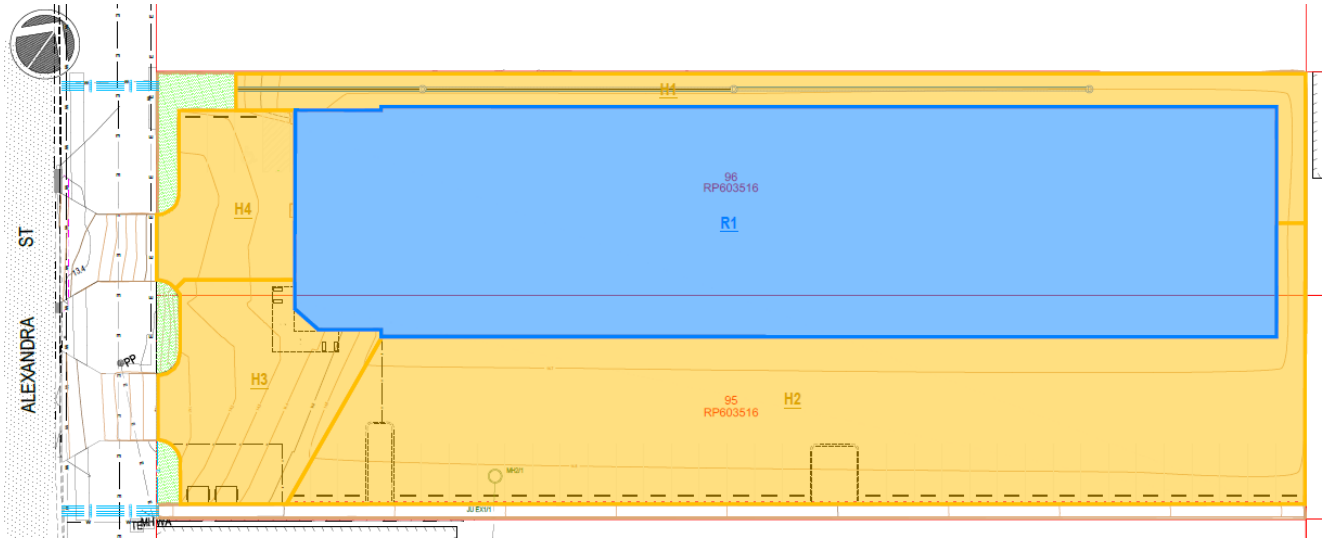

Figure 2 Proposed Site WSUB Sub-Catchments

The adopted MUSIC Runoff Generation Parameters used for the modelling are detailed in the below table.

Table 8 Catchment Runoff Generation Parameters

PARAMETER	LOW-LAND
Field Capacity (mm)	100
Infiltration Capacity Coefficient A	200
Infiltration Capacity Exponent B	1
Rainfall Threshold (mm)	1
Soil Capacity (mm)	250
Initial Storage (%)	30
Daily Recharge Rate (%)	4
Daily Baseflow Rate (%)	2
Initial Depth (mm)	10
Daily Deep Seepage (%)	0.4

Table 9: Pollutant Export Relationships – Split Land Uses

LAND USE FOR MUSIC SOURCE NODE	PARAMETER	TOTAL SUSPENDED SOLIDS (LOG 10mg/L)		TOTAL PHOSPHORUS (LOG 10mg/L)		TOTAL NITROGEN (LOG 10mg/L)	
		BASE FLOW	STORM FLOW	BASE FLOW	STORM FLOW	BASE FLOW	STORM FLOW
Industrial - Roof	Mean	-	1.30	-	-0.89	-	0.25
	Std Deviation	0.45	0.44	0.48	0.36	0.20	0.32
Industrial – Roads/Parking	Mean	0.78	2.43	-1.11	-0.30	0.14	0.25
	Std Deviation	0.45	0.44	0.48	0.36	0.20	0.32

***Source: Mackay MUSIC Guidelines 1.1*

3.3. Proposed Treatment Train

It is proposed to use a combination of proprietary primary gross pollutant traps and tertiary stormwater cleaning devices such as SPEL Stormsacks, the SPEL Hydrochannel and some minor landscaping areas to treat the post development runoff from the site. The development has been separated into five contributing sub catchments, discharging to local contributories of Alexandra St kerb and channel and ultimately Splitters Creek.

As a part of the Post Developed scenario, there are no contributing external catchments according to detailed site survey to be considered. Therefore, catchment R1 and H1 will be conveyed via a series of pit and pipes with SPEL Stormsacks installed to all pit structures. Catchment H3 & H4 will be treated via SPEL Hydrochannels and then directed to their respective lawful points of discharge, whereas H2 will by-pass the tertiary treatment devices.

Table 10 SPEL Treatment Device Efficiencies

SPEL Proprietary Device Efficiencies				
Device	Total Suspended Solida (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Gross Pollutants (GP)
SPEL Stormsack	61%	28%	45%	100%
SPEL Hydrochannel	88%	69%	67%	100%

The MUSIC model screen print below Figure indicates the drainage links between treatment devices for the Post Development scenario.

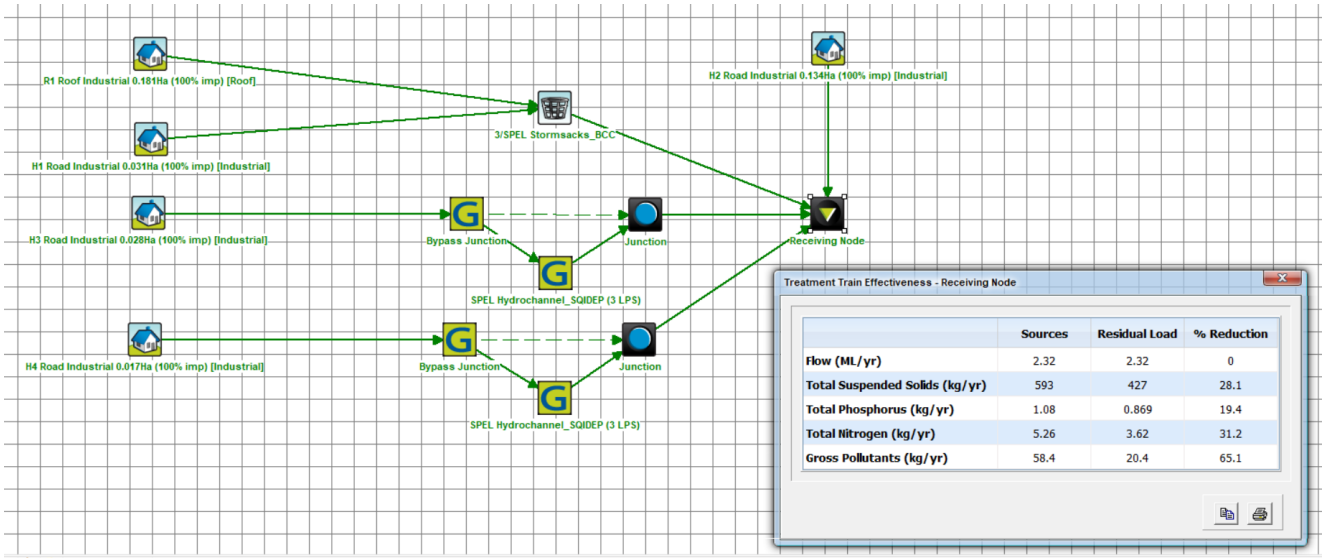

Figure 3 Treatment Train

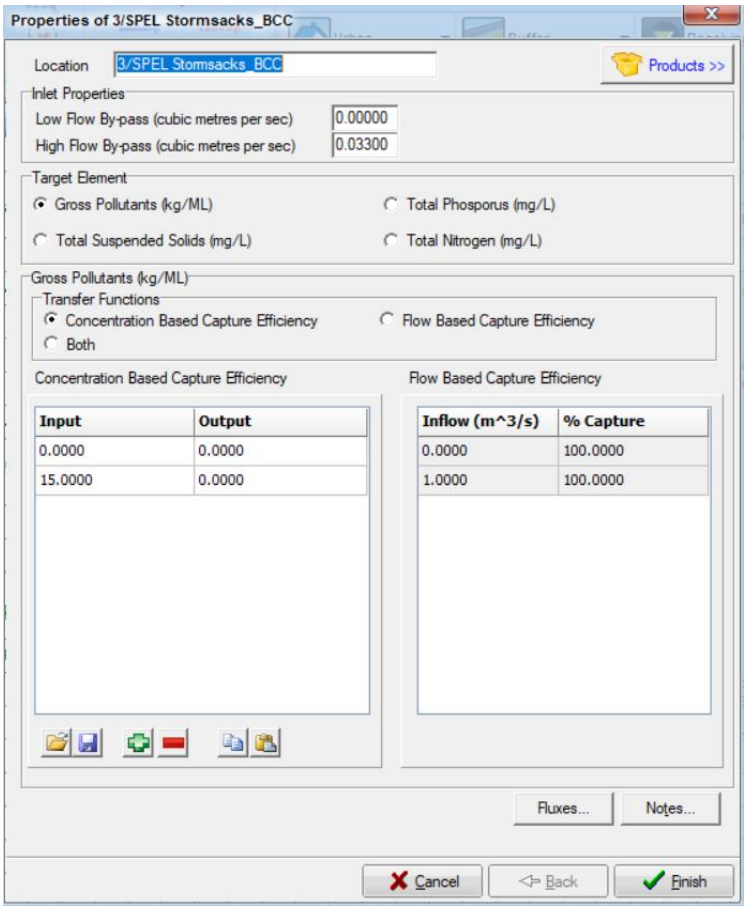

Figure 4 SPEL Stormsack

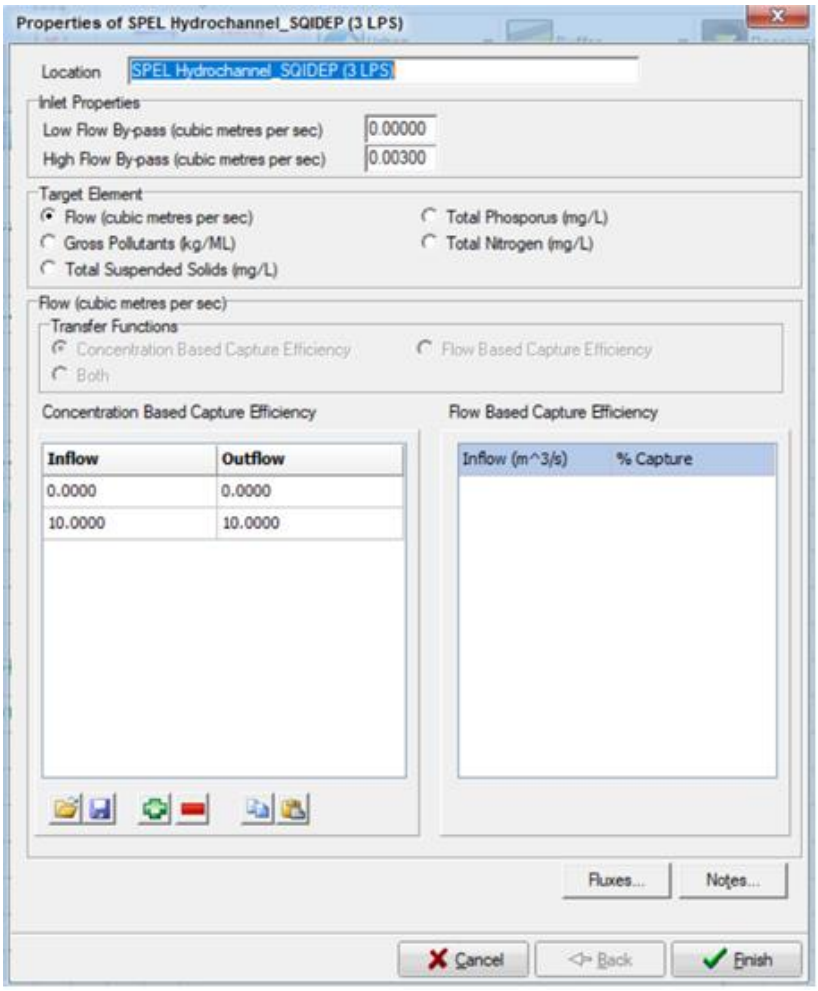

Figure 5 SPEL Hydrochannel

3.4. Water Quality Assessment

The properties of the treatment devices shown above are based on default values in MUSIC, SPEL product parameters and some recommended values in the MUSIC guidelines.

Scenario 1 – Fully Developed site with and without Water Sensitive Urban Design Techniques.
The detailed results produced by the model for the discharge location for development are presented in the below table.

The treatment train modelling results for the modelled scenario with shows that the development with utilisation of Water Sensitive Urban Design techniques effectively reduces the pollutant loads to a deemed fit for purpose level, considering the absence of any existing underground infrastructure within the lawful point of discharge.

- Total Suspended Solids target reduction achieved ~28.1%
- Total Phosphorus target reduction achieved ~19.4%
- Total Nitrogen target reduction achieved ~31.2%
- Gross Pollutants target reduction achieved ~65.1%

Table 11 MUSIC Water Quality Results

Discharge Location Total Annual Load (kg/year)									
Flow ML/year		Total Suspended Solida (TSS)		Total Phosphorus (TP)		Total Nitrogen (TN)		Gross Pollutants (GP)	
Dev. No mitigation	WSUD	Dev. No mitigation	WSUD	Dev. No mitigation	WSUD	Dev. No mitigation	WSUD	Dev. No mitigation	WSUD
2.32	2.32	593	427	1.08	0.869	5.26	3.62	58.4	20.4
Target Reduction		85% of Developed		60% of Developed		45% of Developed		90% of Developed	
Achieved Reduction		28.1% of Developed		19.4% of Developed		31.2% of Developed		65.1% of Developed	

4. CONCLUSION AND RECOMMENDATIONS

As outlined in Section 2 of this report, a total detention volume of 63.5m^3 is required to mitigate the developments peak stormwater flows for storm events up to and including the 1% AEP storm event to pre-development flow rates for all catchments.

To address the water quality requirements, it is proposed to install the specified SPEL proprietary devices outlined in Section 3 of this report, which demonstrate a deemed fit for purpose level of pollutant load reduction.

It is our opinion that if the abovementioned recommendations are implemented, the proposed development will comply with the intent of Rockhampton Regional Council requirements for stormwater quantity and quality management.

APPENDIX A – Engineering Drawings


local buy
Pre-Qualified Supplier


LOCAL
GOVERNMENT
PROCUREMENT
APPROVED CONTRACTOR