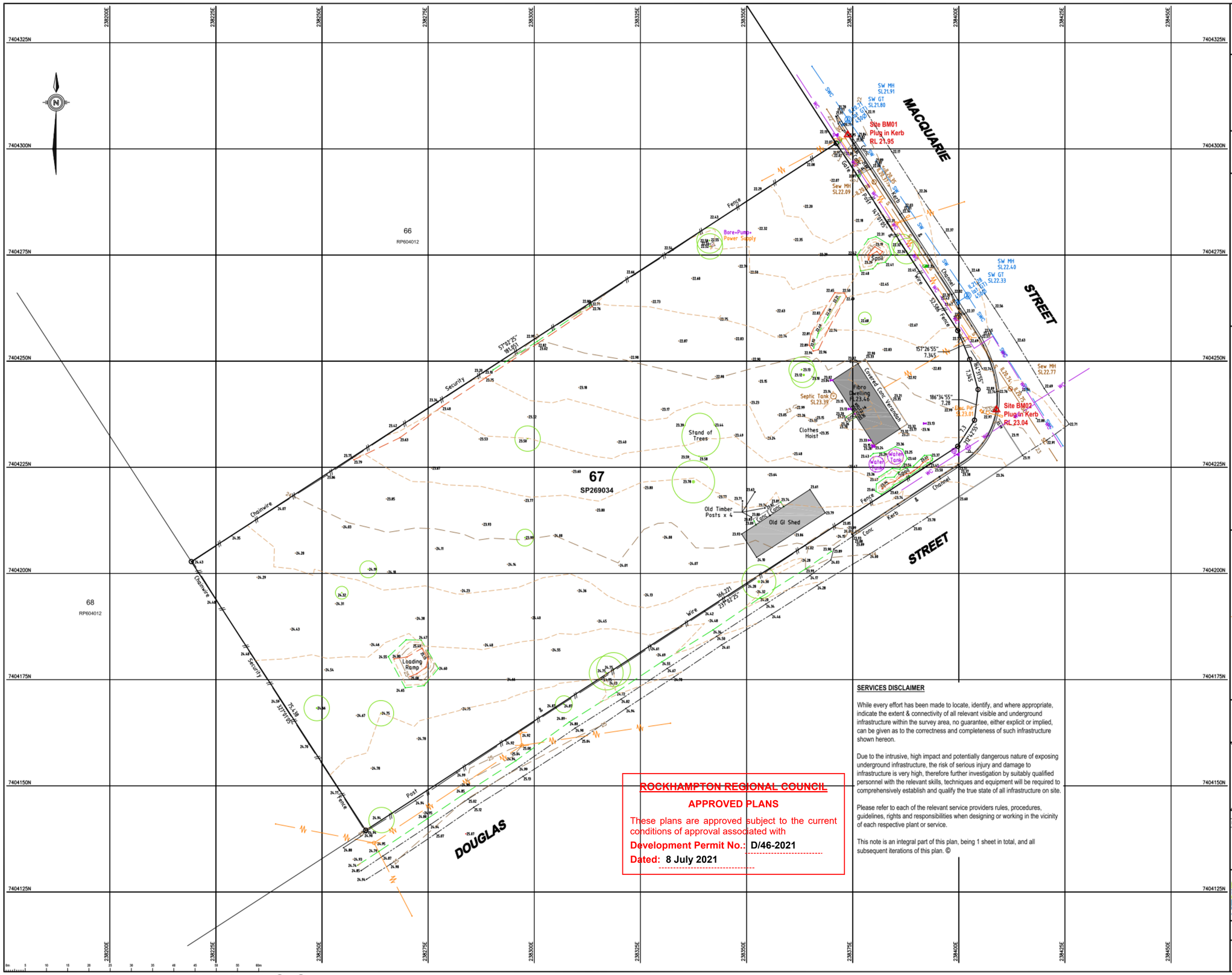


PRINCIPAL

A.I.R.R

DESCRIPTION

DETAIL SURVEY OF LOT 67 ON SP269034

CORNER MACQUARIE STREET & DOUGLAS STREET, GRACEMERE

REAL PROPERTY DESCRIPTION

Lot/Plan :	Lot67 on SP269034
Area :	1.357 ha
Locality :	Gracemere
Local Authority :	Rockhampton Regional Council

NOTES

This plan was prepared for A.I.R.R. from field survey for the purpose of designing new constructions on the subject land and should not be used by any other persons for any other purpose.

Property boundaries have not been reinstated or marked at the time of survey and are approximate only, based on appropriate boundary connections.

Where possible underground services have been located by field survey. Some services shown hereon are compiled from local authority and service provider plans and/or plans provided by the client and are noted accordingly on the plan.

Prior to any design, excavation or construction on site, the relevant authorities, and a qualified service locator should be engaged to ensure all services that may be affected by any future works have been located.

These plans have been prepared as verification plots only. Some text RL's have been omitted for clarity. Please refer to the relevant 3D data files for any spatial interrogation requirements.

Any discrepancies should be verified in writing with Capricorn Survey Group (CQ) Pty Ltd.

This note is an integral part of this plan.

LEGEND

LINETYPE LEGEND

S	UG Sewerage Line
SC	UG Sewerage Line (Compiled)
SW	UG Stormwater Line
SWC	UG Stormwater Line (Compiled)
	Overland Flow/Direction
E	UG Electrical Line
EC	UG Electrical Line (Compiled)
	OH Electrical Line
T	UG Communication Line
TC	UG Communication Line (Compiled)
W	UG Water Line
WC	UG Water Line (Compiled)
W	AG Water Line
G	UG Gas Line
GC	UG Gas Line (Compiled)
	Top of Bank
	Toe of Bank
	CL of Bitumen
	Edge of Bitumen
	Retaining Wall
	Line Marking
	Fence Line
A	Roof / Guttering
O	Eaves

CONTOUR LEGEND

	0.25m Interval
5	1.00m Interval

GENERAL SYMBOL LEGEND

Comms Conduit Marker	Stormwater MH
Comms Pit	Stormwater Pit
Elec Conduit Marker	Stormwater Kerb Outlet
Elec Turret	Water Fire Hydrant
Elec Pit	Water Meter
Elec Light Bollard	Water Valve
Elec Light Pole	Water Tap
Elec Power Pole	Water Control Tap
Elec Power Pole + Light	Water Tee
Elec Power Pole + Transformer	Water Conduit Marker
Elec Stay Point	Water Tapping Band
Traffic Lights	Post
Gas Marker	Bollard
Gas Valve	Guide Sign
Gas Hot Water System	Flag Pole
Sewerage MH	Australia Post Box
Sewerage Vent	Shrub
Sewerage IO	

DATUM

Vertical Datum :	AHD Vide Smartnet Aus
Horizontal Datum :	MGA94 Vide Smartnet Aus
Contour Interval :	0.25m, 1.0m Index
Co-ord System :	MGA94 Vide Smartnet Aus

WARNING

LOCATION AND CONNECTIVITY OF U/G SERVICES SHOWN HEREON HAVE BEEN DETERMINED BY DIRECT ACCESS OR COMPILED FROM LOCAL AUTHORITY AND SERVICE PROVIDER PLANS ONLY. FURTHER INVESTIGATION MAY BE REQUIRED TO DETERMINE LOCATIONS OF ALL INACCESSIBLE SERVICES.

REVISION

Issue	Date	Details	Authorised
A	8-03-2021	Initial Issue	RJKF
-	-	-	-

CREATED

capricornsurveygroupcq
SURVEYING & PLANNING SOLUTIONS
07 4927 5199 | reception@csgcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE **1:400 @ A1**

DRAWING NUMBER **8020-01-DTL (1/1)** ISSUE **A**

~~ROCKHAMPTON REGIONAL COUNCIL~~

APPROVED PLANS

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

Development Permit No.: D/46-2021

Dated: 8 July 2021

SERVICES DISCLAIMER

While every effort has been made to locate, identify, and where appropriate, indicate the extent & connectivity of all relevant visible and underground infrastructure within the survey area, no guarantee, either explicit or implied, can be given as to the correctness and completeness of such infrastructure shown hereon.

Due to the intrusive, high impact and potentially dangerous nature of exposing underground infrastructure, the risk of serious injury and damage to infrastructure is very high, therefore further investigation by suitably qualified personnel with the relevant skills, techniques and equipment will be required to comprehensively establish and qualify the true state of all infrastructure on site.

Please refer to each of the relevant service providers rules, procedures, guidelines, rights and responsibilities when designing or working in the vicinity of each respective plant or service.

This note is an integral part of this plan, being 1 sheet in total, and all subsequent iterations of this plan. ©

PRELIM 03
DATE: 26/05/21
NOT FOR CONSTRUCTION

REVISIONS No.	DESCRIPTION	DATE

PROPOSED WAREHOUSE
FOR A.I.R.R.
AT46 MACQUARIE STREET
GRACEMERE

this drawing
Surveyor's Detailed Survey Plan

Rufus Design Group
STYLE • QUALITY • INNOVATION

MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
Licenced under the QBCC Act Lic No. 1180286
Telephone 61 7 49288011
E-mail mailbox@rufusdesigngroup.com

PROJECT MANAGER : DJWebb
DRAWN : DJWebb
CHKD :

WIND SPEED C2
PLAN SIZE: A1

PROJECT NUMBER 210109 - 01
SHEET 01 OF 01 SHEETS
REVISION

PRINT DATE : 26/05/2021 11:56:07 AM

Site Analysis

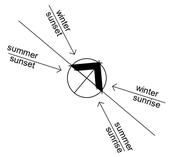
Proposed Floor Area	=	5466.7 sqm
Total Building Footprint Area	=	5466.7 sqm
Total Site Coverage	=	40.3%
Total Landscaped Area Required	=	2m to frontages
Total Landscaped Area Provided	=	3096.5 sqm
Total Site Area	=	13570 sqm

Car Parking

Car parking spaces required	=	15
Total car spaces provided	=	20

Driveways

Existing concrete driveway area	=	NIL
New concrete driveway area	=	5003.0 sqm
Total driveway area	=	5003.0 sqm



R.P.D.

Lot Number :	67
Reg./Survey Plan Number :	SP269034
Locality :	Gracemere
Local Government :	Rockhampton RC
Area :	13570m²

LEGEND

FH	Street Fire hydrant
CP	Communications Pit
ET	Electrical Turret
EP	Electrical Pit
WM	Water Meter
RWT	Rain Water Tank
BO	Bollard to eng's detail
FHR	Fire Hose Reel
MB	Electrical Meter Box
SWP	Storm Water Pit
MH	Man Hole
DP	Down Pipe
HC	Hose Cock

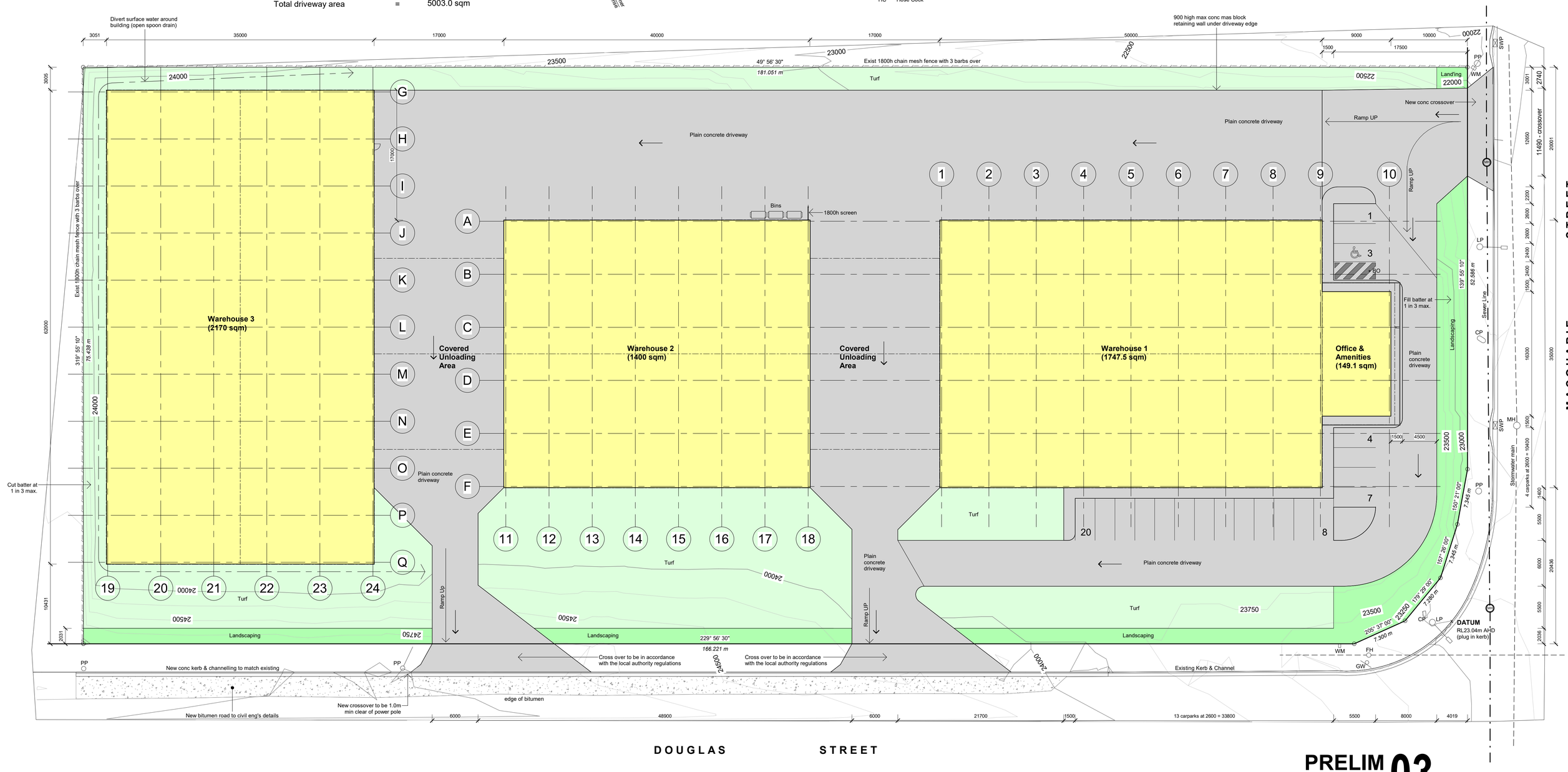
ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/46-2021

Dated: 8 July 2021



1 Site Plan
1 : 250

PRELIM
DATE: **26/05/21** **03**

NOT FOR CONSTRUCTION

REVISIONS			
No.	DESCRIPTION	DATE	

PROPOSED WAREHOUSE
FOR A.I.R.R.
AT46 MACQUARIE STREET
GRACEMERE

this drawing: Site Plan

Rufus Design Group
STYLE • QUALITY • INNOVATION
MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
Licenced under the QBCC Act Lic No. 1180286
Telephone 61 7 49288011
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PROJECT MANAGER : DJWebb
DRAWN : DJWebb
CHKD :
PLAN SIZE: A1
WIND SPEED C2
PROJECT NUMBER 210109 - 02
SHEET 02OF 08SHEETS
REVISION

PRINT DATE : 26/05/2021 11:56:08 AM

2 3D View 1
1 : 1

PRELIM DATE: **26/05/21** **03**

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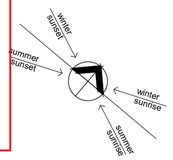
APPROVED PLANS

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

Development Permit No.: D/46-2021

Dated: 8 July 2021

ELEVATIONS



Floor Areas	
Adminstration	149.1 m²
Warehouse 2	1400.0 m²
Warehouse 1	1747.5 m²
Warehouse 3	2170.0 m²
Grand total	5466.6 m²

1 Floor Plan - Overall
1 : 250

REVISIONS			
No.	DESCRIPTION	DATE	

PROPOSED WAREHOUSE
FOR A.I.R.R.
AT46 MACQUARIE STREET
GRACEMERE

this drawing
Floor Plan - Overall

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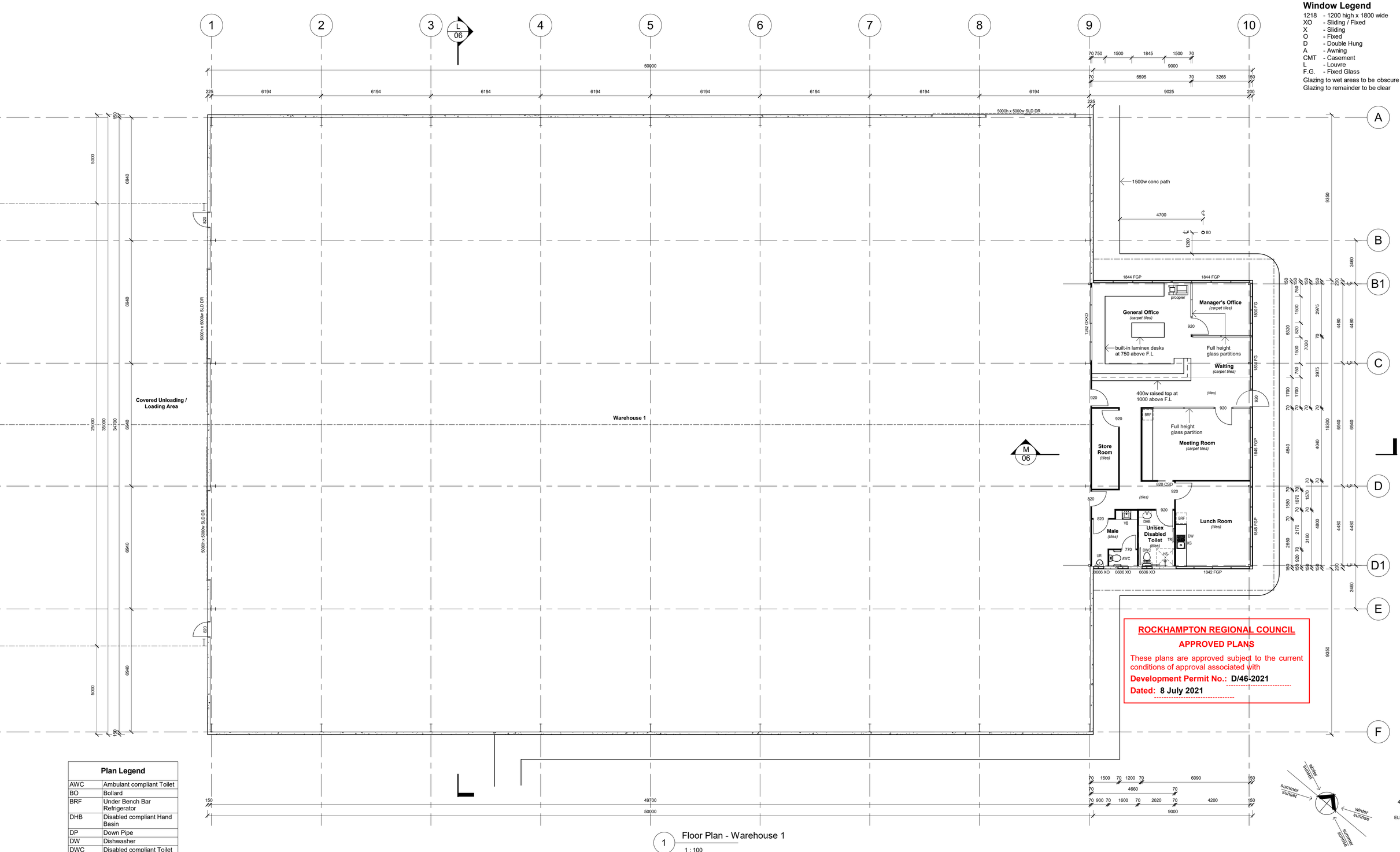
PROJECT MANAGER : DJWebb
DRAWN : DJWebb
CHKD :
WIND SPEED C2
PLAN SIZE: A1
PROJECT NUMBER 210109 - 03
SHEET 03 OF 08 SHEETS
REVISION

PRINT DATE : 26/05/2021 11:56:09 AM

Window Legend

1218 - 1200 high x 1800 wide
XO - Sliding / Fixed
X - Sliding
O - Fixed
D - Double Hung
A - Awning
CMT - Casement
L - Louvre
F.G. - Fixed Glass

Glazing to wet areas to be obscure
Glazing to remainder to be clear



ROCKHAMPTON REGIONAL COUNCIL

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

Development Permit No.: D/46-2021

Dated: 8 July 2021

Plan Legend	
AWC	Ambulant compliant Toilet
BO	Bollard
BRF	Under Bench Bar Refrigerator
DHB	Disabled compliant Hand Basin
DP	Down Pipe
DW	Dishwasher
DWC	Disabled compliant Toilet
HC	Hose Cock
HS	Non-disabled Hobless Shower with ceiling suspended curtain rail only
KS	Kitchen Sink
TR	Towel Rail
UR	Urinal
VB	Vanity Basin

Floor Areas	
Adminstration	149.1 m²
Warehouse 2	1400.0 m²
Warehouse 1	1747.5 m²
Warehouse 3	2170.0 m²
Grand total	5466.6 m²

1 Floor Plan - Warehouse 1
1 : 100

PRELIM 03
DATE: **26/05/21**
NOT FOR CONSTRUCTION

REVISIONS			
No.	DESCRIPTION	DATE	

PROPOSED WAREHOUSE
FOR A.I.R.R.
AT46 MACQUARIE STREET
GRACEMERE

this drawing
Floor Plan - Warehouse 1

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MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
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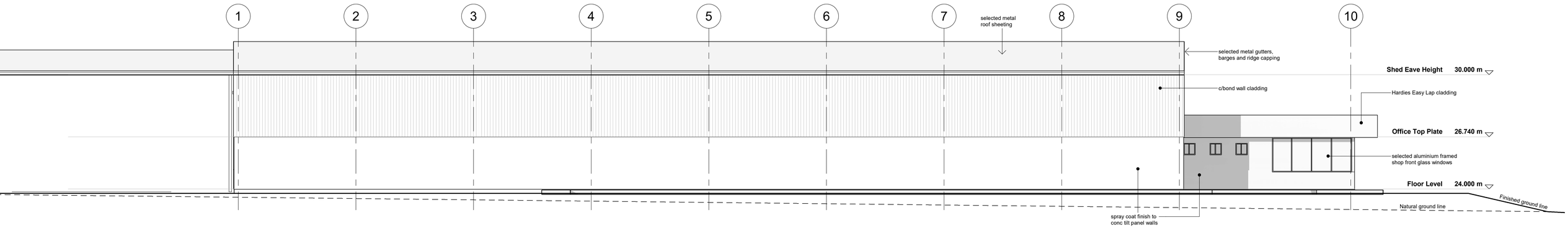
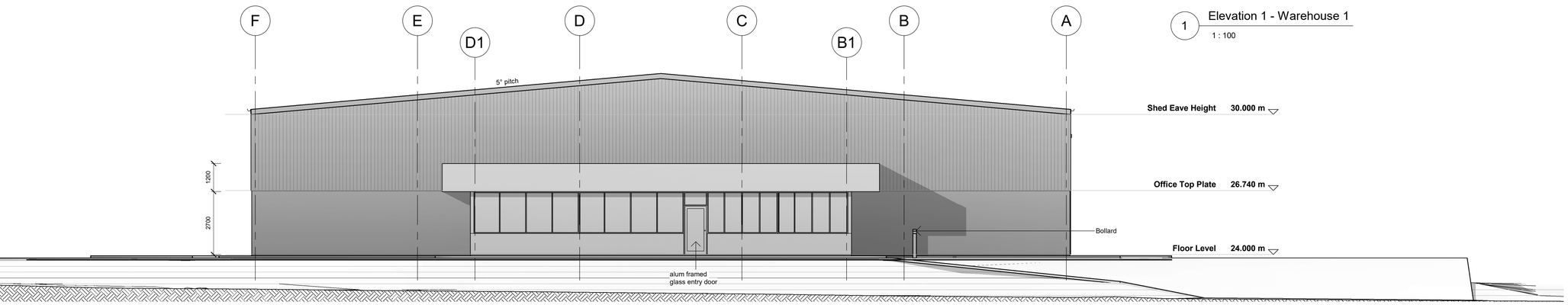
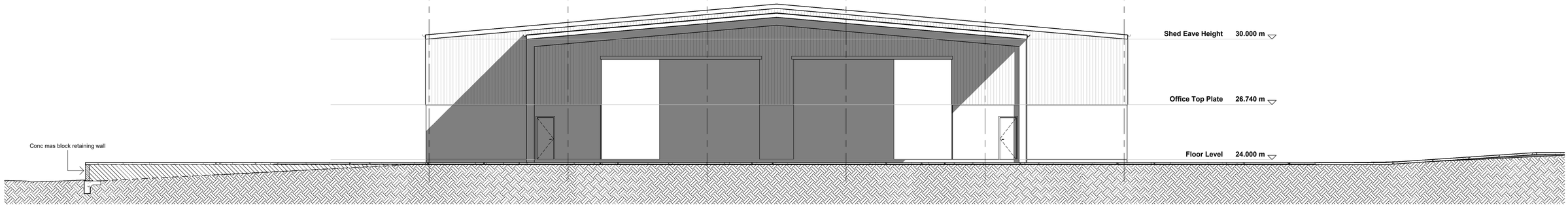
PROJECT MANAGER : DJWebb
DRAWN : DJWebb
CHKD :
PLAN SIZE: A1
WIND SPEED C2
PROJECT NUMBER 210109 - 04
SHEET 04 OF 06 SHEETS
REVISION
PRINT DATE : 26/05/2021 11:56:09 AM

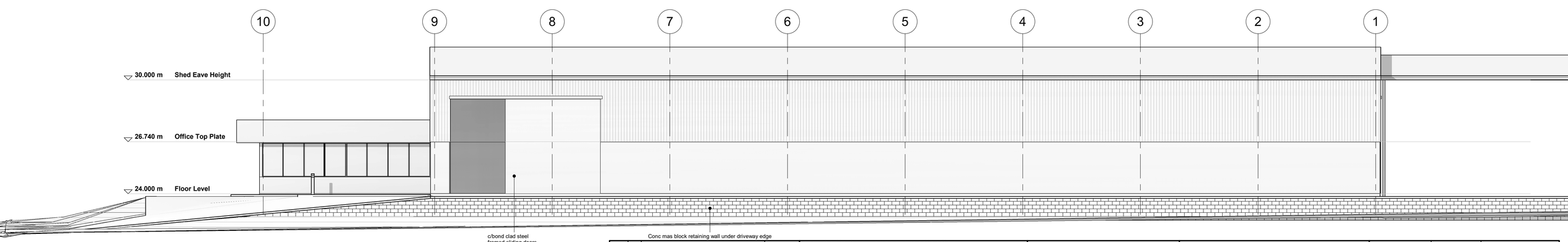




1 Elevation 1 - Warehouse 1
1 : 100



4 Elevation 4 - Warehouse 1
1 : 100



3 Elevation 3 - Warehouse 1
1 : 100

2 Elevation 2
1 : 100

A B C D E F

PRELIM DATE: 26/05/21 **03**

NOT FOR CONSTRUCTION

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Development Permit No.: D/46-2021

Dated: 8 July 2021

REVISIONS

No.	DESCRIPTION	DATE

PROPOSED WAREHOUSE
FOR A.I.R.R.
AT46 MACQUARIE STREET
GRACEMERE

this drawing
Elevations - Warehouse 1

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MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
Licenced under the QBCC Act Lic No. 1180286
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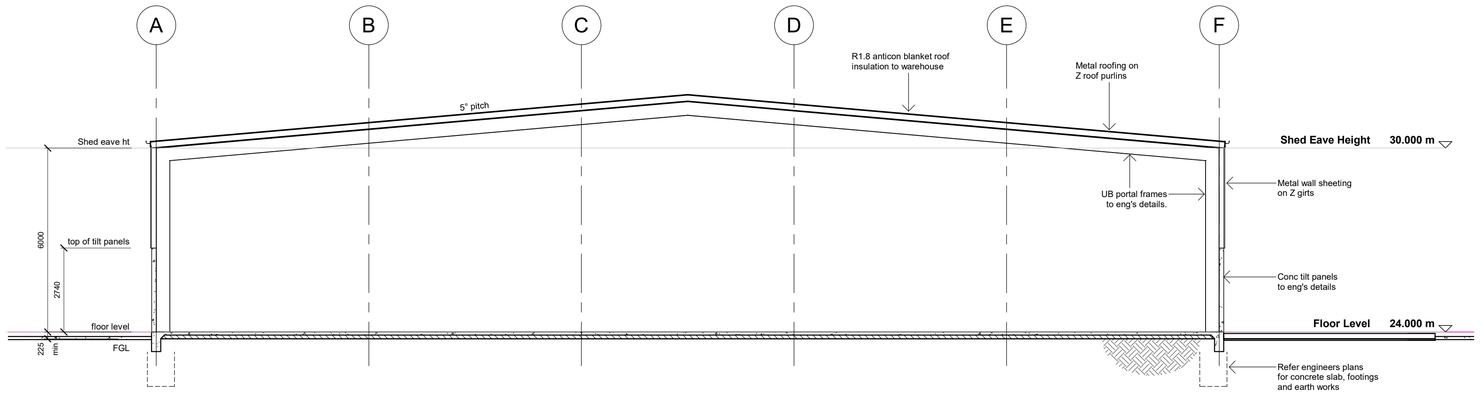
PROJECT MANAGER : DJWebb
DRAWN : DJWebb
CHKD :

WIND SPEED C2
PLAN SIZE: A1

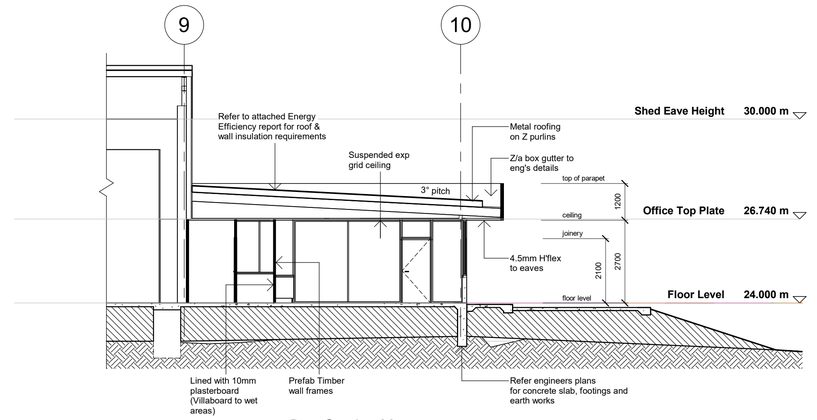
PROJECT NUMBER 210109 - 05
SHEET 05 OF 08 SHEETS
REVISION

PRINT DATE : 26/05/2021 11:56:12 AM



L Section L (Typical to all 3 warehouses)

1 : 100



M Section M

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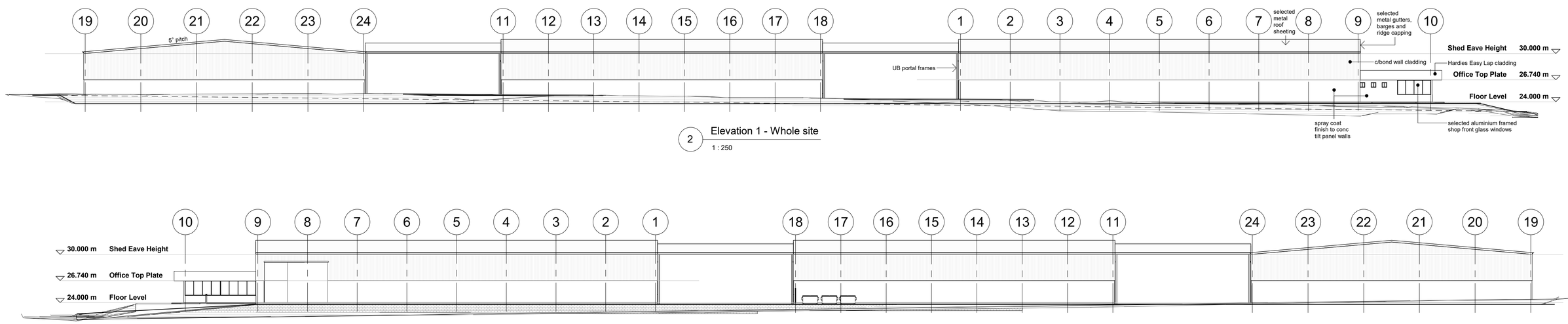

2 Elevation 1 - Whole site

1 : 250

3 Elevation 3 - Whole site

1 : 250

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APPROVED PLANS

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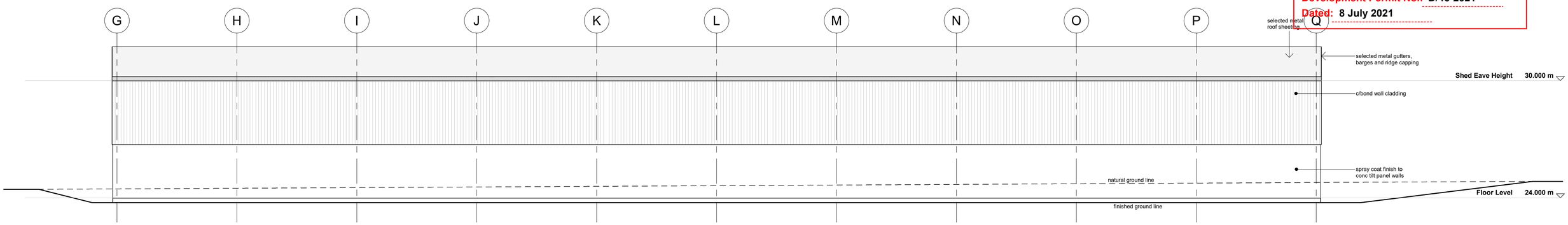
Development Permit No.: D/46-2021

Dated: 8 July 2021



1 Elevation 4

1 : 100

PRELIM DATE: **26/05/21** **03**

NOT FOR CONSTRUCTION

REVISIONS			
No.	DESCRIPTION	DATE	

PROPOSED WAREHOUSE FOR A.I.R.R. AT46 MACQUARIE STREET GRACEMERE

this drawing: Sections L & M & Whole Site Elevations

Rufus Design Group — STYLE • QUALITY • INNOVATION

MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.

Licenced under the QBCC Act Lic No. 1180286

Telephone 61 7 49288011

E-mail mailbox@rufusdesigngroup.com

PROJECT MANAGER : DJWebb

DRAWN : DJWebb

CHKD :

WIND SPEED C2

PLAN SIZE: A1

PROJECT NUMBER 210109 - 06

SHEET 06 OF 06 SHEETS

REVISION

PRINT DATE : 26/05/2021 11:56:14 AM

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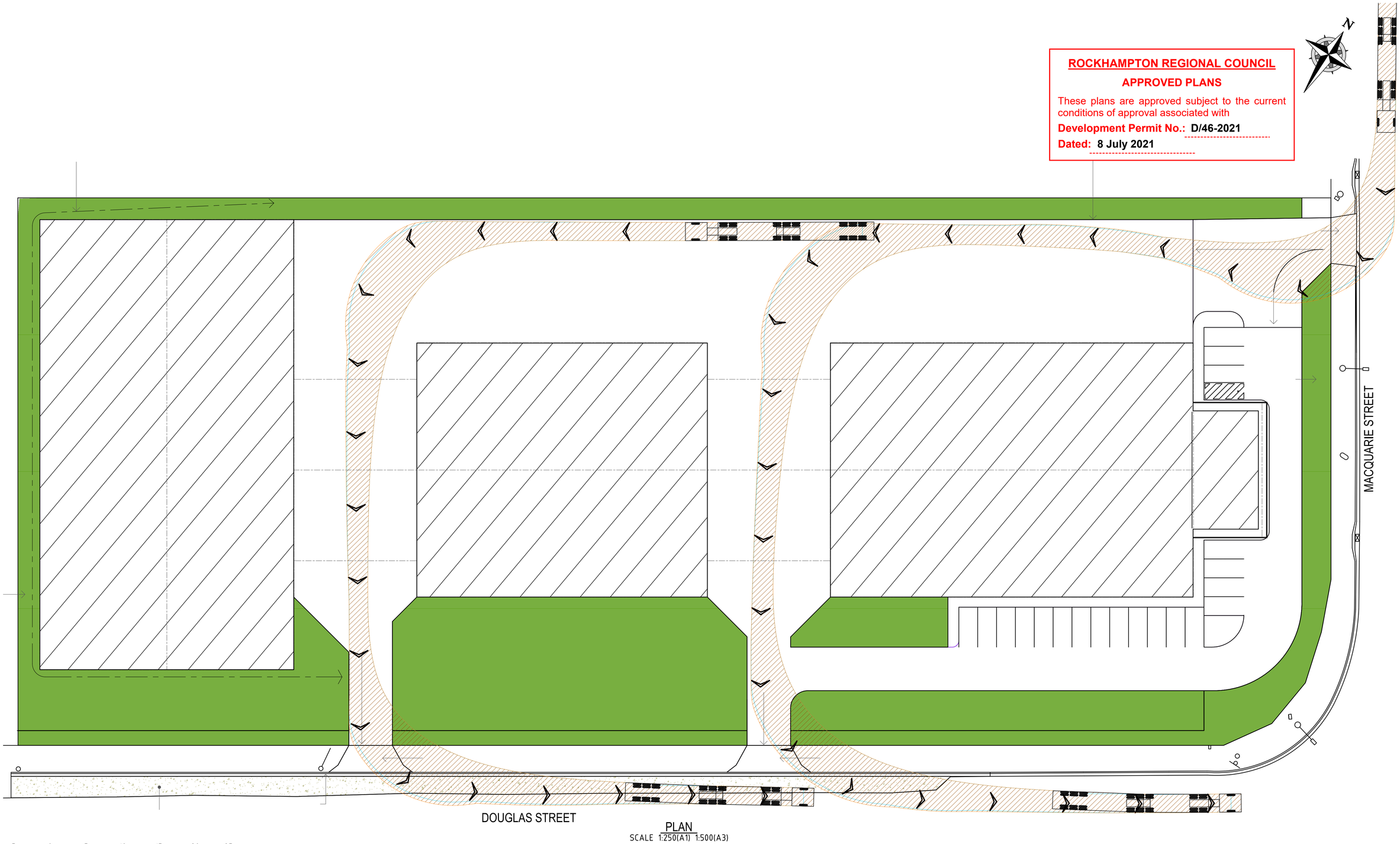
Dated: 8 July 2021



PLAN

SCALE 1:250(A1) 1:500(A3)

5 0 5 10 15 20 25m

SCALE 1:250 @ A1 SCALE 1:500 @ A3

INFORMATION ONLY

SURVEYOR										
ADDRESS:										
CO-ORDINATE DATUM										
HEIGHT DATUM										
	DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DFT	DFT CHK	DES	DES CHK
			A	21.05.21	SUBMITTED FOR INFORMATION	SJP	CH	SJP	CH

	BY	DATE
REVIEWED		
RPEQ ENG		

RPEQ No:

CLIENT AIRR always there.

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SCALE: AS SHOWN

PREPARED BY 0782021

mcmurtrie CONSULTING ENGINEERS

Address: 63 Charles Street NORTH ROCKHAMPTON QLD 4701
Postal: PO BOX 2149, WANDAL QLD 4700
E-mail: mail@mcmengineers.com
Phone: (07) 4921 1780
Mobile: 0407 631 066
Fax: (07) 4921 1790

CLIENT AIRR

PROJECT 46 Macquarie Street

TITLE Proposed Warehouse
B-Double Sept Paths

A1

DRAWING NUMBER 0782021-SK0001

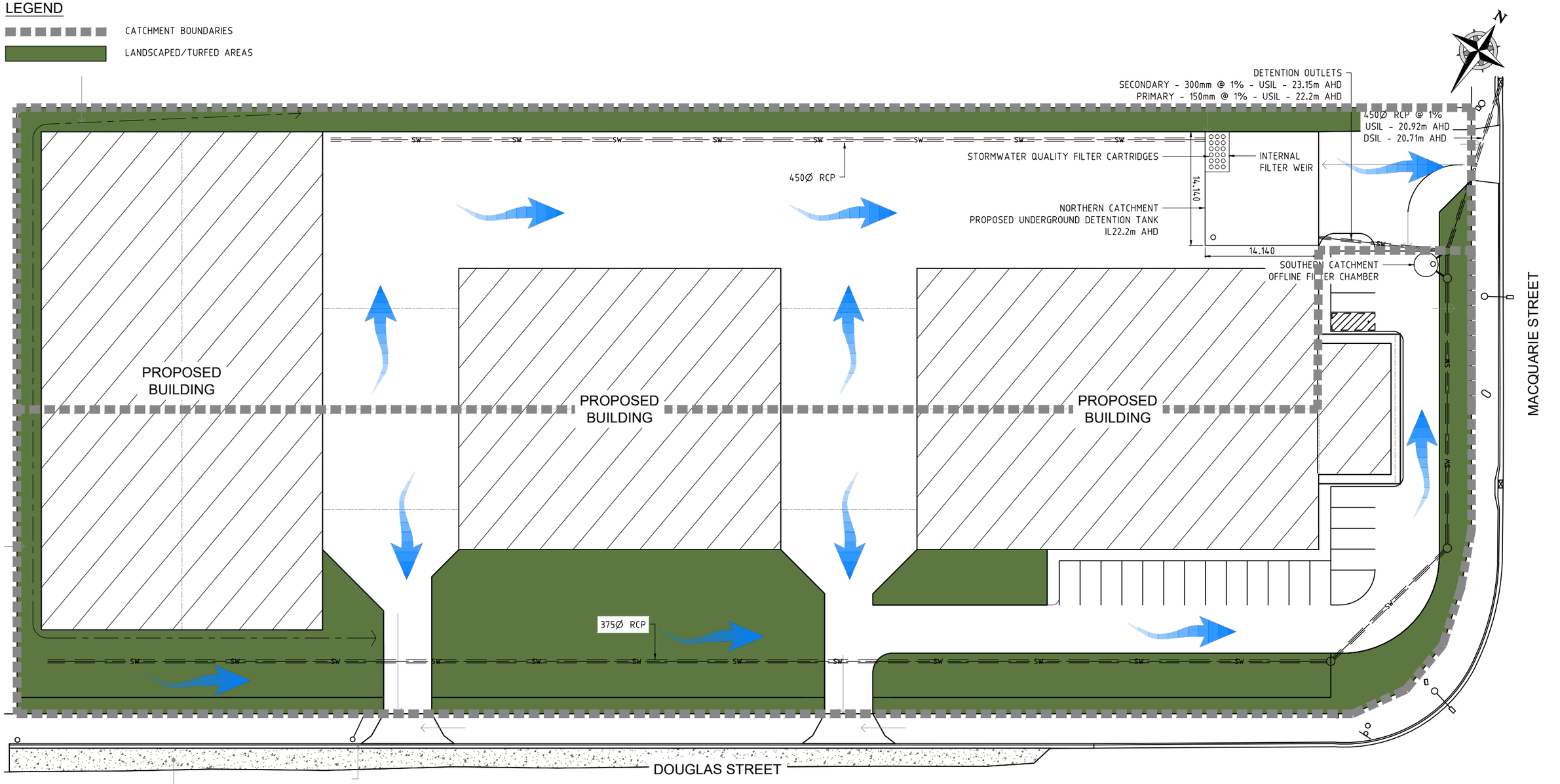
REVISION A

PLOT DATE: 28/04/2021 11:37:08 AM DRAWING LOCATION: DRAWING1.DWG

LEGEND

CATCHMENT BOUNDARIES

LANDSCAPED/TURFED AREAS



STORMWATER MANAGEMENT LAYOUT

SCALE 1:250(A1) 1:500(A3)

NOTE

1. PIT AND PIPE LOCATIONS ARE INDICATIVE ONLY, DETAILS TO BE CONFIRMED AT OPERATIONAL WORKS STAGE
2. MUSIC MODELING TO BE COMPLETED AT OPERATIONAL WORKS STAGE
3. ALL TRAFFIC CIRCULATION AREAS AND CAR PARKS TO BE SEALED

5 0 5 10 15 20 25m

SCALE 1:250 @ A1 SCALE 1:500 @ A3

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/46-2021

Dated: 8 July 2021

INFORMATION ONLY

SURVEYOR											
ADDRESS:											
CO-ORDINATE DATUM											
HEIGHT DATUM											
	DRAWING No.	REFERENCE DRAWING TITLE	A		SUBMITTED FOR INFORMATION						
			REV	DATE	REVISION DESCRIPTION	DFT	DFT CHK	DES	DES CHK		

	BY	DATE
REVIEWED		
RPEQ ENG		
RPEQ No:		

CLIENT AIRR always there.

SCALE: AS SHOWN

PREPARED BY 0782021

mcmurtrie CONSULTING ENGINEERS

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Phone: (07) 4921 1780
Mobile: 0407 631 066
Fax: (07) 4921 1790

CLIENT AIRR

PROJECT 46 MACQUARIE STREET - WAREHOUSE

TITLE STORMWATER MANAGEMENT LAYOUT

A1

DRAWING NUMBER 0782021-SK0001

REVISION A

DRAWING LOCATION: S:\PROJECT RECORDS\20-21\0782-20-21 - 46 MACQUARIE STREET GRACEMERE\DESIGN\DWGS\SKETCH\0782-20-21 - STORMWATER LAYOUT.DWG

PLOT DATE: 20/05/2021 9:21:59 AM

DATE	OUR REF.
19.05.21	078-20-21

REPORT TYPE

Stormwater Management plan

PROJECT

46 Macquarie Street, Gracemere

CLIENT

Australian Independent Rural Retailers Pty. Ltd.

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/46-2021

Dated: 8 July 2021

mcmurtrie CONSULTING ENGINEERS

DOCUMENT CONTROL

Revision History			
Revision No	**Date**	**Checked By**	**Issued By**
A	19.05.2021	MM	Chris Hewitt

CONTENTS

1 INTRODUCTION AND APPROACH

1.1 PROJECT OVERVIEW

McMurtrie Consulting Engineers (MCE) have been commissioned by Australian Independent Rural Retailers Pty. Ltd. (AIRR) to undertake a site-based Stormwater Management Plan (SMP) for a proposed warehouse facility located at 46 Macquarie Street Gracemere described as Lot 67 on SP269034. The aim of this SMP is to demonstrate that the proposed development will comply with Capricorn Municipal Development Guidelines (CMDG), Queensland Urban Drainage Manual (QUDM 2016), Australian Rainfall and Runoff 2016 (ARR'19) and State Planning Policy (SPP 2017).

1.2 METHODOLOGY

The assessment methodology adopted for this SWMP is summarised below.

- Broadly identify the contributing catchments to the project.
- Identify Lawful Point of Discharge (LPOD) for the site stormwater runoff.
- Identify the critical storm event and duration for this project
- Estimate peak discharge runoff for pre-development and post-development scenarios.
- Identify potential mitigation and management strategies to be implemented during the construction and operational phases to ensure no worsening to downstream catchments and infrastructure.
- Assess the stormwater quality treatment requirements for the project.

1.3 DATA SOURCES

The background data used to undertake this assessment were collected from the following sources:

- ARR'16 data hub
    - Rainfall data
    - Design storm ensemble temporal patterns
- Site based survey data (Design and Architecture)
- Geoscience Australia ELVIS - Elevation Foundation Spatial Data
- Preliminary overall layout plans (Rufus)
- Pluviograph rainfall data for the 'Rockhampton Aero' station (Rufus)

2 SITE CHARACTERISTICS

2.1 SITE LOCATION

The proposed project site is located on Lots 67 on SP269034, on Macquarie Street, Gracemere. Site details have been summarised within Table 1 and a Queensland Globe Extract is presented as Figure 1.

Table 1: Site Description

Developer	Property and Location	
	Lot and Property Description	**Address**
AIRR	Lots 67 on SP269034	Macquarie Street, Gracemere

Figure 1: Site Location ***[source: QLD Globe]***

The site is bounded by Douglas Street to the south east, Macquarie Street to the north east and adjacent private property to the west. Refer Appendix A for proposed lot layout.

2.2 TOPOGRAPHY

The development is currently occupied by two small buildings however is predominately covered by grasses, scattered trees and other vegetation. The existing site is approximately 1.36 ha in land area. The existing site levels range from 24.95m AHD at the southern corner fronting Douglas Street to 22.47 AHD at the northern corner fronting Macquarie Street. The proposed site is considered to be a single catchment, discharging to Macquarie Street.

3 HYDROLOGY ASSESSMENT

3.1 LAWFUL POINT OF DISCHARGE

The existing site surface grades towards the northern corner of the property adjacent Macquarie Street, which will be the Lawful Point of Discharge (LPOD) for the site. The proposed development will not be altering the stormwater discharge characteristics in a manner that may substantially damage third party property, in accordance with QUDM (Section 3.9.1).

3.2 HYDRAULIC MODELLING

Hydrologic calculations have been undertaken using XPSTORM 2020.1 for pre and post development scenarios. The modelling within XPSTROM environment has been undertaken to estimate the peak discharge for storms up to 1% AEP. Hydrologic modelling has been undertaken using the Laurenson Runoff Routing Method. Laurenson's Method is an industry leading hydrologic routing method that can be used for catchments ranging between 10m^2 up to 20,000km^2. The information required to apply Laurenson's Method include:

- Rainfall Intensity Data (obtained from the Bureau of Meteorology 2016 IFD utility)
- Rainfall Temporal Patterns (obtained from the ARR'19 Data Hub)
- Catchment Area (ha)
- Catchment Slope
- Initial and Continuing Infiltration Data
- Catchment Roughness (Manning's 'n')

Given the relatively limited scope of this hydraulic impact assessment a lumped catchment approach, as defined by ARR'19 and shown in Figure 2 below, was applied to the hydrologic review of the site. The lumped approach is suitable for this site given the relative consistency in land use and the ultimate purpose of the model. There is also no historical data available to allow for a comparison or calibration for this location.

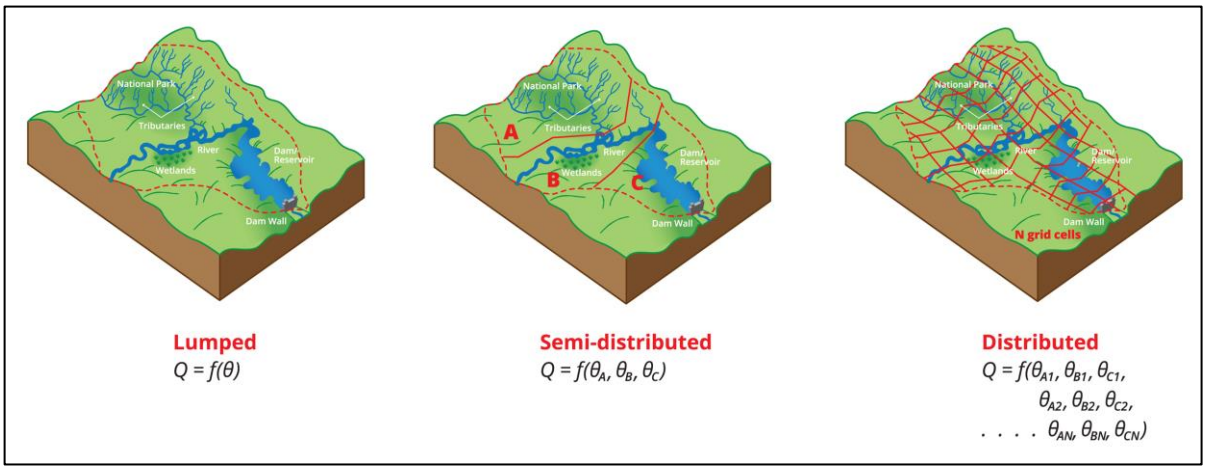

Figure 2: Catchment Analysis Options

Figure 3 and 4 are extracts from QGIS mapping and present the pre and post development catchment boundaries with flow links.

Figure 3: Site Catchment

3.2.1 CATCHMENT HYDROLOGY PARAMETERS

Below tables summarises the pervious and impervious area for external catchments and sub-catchments in pre-development and post-development scenario.

Table 2: Pre-Development Catchment Areas

Catchment	Pervious Area (ha)	Impervious Area (ha)	Catchment Area (ha)
Internal Catchment	1.307	0.05	1.357

Table 3: Post-Development Catchment Areas

Catchment	Pervious Area (ha)	Impervious Area (ha)	Catchment Area (ha)
Internal Catchment	0.31	1.047	1.357

Tables 4 and 5 summarises the input data for the development site in pre-development and post development conditions.

Table 4: Pre-Development Model Parameters (XP Storm)

Parameter		Land Description	
		Vacant Land	Roof Area
Area (ha)		1.307	0.05
Impervious (%)		0.0	100
Slope (%)		1.4	1.4
Laurenson 'n' (storage non-linearity exponent)		-0.285	-0.285
Infiltration	Initial Loss (mm)	0.0	0.0
	Continuing Loss (mm/hr)	2.5	0.0
Manning's Roughness (n)		0.030	0.018

Table 5: Post-Development Model Parameters (XP Storm)

Parameter		Land Description			
		Northern Catchment		Southern Catchment	
		Pervious	Impervious	Pervious	Impervious
Area (ha)		0.048	0.554	0.221	0.494
Impervious (%)		0	100	0	100
Slope (%)		1.0	1.0	1.0	1.0
Laurenson 'n' (storage non-linearity exponent)		-0.285	-0.285	-0.285	-0.285
Infiltration	Initial loss (mm)	0	0	0	0
	Continuing loss (mm/h	2.5	0	2.5	0
Manning's Roughness (n)		0.030	0.018	0.030	0.018

Applying no initial losses within the model is consistent with the requirements of both ARR'87 and ARR'19. ARR'19 states that there is no evidence that infiltration losses change with respect to the recurrence interval being modelled and that continuing losses can be applied equally to frequent and rare events. The following Manning's roughness values have been applied to the catchments:

- Pervious 'n' = 0.030 (weighted average roughness of graded gravel surface or short grass)
- Impervious 'n' = 0.018 (weighted average roughness of sealed surface, urban residential lots and mixed use commercial development)

3.2.2 HYDROLOGY RESULTS

Applying the ARR'19 ensemble temporal patterns to the pre and post developed catchments allowed the identification of the critical duration for the mean minor and major storm event. Below figures are the Box and Whisker plot taken from XPSTORM software. This plot shows the comparison of storm ensembles for different durations for minor and major storm events.

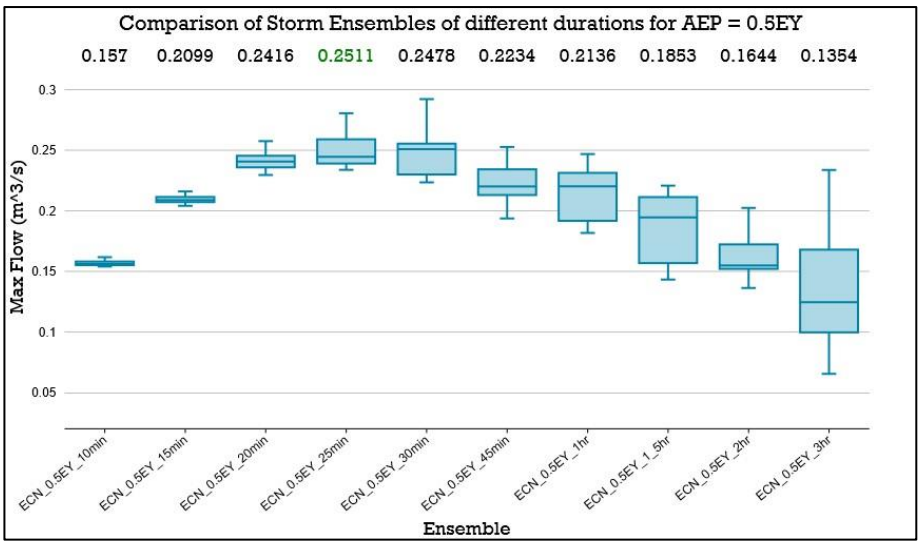

Figure 5: Comparison of Storm Ensembles of different durations for 0.5EY Pre-Development (XP Storm Model)

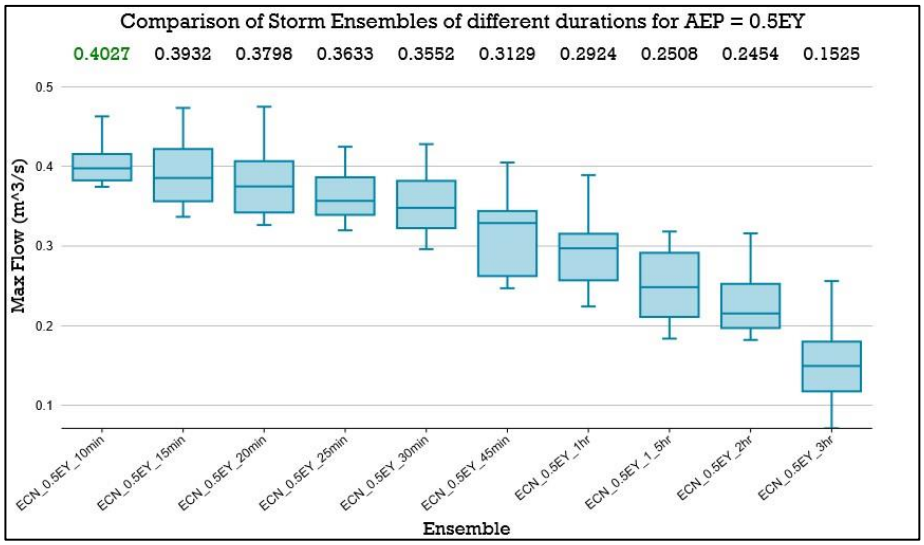

Figure 6: Comparison of Storm Ensembles of different durations for 0.5EY Post-Development (XP Storm Model)

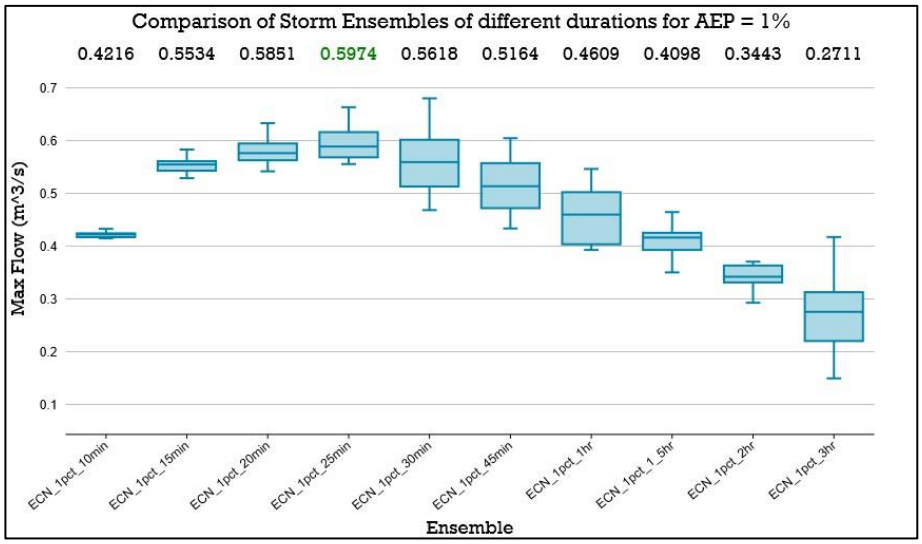

Figure 7: Comparison of Storm Ensembles of different durations for 1% Pre-Development (XP Storm Model)

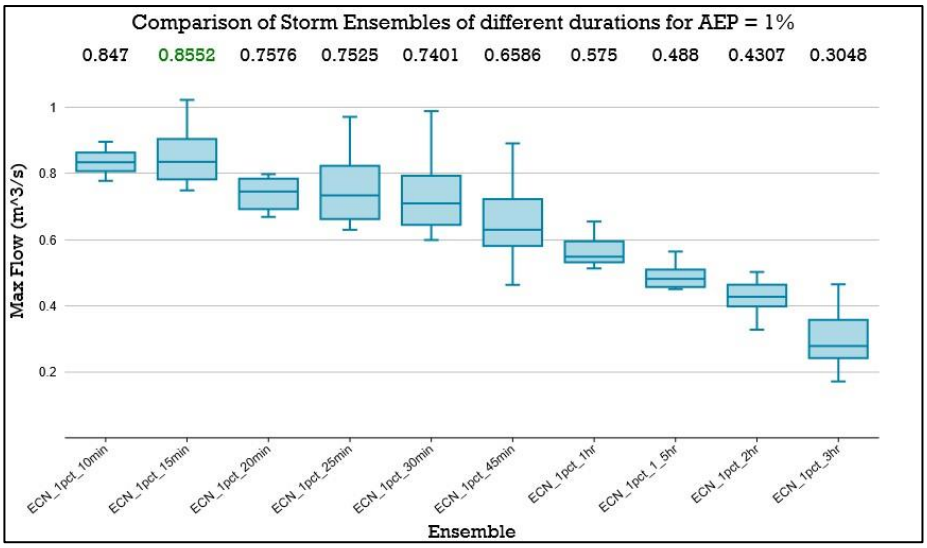

Figure 8: Comparison of Storm Ensembles of different durations for 1% Post-Development (XP Storm Model)

The results of each of the ensembles are summarised in Table 6. The same storm events are applied to the hydraulic analysis.

Table 6: Critical Storm Events

Annual Exceedance Probability (AEP)	Pre-Developed Site Critical Storm Event	Post-Developed Site Critical Storm Event
0.5EY [39% AEP] (Minor Event)	0.5EY_25min_8	0.5EY_10min_3
1% AEP (Major Event)	1pct_25min_8	1pct_15min_1

4 HYDRAULIC ASSESMENT

4.1 BACKGROUND

The hydraulic assessment for the site has been carried out using XPSTORM 2020.1. The main aim of the hydraulic modelling is to demonstrate that the post-development minor and major storm peak discharge at the LPOD is equal or less than peak pre-development discharge. This aim will be achieved by detaining the site runoff via an underground detention tank within the development site.

It is proposed that the previously defined southern catchment, including roof areas, sealed pavements and landscaped areas will be discharged freely from the site with no mitigation. The Northern Catchment will be routed though detention prior to being discharged to Macquarie Street's stormwater network. The sum of these outflows are to be equivalent or less than the pre-development runoff.

4.2 DETENTION

It is proposed to provide a 260m^3 concrete underground detention tank with an invert level of 22.2m AHD, to ensure there will be no adverse impacts on downstream properties and infrastructure. Post-development flows from the industrial development will be directed to the detention basin and no ponding in the carpark or any other area within the development site has been allowed.
Table 7 summarises the peak discharge at the LPOD for different scenarios.

Table 7: Peak Discharge at LPOD

Storm Event (AEP)	Pre-Development (m^3/s)	Post-Development without Detention (m^3/s)	Post-Development with Detention (m^3/s)
39% AEP [0.5EY] (Minor Event)	0.259	0.399	0.216
1% AEP (Major Event)	0.608	0.970	0.552

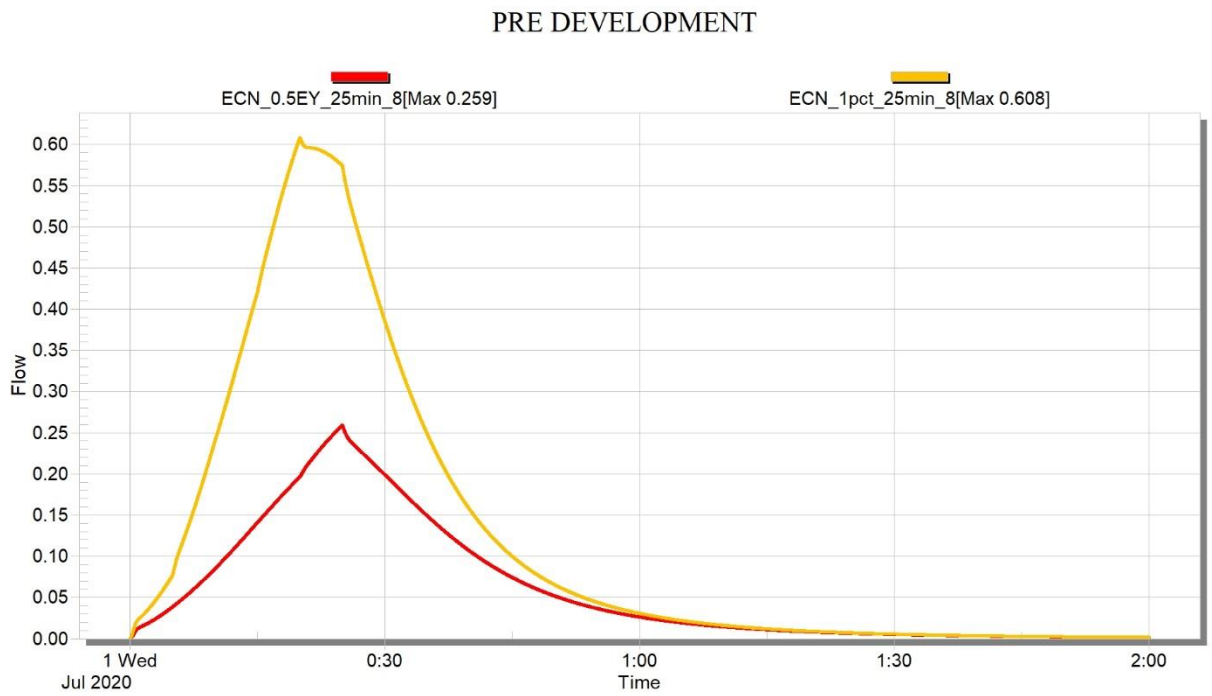

Figure 11: Pre-Development Peak Discharge at LPOD

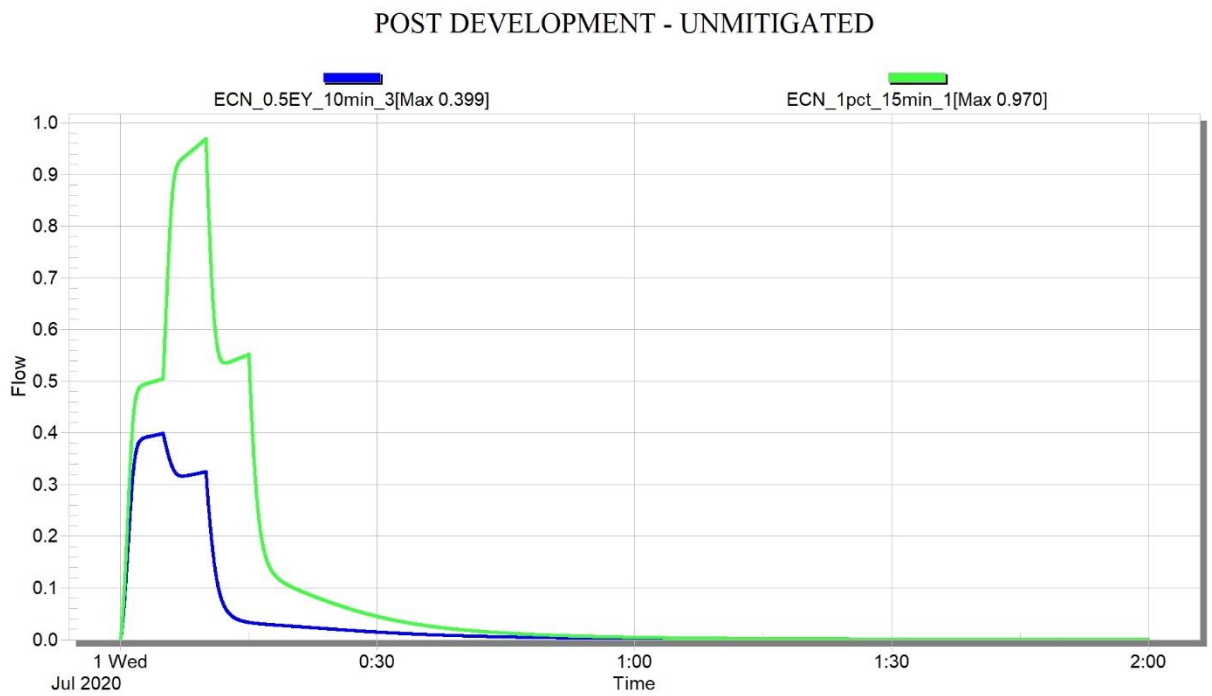

Figure 12: Post-Development Peak Discharge at LPOD

Table 8 summarises the detention basin parameters to achieve the target mitigated pre-development flow rates.

Table 8: Detention Basin Parameters

Total Effective Detention Volume	**260m³**
Invert Level	**22.2 AHD**
Peak Water Level in 1% AEP	**23.485 AHD**
Peak Water Depth at 1% AEP	**1.285m**
Primary Discharge Structure	**150mm Pipe**
Primary discharge Invert Level	**22.2m AHD**
Secondary Discharge Structure	**300mm Pipe**
Secondary Discharge Invert Level	**23.15m AHD**

Figures 13 and 14 show the hydraulic behaviour of the proposed detention tank outflow in post-development conditions. Figures 15 through 17 show the out flow from the southern catchment. The post-development peak discharge rate is less than the pre-development runoff and will not adversely impact on downstream properties or structures.

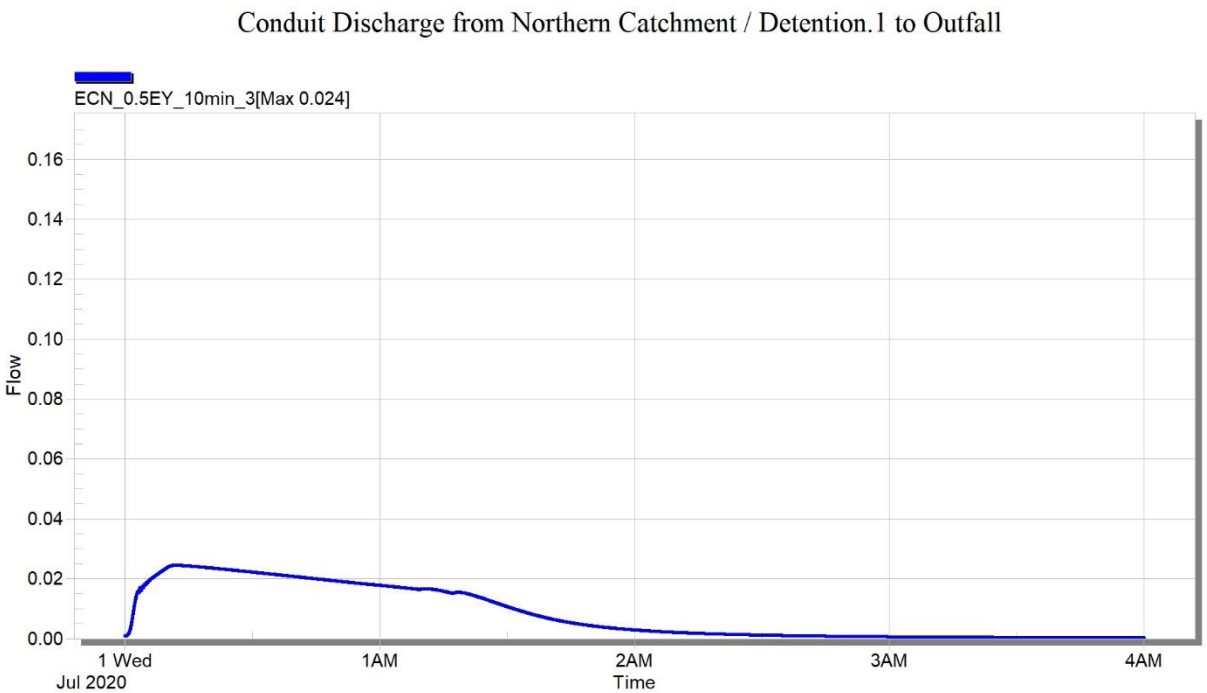

Figure 13: 0.5EY - Post Development discharge from detention basin structures to existing stormwater pit

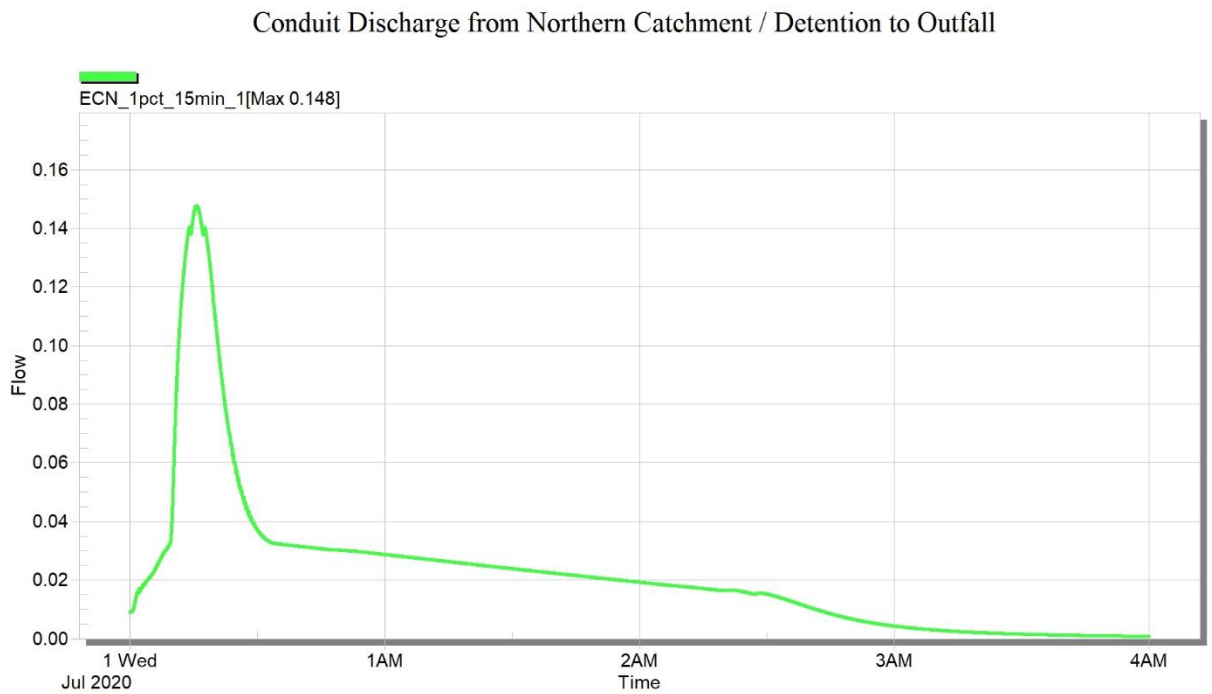

Figure 14: 1% AEP - Post Development discharge from detention basin structures to existing stormwater pit

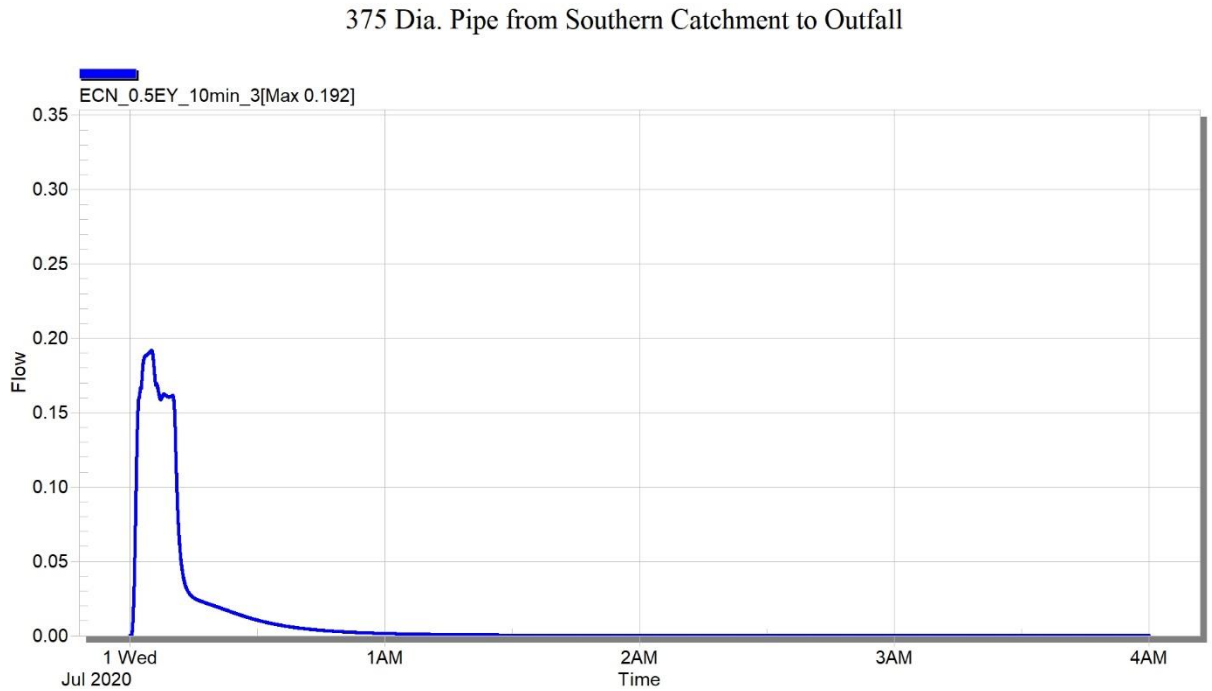

Figure 15: 0.5EY - Post Development discharge from southern catchment 375dia. Pipe to existing stormwater pit

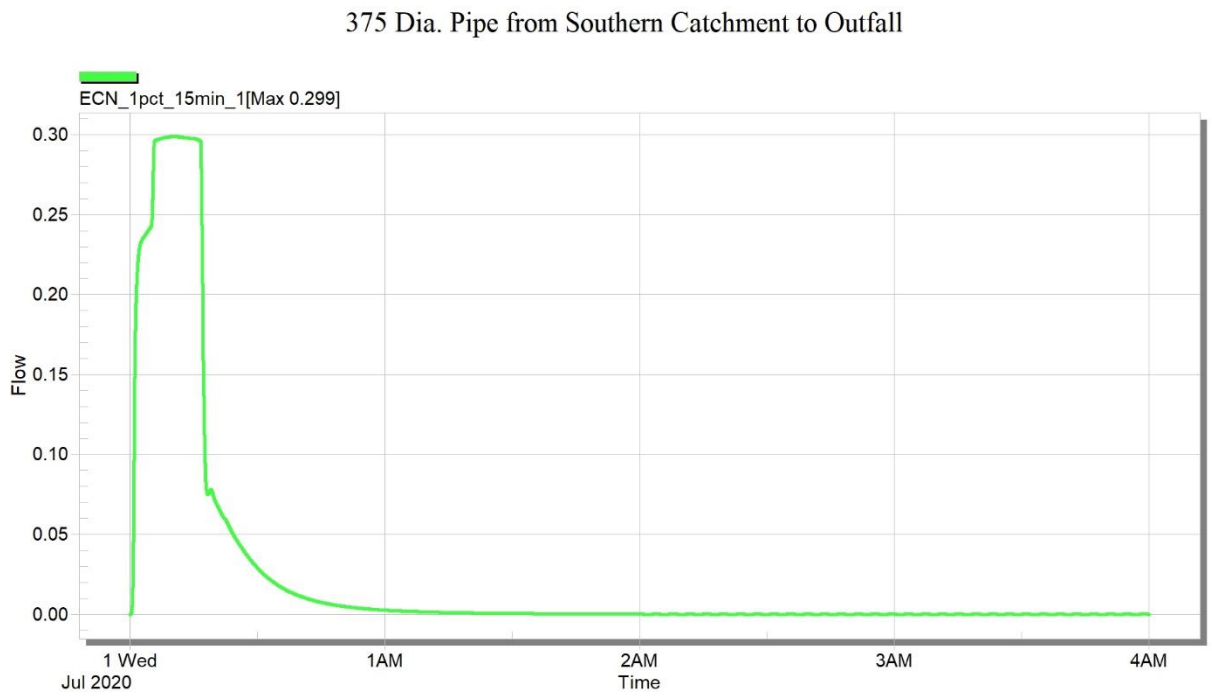

Figure 16: 1% AEP - Post Development discharge from southern catchment 375dia. Pipe to existing stormwater pit

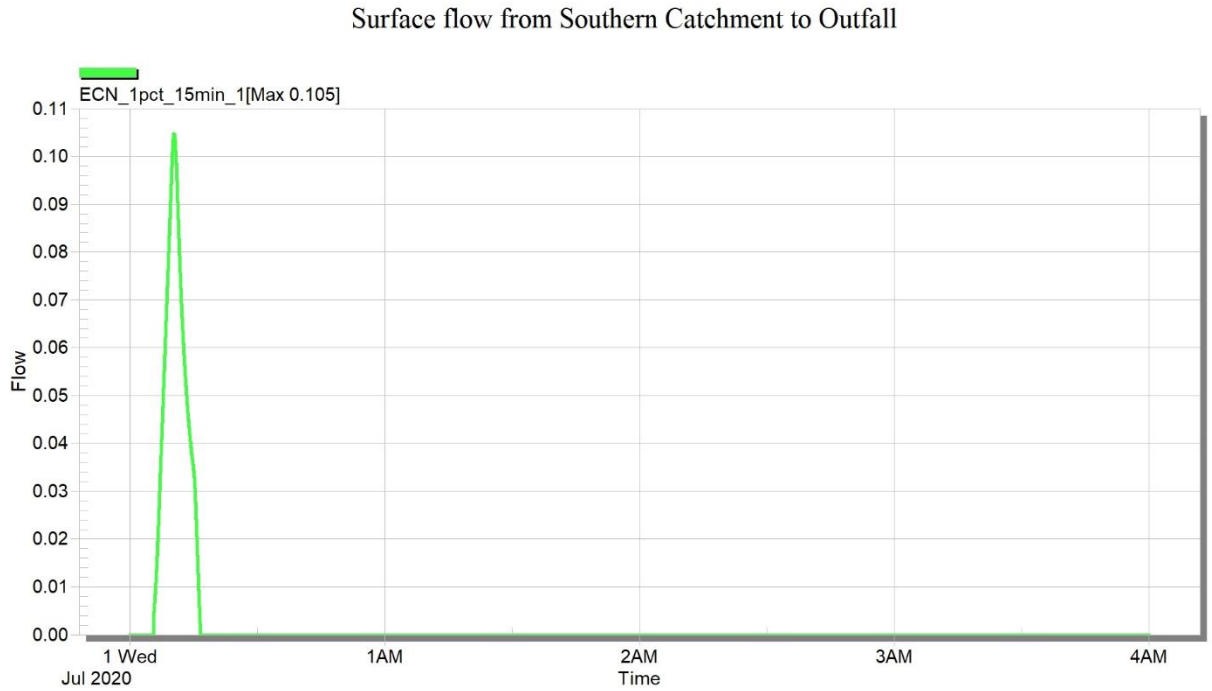

Figure 17: 1% AEP - Post Development discharge from southern catchment surface flow to street

Table 9: Discharge Summary

Storm Event	Unmitigated Southern Catchment Discharge		Mitigated Northern Catchment Discharge	Total Discharge
	375dia. Pipe	Surface Runoff	Detention Outlet	
0.5EY Peak Discharge (m3 /s)	0.192	0.0	0.024	0.216
1% AEP Peak Discharge (m3 /s)	0.299	0.105	0.148	0.552

5 QUALITY ASSESSMENT

5.1 BACKGROUND

The development of the land has the potential to increase the pollutant loads within stormwater runoff and downstream watercourses. During the construction phase of the development, disturbances to the existing ground have the potential to significantly increase sediment loads entering downstream drainage systems and watercourses. The operational phase of the development will potentially increase the amount of sediment and nutrients washing from the site. The following sections describe construction and operational phase controls and water quality modelling of the proposed treatment train in compliance with Council guidelines.

5.2 CONSTRUCTION PHASE

5.2.1 KEY POLLUTANTS

During the construction phase a number of key pollutants have been identified for this development. Table 10 illustrates the key pollutants that have been identified.

Table 10: Key Pollutants – Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material off cuts.
Sediment	Exposed soils and stockpiles during earthworks and building works.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment and temporary car park areas.

5.2.2 SEDIMENT AND EROSION CONTROLS

Sediment and erosion control devices (S&EC) employed on the site shall be designed and constructed in accordance with IECA Australasia Best Practice Erosion & Sediment Control Guidelines (2008).

PRE-CONSTRUCTION

- Stabilised site access/exit.
- Sediment fences to be located along the contour lines downstream of disturbed areas.
- Diversion drains to divert clean runoff around the construction site.
- Educate site personnel to the requirements of the Sediment and Erosion Control Plan.

CONSTRUCTION

- Maintain construction access/exit, sediment fencing, catch drains and all other existing controls as required.
- Progressively surface and revegetate finished areas as appropriate.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include mulching the soil and watering. Road access is to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build-up of typical road dirt and tyre dusts from delivery vehicles.
Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter hydrocarbons, toxic materials, acids or alkaline substances.

5.3 OPERATIONAL PHASE

Stormwater Quality Improvement Devices (SQID's) that form a treatment train for the operational phase of the development will be required to meet the water quality objectives of the State Planning Policy 2017:

- 85% reduction in Total Suspended Sediment (TSS)
- 60% reduction in Total Phosphorus (TP)
- 45% reduction in Total Nitrogen (TN)
- 90% reduction in litter (sized 5 mm or greater)

5.3.1 Stormwater Quality Improvement Devices

This development will require stormwater quality treatment of both the southern catchment and northern catchment independently. It is proposed that cartridge filtration units be implemented for these locations. MUSIC modelling will be conducted by the product manufacturer at operational work phase.

Appendix A – Concept Stormwater Layout

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