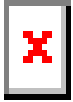


From: "No Reply" <mydas-notifications-prod2@qld.gov.au>
Sent: 11/10/2018 17:11:40
To: "Hugh.campbell@dsdmip.qld.gov.au" <Hugh.campbell@dsdmip.qld.gov.au>; "admin@gassman.com.au" <admin@gassman.com.au>
Cc: "City of Gold Coast mail" <mail@goldcoast.qld.gov.au>
Subject: 1710-2228 SPD application correspondence
Attachments: Approved Plans and Specifications - 1710-2228 SPD.pdf, GE11-N Planning Act 2016 - Appeal provisions.pdf, DSDMIP Statement of reasons - 1710-2228 SPD.pdf, DSDMIP Changed referral agency response minor change to development approval - 1710-2228 SPD.pdf, DSDMIP Decision notice change to a development approval - 1710-2228 SPD.pdf
Importance: Normal

Please find attached a notice regarding application [1710-2228 SPD](#).

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RE2-N



Department of State Development,
Manufacturing, Infrastructure and Planning

Email Id: RFLG-1018-0003-1284

This email originates from outside of the City of Gold Coast.

- NOTES:
1. CONTOURS SHOWN ARE EXISTING CONTOURS ONLY AT 0.25m INTERVAL.
 2. REPLACE GUARDRAIL TO NORTHERN SIDE OF ROAD (FOR RURAL PROFILE) IN ACCORDANCE WITH DTMR STANDARDS.
 3. EXISTING OVERHEAD ELECTRICITY & POWER POLES ARE INDICATED ON THIS DRAWING. TO ACCOMMODATE THE PROPOSED ROAD WIDENING, THE RELOCATION OF 3 POWER POLES IS REQUIRED.

LOT 6
SP139664

LOT 7
SP139664

LEGEND

- 1.5m WIDE CONCRETE FOOTPATH
- DESIGN VERGE PROFILE
- REMOVE EXISTING STORMWATER
- PROPOSED STORMWATER DRAINAGE
- EXISTING GUARDRAIL (TO BE REMOVED)
- DESIGN LINEMARKING
- ROAD DEDICATION BOUNDARY
- PROPERTY BOUNDARY

PLANS AND DOCUMENTS
referred to in the REFERRAL
AGENCY RESPONSE

SARA ref:

1710- 2228 SPD

Date:

11 October 2018



ant:

KS8 Pty. Ltd.

Site Address:

60 STAPYLTON JACOBS
WELL ROAD, STAPYLTON

RPD:

Lot / Plan: 1 on RP6882
240 on W31320
4 on RP6843
Parish: Albert
County: Ward
Local Authority: City of Gold Coast
Council
Level Datum: AHD
Meridian: IS216853
Contour Interval: -
PSM: -
RL: -

ISSUED FOR APPROVAL
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DRAWING TO BE READ IN CONJUNCTION WITH GENERAL NOTES

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DRAWING TITLE
FUNCTIONAL ROAD
LAYOUT PLAN AND
STORMWATER DRAINAGE
LAYOUT PLAN
SHEET 2 OF 2

Issue		Description		IG	MG
B	24-07-18	AMENDMENTS AS PER DTMR REQUEST		IG	MG
A	18-07-18	ORIGINAL ISSUE		IG	MG

SCALE IN METRES

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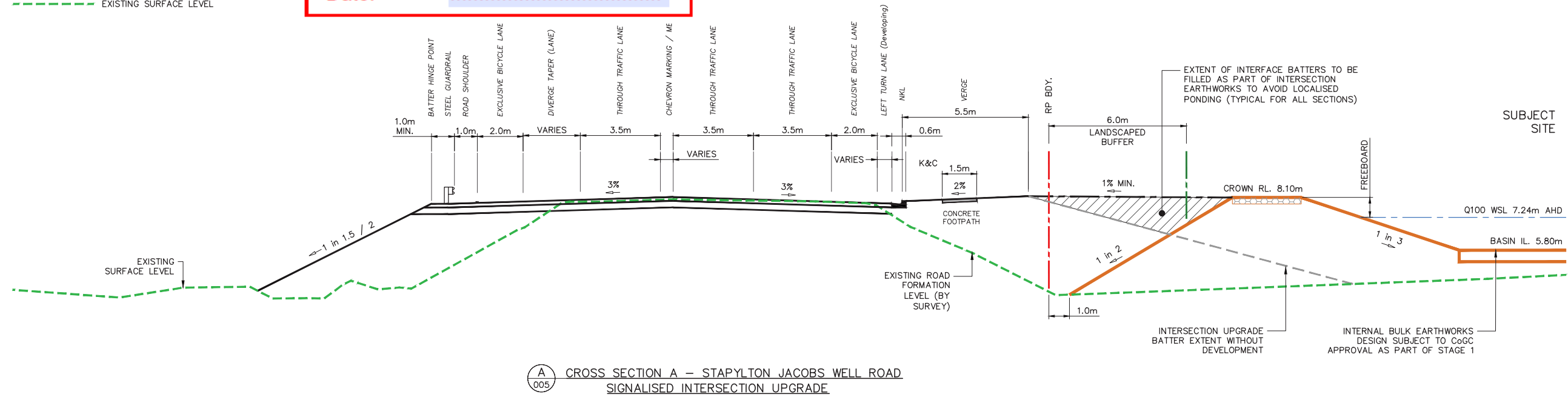
Scale at A1:	1:200
Designed:	IG
Drafted:	IG
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-07-18
Drawing No:	5738 ENG BE1 SK-005
Rev. No:	B

Queensland
Government

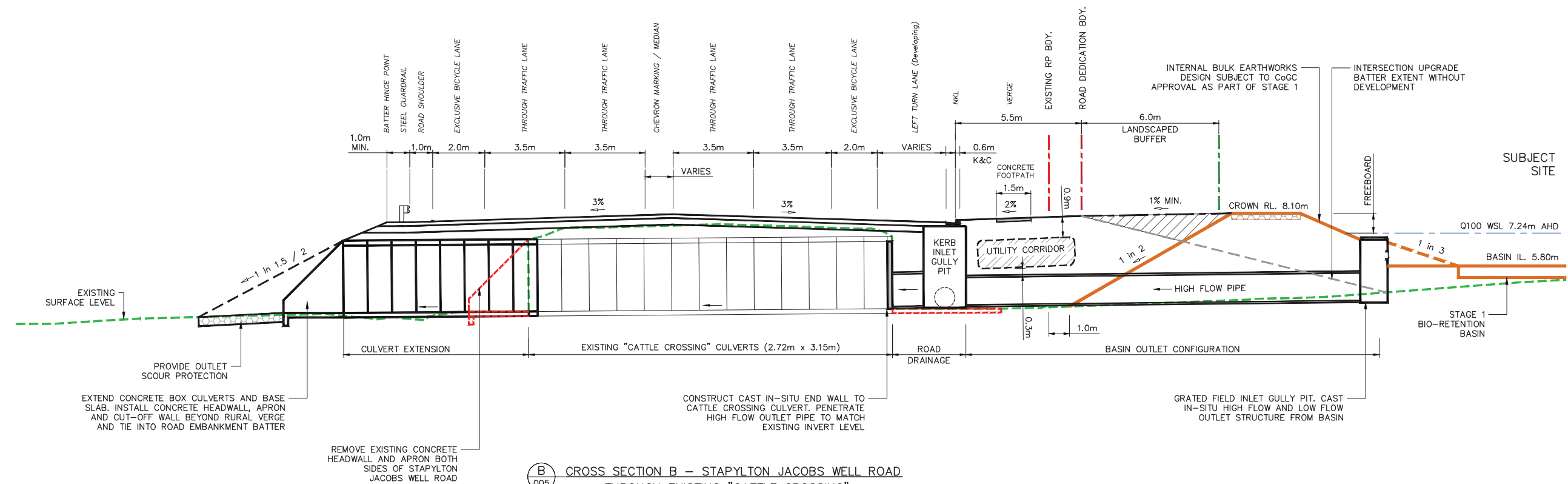
1710- 2228 SPD
.....

11 October 2018

 DTMR WORKS
 STAGE 1 BULK EARTHWORKS
 EXISTING SURFACE LEVEL



**CROSS SECTION A – STAPYLTON JACOBS WELL ROAD
SIGNALISED INTERSECTION UPGRADE**



(B) CROSS SECTION B - STAPYLTON JACOBS WELL ROAD
005 THROUGH EXISTING "CATTLE CROSSING"



Client: KS8 Pty. Ltd.

60 STAPYLTON JACOBS
WELL ROAD, STAPYLTON

Lot / Plan: 1 on RP6882
240 on W31320
4 on RP6843

Parish: Albert

County: Ward

Local Authority: City of Gold Coast
Council

Level Datum: AHD

Meridian: IS216853

Contour Interval: -

PSM:

RL:

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TYPICAL CROSS SECTIONS OF STAPYLTON JACOBS WELL ROAD

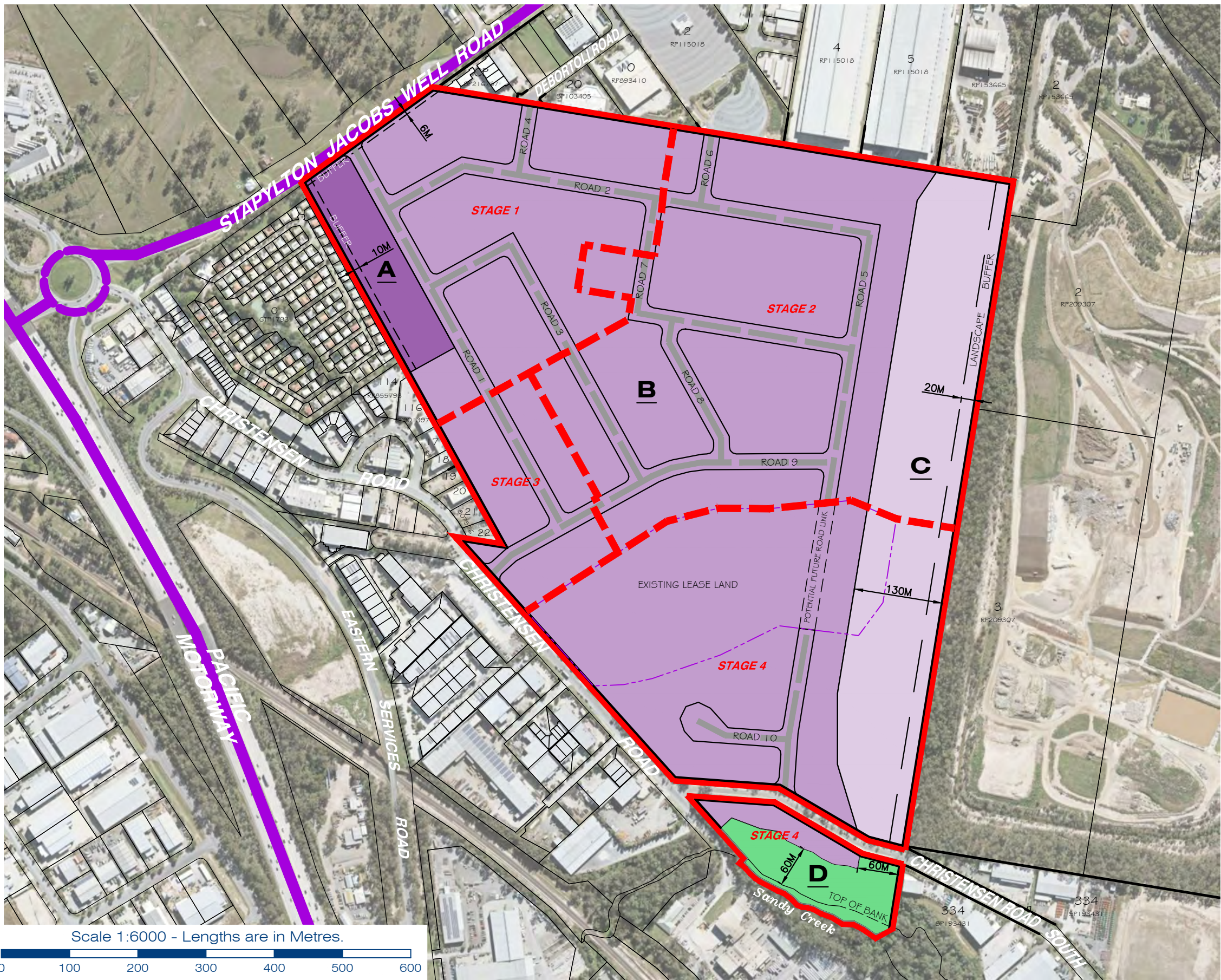
B	24-07-18	AMENDMENTS AS PER DTMIR REQUEST	IG	MG	
A	18-07-18	ORIGINAL ISSUE	IG	MG	
Issue	Date	Description	DRN	CHK	

0 1 2 3 4 5m
1:100 @ A1

Date:	24-07-18
-------	----------

Drawing No:	Rev. No:
5738 ENG BE1 SK-006	B





LEGEND

Site Area: 73.114 Ha

- Limit of Application
- Major State controlled Roads
- Possible future industrial collector road
- Existing lease land extent

A	LOW IMPACT AND SERVICE INDUSTRY	2.41 Ha
B	GENERAL IMPACT BUSINESS & INDUSTRY	56.4311 Ha
C	LIMITED GENERAL IMPACT BUSINESS & INDUSTRY	12.193 Ha
D	OPEN SPACE / RESERVE	1.31 Ha

STAGE	AREA
STAGE 1	16.20Ha
STAGE 2	29.76Ha
STAGE 3	4.811Ha
STAGE 4	22.343Ha

NOTE:

- The landscaped buffer areas shall be established and maintained for the life of the development. No building works are to occur within the landscape buffer areas unless otherwise approved by the Chief Executive Officer;
- Roadworks and land dedication associated with Road 1, Christensen Road, Eastern Service Road and Christensen Road South will be subject to the detailed design for Stage 3 & 4 of the development;
- Lot access on the southern side of Christensen Road South is subject to further evaluation and approval following the detailed design of roadworks in Stage 3 & 4 of the development;

PLANS AND DOCUMENTS referred to in the REFERRAL AGENCY RESPONSE



SARA ref: 1710- 2228 SPD
Date: 11 October 2018



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Gold Coast & Logan | 76 Business Street, Yatala QLD | PO Box 392, Beenleigh 4207

Scale at A3:	1:6000			
Date:	23-08-18			
Design:	.			
Drawn:	RM			
Checked:	BC			
D	23/06/2018	AMEND ZONE A & ADD ROAD NUMBERING	RM	BC
C	30/05/2018	MINOR UPDATES	RM	BC
B	11/05/2018	POSSIBLE FUTURE COLLECTOR ROADS	RM	BC
A	08/02/2018	ORIGINAL ISSUE	RM/SH	BC
Issue	Date	Description	DRN	CHK

Project:

Stapylton-Jacobs Well Road,
Stapylton

Client:

KS8 Pty Ltd

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Classification
and Staging Plan

Drawing No:
5738 P 001

Revision No:
D

SITE BASED STORMWATER MANAGEMENT PLAN

DEVELOPMENT APPLICATION FOR RECONFIGURATION OF LOT (38 INDUSTRIAL LOTS)

ADDRESS

31 Yellowwood Road, 60 Stapylton Jacobs Well Road
and 82 Christensen Road, Stapylton

REAL PROPERTY DESCRIPTION

Lot 4 on RP6843, Lot 1 on RP6882 and Lot 240 on
W31320

PREPARED FOR

KS8 Pty. Ltd.

August 2018 (Rev. 3)

PLANS AND DOCUMENTS referred to in the REFERRAL AGENCY RESPONSE

SARA ref: 1710- 2228 SPD

Date: 11 October 2018



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urban + regional planning
landscape + urban design
engineering services
environmental management
visualisation + spatial services
surveying services
advisory services

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In preparing this report we have made certain assumptions. We have assumed that all information and documents provided to us by the Client or as a result of a specific request or enquiry were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.

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GDP DOCUMENT CONTROL

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Revision / Checking History

No.	Author	Reviewer	Date
INTERNAL DRAFT	Mitchell Gassman	Ian Grieves	
1.	Mitchell Gassman	Ian Grieves	9 February 2018
2.	Mitchell Gassman	Ian Grieves	10 May 2018
3.	Mitchell Gassman	Ian Grieves	29 August 2018

Approval for Issue

Rev. No.	Name	Position	Signature	Date
3.	Mitchell Gassman	Civil Project Engineer RPEQ 16939		30 August 2018

Final Distribution

KS8 Pty. Ltd. (Client)	1 electronic copy
Gold Coast City Council (Assessment Manager)	1 electronic copy
GDP File	1 electronic copy

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1.0 INTRODUCTION

Gassman Development Perspectives (GDP) has been engaged by KS8 Pty. Ltd. (Client) to prepare a Site Based Stormwater Management Plan over land situated at 60 Stapylton Jacobs Well Road and 82 Christensen Road, Stapylton (Lot 1 on RP6882 and Lot 240 on W31320) being the 'subject site'.

This report has been prepared for submission to City of Gold Coast Council (Council) as part of a Development Application for Reconfiguration of Lot (38 industrial lots) with the intent of investigating and addressing the stormwater quantity and stormwater quality requirements for the proposed development in accordance with the applicable State and Local Government standards.

Stormwater quantity is addressed through pre and post development scenarios modelled in XPSTORM software utilising temporal pattern inputs from Council's Current Schedule 6.09 Land Development Guidelines Version 2.0. A strategy for managing post development peak flows discharging from the site and the required attenuation measures are provided to demonstrate that any increase in peak flows can be managed within the subject site as not to measurably impact neighbouring properties.

Stormwater quality analysis is also undertaken through the use of MUSIC software to confirm the adequacy of proposed Stormwater Quality Improvement Devices (SQIDs) required to meet the State Planning Policy's Water Quality Objectives (WQOs) and the pollutant removal targets set by City of Gold Coast Council.

A copy of the XPSTORM and MUSIC modelling data files are attached on a DVD for Council's records.

Revision 3 of this report (dated 30 August 2018) primarily focuses on the alterations to the bio-retention basin design arrangement for M38 Industrial Park - Stage 1. As a result of a SARA / QTMR request for the design modelling of the ultimate Stapylton Jacobs Well Road profile – the basin geometry and storage characteristics were amended. The hydraulic analysis results of the revised geometry and outlet configurations are contained in this report.

2.0 SITE CHARACTERISTICS

2.1 LOCATION

The subject site is located within the City of Gold Coast Council local government boundaries. The subject site is bounded by Stapylton Jacobs Well Road to the north, Christensen Road and existing industrial uses to the west and Council's land fill facility to the south-east.



Figure 2.1: Site Locality Plan, Source: Google Earth 2017

2.2 SITE AREA

The current area of the site is 73.114 Ha of which the proposed bulk earthworks change to ground level works for Stage 1 makes up approximately 25.0 Ha, (16.1Ha development area).

2.3 EXISTING TOPOGRAPHY AND SITE DRAINAGE

Along the south-eastern boundary of the subject site is the existing high point of 29.23m AHD with a ridge line extending through to the properties' northern boundary. This existing topography defines the existing catchments of the site and current stormwater discharge locations along the northern and eastern boundaries. These low points are visible within

Appendix A – Site Survey Plan of the report with the pre development catchments defined within **Appendix B – Pre and Post Development Catchment Plans**.

2.4 EXISTING LAND USAGE

The subject land is mainly improved by an existing rural homestead and accompanying farming sheds consisting of vacant land and agricultural uses for specifically cattle grazing.

Amgrow Pty. Ltd. (soil and fertilizer distributor) leases approximately 9.4ha of part Lot 240 on W31320, for the purpose of mixing, reconditioning and distributing soil and fertilizer, on a wholesale basis. Warehouse buildings and ancillary offices are located on the leased land with sole access from Christensen Road.

The property at No.31 Yellowwood Road is currently used for the grazing of cattle mainly associated with the adjoining lands to the west. The land has a frontage to the Albert River to the rear of the property.

2.5 PLANNING PROVISIONS AND PROPOSED DEVELOPMENT

The subject site is zoned “Low Impact Industry, Future Precinct” and “Medium Impact Industry, Future Precinct” under Council’s current City Plan. The current proposal involves creating further industrial lots created within the subject site which will require large scale bulk earthworks necessary to facilitate clear and flat earthwork pads suitable for this land use.

2.6 FLOODING

The subject site is located within the extent of the Flood Overlay as defined in Council’s City Plan Interactive Mapping – Version 3.

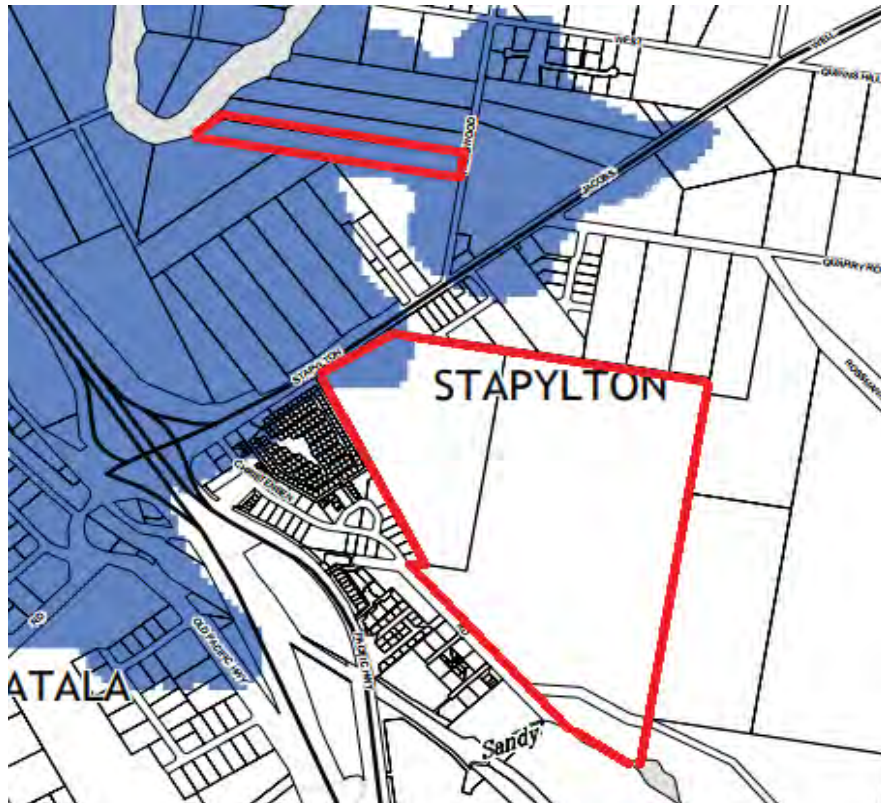
Compensatory cut within the Yellowwood Road property is proposed to balance flood storage where fill within the subject site is proposed below the defined flood event level of RL8.60m AHD (Q100).

On-site regional flood storage volumes have been calculated for the site based on Council’s provided flood level of 8.60m AHD and the existing surface levels within the property boundary. The volume of on-site regional flood storage is equal to **19,927 m³**. In summary, the compensatory balance flood storage proposal is as follows:

Site Address	Available Q100 Flood Storage Volume	
	Pre Developed	Post Developed
60 Stapylton Jacobs Well Road, Stapylton	19,927 m ³	14,544 m ³
Shortfall of Flood Storage at Subject Site	5,383 m ³	
Earthworks below Q100 at Yellowwood Rd	5,769 m ³ *	

** A gain of 386 m³ of flood storage has been achieved in the post development scenario.*

Refer **Appendix D** which provides detailed drawings of the bulk earthworks proposal and how a flood storage balance between the pre and post development scenario will be achieved.



3.0 CONVEYANCE MANAGEMENT AND PRE AND POST DEVELOPMENT CATCHMENTS

3.1 LAWFUL POINT OF DISCHARGE

The *Queensland Urban Drainage Manual* (QUDM) has set criteria that define a lawful point of discharge for a proposed development. These being:

- 1) The location of the discharge is under the control of the Local Authority or other statutory authority from whom permission to discharge has been received. This will include park, drainage or road reserve, stormwater drainage easement; and
- 2) That in discharging in that location, the discharge will not cause actionable nuisance (i.e. a nuisance from which the current or some future neighbouring proprietor may bring an action or claim for damages arising out of the nuisance). In general terms this implies no worsening as a result of the discharge.

The Stage 1 development will utilise one (1) lawful point of discharge being to the northern boundary of the site; utilising the existing 2.70m x 3.00m RCBC “cattle crossing” located under Stapylton Jacobs Well Road. The existing structure – used primarily for paddock-to-paddock farm access is an asset of QTMR. An extension to this structure is required to accommodate for the widened carriageway of the ultimate QTMR intersection upgrade.

3.2 PRE DEVELOPMENT CATCHMENTS

The existing natural slope currently dictates the overland flow and drainage pattern of the subject site as illustrated in the pre development stormwater catchment plan within **Appendix B**. The flow patterns generally follow the ridgeline out falling towards the existing low points of the site.

3.3 POST DEVELOPMENT CATCHMENTS

The intent of the proposed bulk earthworks outlined within this Stormwater Management Plan is to generally follow the pre development conditions to ensure no worsening of stormwater impacts downstream both during and post the construction period. Whilst the proposed bulk earthworks over the site generally flatten the existing steep grades of the land as part of creating the earthworked pads, the increase in impervious areas associated with the proposed land use mean that a hydrologic review is required to determine the changes in discharge characteristics (i.e. peak flow, water quality) from the site and identify suitable attenuation measures that need to be implemented to mitigate any potential downstream impacts. The post development catchments are illustrated within the post development catchment plan included within **Appendix B**.

4.0 HYDROLOGICAL ASSESSMENT

4.1 TEMPORAL PATTERNS AND RAINFALL DATA

In accordance with Council's City Plan Current Schedule 6.09 Land Development Guidelines, Council's Standard Drawings have been utilised to generate rainfall data for the various design storm hydrographs which have been utilised in the below modelling of stormwater runoff from the subject site. The parameters outlined in **Figure 4.10 and 4.11** below were determined from Council's standard drawings and were confirmed by referencing the Polynomial Coefficients table sourced from the Bureau of Meteorology.

Parameter	Value (mm/hr where applicable)
Easting / Northing / Zone	523 493.88 E / 6 931 923.68 N / 56
Latitude / Longitude	27.725 S / 153.250 E
1-2	49.40
12-2	9.48
72-2	3.19
1-50	87.16
12-50	18.68
72-50	7.19
Geographical Factor (F2)	4.4
Geographical Factor (F50)	17.22
Map Skewness (G)	0.08

Figure 4.10: Temporal Pattern Summary, Sourced: CoGC City Plan Schedule 6.09

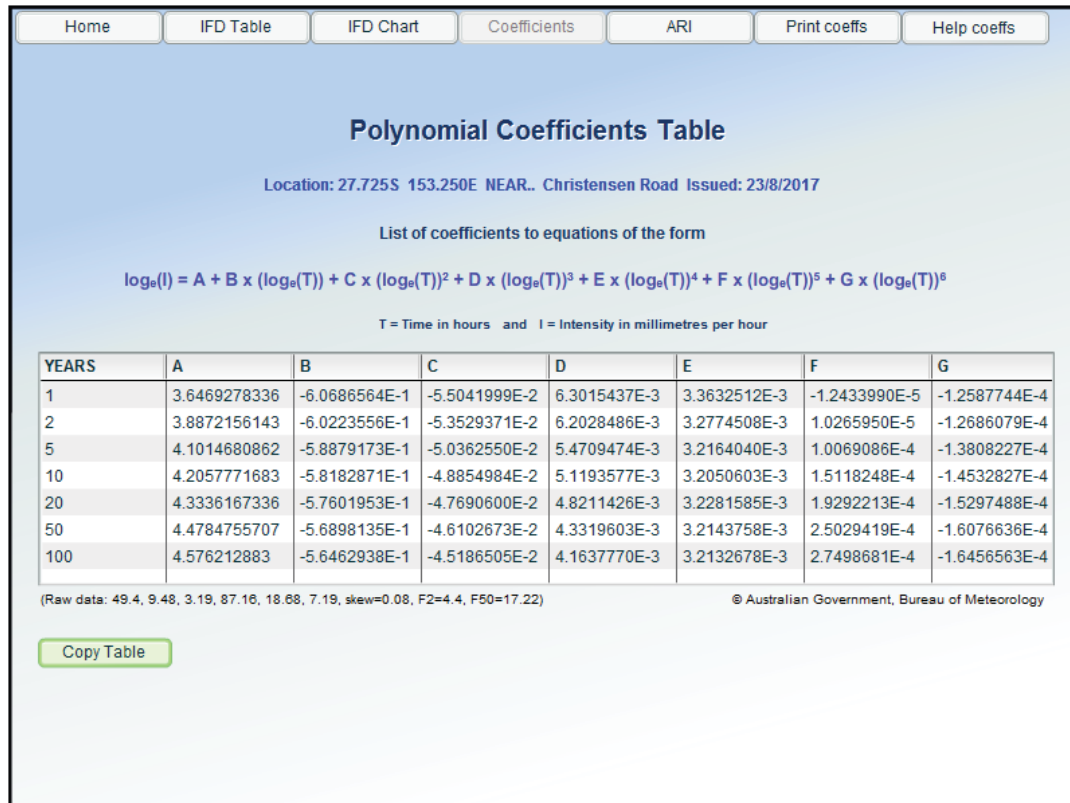


Figure 4.11: Temporal Pattern Summary Sourced from The BoM (Provided by XP Solutions)

4.2 CATCHMENTS

As discussed within Section 3 of this report the pre and post development stormwater catchments (refer **Appendix B**) have been determined using a combination of the site based Contour and Detail survey undertaken by Gassman Development Perspectives (refer **Appendix A**) along with Lidar survey of the surrounding area to identify any potential external catchments.

A summary of the parameters assigned to these sub-catchments used to assess the pre and post development flows is contained within **Tables 4.2A, 4.2B and 4.2C** below which aligns with the two scenarios assessed within this reporting.

Parameter		Sub-Catchments (Pre Development - Total Site)		
Name		CAT-X1	CAT-X2	CAT-1
Area (Ha)		1.637	2.182	12.715
Vectored Slope (%)		1.00	1.00	5.41
Impervious Area (%)		90.00	90.00	5.00
Pervious Area (%)		10.00	10.00	95.00
Roughness (n)		0.020	0.020	0.080
Parameter		Catchments (Pre Development - Total Site)		
Name		CAT-2	CAT-3	CAT-4
Area (Ha)		7.114	3.015	8.666
Vectored Slope (%)		5.95	5.54	5.80
Impervious Area (%)		1.00	0.00	0.00
Pervious Area (%)		99.00	100.00	100.00
Roughness (n)		0.050	0.080	0.100
Parameter		Catchments (Pre Development - Total Site)		
Name		CAT-5	CAT-6	CAT-6A
Area (Ha)		4.144	6.474	4.767
Vectored Slope (%)		4.02	3.91	3.50
Impervious Area (%)		0.00	0.00	35.00
Pervious Area (%)		100.00	100.00	65.00
Roughness (n)		0.050	0.100	0.030
Parameter		Catchments (Pre Development - Total Site)		
Name		CAT-7	CAT-7A	CAT-8
Area (Ha)		9.981	3.410	2.481
Vectored Slope (%)		3.51	2.50	3.00
Impervious Area (%)		0.00	85.00	0.00
Pervious Area (%)		100.00	15.00	100.00
Roughness (n)		0.060	0.020	0.060
Parameter		Catchments (Pre Development - Total Site)		
Name		CAT-9	CAT-10	
Area (Ha)		2.210	8.523	
Vectored Slope (%)		2.21	6.45	
Impervious Area (%)		0.00	8.20	
Pervious Area (%)		100.00	91.80	
Roughness (n)		0.060	0.030	

Table 4.2A: Pre Development Catchment Parameters

Parameter		Catchments (Total Site)	
Reporting Location	LPOD-1	LPOD-2	LPOD-3
Contributing Sub Catchments	CAT-1, CAT-2, CAT-3, CAT-X2, CAT-4, CAT-5, CAT-6, CAT-6A, and CAT-X1	CAT-7 and CAT-7A	CAT-8
Area (Ha)	50.714	13.391	2.481
Vectored Slope (%)	4.01	3.01	3.00
Impervious Area (%)	3.10	2.50	0.00
Pervious Area (%)	96.90	97.50	100.00
Roughness (n)	0.059	0.059	0.060
Initial Loss (mm)	5.00	5.00	5.00
Continuing Loss (mm/hr)	2.50	2.50	2.50
Parameter		Catchments (Total Site)	
Reporting Location	LPOD-4	LPOD-5	
Contributing Sub Catchments	CAT-9	CAT-10	
Area (Ha)	2.21	8.523	
Vectored Slope (%)	2.21	6.45	
Impervious Area (%)	0.00	8.20	
Pervious Area (%)	100.00	91.80	
Roughness (n)	0.060	0.030	
Initial Loss (mm)	5.00	5.00	
Continuing Loss (mm/hr)	2.50	2.50	

Table 4.2B: Contributing Catchment Parameters to Reporting Locations

Parameter		Catchments (Post Development - Stage 1)	
Name		CAT-10A Impervious	CAT-10A Pervious
Total Area (Ha)		15.882	
Area Split (Ha)		14.294	1.588
Vectored Slope (%)		2.55	2.55
Impervious Area (%)		100.00	0.00
Roughness (n) for Impervious Area		0.020	-
Pervious Area (%)		0.00	100.00
Roughness (n) for Pervious Area		-	0.045
Initial Loss (mm)		0.00	5.00
Continuing Loss (mm/hr)		2.50	2.50

Table 4.2C: Post Development Catchment Parameters

4.3 LAND USE

Land uses were mapped within the pre and post development catchments with the varying hydraulic roughness and hydrological losses input into the XPSTORM model summarised in **Table 4.3 below**.

Land Use Type	Initial Loss (mm)	Continuing Loss (mm/hr)
Pre Developed		
Pervious	5.0	2.5
Impervious	0.0	2.5

Land Use Type	Initial Loss (mm)	Continuing Loss (mm/hr)
Post Developed		
Pervious	5.0	2.5
Impervious	0.0	2.5

Table 4.3: Summary of Adopted Initial & Continuing Losses

4.4 PRE AND POST DEVELOPMENT FLOW CALCULATIONS

XPSTORM modelling software was utilised to determine the pre and post development discharge flow rate for each catchment based on the parameters listed above.

The computations were run for the standard Average Recurrence Intervals (ARI) 1, 2, 5, 10, 20, 50 and 100 years. Catchment runoff volumes to the respective existing lawful points of discharge (reporting locations) are summarised in **Table 4.4**. *Catchment: CAT-10 for LPOD-5 is the only catchment area influenced by the subject Stage 1 development proposal.*

Catchment	Peak Flow Rates for Average Recurrence Interval (m ³ /s)						
Pre Developed Condition (Critical Duration)	Q₁	Q₂	Q₅	Q₁₀	Q₂₀	Q₅₀	Q₁₀₀
LPOD-1 (60 min)	3.722	5.264	7.162	8.366	10.051	12.006	13.574
LPOD-2 (60 min)	1.141	1.604	2.155	2.506	3.004	3.556	4.020
LPOD-3 (60 min)	0.268	0.372	0.498	0.578	0.688	0.801	0.902
LPOD-4 (60 min)	0.213	0.297	0.399	0.463	0.553	0.650	0.736
LPOD-5 (CAT-10) (25 min)	1.875	2.640	3.472	3.901	4.565	4.848	5.403
Catchment	Peak Flow Rates for Average Recurrence Interval (m³/s)						
Post Developed Condition (Critical Duration)	Q₁	Q₂	Q₅	Q₁₀	Q₂₀	Q₅₀	Q₁₀₀
LPOD-5 (CAT-10A) (15 min)	4.798	6.083	7.484	8.272	9.369	10.138	11.152

Table 4.4: Flow Rates Calculated Using the Laurenson Method in XPSTORM

Figure 4.12 below contains the pre developed peak flow rate hydrographs per reporting location / lawful point of discharge:

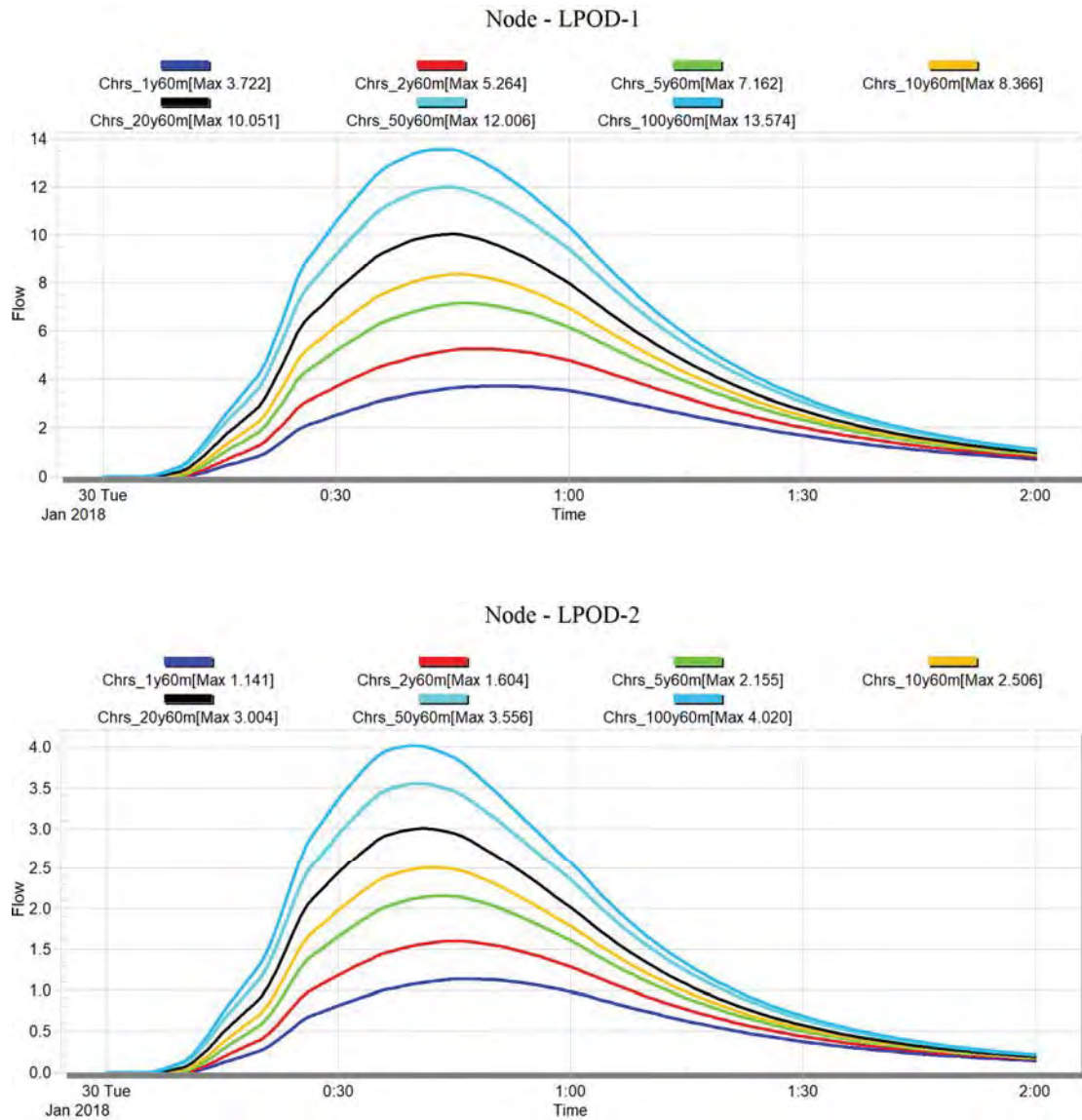


Figure 4.12: Pre Developed Peak Flow Rate Hydrographs

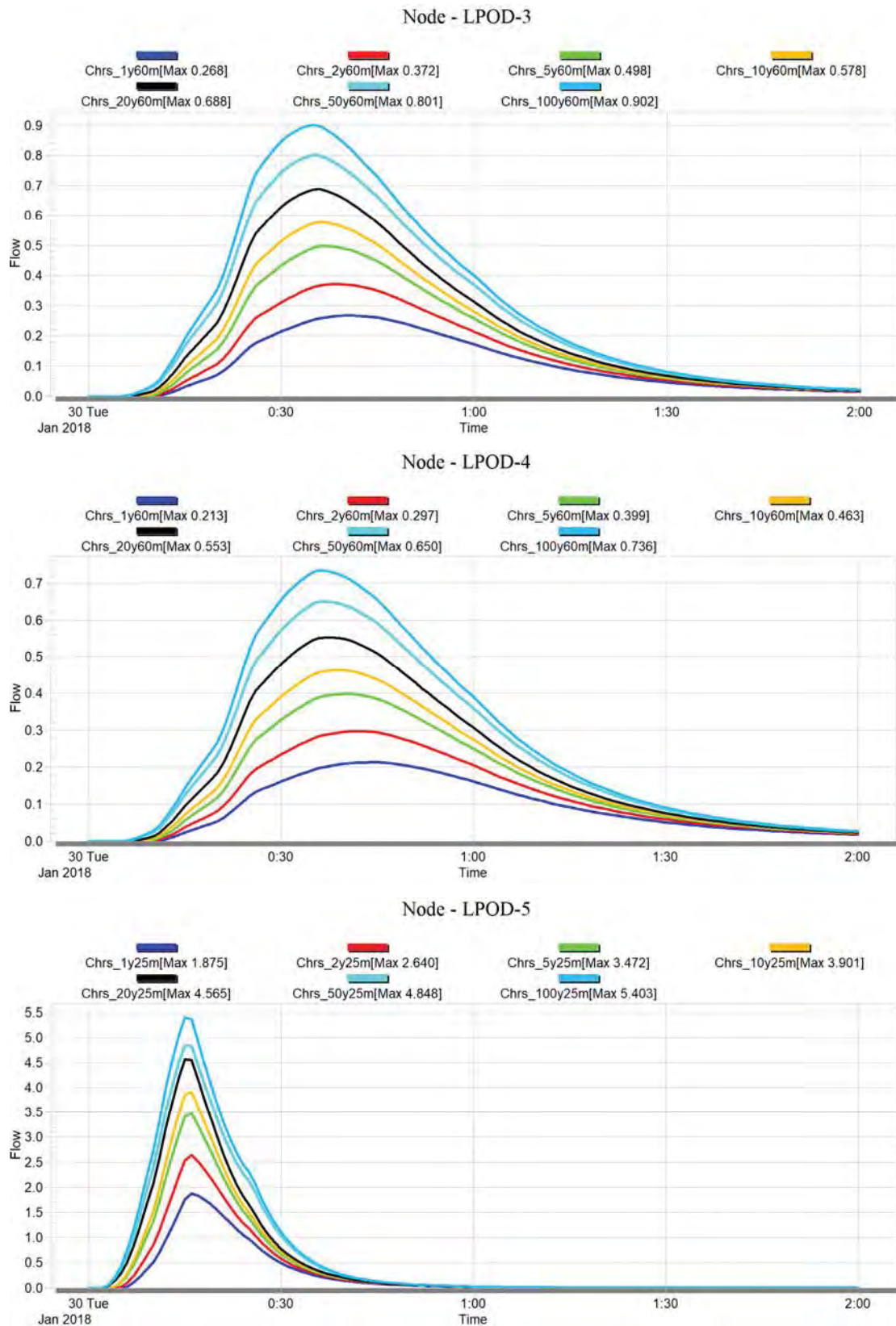


Figure 4.12: Pre Developed Peak Flow Rate Hydrographs (cont.)

Figure 4.13 below contains the post developed peak flow rate hydrograph at the reporting location / lawful point of discharge (CAT-10A / LPOD-5):

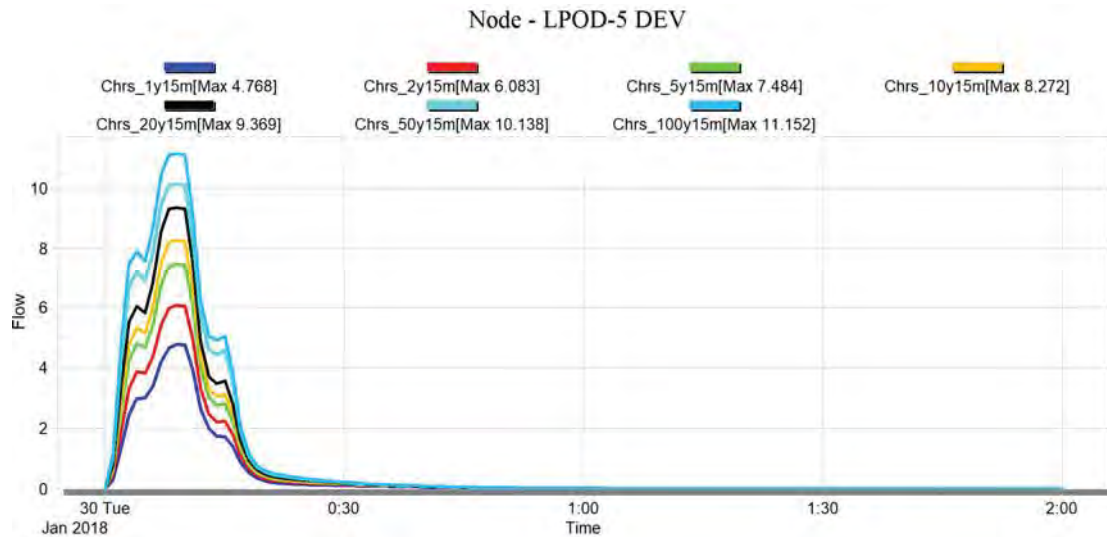


Figure 4.13: Post Developed Peak Flow Rate Hydrograph

5.0 STORMWATER QUANTITY, DETENTION & HYDRAULIC DESIGN

5.1 ATTENUATION OF DEVELOPED FLOWS

To ensure that the increased flow rates from the developed site have minimal impact on downstream property, the following hydrological objective has been set for stormwater exiting the subject site;

- *No increase in peak discharge flow rates from the developed site to downstream infrastructure.*

To achieve this objective, stormwater discharge from the development must be detained to pre development flow rates for all storm events up to and including Q100. The following sections provide a summary of the procedure used to design the onsite detention system at subject site.

5.2 METHODOLOGY

For the site catchment identified as having an increase in peak flow rates when developed, a hydrologic model was created using XPSTORM. The model was then used to route post-development runoff through various proposed detention structures to determine the most efficient on-site detention system.

5.2.1 MODEL CONDITIONS

In XPSTORM three (3) hydraulic conditions were modelled in order to demonstrate the stormwater quantity, detention and hydraulic objective;

1. Existing Condition - Current condition of site with all the external catchments to assess the natural hydrology.
2. Developed Condition - Future condition of site when developed with all the external catchments. The main changes in hydrology as part of development include; increase in impervious area of the subject site due to the construction of the hardstand and other impervious areas and reduction in Manning's roughness coefficient for sections of the site to be developed.
3. Mitigated Condition - Future condition of site when developed with proposed detention structures in place with all the external catchments where applicable.

5.2.2 CRITICAL STORM EVENT AND DURATIONS

An analysis of storm events ranging from Q1 to Q100 was undertaken to determine the critical storm event and the critical storm duration per catchment. The determined critical storm events for the pre developed and post developed condition are indicated in **Table 5.2.2** below.

MODEL CONDITION	CRITICAL STORM EVENT	CRITICAL STORM DURATION
Pre Developed	Storm	(mins)
LPOD-1	Q100	60
LPOD-2	Q100	60
LPOD-3	Q100	60
LPOD-4	Q100	60
LPOD-5	Q100	25

MODEL CONDITION	CRITICAL STORM EVENT	CRITICAL STORM DURATION
Post Developed	Storm	(mins)
LPOD-5	Q100	15

Table 5.2.2: Critical Storm Event and Duration Summary Table

Critical storm duration hydrographs per model condition are indicated in **Figures 5.2.1 and 5.2.2**.

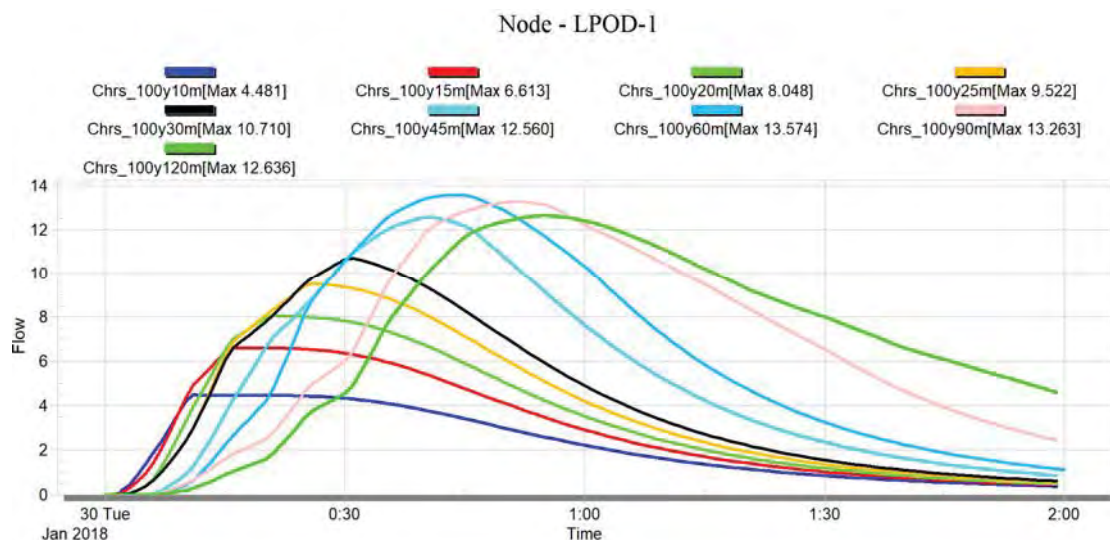
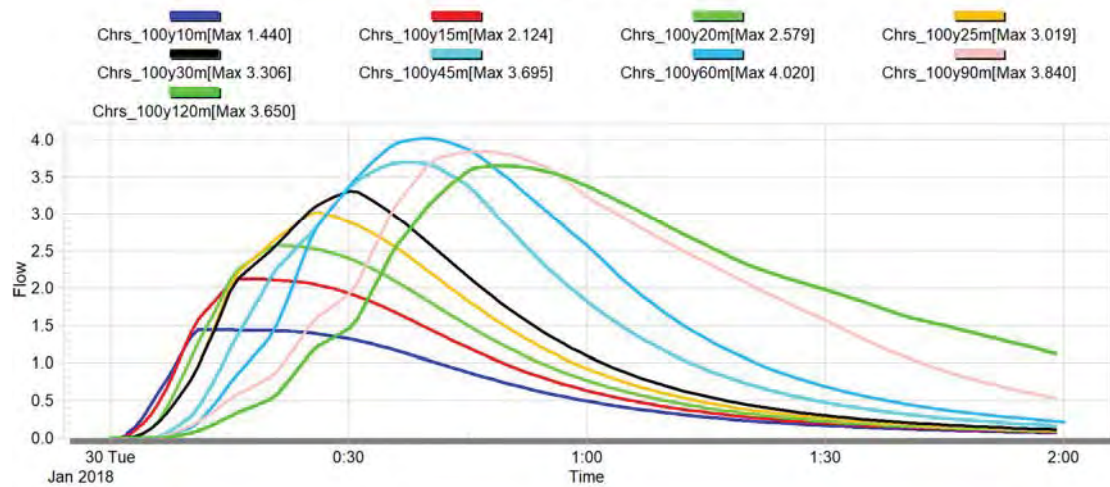
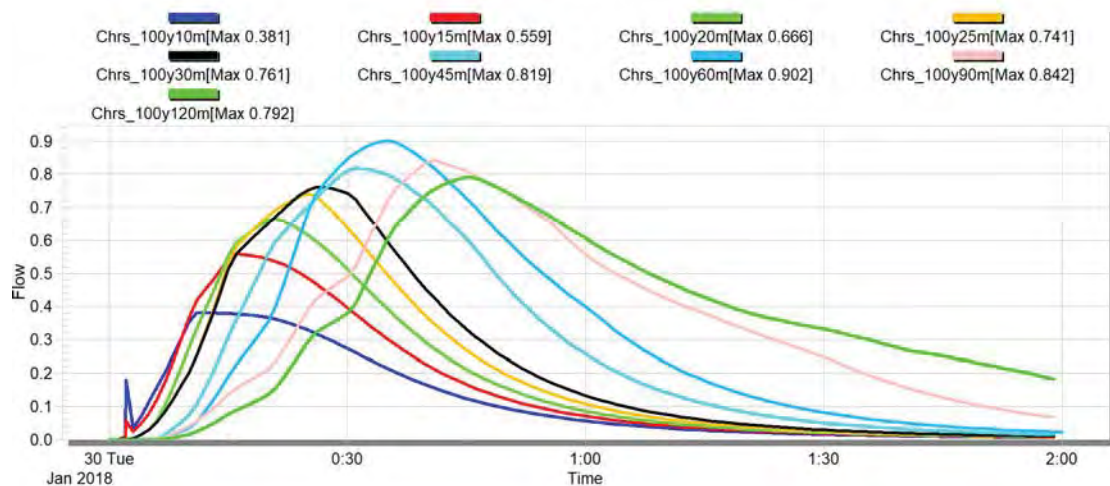


Figure 5.2.1: Critical Storm Event Durations for all *Pre Developed* Catchments (LPOD-1,2,3,4,5)

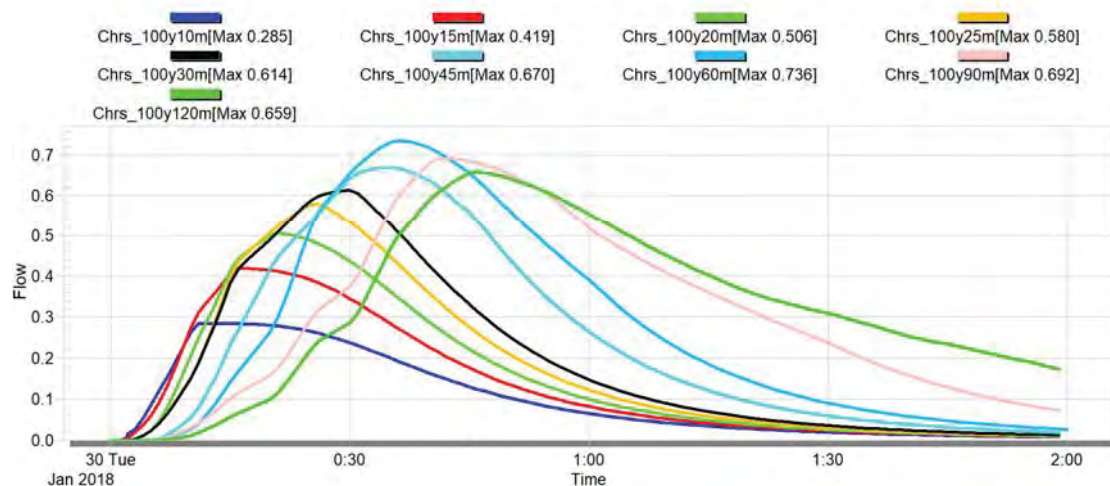
Node - LPOD-2



Node - LPOD-3



Node - LPOD-4



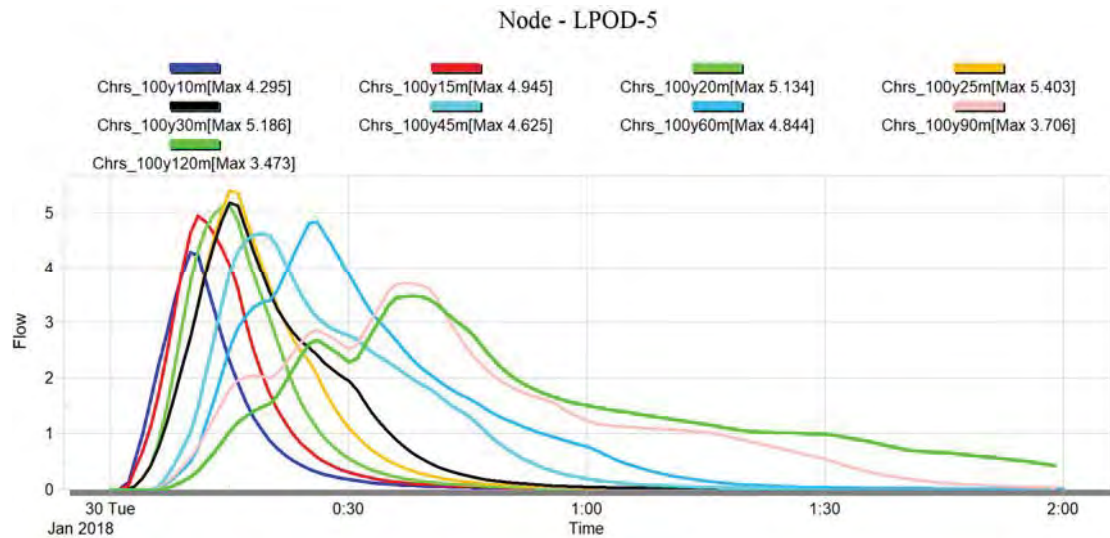


Figure 5.2.1: Critical Storm Event Durations for *Pre Developed* Catchments (LPOD-1,2,3,4,5)

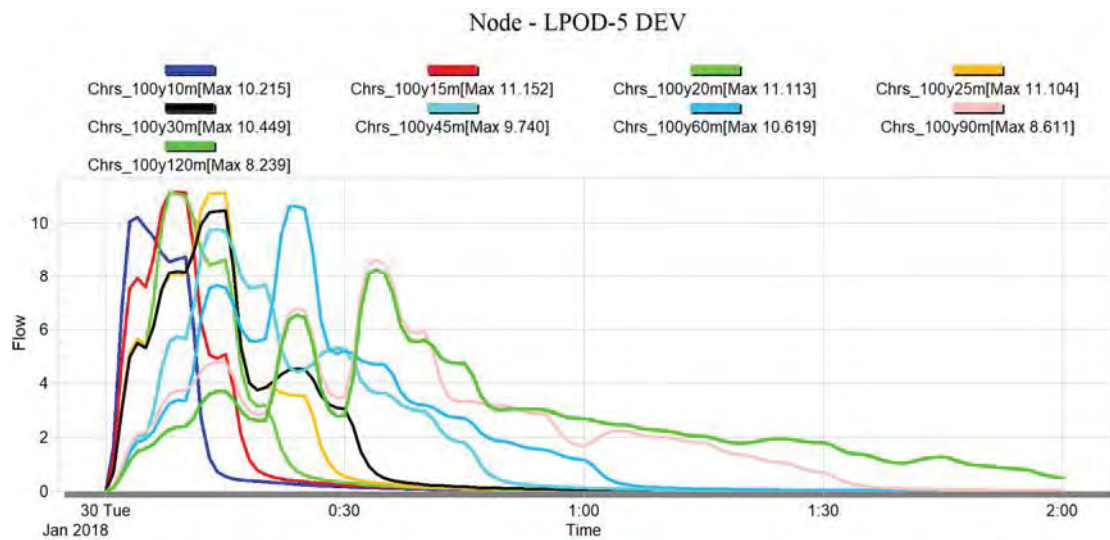


Figure 5.2.2: Critical Storm Event Durations for *Post Developed* Catchment (LPOD-5)

5.2.3 DETENTION SYSTEM DESIGN

Detention devices capture and temporarily store stormwater runoff during major / critical storm events and release to the Lawful Point of Discharge (LPoD) at a controlled rate. Hence, detention devices act to mitigate potential downstream flooding impacts and also provide minor water quality treatment.

Therefore, to achieve the objective of zero post development flow rate increase to pre-developed Q1 to Q100 year ARI flow rates at the downstream reporting location (outfall), on-site detention basins are introduced with low and high flow discharge devices.

Table 5.2.3 includes the design details for the proposed on site detention system for Stage 1.

Parameter	Value
Catchment	CAT-10A
Type	Detention Basin (in ground)
Internal Batter Slope on Basin Sides	1 in 3
Basin Base RL	5.80 m AHD
Basin Embankment / Crown R.L	8.10 m AHD
Basin Weir Crest RL	7.66 m AHD
Freeboard to Crown	0.44m
Detention Volume Depth	1.889m to Q100 WSL (<i>measured from floor IL of basin</i>)
Detention Volume to Crown (m ³)	8,458 to RL 8.10m (<i>deducting 0.30m extended detention</i>)
Detention Volume to Q100 WSL (m ³)	6,348 to RL 7.689m (<i>deducting 0.30m extended detention</i>)
Detention Volume to Weir Crest (m ³)	6,208 to RL 7.660m (<i>deducting 0.30m extended detention</i>)
Low Flow Outlets	2 / 600mm x 600mm dome top field inlet pits, top of grate level set at 0.300m above basin floor; and 225mm dia. outlet orifice; IL at 0.600m above basin floor
High Flow Outlets	1 / 1500 x 2000mm grated field inlet pit at 1.175m above basin floor, 1 / 1050mm RCP laid at max. grade of 3.50%, 10.0 metre wide broad crested weir set at 1.860m above basin floor with 1.70 discharge coefficient

Table 5.2.3: Summary of Design Parameters of Proposed Detention System for Stage 1

5.2.4 MODEL RESULTS

Table 5.2.4.1 presents the results obtained from XPSTORM modelling as a result of implementing the above detention system for flow mitigation.

PRE-DEVELOPED PEAK FLOWS FOR CAT-10							
ARI (Years)	Q1	Q2	Q5	Q10	Q20	Q50	Q100
LPOD-5 (CAT-10) (25 min)	1.875	2.640	3.472	3.901	4.565	4.848	5.403

PEAK FLOWS (POST MITIGATION) FOR CAT-10A							
ARI (Years)	Q1	Q2	Q5	Q10	Q20	Q50	Q100
Peak Flow (m3/sec)	1.132	2.046	3.472	3.828	4.240	4.576	4.962
Max Water Elevation RL	7.006	7.181	7.275	7.361	7.475	7.578	7.689
Peak Duration (min)	60	60	90	90	90	60	60
Depth to WSL (m)	1.206	1.381	1.475	1.561	1.675	1.778	1.889

Table 5.2.4.1: Summary of XPSTORM Hydrologic / Hydraulic Results at Catchment CAT-10A

Figures 5.2.3-1 to 5.2.3-3 below presents the hydrograph results obtained from XPSTORM for the multiple outflow discharges from the proposed detention basin. **Table 5.2.4.2** sums the discharges and compares directly against the pre developed hydrology condition across a range of storm events.

MITIGATED DISCHARGE SUMMARY PROPOSED DETENTION BASIN							
ARI (Years)	Q1	Q2	Q5	Q10	Q20	Q50	Q100
1500 x 2000mm F.I. (m3/s)	0.033	0.824	2.192	2.490	2.833	3.109	3.385
600 x 600mm F.I. (1) (m3/s)	0.457	0.499	0.520	0.540	0.564	0.585	0.589
600 x 600mm F.I. (2) (m3/s)	0.457	0.499	0.520	0.540	0.564	0.585	0.589
225mm dia. Orifice (m3/s)	0.185	0.224	0.240	0.258	0.279	0.297	0.315
10 metre Wide Weir (m3/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.084
TOTAL (m3/s)	1.132	2.046	3.472	3.828	4.240	4.576	4.962

Flow Mitigation from Existing Condition (m3/s)	0.743	0.594	0.000	0.073	0.325	0.272	0.441
Attenuation Achieved (Y/N)	Y	Y	Y	Y	Y	Y	Y

Table 5.2.4.2: Summary of Mitigated Discharges from XPSTORM Hydrologic / Hydraulic Results

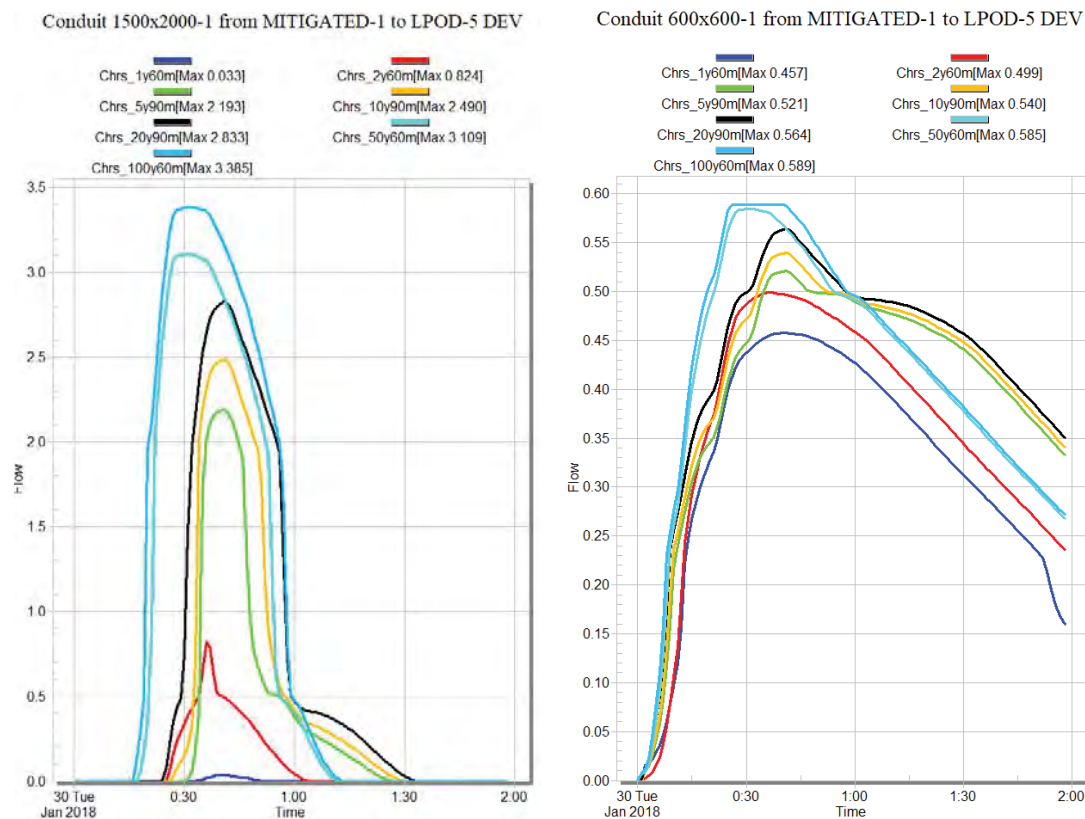
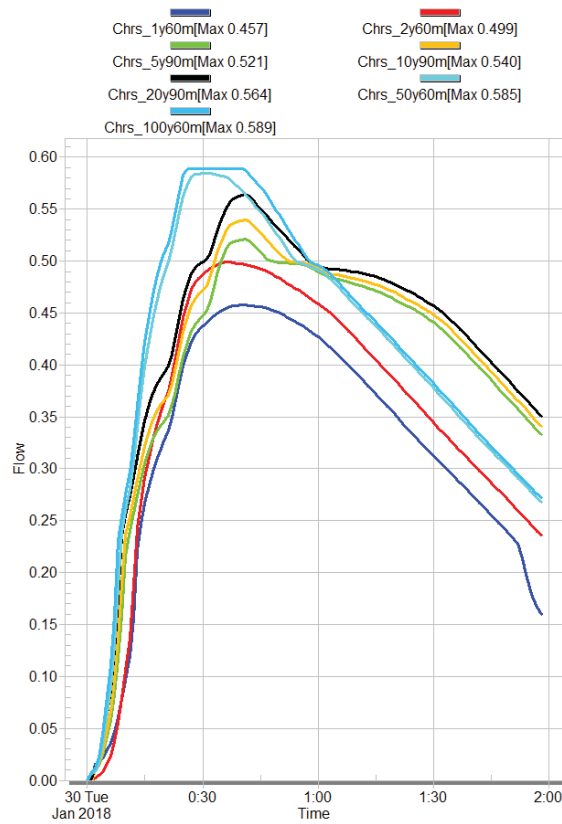
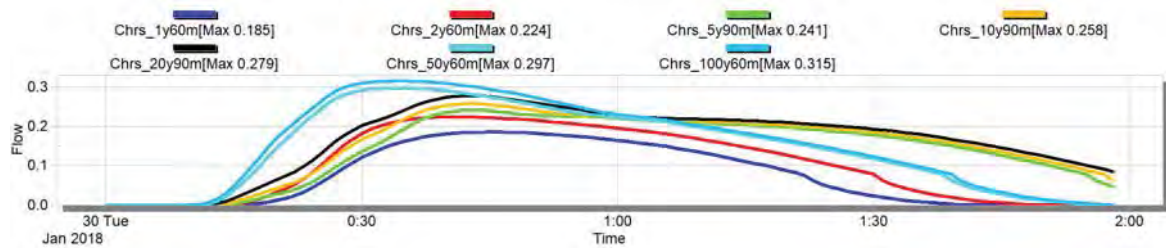


Figure 5.2.3-1: Peak Duration Mitigated Discharge Hydrographs from XPSTORM

Conduit 600x600-2 from MITIGATED-1 to LPOD-5 DEV



Diversion ORIF-1 from MITIGATED-1 to LPOD-5 DEV



Diversion WEIR-1 from MITIGATED-1 to LPOD-5 DEV

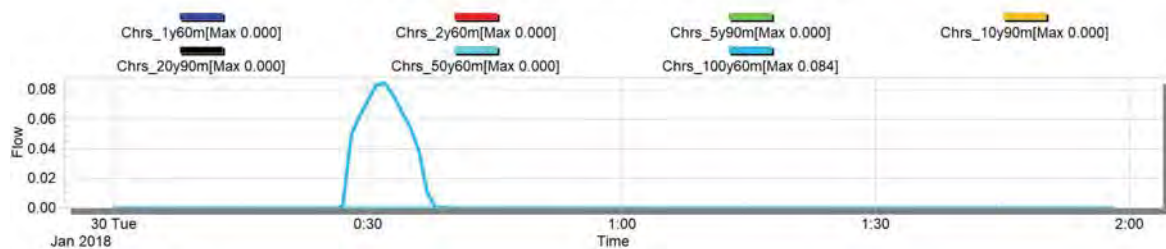


Figure 5.2.3-2: Peak Mitigated Discharge Hydrographs from XPSTORM (cont.)

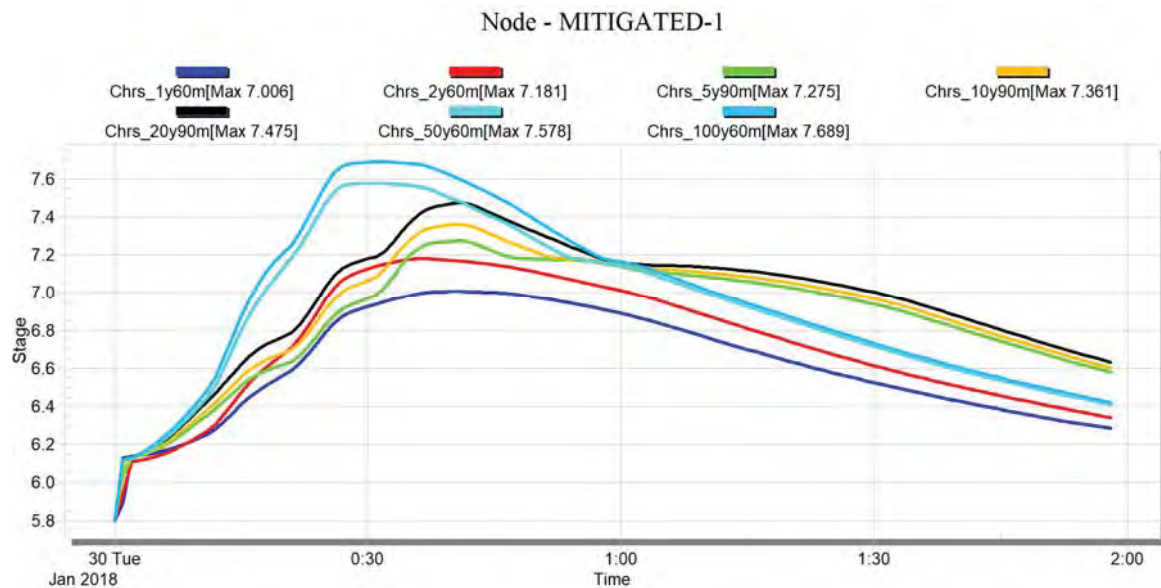


Figure 5.2.3-3: Peak Stage Relationship Indicating Water Surface Elevations from XPSTORM

5.2.5 DISCUSSION ON MODELLING OUTCOMES

The above hydraulic modelling has confirmed that there is no increase in peak discharge flow rates from the development site to existing infrastructure or downstream / neighbouring properties by implementing the proposed designed detention measures. All ARI's ranging from Q1 to Q100 achieve mitigation.

Refer important note below.

Important Note:

Due to the predicted water surface elevations and depths – it is proposed that the bio-retention basin will be fenced to restrict public access for safety, at it's perimeter. Fencing is proposed as the City of Gold Coast Council's standard chain wire type fencing at a height of 1.80 metres above finished ground level. Chain wire, posts and fittings are proposed to be black in colour.

Reference is made to CoGC Standard Drawing 05-014 (City Plan v5).

Adequate provision has been made for a master-key locked gate location to enable access for Council staff to the maintenance track, adjoining the internal entry road in Stage 1.

6.0 STORMWATER QUALITY

Stormwater quality analysis has been undertaken through the use of MUSIC software to confirm the adequacy of proposed Stormwater Quality Improvement Devices (SQIDs) required to meet the State Planning Policy's (SPP 2014) Water Quality Objectives (WQOs) and the pollutant removal targets set by the City of Gold Coast Council. A suitable treatment strategy addressing the typical pollutant types generated during construction and operation of an industrial development are outlined within this section of reporting.

6.1 POLLUTANTS OF CONCERN

There are a number of pollutants typically generated during the operational phase (following construction) of an industrial development. These include:

- **Litter / gross pollutants**
- **Sediment**
- Toxic materials
- Heavy metals
- Hydrocarbons
- **Nutrients (i.e. nitrogen & phosphorous)**
- Pathogens / faecal coliforms
- Oxygen demanding substance
- Surfactants
- Acid or alkaline substances
- Organochlorines & organophosphates
- Thermal pollution

The key pollutants highlighted in **bold** above represent those that will be further addressed within this report. This will be done through the use of MUSIC modelling software which will assist in estimating the generation of the pollutants in the developed condition and the associated treatment measures requiring implementation in order to meet the stormwater quality objectives as defined within Section 6.2 of this report.

6.2 STORMWATER QUALITY OBJECTIVES (OPERATIONAL PHASE)

City of Gold Coast Council have set stormwater quality objectives with the intent of “protecting receiving water quality by limiting the quantity (loads) of stormwater pollutants discharged into receiving waters from development” such as that proposed over the subject site. These are summarised in Table SC6.9.3-3 of Council's City Plan Version 2.0 Schedule 6.9 and outlined below.

Pollutant	Load Reduction Objective (in mean annual load)
Gross Pollutants (>5mm)	90%
Total Suspended Solids (TSS)	80%
Total Phosphorous (TP)	60%
Total Nitrogen (TN)	45%

Table 6.2: CoGC's Stormwater Quality Objectives (Source: City Plan, Schedule 6.9)

6.3 PROPOSED STORMWATER QUALITY MANAGEMENT STRATEGY

Development over the subject site has the potential to introduce increased pollutant loads and concentrate stormwater runoff into existing downstream waterways. To mitigate any potential increase in the export of pollutants from the subject site, suitable stormwater treatment devices will be utilised throughout the developed area as part of the integrated design of the road and stormwater drainage networks.

The implementation of a site specific stormwater treatment train prior to the discharge of stormwater from the site will ensure the quality objectives outlined in Section 6.2 of this report are achieved.

6.3.1 BIO RETENTION BASINS

Due to the spatial allowances over the subject site and the proposed development type, bio retention basins have been identified as a suitable Stormwater Quality Improvement Device (SQID) to reduce the off-site discharge of pollutants in line with the operational phase stormwater quality objectives identified within this report.

Bio retention basins are designed to treat conveyed stormwater by filtering the water through various layers of vegetation, biologically active sands and loam filter media which capture the pollutants as the water percolates down through the system.

The treated water is then conveyed through slotted / perforated pipes to downstream drainage systems (*Bioretention Technical Design Guidelines Version 1.1, October 2014*). A typical configuration of a bio retention system is outlined in Figure 6.3.1 below.

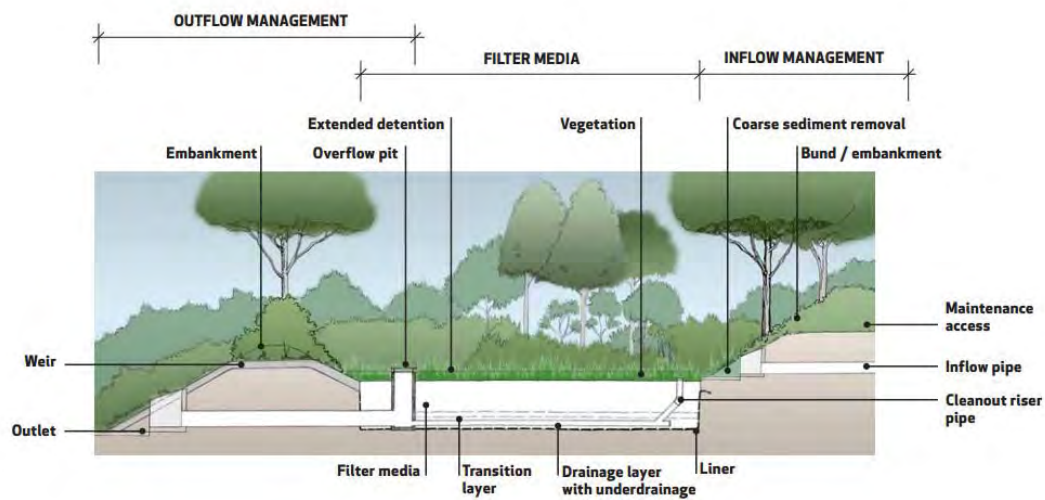


Figure 6.3.1: Components of a Typical Bio Retention System (Source: Water by Design, Bio Retention Technical Design Guidelines Version 1.1)

The bio retention basin for the subject site has been designed in accordance with Bio Retention Technical Design Guidelines (2012) with the properties as outlined in **Table 6.3.1** below.

Outlet structures within the basin are designed to ensure an extended detention depth of 300mm is maintained over the filter media. The required surface area and filter media profile required to adequately treat the contributing developed catchment is discussed within Section 6.4 of this report.

Parameter	Value
Geofabric Lining to Base	Yes
Hydraulic Conductivity	180 mm per hour
Orthophosphate Content	40 mg per kg
Filter Media's TN Content	800 mg per kg
Vegetation Properties	Basin to be vegetated with effective nutrient removal plants

Table 6.3.1: Summary of Adopted Bio Retention Properties

6.4 MUSIC MODELLING METHODOLOGY FOR THE DEVELOPMENT SITE

MUSIC Version 6.3.0 was utilised for the water quality modelling of the proposed development and was calibrated in accordance with Water by Design's MUSIC Modelling Guidelines for South East Queensland Version 1.0 (2010).

Modelling of the developed scenario with the nominated SQIDs in place was undertaken replicate the transfer of pollutants through a stormwater drainage system and to assist in determining the effectiveness of the proposed stormwater treatment train in meeting the City of Gold Coast Stormwater Quality Objectives (Section 6.2).

6.4.1 METEOROLOGICAL DATA

The meteorological data required for input into MUSIC software was obtained from the eWater website for Beenleigh Bowls Club Station (No. 040406). The data received is in the form of 6-minute pluviographic data for a 10-year period from 01st January 1990 to 31st December 1999. The mean average rainfall for this period was 1105mm.

Daily potential evapo-transpiration (PET) data (01/01/1990 to 31/12/1999) from the above mentioned station has been used.

A summary of the information is indicated below:

Catchment Name: 5738 CoGC M38 Industrial Park, Yatala MUSIC Model
Rainfall Station: 40406 BEENLEIGH
ET Station: User-defined monthly PET
Start Date: 1/01/1990 12:00 AM
End Date: 31/12/1999 11:54 PM
Modelling Time Step: 6 Minutes

	Rainfall/6 Minutes	Evapo-Transpiration
mean	0.013	4.086
median	0.000	3.600
maximum	22.100	6.290
minimum	0.000	2.000
10 percentile	0.000	2.033
90 percentile	0.001	6.194
mean annual	1105	1492

6.4.2 SOURCE NODES

MUSIC modelling has utilised the *City of Gold Coast (North) MUSIC-Link data (Version 6.30)* to define the parameters assigned to the pollutant source node inputs for the MUSIC model.

Refer to **Appendix E** for the MUSIC Catchment Plan.

CITY OF GOLDCOAST.
City of Gold Coast (Central)
City of Gold Coast Central.mlb
City of Gold Coast (North)
City of Gold Coast North.mlb
City of Gold Coast (South)
City of Gold Coast South.mlb

Current Project Version

Music Version	6.3.0
MUSIC-link Data Version	6.30
Authority	City of Gold Coast
Area	City of Gold Coast (North)
Scenario	City of Gold Coast (North)

The intended industrial land use allows the developed catchment parameters to be conservatively assumed with the catchments broken down into a number of major surface types being ground level, roads (includes entire road reserve), roofs and drainage reserves. These surface types were allocated an effective impervious area (%) and further refined through the MUSIC modelling process via the “split” catchment approach.

The below table and figures summarise the imperviousness of the allocated source nodes within the MUSIC model.

External catchments that are conveyed through the site are assumed to be treated on site by the relevant lot owner prior to entering the subject site.

Catchment - MUSIC Source Node	Modelling Approach	Area (Ha)	Impervious %
CAT-10A TOTAL CATCHMENT = 15.882 Ha			
ROAD	SPLIT	2.800	90 *
ROOF	SPLIT	8.546	100 *
GROUND	SPLIT	3.663	90 *
DRAINAGE RESERVE	SPLIT	0.873	10 *
TOTAL		15.882	

* *Effective impervious areas were calibrated to ensure an overall site imperviousness of 90% was achieved. Refer to MUSIC Link Report in **Appendix F** for further details.*

Table 6.4: MUSIC Modelling Summary of Source Node Impervious Allocations

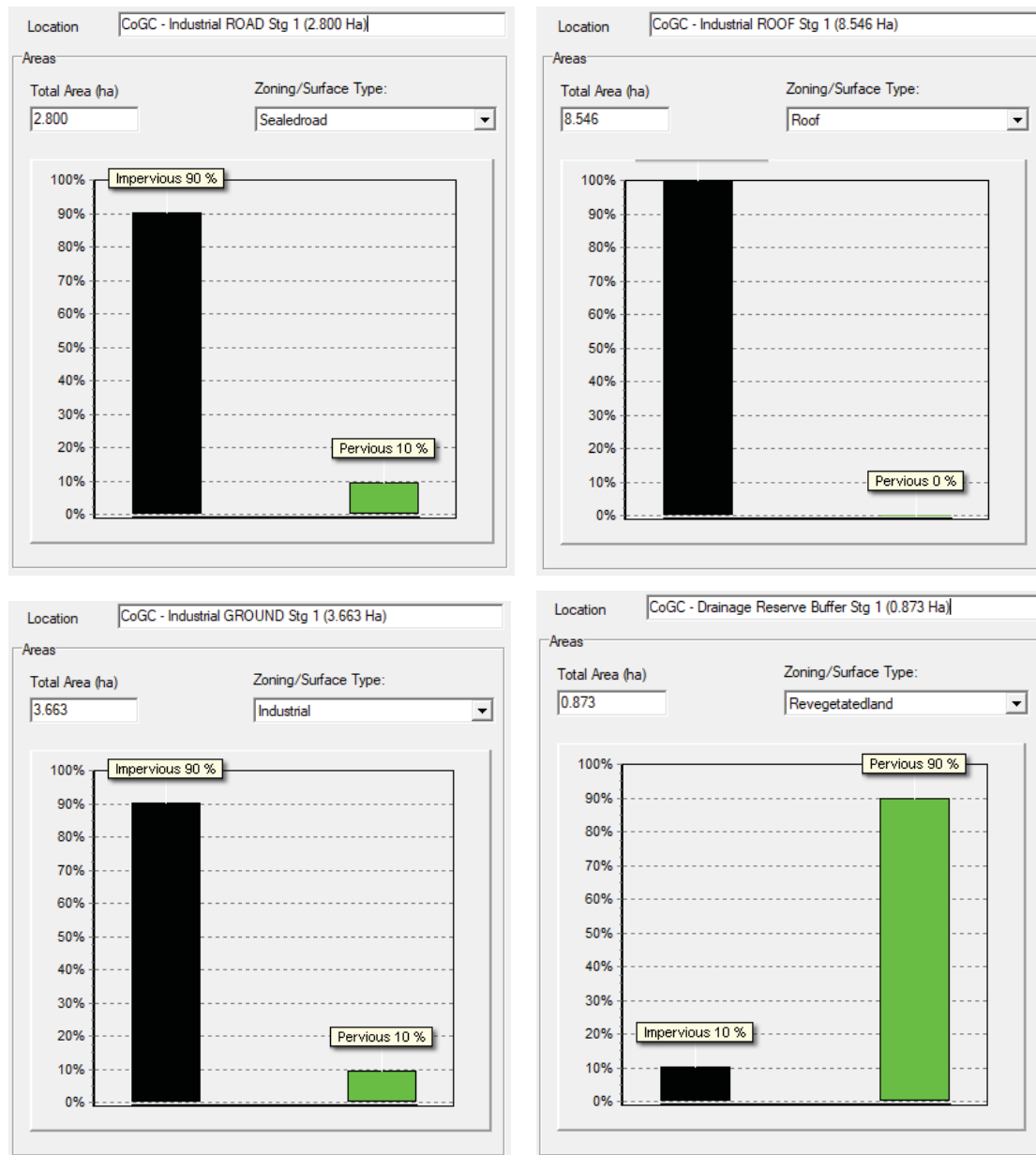


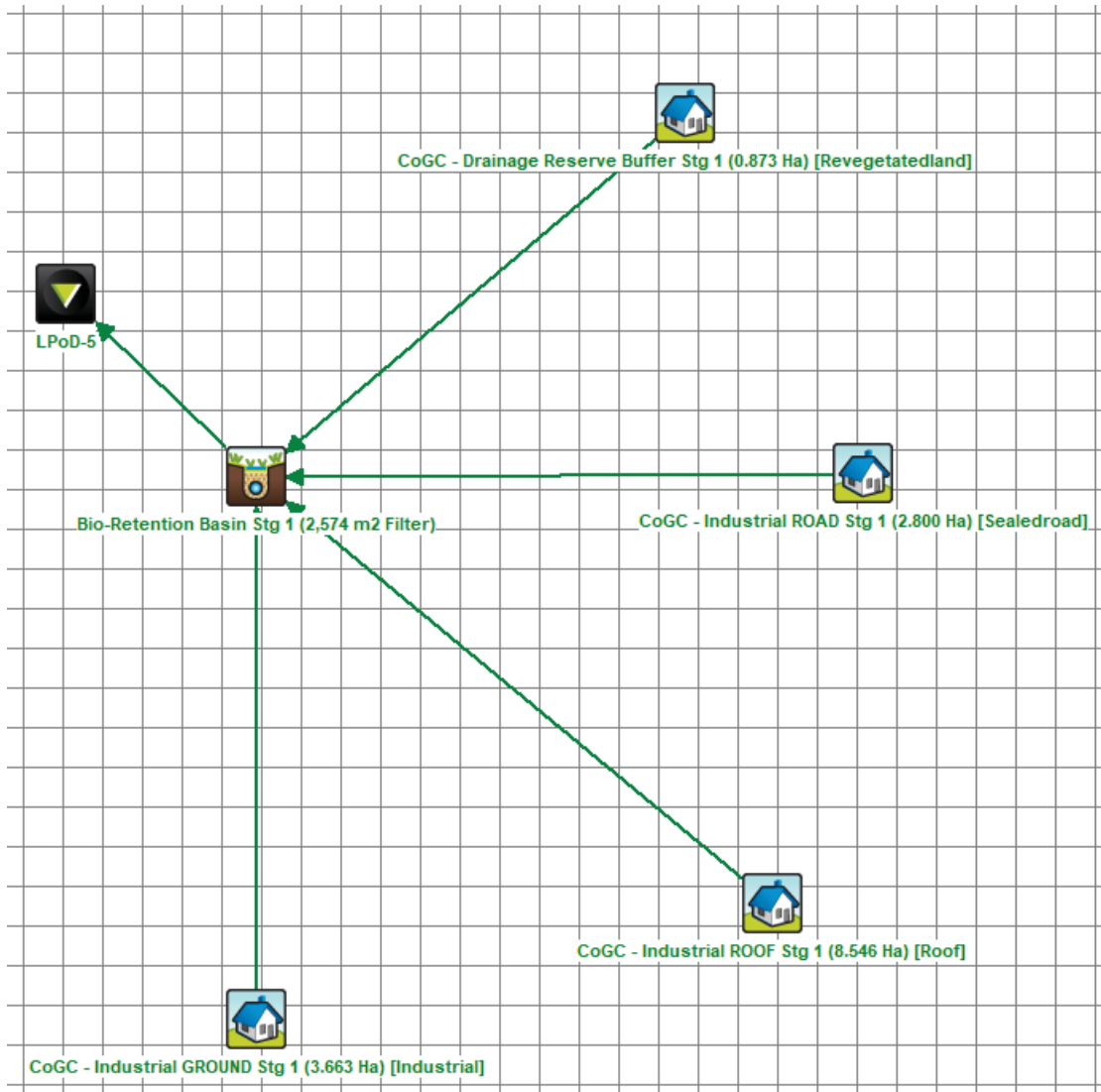
Figure 6.4.1: MUSIC Modelling Source Node Impervious Allocations

6.4.3 DRAINAGE LINKS

No routing has been adopted for the drainage links within the modelling that has been undertaken. This approach is believed to provide more conservative results.

6.4.4 MUSIC MODEL LAYOUT AND RESULTS

The diagrammatic representation of the source nodes, modelling configuration and results of pollutant reduction is outlined in Figure 6.4.4-1 below for the post developed catchment.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	148	141	4.6
Total Suspended Solids (kg/yr)	17900	1890	89.4
Total Phosphorus (kg/yr)	43.5	12.8	70.7
Total Nitrogen (kg/yr)	316	134	57.5
Gross Pollutants (kg/yr)	3560	4.76	99.9

Figure 6.4.4-1: Catchment CAT-10A MUSIC Layout and Results

The reduction in target pollutants to meet City of Gold Coast Council's requirements are achieved based on the below bio retention measures being implemented for the catchment.

Parameter	Value
	CAT-10A
Filter Area (m2)	2,574
Filter Media Depth (m)	0.50
Extended Detention Depth (m)	0.30
Weir Crest Width (m)	10.00

Location		Bio-Retention Basin Stg 1 (2,574 m2 Filter)
Inlet Properties		
Low Flow By-pass (cubic metres per sec)		0.000
High Flow By-pass (cubic metres per sec)		4.962
Storage Properties		
Extended Detention Depth (metres)		0.30
Surface Area (square metres)		2905.00
Filter and Media Properties		
Filter Area (square metres)		2574.00
Unlined Filter Media Perimeter (metres)		0.01
Saturated Hydraulic Conductivity (mm/hour)		180.00
Filter Depth (metres)		0.50
TN Content of Filter Media (mg/kg)		800
Orthophosphate Content of Filter Media (mg/kg)		40.0
Infiltration Properties		
Exfiltration Rate (mm/hr)		0.00

Table 6.4.4: Summary of Proposed Bio Retention Measures

Lining Properties	
Is Base Lined?	☒ Yes ☐ No
Vegetation Properties	
☒ Vegetated with Effective Nutrient Removal Plants	
☐ Vegetated with Ineffective Nutrient Removal Plants	
☐ Unvegetated	
Outlet Properties	
Overflow Weir Width (metres)	10.00
Underdrain Present?	☒ Yes ☐ No
Submerged Zone With Carbon Present?	☐ Yes ☒ No
Depth (metres)	0.45

Table 6.4.4: Summary of Proposed Bio Retention Measures (cont.)

7.0 CONSTRUCTION, OPERATIONAL MANAGEMENT & MAINTENANCE

7.1 CONSTRUCTION PHASE SEDIMENT AND EROSION CONTROL

The operational phase detention basin is proposed to be utilised as a sediment basin during the construction phase of the development.

Where ultimate detention basin sizing does not align with the volumetric requirements of International Erosion Control Association's (IECA) Best Practice Guidelines, temporary construction phase sediment basins will be implemented.

Monitoring and maintenance of both the construction phase sediment basins and associated sediment and erosion control measures implemented over the site will be in accordance with IECA's Best Practice Guidelines and City of Gold Coast Council's standards.

7.2 ASSET OWNERSHIP AND HANDOVER

The SQIDs have been designed in accordance with QUDM standards and City of Gold Coast Council's Land Development Guidelines and in doing so aim to provide suitable and safe vehicular access for future maintenance. The current development proposal retains the SQIDs as assets of the developer though a formal handover from the Contractor to the Asset Owner will be required to ensure the SQIDs have been built in accordance with the requirements

7.3 MAINTENANCE OF BIO RETENTION BASINS DURING OPERATIONAL PHASE

Inspections and maintenance are to be carried out on a yearly basis to determine if the SQIDs are functioning as intended.

WSUD Technical Design Guidelines for South East Queensland have a Maintenance Checklist (*refer **Appendix G***) covering the items to be inspected and should be utilised and kept on record to ensure that a mechanism is in place to log the continued effectiveness of the SQIDs. Inspections and any required maintenance will be the responsibility of the asset owner.

8.0 CONCLUSION

Gassman Development Perspectives have prepared this Site Based Stormwater Management Plan to support an application for *Reconfiguration of Lot* over Lot 1 on RP6882 (60 Stapylton Jacobs Well Road, Stapylton) and Lot 240 on W31320 (82 Christensen Road, Stapylton).

The purpose of which is to address and manage stormwater quantity and quality requirements of the proposed development over the subject site in accordance with the relevant State and Local Authority's legislation and regulatory guidelines.

The key outcomes achieved through the analysis and modelling undertaken within this report are demonstrated in the stormwater bio-retention and sediment basin designs within **Appendix C**, and are as described below:

Stormwater Quantity

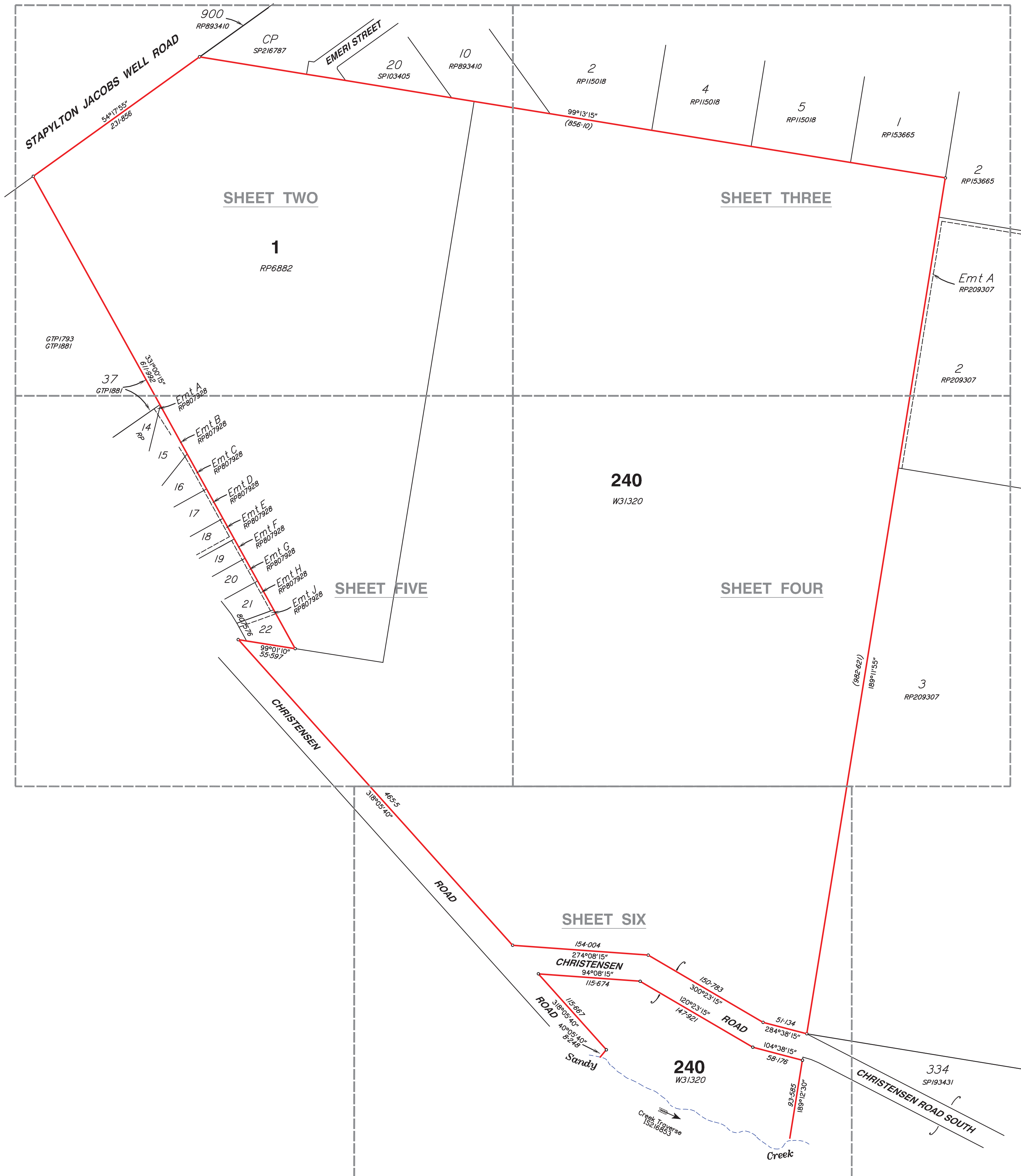
Suitable attenuation measures are able to be incorporated into the proposed development to ensure there is no adverse impacts to downstream properties, waterways or infrastructure as a result of an increase in peak stormwater flow rates discharging from the subject site upon development.

This is achieved through the design of an appropriately sized detention basin that complies with City of Gold Coast Council's Land Development Guidelines along with the Queensland Urban Drainage Manual (QUDM). Adequate provision has also been made within the earthworks design and associated reporting to cater for the conveyance of external upstream catchments through the subject site.

Stormwater Quality

Stormwater quality objectives for the subject site are achieved through the design of a suitable stormwater treatment train that implements all necessary steps to ensure that the quality of stormwater discharging from the subject site meets the necessary standards to comply with City of Gold Coast Council's Water Sensitive Urban Design (WSUD) requirements, Queensland Urban Drainage Manual (QUDM) and the performance objectives of the Queensland State Planning Policy (SPP).

Appendix A – Site Survey Plan



Notes

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CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**

County of **Ward**

Local Govt **GOLD COAST CITY COUNCIL**

Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	15216853	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471	Checked	
	RL 22.169		

Scale (on A1 original)

1:2500

Designed

Drawn

Date Designed



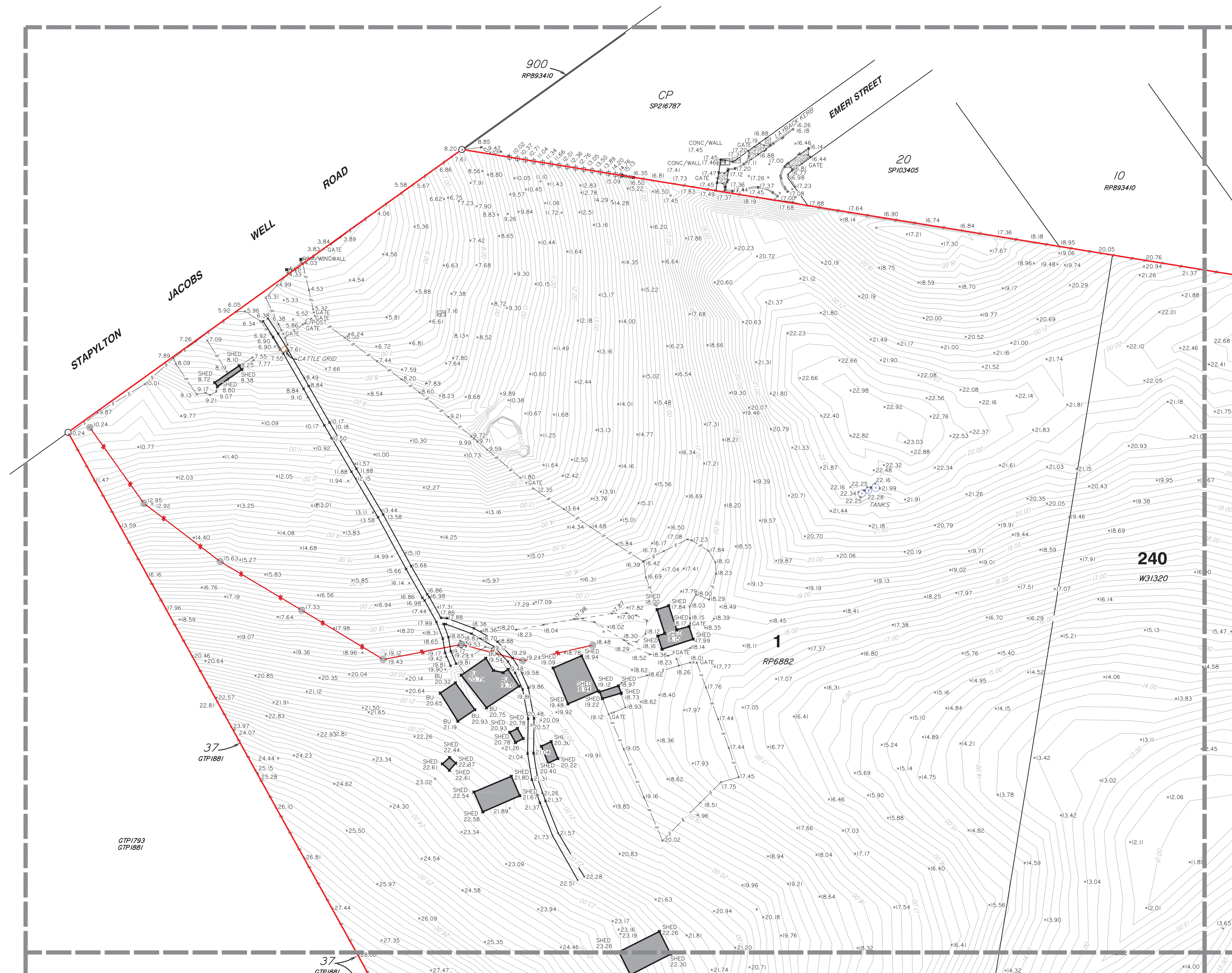
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planning
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w: www.gassman.com.au

REFERENCE No. **5093-10**

PLAN No. **5093 S CD 01**



- LEGEND**
- PERMANENT MARK
 - SEWER MANHOLE
 - SEWER INSPECTION OUTLET
 - ELECTRICITY PILLAR
 - ELECTRICITY POLE
 - ELECTRICITY POLE WITH LIGHT
 - TELSTRA PIT
 - MANHOLE
 - STORMWATER MANHOLE
 - GULLY TRAP
 - WATER METER
 - FIRE HYDRANT
 - VALVE
 - GATE
 - BOLLARD
 - CONCRETE
 - EDGE OF BITUMEN
 - FENCE
 - OVERHEAD ELECTRICITY
 - OPEN DRAIN
 - RETAINING WALL
 - EDGE OF GARDEN
 - CONTOUR LEVEL

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CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

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Meridian	IS133471	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471	Checked	RL 22.169
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		Drawn	
		Date Designed	



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- TELSTRA PIT
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CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**
County of **Ward**
Local Govt **GOLD COAST CITY COUNCIL**

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F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471	Checked	RL 22.169
Scale (on A1 original)	Designed		
	Drawn		
	Date Designed		

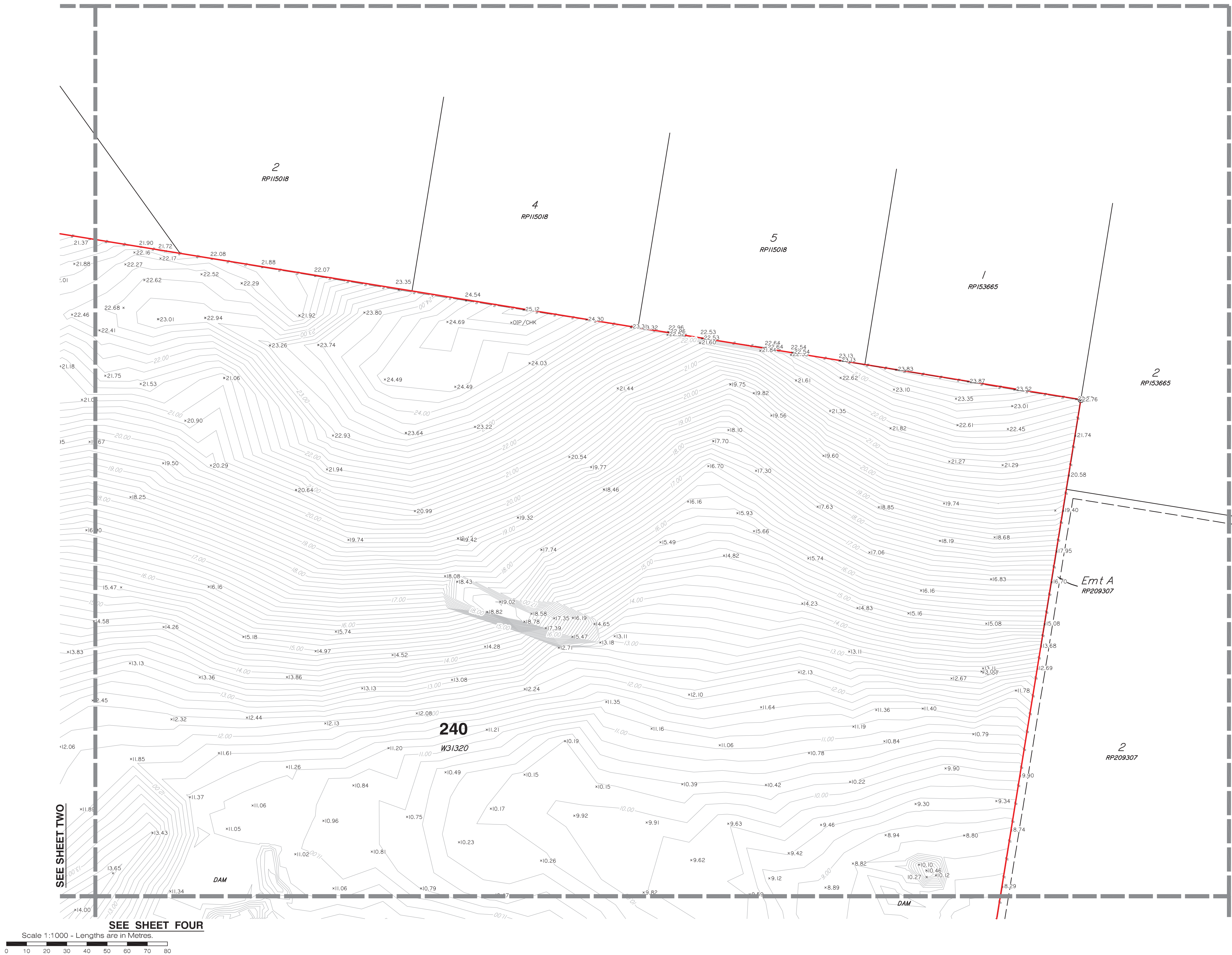
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REFERENCE No. 5093-10

PLAN No. 5093 S CD 01





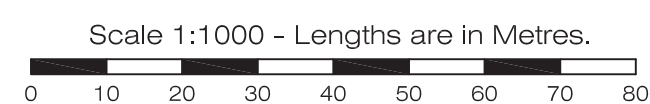
SEE SHEET THREE

SEE SHEET FIVE

Topographic map showing contour lines and spot elevations. Key features include:

- Contour Lines:** Representing elevation, with labels such as 10.00, 11.00, 12.00, 13.00, 14.00, 15.00, 16.00, 17.00, 18.00, 19.00, 20.00, 21.00, 22.00, 23.00, 24.00.
- Spot Elevations:** Numerous points marked with elevations, e.g., 11.78, 12.14, 12.68, 13.29, 13.66, 14.37, 15.46, 16.57, 17.61, 18.58, 19.44, 20.38, 21.81, 22.36, 22.98, 23.47, 24.19, 23.66, 22.55, 21.78, 20.48, 18.85, 14.60, 13.21, 13.04, 12.82, 13.14, 14.23, 14.81, 15.10, 16.28, 18.12, 18.02, 16.35, 16.60, 17.42, 17.57, 17.74, 17.58, 17.82, 17.52, 18.39, 18.84, 18.42, 18.77, 18.71, 19.46, 19.42, 18.61, 18.64, 18.29, 18.07, 18.12, 16.28, 15.97, 15.61, 15.59, 17.80, 17.78, 13.75, 12.93, 12.02, 10.92, 10.60, 10.50, 10.25, 10.10, 9.75, 9.19, 9.02, 8.87, 8.44, 8.01, 8.37, 8.38, 8.0, 8.29.
- Labels and Notes:**
 - 240** (large number)
 - W31320** (text)
 - Lease A** (text)
 - SP125788** (text)
 - Emt A** (text)
 - RP209307** (text, appearing multiple times)
 - 2** (large number)
 - 3** (large number)
 - DAM** (text, appearing twice)
 - SEE SHEET FIVE** (text on the left edge)
- Boundaries:** A red line runs along the right side, and a dashed line runs along the bottom. A solid line runs along the top.

SEE SHEET SIX



LEGEND

- | | |
|---|-----------------------------|
|  | PERMANENT MARK |
|  | SEWER MANHOLE |
|  | SEWER INSPECTION OUTLET |
|  | ELECTRICITY PILLAR |
|  | ELECTRICITY POLE |
|  | ELECTRICITY POLE WITH LIGHT |
|  | ELSTRA FIT |
|  | MANHOLE |
|  | STORMWATER MANHOLE |
|  | GULLY TRAP |
|  | WATER METER |
|  | FIRE HYDRANT |
|  | VALVE |
|  | GATE |
|  | BOLLARD |
|  | CONCRETE |
|  | EDGE OF BITUMEN |
|  | FENCE |
|  | OVERHEAD ELECTRICITY |
|  | OPEN DRAIN |
|  | RETAINING WALL |
|  | EDGE OF GARDEN |
|  | CONTOUR LEVEL |

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CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**County of **Ward**

Local Govt **GOLD COAST CITY COUNCIL**

Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	IS216853	Surveyor	A. Macdonald
Contour interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471 RL 22.169	Checked	

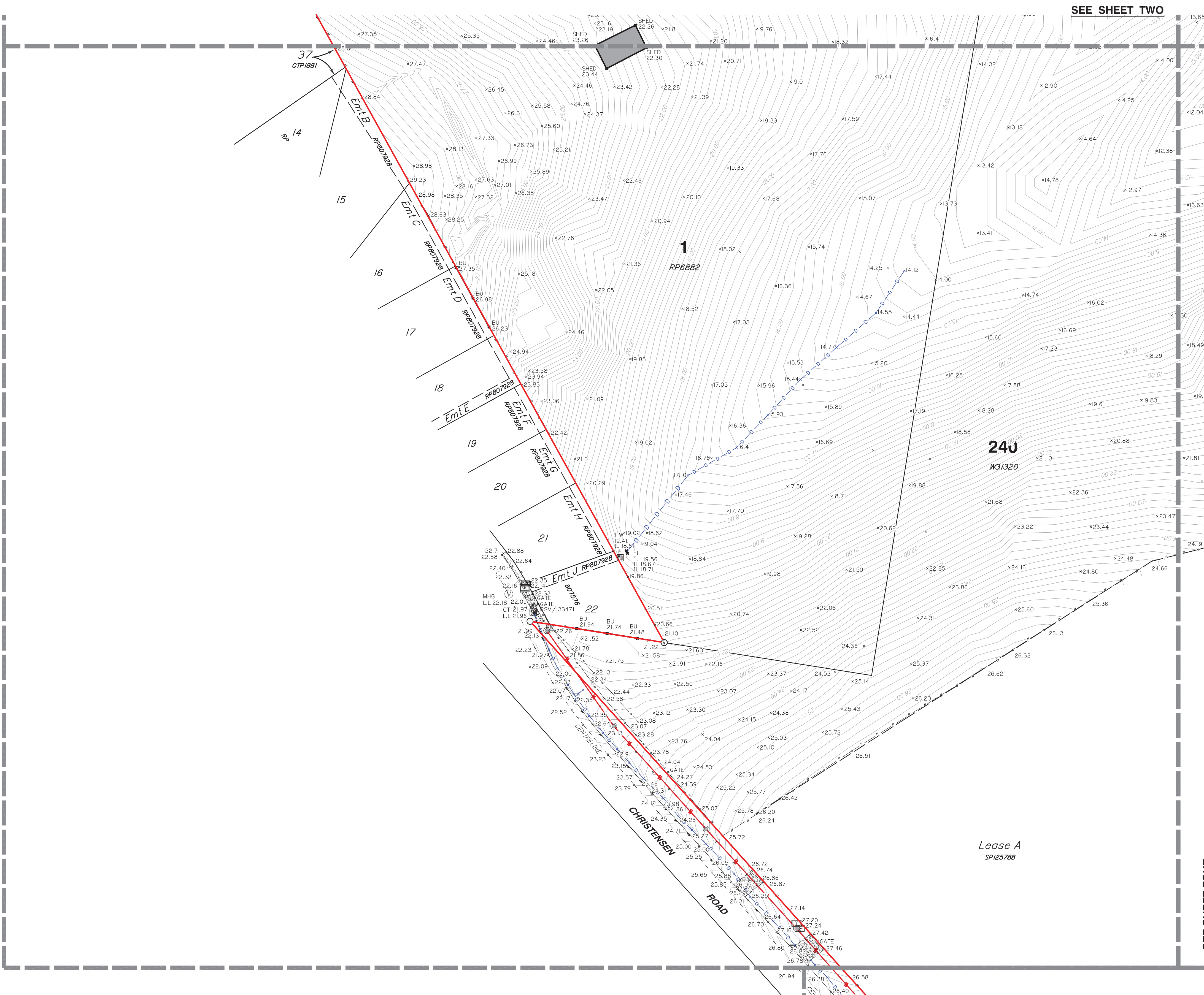
Scale (on AI original)	Designed
1:1000	Drawn
	Date Designed



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w: www.gassman.com.au

REFERENCE No. 5093-10

PLAN No. **5093 S CD 01**



- LEGEND**
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County of **Ward**

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Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471	Checked	
	RL 22.169		

Scale (on A1 original)	Designed
1:1000	Date Designed

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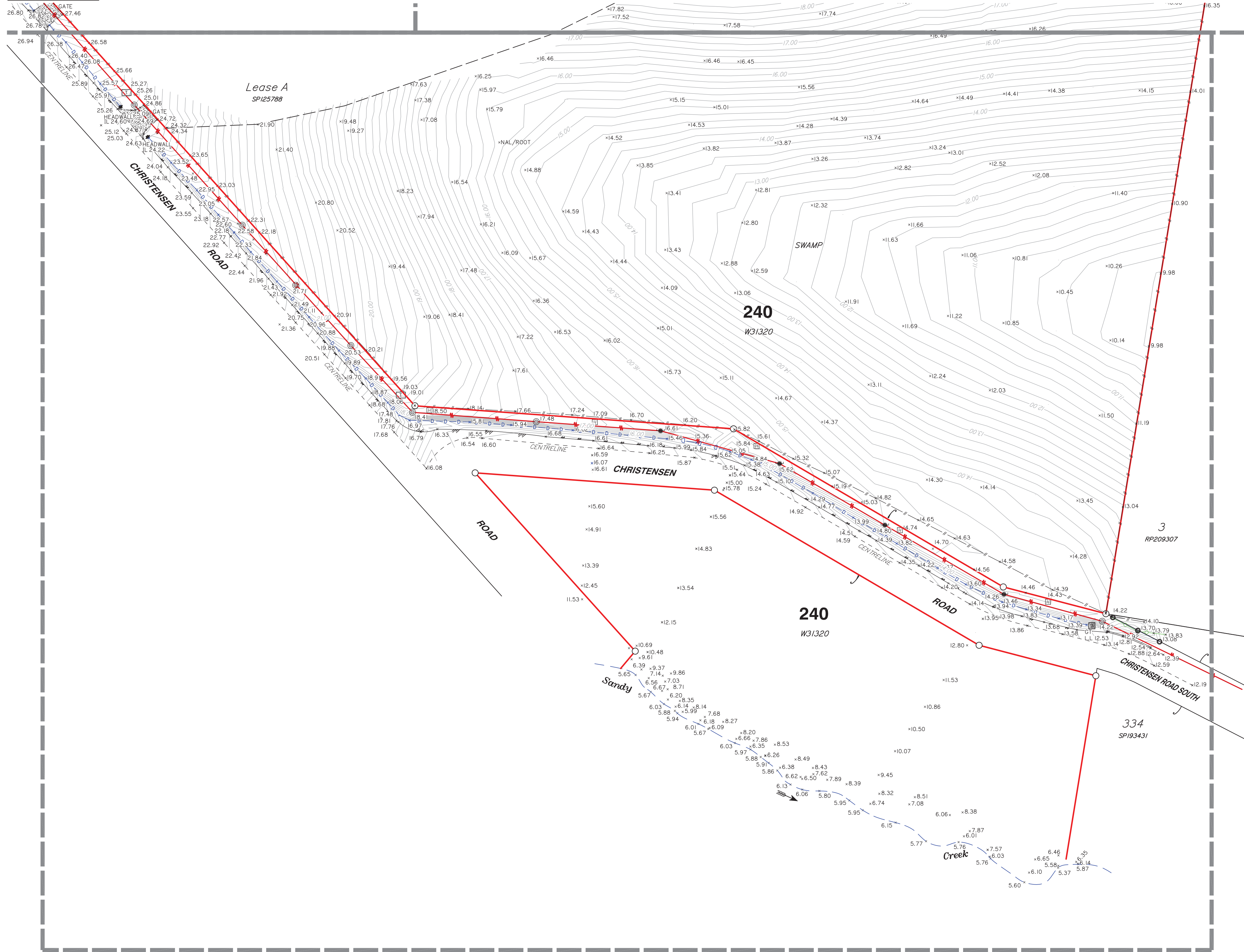
REFERENCE No. **5093-10**

PLAN No. **5093 S CD 01**



SEE SHEET FIVE

SEE SHEET FOUR



LEGEND

- PERMANENT MARK
- SEWER MANHOLE
- SEWER INSPECTION OUTLET
- ELECTRICITY PILLAR
- ELECTRICITY POLE
- ELECTRICITY POLE WITH LIGHT
- TELSTRA PIT
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Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**

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Local Govt **GOLD COAST CITY COUNCIL**

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Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471	Checked	
	RL 22.169		

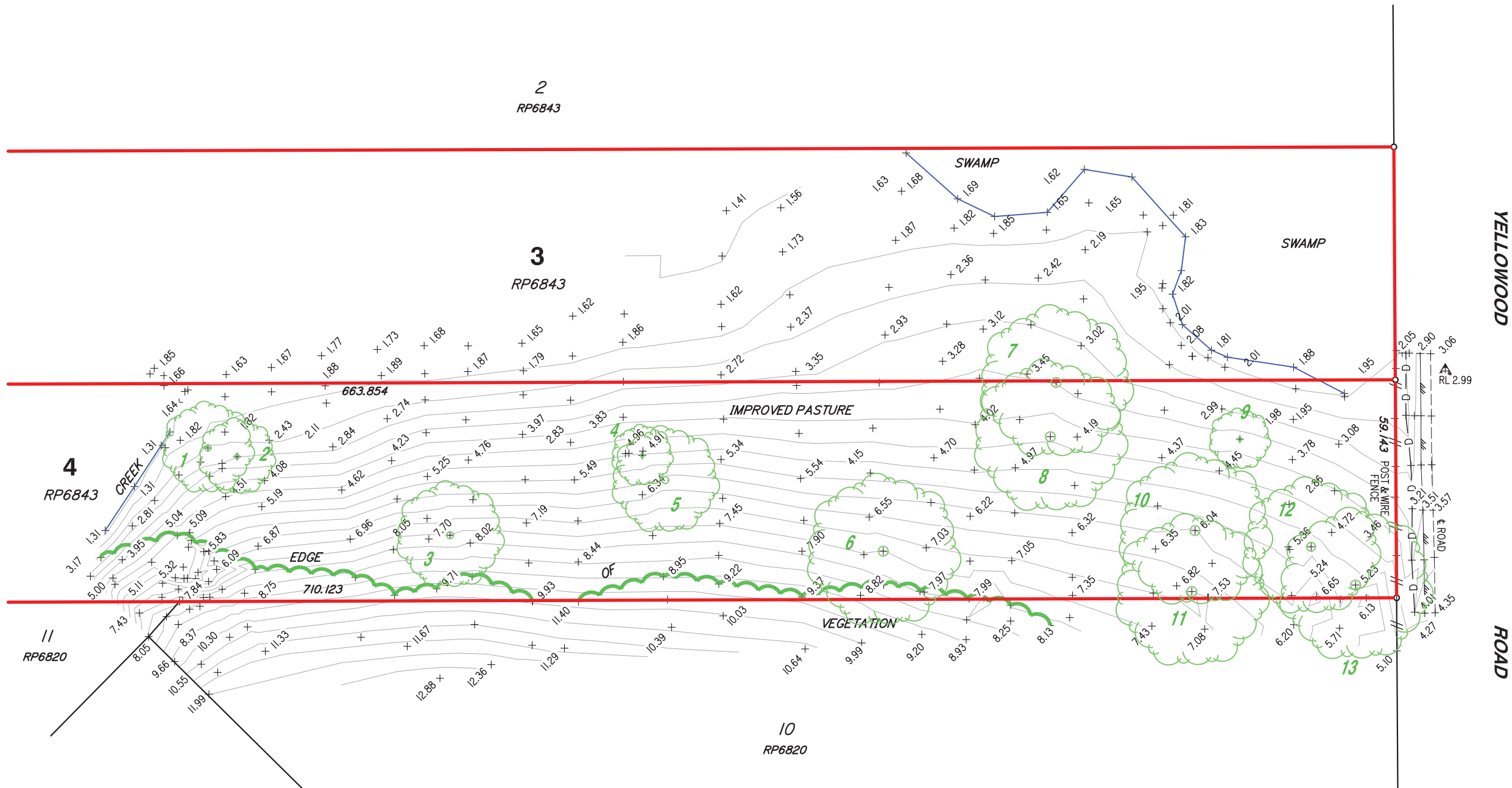
Scale (on A1 original)	Designed
1:1000	Date Designed

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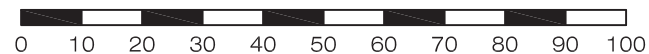
PLAN No. **5093 S CD 01**



LEGEND

- BENCH MARK
- OPEN DRAIN
- EDGE OF BITUMEN
- FENCE

Scale 1:1250 - Lengths are in Metres.



TREE TABLE

TREE No.	Ø	SPREAD	HEIGHT
1	0.4Ø	12m	14m
2	0.4Ø	10m	14m
3	1.0Ø	14m	20m
4	0.3Ø	8m	10m
5	0.6Ø	14m	12m
6	0.8Ø	20m	10m
7	1.0Ø	20m	20m
8	1.0Ø	20m	20m
9	0.4Ø	8m	8m
10	1.5Ø	20m	26m
11	1.5Ø	20m	26m
12	0.6Ø	16m	20m
13	1.2Ø	20m	26m

Notes

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CONTOUR AND DETAIL PLAN

BORROW SITE

on Part of Lots 3 & 4 on RP6843

Parish of **ALBERT**

County of **Ward**

Local Govt **GOLD COAST CITY COUNCIL**

Level Datum	A.H.D.	Date Surveyed	21-07-2011
Meridian	RP6843	Surveyor	S. White
Contour Interval	0.5	Drawn	S. Holt
F.B.	No	Date Drafted	22-07-2011
Origin	PSM130468	Checked	
	7.744		

Scale (on A3 original)	Designed
1:1250	Drawn
	Date Designed



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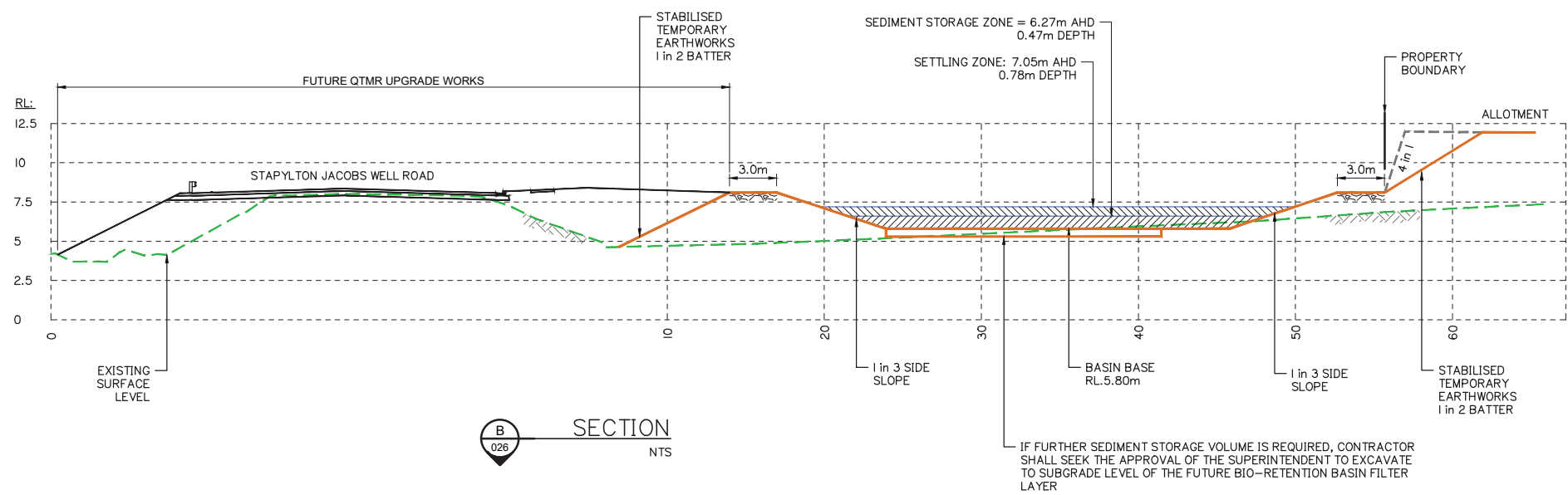
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REFERENCE No. **5093-11**

PLAN No. **5093 S CD 03**

Appendix B – Pre and Post Development Catchment Plans

Appendix C – Design of Stormwater Quantity and Quality Basin





KS8 Pty. Ltd.

60 STAPLYTON JACOBS
WELL ROAD, STAPYLTON

Lot / Plan: 1 on RP6882
240 on W31320
4 on RP6843

Parish: Albert
County: Ward
Local Authority: City of Gold Coast Council

Level Datum: AHD
Meridian: IS216853
Contour Interval: -
PSM:
RL:

ISSUED FOR APPROVAL
NOT FOR CONSTRUCTION

DRAWING TO BE READ IN CONJUNCTION WITH GENERAL NOTES

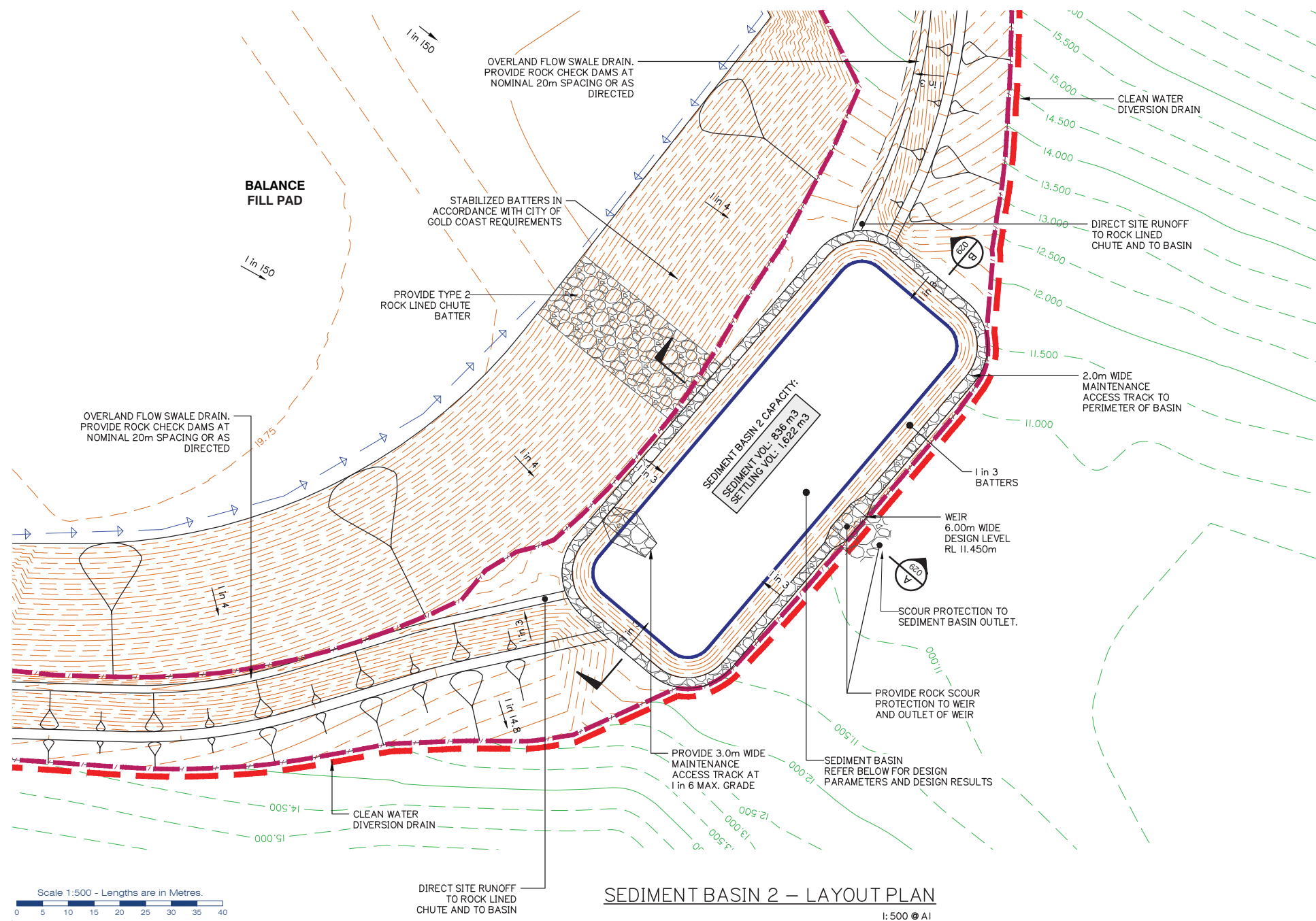
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DRAWING TITLE
CONSTRUCTION PHASE
SEDIMENT BASIN 2
LAYOUT PLAN AND
DETAILS SHEET 1 OF 2

B	11-05-18	INFORMATION REQUEST RESPONSE	GCP	MG	
A	09-02-18	ORIGINAL ISSUE	GCP	MG	
Issue	Date	Description	DRN	Ch-K	

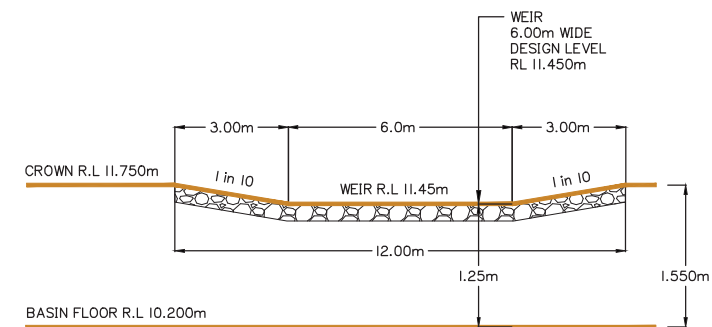
AS SHOWN

Date:	11-05-18
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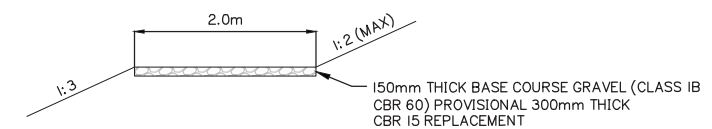
Rev. No:
B

I(1YR, 120hr)	1.46
K1	33.5
K2	14.2
R(Y%, 5-DAY)	63.11
Cv	0.29
A (Ha)	8.175
Settling Zone Vol: Vs	1496
Sediment Zone Vol: Vsd	748

SEDIMENT ZONE		SETTLING ZONE	
1:3 Batter Calc		1:3 Batter Calc	
INPUT NOMINATED BASIN BASE AREA	2274	INPUT NOMINATED BASE AREA	2490
INPUT NOMINATED SEDIMENT HEIGHT	0.35	INPUT NOMINATED SETTLING HEIGHT	0.6
INPUT OUTSIDE BOUNDARY LENGTH OF BASIN	219	INPUT OUTSIDE BOUNDARY LENGTH OF BASIN	237
SEDIMENT VOLUME CHECK, $V_{SED} =$	836	SETTLING VOLUME CHECK, $V_s =$	1622
	OK		OK



OVERFLOW WEIR – TYPICAL ELEVATION
N.T.S



MAINTENANCE ACCESS TRACK – TYPICAL SECTION



Client:

KS8 Pty. Ltd.

Site Address:

60 STAPLYTON JACOBS
WELL ROAD, STAPYLTON

RPD:

Lot / Plan: 1 on RP6882
240 on W31320
4 on RP6843

Parish: Albert
County: Ward
Local Authority: City of Gold Coast
Council

Level Datum: AHD
Meridian: IS216853
Contour Interval: -
PSM: -
RL: -

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DRAWING TITLE

OPERATIONAL PHASE
BIO RETENTION BASIN
LAYOUT PLAN AND DETAILS
SHEET 1 OF 2

SCALE IN METRES

AS SHOWN

Scale at A1: AS SHOWN

Designed: IG

Drafted: GCP

Approved: MG

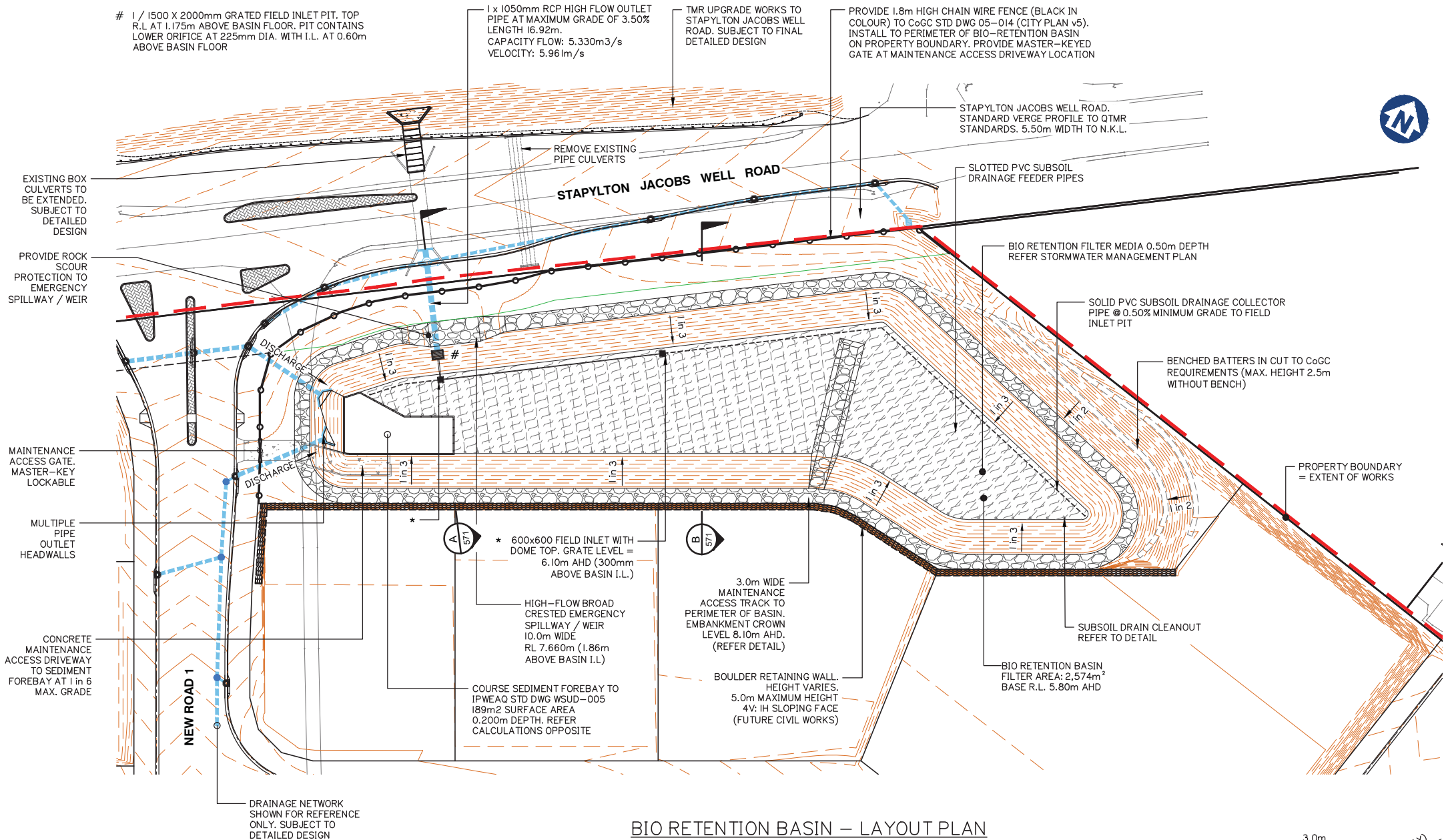
RPEQ: 16939

Signed: 

Date: 30-08-18

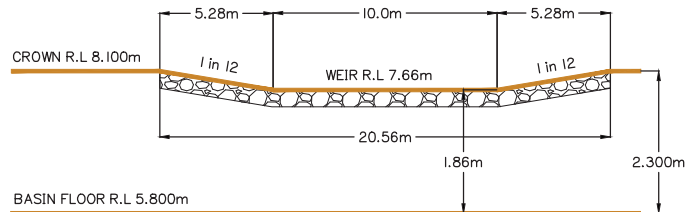
Drawing No:
5738 ENG BE1 570

Rev. No:
C



BIO RETENTION BASIN - LAYOUT PLAN

I:500 @ A1

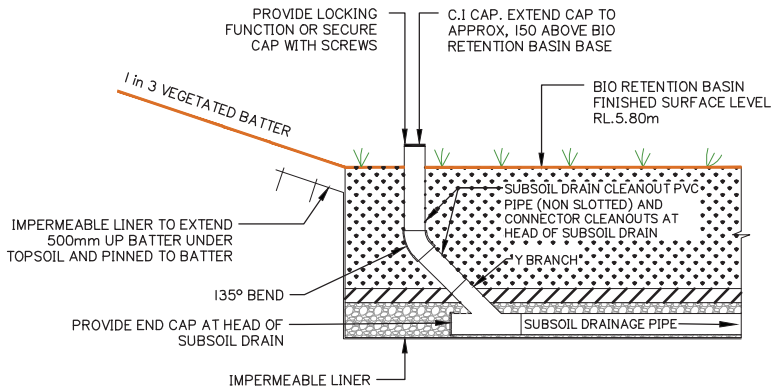


OVERFLOW WEIR - TYPICAL ELEVATION

N.T.S.

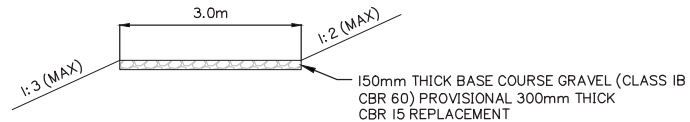
LEGEND

- LOT BOUNDARY
- LIMIT OF WORKS
- DESIGN CONTOURS (MINOR)
- DESIGN CONTOURS (MAJOR)



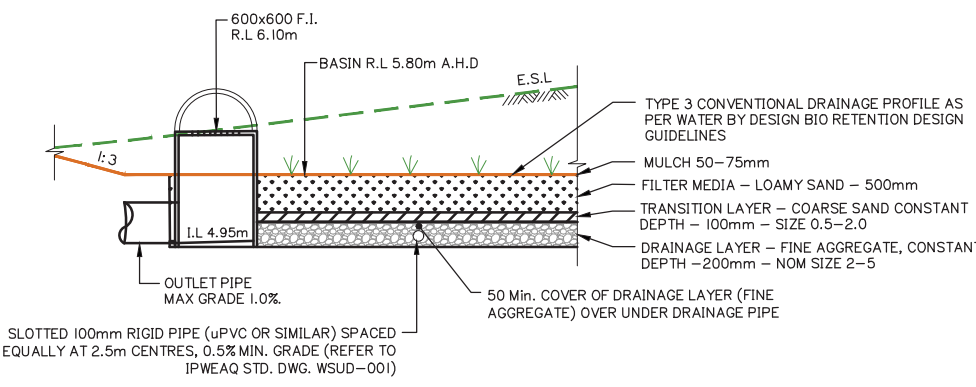
SUBSOIL DRAIN CLEANOUT - IN BASIN

N.T.S.



MAINTENANCE ACCESS TRACK - TYPICAL SECTION

N.T.S.



TYPICAL BIO-RETENTION BASIN DETAIL

N.T.S.

BIO RETENTION - COURSE SEDIMENT
FOREBAY SIZING GUIDE CALCULATIONS

$$V_s = A_c \times R \times L_o \times F = 7.624 \text{ m}^3$$

$$R = 1 - \left[1 + \frac{1}{n} \times \frac{V_s}{Q/A_f} \right]^{-n}$$

$$0.8 = 1 - \left[\frac{1 + 0.100}{0.5 \times 2.423/A_f} \right]^{-0.5} \quad A_f = 290.76 \text{ m}^2$$

$$D_s = \frac{V_s}{A_f} \quad D_s = \frac{7.624}{290.76} = 0.026 \text{ m}$$

$$D_s = \frac{7.624 \text{ m}^3}{189.00 \text{ m}^2} = 0.040 \text{ m}$$

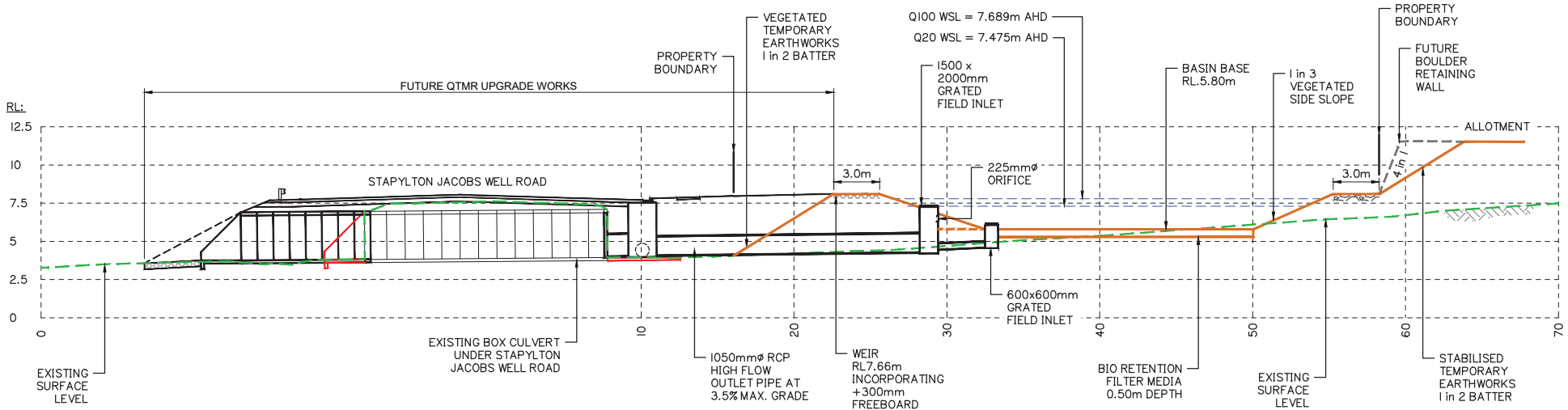
OPTIMIZATION OF MINIMUM FOREBAY SIZE:

$$D_s = \frac{7.624 \text{ m}^3}{189.00 \text{ m}^2} = 0.040 \text{ m}$$

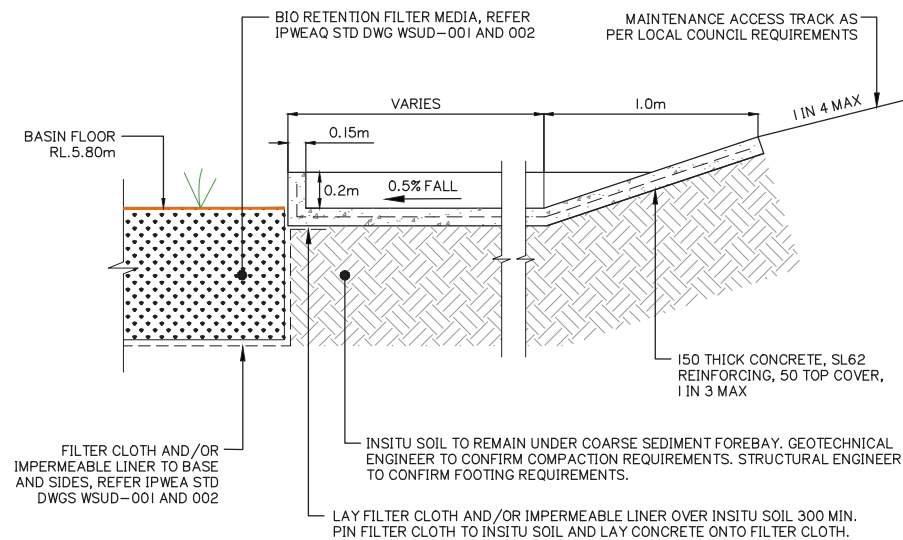
$V_s = 7.624 \text{ m}^3$ (Workings Above)
 $A_c = 15.882 \text{ ha}$ (Refer Catchment Plans)
 $Q = 2.423 \text{ m}^3/\text{s}$ (3 month ARI = 0.5 x Q1)
 $V_s = 0.1 \text{ m/s}$ (Recommended for Imm Particle)
 $R = 0.8$ (Recommended 80% Capture)
 $L_o = 0.6$ (From Healthy Waterways Guide)
 $n = 0.5$ (Recommended Turbulence)
 $F_c = 1.0$ (Frequency of Clean Out / Yr)

REFER TO BIORETENTION TECHNICAL
DESIGN GUIDELINES FOR FURTHER
INFORMATION.

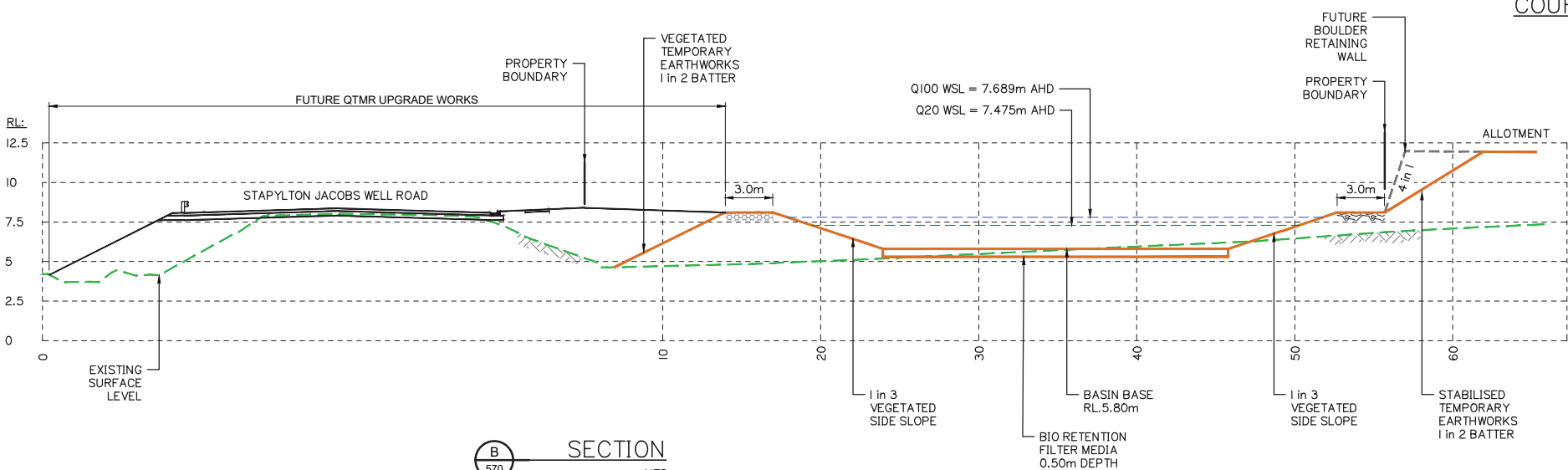
ARI (YEARS)	MAX. WATER ELEVATION (m) A.H.D.	MAX. WATER DEPTH (m)
Q1	7.006	1.206
Q2	7.181	1.381
Q5	7.275	1.475
Q10	7.361	1.561
Q20	7.475	1.675
Q50	7.578	1.778
Q100	7.689	1.889



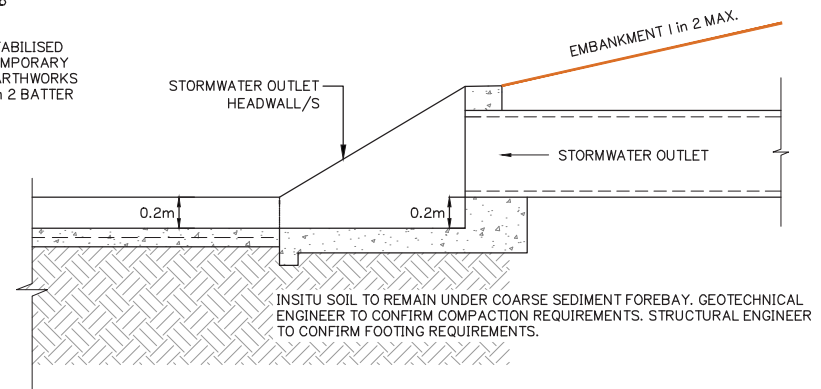
SECTION A 570 NTS



COURSE SEDIMENT FOREBAY TYPICAL SECTION N.T.S



SECTION B 570 NTS



TYPICAL STORMWATER OUTLET TO SEDIMENT FOREBAY N.T.S

Client: KS8 Pty. Ltd.

Site Address: 60 STAPYLTON JACOBS WELL ROAD, STAPYLTON

RPD: Lot / Plan: 1 on RP6882, 240 on W31320, 4 on RP6843
Parish: Albert
County: Ward
Local Authority: City of Gold Coast Council
Level Datum: AHD
Meridian: IS216853
Contour Interval: -
PSM: -
RL: -

ISSUED FOR APPROVAL NOT FOR CONSTRUCTION

DRAWING TO BE READ IN CONJUNCTION WITH GENERAL NOTES

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DRAWING TITLE
OPERATIONAL PHASE
BIO RETENTION BASIN
LAYOUT PLAN AND DETAILS
SHEET 2 OF 2

Table with 4 columns: Issue, Date, Description, and initials (IG, MG, GCP, DRN, CHK).

SCALE IN METRES
AS SHOWN

Table with 2 columns: Field (Designed, Drafted, Approved, RPEQ, Signed, Date) and Value (AS SHOWN, IG, GCP, MG, 16939, signature, 30-08-18).

Drawing No: 5738 ENG BE1 571 Rev. No: B

Appendix D – Balance Earthworks Below Defined Flood Event Level



KS8 Pty. Ltd.

60 STAPLYTON JACOBS
WELL ROAD, STAPYLTON

Lot / Plan: 1 on RP6882
240 on W31320
4 on RP6843

Parish: Albert
County: Ward
Local Authority: City of Gold Coast

Level Datum: Council
Meridian: AHD
Contour Interval: IS216853
PSM: -
RL:

ISSUED FOR APPROVAL
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DRAWING TITLE

POST DEVELOPED Q100 FLOOD STORAGE VOLUME ASSESSMENT

C	30-08-18	FURTHER INFORMATION REQUEST RESPONSE	IG	MG	
B	30-05-18	ISSUED FOR TENDER	GCP	MG	
B	11-05-18	INFORMATION REQUEST RESPONSE	GCP	MG	
A	09-02-18	ORIGINAL ISSUE	GCP	MG	
ISSUE	Date	Description	CPI	CHK	

SCALE IN METRES



1:400 (FULL SIZE A1)
1:800 (HALF SIZE A3)

Scale at A1: 1:400

Designed:	IC
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Drafted:	GCP
----------	-----

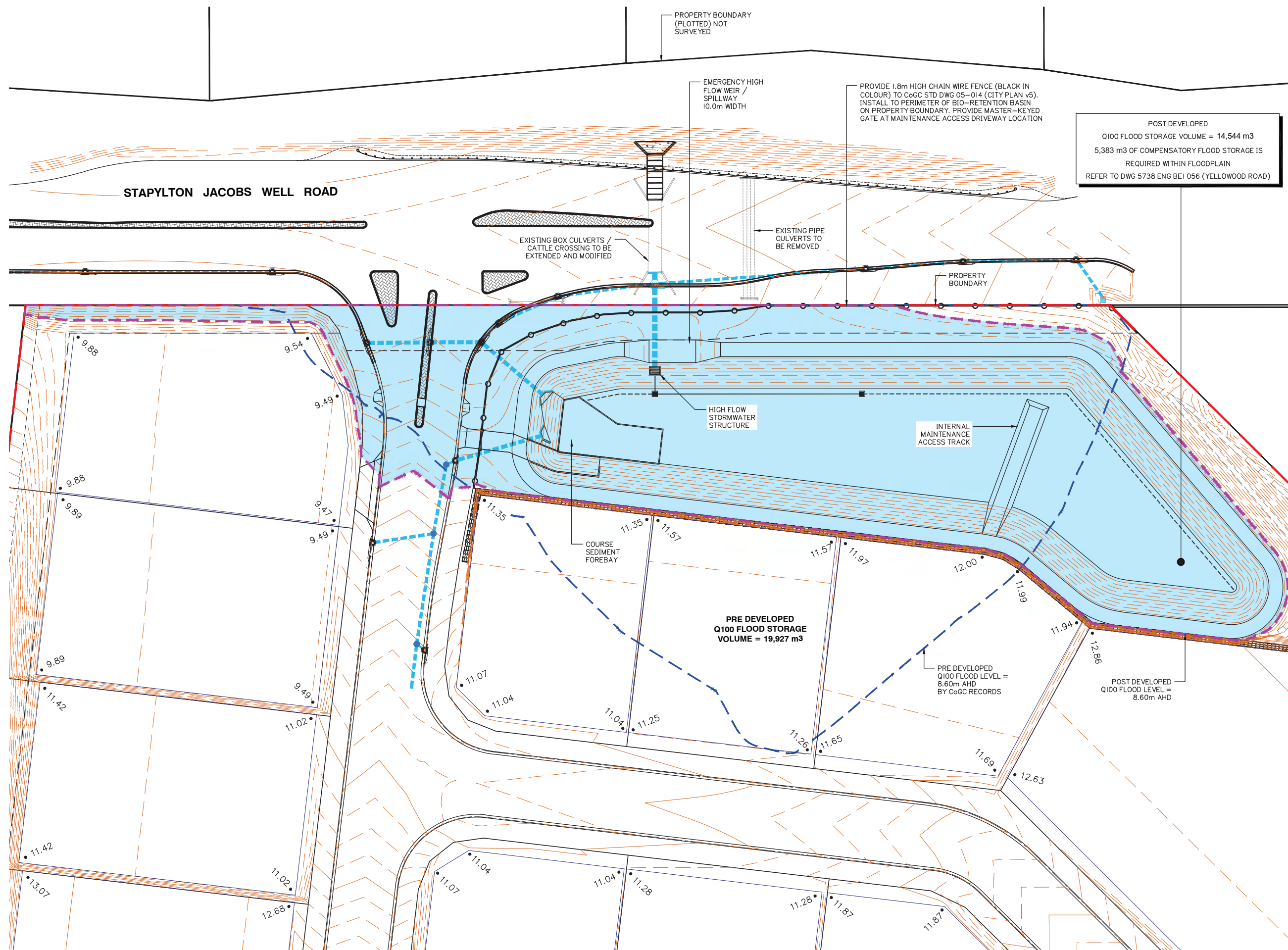
Approved:	MG
-----------	----

RPEQ:	1693
-------	------

Signed:	<i>M. L. ...</i>
---------	------------------

Date:	30-08-18
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Drawing No:	Rev. No:
5738 ENG BE1 423	C



POST DEVELOPED Q100 FLOOD STORAGE VOLUME ASSESSMENT

Appendix E – MUSIC Catchment Plan



PROPOSED BIO-RETENTION BASIN DETAILS

- 1 in 3 INTERNAL BATTER SLOPE
- 189m² COURSE SEDIMENT FOREBAY PROVIDED AT PIPE OUTLETS
- MAINTENANCE BUND WHERE AREA EXCEEDS 800m²
- 3.0m WIDE MAINTENANCE ACCESS TO PERIMETER
- 2,574m² FILTER AREA
- 0.50m FILTER DEPTH
- 300mm EXTENDED DETENTION
- 2,905m² EXTENDED DETENTION SURFACE AREA
- 4.962m³/s HIGH FLOW BYPASS (MITIGATED DISCHARGE)
- 180mm/hr HYDRAULIC CONDUCTIVITY
- 800mg/kg TN CONTENT OF FILTER MEDIA
- 40mg/kg ORTHOPHOSPHATE CONTENT OF FILTER MEDIA
- BASE OF BASIN IS LINED
- BASIN IS VEGETATED WITH EFFECTIVE NUTRIENT REMOVAL PLANTS
- 10.0m BROAD CRESTED EMERGENCY SPILLWAY / WEIR (HIGH FLOW)
- PERFORATED AND SOLID UNDER DRAINAGE IS PRESENT
- PROVIDE 1.80m HIGH CHAIN WIRE FENCING TO BASIN PERIMETER TO CoGC STD DWG 05-014 (CITY PLAN v5), COLOURED: BLACK

EMERGENCY
HIGH FLOW
WEIR /
SPILLWAY

WELL
ROAD

INTERNAL MAINTENANCE TRACK

COURSE
SEDIMENT
FOREBAY
189m²

JACOBS

STAPYLTON

EMERI STREET EXT.

ROAD 3

ROAD 3

ROAD 7

ROAD 4

ROAD 1

SWALE 01

CONSTRUCTION PHASE
SEDIMENT BASIN

OVERLAND FLOW PATH SWALE
DRAINING TO SEDIMENT BASIN

SWALE 02

CLEAN WATER DIVERSION
DRAIN / EARTH BUND

Lease B
SP264740



**gassman
development
perspectives**

planning | environment | landscape | engineering | survey
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Gold Coast & Logan | 76 Business Street, Yatala QLD | PO Box 392, Beenleigh 4207
Brisbane | Level 8, 97 Creek Street, Brisbane QLD 4000 GPO Box 999, Brisbane 4000

Client:

KS8 Pty. Ltd.

Site Address:

60 STAPYLTON JACOBS WELL
ROAD, STAPYLTON

RPD:

Lot / Plan: 1 / RP6882
240 / W31320
Parish: Albert
County: Ward
Local Authority: City of Gold Coast
Council
Level Datum: AHD
Meridian: IS216853
Contour Interval: .
RL: .

Associated Consultants:

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DRAWING TITLE:

MUSIC CATCHMENT PLAN

LEGEND

CONTRIBUTING CATCHMENTS FOR MUSIC
MODELLING, INDICATED IN RED BOUNDARY



LANDSCAPE (10% IMPERVIOUS)
INCLUDING FILTER MEDIA AREA
0.873 Ha

LOTS (70% ROOF, 30% GROUND)
TOTAL: 12.209 Ha
ROOF 70% SPLIT: 8.546 Ha
GROUND 30% SPLIT: 3.663 Ha

ROAD (90% IMPERVIOUS)
2.800 Ha

NOTE:

IMPERVIOUS VALUES PER POLLUTANT GENERATOR NODE HAVE BEEN CALIBRATED
TO ENSURE 90% OVERALL IMPERVIOUS AREA IS ACHIEVED FOR MUSIC MODELLING

Issue	Date	Description	IG	MG	AN	MG	DRN	CHK
C	30-08-18	FURTHER INFORMATION REQUEST RESPONSE	IG	MG				
B	11-05-18	INFORMATION REQUEST RESPONSE	AN	MG				
A	09-02-18	ORIGINAL ISSUE	IG	MG				

SCALE IN METRES



1:1500 (FULL SIZE A1)
1:3000 (HALF SIZE A3)

Scale at A1: 1:1500

Designed:	IG
Drafted:	IG
Approved:	MG
RPEQ:	16939
Signed:	
Date:	30-08-18

Drawing No: 5738 ENG SMP1 003
Rev. No: C

MUSIC CATCHMENT PLAN

Appendix F – MUSIC Link Report

MUSIC-link Report

Project Details		Company Details	
Project:	CoGC: M38 Industrial Park, Yatala	Company:	KS8 Pty. Ltd. c/o Gassman Development Perspectives Pty Ltd
Report Export Date:	22/08/2018	Contact:	Mitchell Gassman
Catchment Name:	5738 CoGC M38 Industrial Park	Address:	76 Business Street Yatala QLD 4207
Catchment Area:	15.882ha	Phone:	0738073333
Impervious Area*:	91.12%	Email:	mitchell@gassman.com.au
Rainfall Station:	40406 BEENLEIGH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1990 - 31/12/1999 11:54:00 PM		
Mean Annual Rainfall:	1105mm		
Evapotranspiration:	1492mm		
MUSIC Version:	6.2.1		
MUSIC-link data Version:	6.22		
Study Area:	City of Gold Coast (North)		
Scenario:	City of Gold Coast (North)		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: LPoD-5	Reduction	Node Type	Number	Node Type	Number
Flow	4.55%	Bio Retention Node	1	Urban Source Node	4
TSS	89.4%				
TP	70.7%				
TN	57.5%				
GP	99.9%				

Comments

- 1 in 3 INTERNAL BATTER SLOPE
- 189m2 COURSE SEDIMENT FOREBAY PROVIDED AT PIPE OUTLETS
- INTERNAL MAINTENANCE BUND WHERE AREA EXCEEDS 800m2
- 3.0m WIDE MAINTENANCE ACCESS TO PERIMETER
- 2,574m2 FILTER AREA, 0.50m FILTER DEPTH
- 300mm EXTENDED DETENTION, 2,905m2 EXTENDED DETENTION SURFACE AREA
- 4.962m3/s HIGH FLOW BYPASS (MITIGATED DISCHARGE)
- 180mm/hr HYDRAULIC CONDUCTIVITY
- 800mg/kg TN CONTENT OF FILTER MEDIA
- 40mg/kg ORTHOPHOSPHATE CONTENT OF FILTER MEDIA
- BASE OF BASIN IS LINED, BASIN IS VEGETATED WITH EFFECTIVE NUTRIENT REMOVAL PLANTS
- 10.00m OVERFLOW BROAD CRESTED WEIR WIDTH, UNDER DRAINAGE IS PRESENT

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Exfiltration Rate (mm/hr)	None	None	0
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Extended detention depth (m)	None	1	0.3
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Filter depth (m)	0.4	1	0.5
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Hi-flow bypass rate (cum/sec)	None	None	4.962
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Orthophosphate Content in Filter (mg/kg)	None	None	40
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	PET Scaling Factor	2.1	2.1	2.1
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Saturated Hydraulic Conductivity (mm/hr)	50	200	180
Bio	Bio-Retention Basin Stg 1 (2_574 m2 Filter)	Total Nitrogen Content in Filter (mg/kg)	None	None	800
Receiving	LPoD-5	% Load Reduction	None	None	4.55
Receiving	LPoD-5	GP % Load Reduction	90	None	99.9
Receiving	LPoD-5	TN % Load Reduction	45	None	57.5
Receiving	LPoD-5	TP % Load Reduction	60	None	70.7
Receiving	LPoD-5	TSS % Load Reduction	80	None	89.4
Urban	CoGC - Drainage Reserve Buffer Stg 1 (0.873 Ha)	Area Impervious (ha)	None	None	0.088
Urban	CoGC - Drainage Reserve Buffer Stg 1 (0.873 Ha)	Area Pervious (ha)	None	None	0.784
Urban	CoGC - Drainage Reserve Buffer Stg 1 (0.873 Ha)	Total Area (ha)	None	None	0.873
Urban	CoGC - Industrial GROUND Stg 1 (3.663 Ha)	Area Impervious (ha)	None	None	3.308
Urban	CoGC - Industrial GROUND Stg 1 (3.663 Ha)	Area Pervious (ha)	None	None	0.354
Urban	CoGC - Industrial GROUND Stg 1 (3.663 Ha)	Total Area (ha)	None	None	3.663
Urban	CoGC - Industrial ROAD Stg 1 (2.800 Ha)	Area Impervious (ha)	None	None	2.529
Urban	CoGC - Industrial ROAD Stg 1 (2.800 Ha)	Area Pervious (ha)	None	None	0.270
Urban	CoGC - Industrial ROAD Stg 1 (2.800 Ha)	Total Area (ha)	None	None	2.8
Urban	CoGC - Industrial ROOF Stg 1 (8.546 Ha)	Area Impervious (ha)	None	None	8.546
Urban	CoGC - Industrial ROOF Stg 1 (8.546 Ha)	Area Pervious (ha)	None	None	0
Urban	CoGC - Industrial ROOF Stg 1 (8.546 Ha)	Total Area (ha)	None	None	8.546

Only certain parameters are reported when they pass validation

Appendix G – WSUD Bio Retention Basin Maintenance Checklists

BIORETENTION BASIN CONSTRUCTION INSPECTION CHECKLIST											
Asset I.D.					Inspected By:						
Site:					Date:						
					Time:						
Constructed By:					Weather:						
					Contact During Visit:						
Items inspected		Checked		Satisfactory		Items inspected		Checked		Satisfactory	
		Y	N	Y	N			Y	N	Y	N
DURING CONSTRUCTION & ESTABLISHMENT											
A. FUNCTIONAL INSTALLATION						Structural components					
Preliminary Works						15. Location and configuration of inflow systems as designed					
1. Erosion and sediment control plan adopted						16. Location and levels of overflow pits as designed					
2. Temporary traffic/safety control measures						17. Under-drainage connected to overflow pits as designed					
3. Location same as plans						18. Concrete and reinforcement as designed					
4. Site protection from existing flows						19. Set down to correct level for flush kerbs (streetscape applications only)					
Earthworks and Filter Media						20. Kerb opening width as designed					
5. Bed of basin correct shape and slope											
6. Batter slopes as plans						B. SEDIMENT & EROSION CONTROL (IF REQUIRED)					
7. Dimensions of bioretention area as plans						21. Stabilisation immediately following earthworks and planting of terrestrial landscape around basin					
8. Confirm surrounding soil type with design						22. Silt fences and traffic control in place					
9. Confirm filter media specification in accordance with Step 4						23. Temporary protection layers in place					
9. Provision of liner (if required)											
10. Under-drainage installed as designed						C. OPERATIONAL ESTABLISHMENT					
11. Drainage layer media as designed						24. Temporary protection layers and associated silt removed					
12. Transition layer media as designed (if required)						Vegetation					
14. Extended detention depth as designed						25. Planting as designed (species and densities)					
						26. Weed removal and watering as required					
FINAL INSPECTION											
1. Confirm levels of inlets and outlets						6. Check for uneven settling of banks					
2. Confirm structural element sizes						7. Under-drainage working					
3. Check batter slopes						8. Inflow systems working					
4. Vegetation as designed						9. Maintenance access provided					
5. Bioretention filter media surface flat and free of clogging											
COMMENTS ON INSPECTION											
ACTIONS REQUIRED											
Inspection officer signature:											

BIORETENTION BASIN MAINTENANCE CHECKLIST				
Inspection Frequency:	1 to 6 monthly	Date of Visit:		
Location:				
Description:				
Asset I.D.				
Site Visit by:				
INSPECTION ITEMS:	Y	N	Action Required (details)	
Sediment accumulation at inflow points?				
Litter within basin?				
Erosion at inlet or other key structures?				
Traffic damage present?				
Evidence of dumping (e.g. building waste)?				
Vegetation condition satisfactory (density, weeds etc)?				
Watering of vegetation required?				
Replanting required?				
Mowing/slashing required?				
Clogging of drainage points (sediment or debris)?				
Evidence of ponding?				
Damage/vandalism to structures present?				
Surface clogging visible?				
Drainage system inspected?				
Resetting of system required?				
COMMENTS				

BIORETENTION BASIN ASSET TRANSFER CHECKLIST			
Asset I.D.			
Asset Location:			
Construction by:			
'On-maintenance' Period:			
TREATMENT	Y	N	
System appears to be working as designed visually?			
No obvious signs of under-performance?			
MAINTENANCE	Y	N	
Maintenance plans and indicative maintenance costs provided for each asset?			
Vegetation establishment period completed (2 years)?			
Inspection and maintenance undertaken as per maintenance plan?			
Inspection and maintenance forms provided?			
ASSET INSPECTED FOR DEFECTS AND/OR MAINTENANCE ISSUES AT TIME OF ASSET TRANSFER	Y	N	
Sediment accumulation at inflow points?			
Litter within basin?			
Erosion at inlet or other key structures?			
Traffic damage present?			
Evidence of dumping (e.g. building waste)?			
Vegetation condition satisfactory (density, weeds etc)?			
Watering of vegetation required?			
Replanting required?			
Mowing/slashing required?			
Clogging of drainage points (sediment or debris)?			
Evidence of ponding?			
Damage/vandalism to structures present?			
Surface clogging visible?			
Drainage system inspected?			
COMMENTS/ACTIONS REQUIRED FOR ASSET TRANSFER			
ASSET INFORMATION	Y	N	
Design Assessment Checklist provided?			
As constructed plans provided?			
Copies of all required permits (both construction and operational) submitted?			
Proprietary information provided (if applicable)?			
Digital files (e.g. drawings, survey, models) provided?			
Asset listed on asset register or database?			



TRAFFIC IMPACT ASSESSMENT

PROPOSED INDUSTRIAL ESTATE

60 STAPYLTON – JACOBS WELL ROAD & 82
CHRISTENSEN ROAD, STAPYLTON

LOT 1 ON RP6882, LOT 240 ON W31330

(RESPONSE TO SARA INFORMATION REQUEST)

PLANS AND DOCUMENTS
referred to in the REFERRAL
AGENCY RESPONSE



SARA ref: 1710- 2228 SPD

Date: 11 October 2018

Prepared for

KS8 Pty Ltd

13 APRIL 2018

DOCUMENT REGISTER

Document 60 Stapylton Jacons Well Road
Traffic Impact Assessment (TIA)

RTG Reference 17450

Date 13 April 2018

Prepared by Dare Janzekovic, Luke Rytenskild

Document History

Version	Version date	Details	Reviewed and Authorised	
			Name / Position	Signature
1	30 January 2018	DRAFT	Luke Rytenskild Director RPEQ 6293	
2	2 February 2018	DA SUBMISSION	Luke Rytenskild Director RPEQ 6293	
3	13 April 2018	DA V2 – SARA IR RESPONSE	Luke Rytenskild Director RPEQ 6293	

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1.0 INTRODUCTION

1.1 Background

Rytenskild Traffic Engineering (RTE) has been engaged by KS8 Pty Ltd to prepare a Traffic Impact Assessment of its proposed new intersection in Yatala.

This report forms part of a Change to Approval. The intention of the report is to re-assess the impacts upon the surrounding State – controlled road network, with a view to achieving a more practical outcome with respect to road network upgrade requirements.

The Department of Transport and Main Roads is a referral agency for the application. This report has been prepared in accordance with the Guide to Traffic Impact Assessments 2017 (GTIA) and the Further Advice letter received on 23 November 2017 (ref: 1710-2228 SPD).

The RPEQ certification of this Traffic Impact Assessment (TIA) is provided in Appendix A.

This report is an amended version of that lodged with the DA and addresses the items discussed with the State Assessment and Referral Agency (SARA) in a meeting held on 7 March 2018. A response to each action discussed in the meeting is provided below, with additional information within the report where necessary.

- 1. Applicant to provide a revised trip generation rate (along with rationale/justification) and resulting traffic estimates for the department's review.*

Response

A traffic generation survey has been carried out for an existing industrial area in the immediate vicinity of the proposal (Christensen Rd), using Metrocount equipment. A 'dead end' catchment was selected so that only traffic generated by uses in that area was recorded (ie no through traffic).

As presented in Section 4, and further discussed in Section D, the existing industrial catchment generates in the order of 0.21 peak hour trips per 100m² per peak hour. The surveyed area is similar in scale to the proposed estate and comprises a range of industrial users. The surveyed rate is consistent with surveys carried out by the NSW RMS in the Sydney area, and is considered to be appropriate for the subject site.

The trip generation rate used in the original assessment has been adopted for sensitivity testing.

- 2. Once the trip generation rate and updated traffic modelling is agreed on, the applicant will determine if proposed works are still adequate or if other works are required.*

Response

An updated SIDRA analysis has been carried out at the proposed new access and the Exit 38 interchange. The revised trip generation rate of 0.21 trips per 100m² has been adopted for the assessment. As discussed in Section 5, the following mitigation works are proposed during Stages 1 and 2 to achieve a no-worsening effect to the existing road network.

- STAGE 1** – 1) Construction of proposed access to planned four lane profile
 2) Extension of the second approach lane on Stapylton Jacobs Well Road
 between the eastern roundabout and the proposed site access
- STAGE 2** - 3) Construction of the second approach lane on Christensen Road.
 4) Construction of the second approach lane on the northbound off-ramp
 (western site of the Exit 38 interchange)

The above mitigation works are considered to be sufficient to accommodate the development traffic impact upon the interchange. Additional contributions are proposed for the construction of Stage 3 and 4, to facilitate further upgrades along Christensen Road and/or Jacobs Well Road. Such contributions shall equate to the cost of constructing

3. *Applicant to provide a functional layout plan for the proposed SJW Rd signalised intersection.*

Response

A functional layout plan of the proposed site access intersections with Stapylton Jacobs Well Road is provided in Section 5 of the report. The intersection has been drawn within the existing road reserve. However, is slightly modified to suit the narrow section of road reserve to the west, which is yet to be resumed.

The concept design of the intersection assumes that the signalised intersection will be built in its ultimate alignment, with the geometry between the intersection and the interchange constructed once the appropriate land to the west is resumed.

1.2 Subject Site

As shown in Figure 2.1, the site is located on the southern side of Stapylton Jacobs Well Road. The subject site is identified as Lot 1 on RP6882 & Lot 240 on W31330 and has an approximate site area of 62.65 hectares.



FIGURE 1.1 – LOCATION OF SUBJECT SITE

1.3 Comparison with Other Approvals in the Yatala Enterprise Area

Rytenskild Traffic Engineering has been involved with numerous applications in the Yatala Enterprise Area. To our knowledge, the following requirements have been applied to various projects:

- 1 Eastern Service Road – requirement for an upgrade to the Christensen Road approach to the eastern roundabout at the Exit 38 interchange.
- Caterpillar Warehouse – 71 Elderslie Road, Yatala – Contribution of approximately \$ 225,000 for State – controlled road impacts.
- New industrial estate at 125 Pearson Road, Yatala (Frasers Property) – no requirements.
- Empire Estate (Stages 1 – 4) – Peachey Road, Luscombe – no requirements.

The Referral Agency's response from TMR requires a contribution of \$45 per square metre of Gross Floor Area to be made to offset the potential impact of the proposed development. In recent years, this rate has been applied by TMR to numerous industrial development proposals located outside of the Yatala Enterprise Area. Such has been justified on the basis that these applications are outside of the Yatala Enterprise Area and therefore have not been considered by the TMR in its planning of the surrounding State controlled road network. Given that the subject site is located within the Yatala Enterprise Area, it is considered inappropriate for the rate to have been applied to the site. This report identifies those upgrade works that are required to mitigate the impact of the development, and therefore should be required.

2.0 DEVELOPMENT PROPOSAL

It is proposed that the estate will be developed over four stages, with the following developable areas:

Stage One:	115,945m ²
Stage Two:	288,165m ²
Stage Three:	91,992m ²
Stage Four:	10,750m ²
Total:	506,852m²

It is noted that the above area is conservative as it includes area required for batters. The actual developable area is in the order of 455,000m².

It is estimated that the Gross Floor Area (GFA) will be approximately 45% of the above developable area. These calculations are shown in Section 4.0.

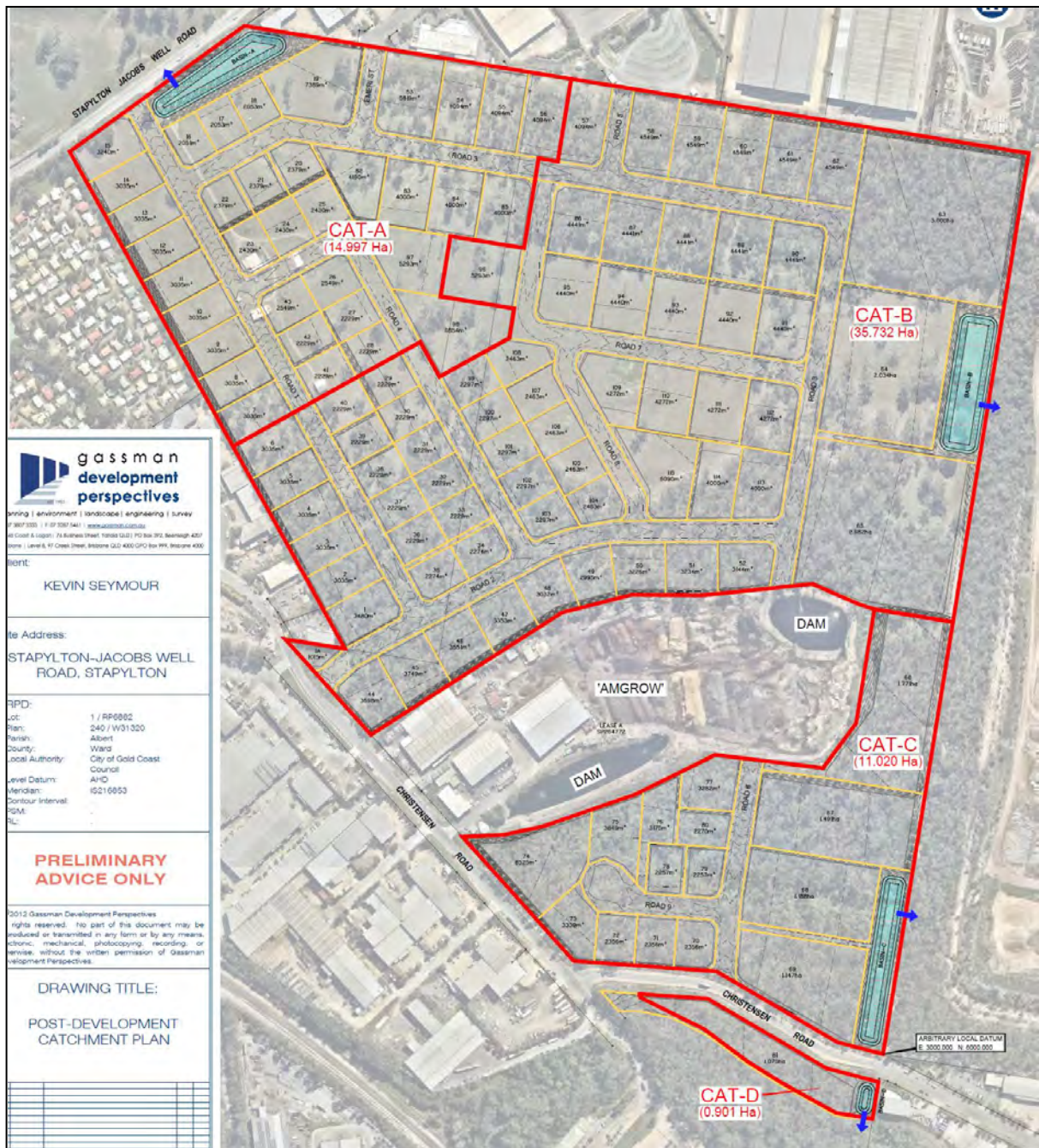
The proposed plan of development allows for future road connections to the adjoining properties to the east which will occur in due course. It is proposed that primary access be gained via a single signalised intersection on the Stapylton – Jacob's Well Road. A road connection linking Stapylton Jacobs Well Road to Christensen Road will be constructed as part of the overall project. Stages 3 and 4 will gain access from Christensen Road.

It is noted that the latest Hyder report was based on a total developable area of 262,500m², however, the proposed master plan was amended during the Decision Notice phase of the Development Application.

The approved staging plan is shown in Figure 2.1. It is proposed that access be achieved as follows:

Stage 1 -	via DeBortoli Street
Stage 2 -	via De Bortoli Street (through stage 1) and Stapylton – Jacob's Well Road
Stage 3 -	via De Bortoli Street and Stapylton – Jacob's Well Rd (through stages 1 & 2)
Stage 4 -	via Christensen Road, with connectivity to S-JW Rd and DeBortoli Street.

It is estimated that Stage 4 will not be developed until beyond the year 2023.



3.0 SURROUNDING ROAD NETWORK

3.1 Interchange Layout

As shown in Figure 3.1, the Exit 38 interchange comprises of a roundabout on each side of the Motorway with a four lane connection road beneath the Motorway. The western roundabout has two circulating lanes and five legs, including the northbound on and off ramps. The western roundabout has two circulating lanes and six legs, including the southbound on and off ramps.

The interchange has recently been upgraded, as follows:

Eastern roundabout:

- A second approach lane on the Stapylton – Jacob’s Well Road leg;
- A signal meter on the Elderslie Road (underpass) approach.

Western roundabout:

- A second approach lane on the Elderslie road approach;
- A signal meter on the Elderslie Road (underpass) approach.

In addition, Nyholt Drive was connected to Martens Street which has provided some relief to the interchange as local traffic is now able to access Beenleigh without using the motorway.

The existing layout of the Exit 38 interchange is shown in Figure 3.1.

3.2 Planned Road Upgrades

The Department of Transport and Main Roads has carried out planning for the future upgrade of the Stapylton – Jacob’s Well Road. Current concept planning layouts are provided as Appendix B. as shown, it is planned that the Stapylton – Jacob’s Well Road will be upgraded to a four – lane divided road with provision made for a signalised intersection providing access to the subject site.

3.3 Traffic Volumes

Traffic count data for each roundabout at the Yatala North interchange have been provided by the Department of Transport and Main Roads. The data was collected in May 2014 on a typical Thursday. This data was collected to the implementation of signal metering on Elderslie Road (underpass) and prior to the connection of Nyholt Drive to Martens Street. These works have significantly improved the performance of the interchange.

Given the above changes, RTE engaged Austraffic to carry out peak period traffic counts in January 2018 (during the first of the school term). During these surveys it was observed that the performance of the roundabouts have significantly improved, particularly with reduced queuing on the off-ramps. Overall, traffic volumes increased at a rate of approximately 3% per annum since the 2014 surveys.

A summary of the January 2018 count data is provided as Appendix C.



FIGURE 3.1 – EXISTING YATALA NORTH INTERCHANGE (PHOTO AUGUST 2015)

4.0 DEVELOPMENT TRAFFIC ESTIMATES

4.1 Trip Generation Rate

Given the size of the subject site and the proposed lot areas, it is considered appropriate that surveyed trip generation from similar developments in the area be used as a basis for estimating vehicle trip generation.

The TMR Road Planning and Design Manual states the following trip generation rates for industrial development:

Table 3.7 Traffic generation data – industrial uses

Description	Peak rate /unit	Daily rate	Unit	Source*
Factories	1	5	100m ² GFA	RTA
	N/A	4-5	100m ² GFA	QT
Warehouses	0.5	4	100m ² GFA	RTA
Light Industrial	0.9	9	100m ² GFA	QT
Notes: Factories are sites where articles are manufactured. For warehouses, generation rates can vary depending on the type of goods being stored. Also, if the warehouse has a retail component, the daily generation rate may be higher. The light industrial category is considered to encompass sites with established uses such as storehouses, light fabrication, building supplies and showrooms. *Abbreviations are as follows: RTA – Roads and Traffic Authority, NSW QT – Queensland Transport				

Recent trip generation surveys carried out by the NSW RMS indicate the following range of trip rates for various types of industrial development:

Business parks and industrial estates

In 2012 eleven of these two types of sites were surveyed, four within the Sydney urban area, four within the Lower Hunter, one in the Illawarra and one in Dubbo. Summary vehicle trip generation rates were as follows:

Weekday Rates	Sydney Average	Sydney Range	Regional Average	Regional Range
AM peak (1 hour) vehicle trips per 100 m ² of GFA.	0.52	0.15-1.31	0.70	0.32-1.20
PM peak (1 hour) vehicle trips per 100 m ² of GFA.	0.56	0.16-1.50	0.78	0.39-1.30
Daily total vehicle trips	4.60	1.89-10.47	7.83	3.78-11.99

In order to more accurately estimate the likely trip generation of future development in the proposed estate a traffic survey has been carried out for an existing industrial area at the southern end of Christensen Road. This area was selected because:

- It comprises a range of industrial users which are representative of what may occupy the subject site. It is a dead end area so that only trips generated by the land uses within that catchment were recorded.
- The area is in the same area as the subject site and would therefore exhibit similar travel characteristics.
- The size of the surveyed catchment is similar to the subject site.

As shown below, the results of the analysis indicate a peak hour traffic generation potential of **approximately 0.21 trips / 100m² GFA / peak hour, and 2 trips / 100m² GFA / day.**

Surveyed area:	266,224m ²
Floor area estimate:	119,800m ² (estimate 45% floor coverage factor)
Daily vehicle trips:	1,300 trips per day
Peak hour vehicle trips:	245 trips per peak hour.

Detailed area calculations and the traffic survey results are shown in Appendix D.

The above rate is within the range of trip generation rates surveyed by the NSW RMS for the Sydney area.

Furthermore, in 2015, RTG in conjunction with Griffith University carried out trip generation surveys at a range of industrial developments located across the Gold Coast, Logan and Brisbane. The purpose of the study was to review the trip generation of various types of industrial developments and considering the locational characteristics of each. Of relevance is the Motorway Circuit catchment, which is considered to be similar to the proposal, given:

- The lot sizes are comparable;
- The zoning is the same (Low Impact Industry);
- It is located in the same area;
- The catchment comprises a mix of small warehouse tenancies and manufacturers.

The Motorway Circuit catchment has a total gross floor area of approximately 45,000m². As shown in Appendix G, Motorway Circuit carries in the order of 1,900 vehicles per day and 190 vehicles per hour. **This equates to a trip generation rate of approximately 0.42 trips / 100m² GFA / peak hour, and 4 trips / 100m² GFA / day.** It is considered that this rate should be adopted for the purposes of the sensitivity analysis.

4.2 Development Trip Generation

Potential floor areas have been estimated through application of a 45% site coverage. Resultant estimates of development trip generation estimates are provided below.

The resultant traffic estimates and calculations for the sensitivity analysis are shown in Appendix F, with the summary of the development trip estimates (based on the 0.21 trips per 100m²) shown below in Table 4.1.

Table 4.1 – Estimated Development Peak Hour Traffic Generation (overall estate)

Stage	Lot Area (m2)	GFA (m2)	Morning Peak Hour			Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Cat A (STAGE 1)	115,945	52,175	71	39	110	22	88	110
Cat B (STAGE 2)	288,165	129,674	176	96	272	54	218	272
Cat C (STAGE 3)	91,992	41,396	56	31	87	17	70	87
Cat D (STAGE 4)	10,750	4838	7	3	10	2	8	10
OVERALL ESTATE	506,852	228,083	310	169	479	95	384	479

Assumes 45% site cover

Peak Hour Distribution: AM Peak 65 / 35, PM Peak 20/80

4.3 Development Trip Distribution

To be consistent with the Hyder Consulting report submitted with the Development Application, it is assumed that development traffic will distribute throughout the road network in accordance with the following splits:

- 80% to and from the Pacific Motorway
- 20% to and from the east via the Stapylton – Jacob’s Well Road.

Further, it is assumed that development traffic would distribute evenly to the north and south on the Pacific Motorway. It is noted that some traffic will use Christensen Road to access Burnside Road to the south, when Christensen Road is extended in the future. Furthermore, the proposed internal road network will allow some non-development traffic to travel between the Stapylton – Jacob’s Well Road and Christensen Road without using the eastern roundabout at the Yatala North interchange.

Resultant estimates of peak hour development traffic volumes are shown in Figure 4.2. As shown, a different distribution has been applied for Stages 1, 2 and 3 / 4, to allow for the change in road network conditions. That is, the distribution has been adjusted to allow for the proposed connection between Christensen Road and the Stapylton – Jacobs Well Road.

The development traffic distribution rates have been maintained as per the current approval prepared by Hyder Consulting. Consistently with the approved traffic assessment, it is estimated that approximately 60% of development traffic will distribute via Stapylton Jacobs Well Road, with the balance distributing on Christensen Road.

The traffic distribution at each road frontage is estimated to be as follows:

Stapylton – Jacob’s Well Road

To / from the west (via the interchange):	80%
To / from the east:	20%

Christensen Road

To / from the north (via the interchange):	85%
To / from the east:	15%

The development traffic estimates at each intersection are presented in Figure 4.1 and 4.2, with the full traffic estimate at the Yatala Interchange (Exit 38) shown in Figure 4.3.

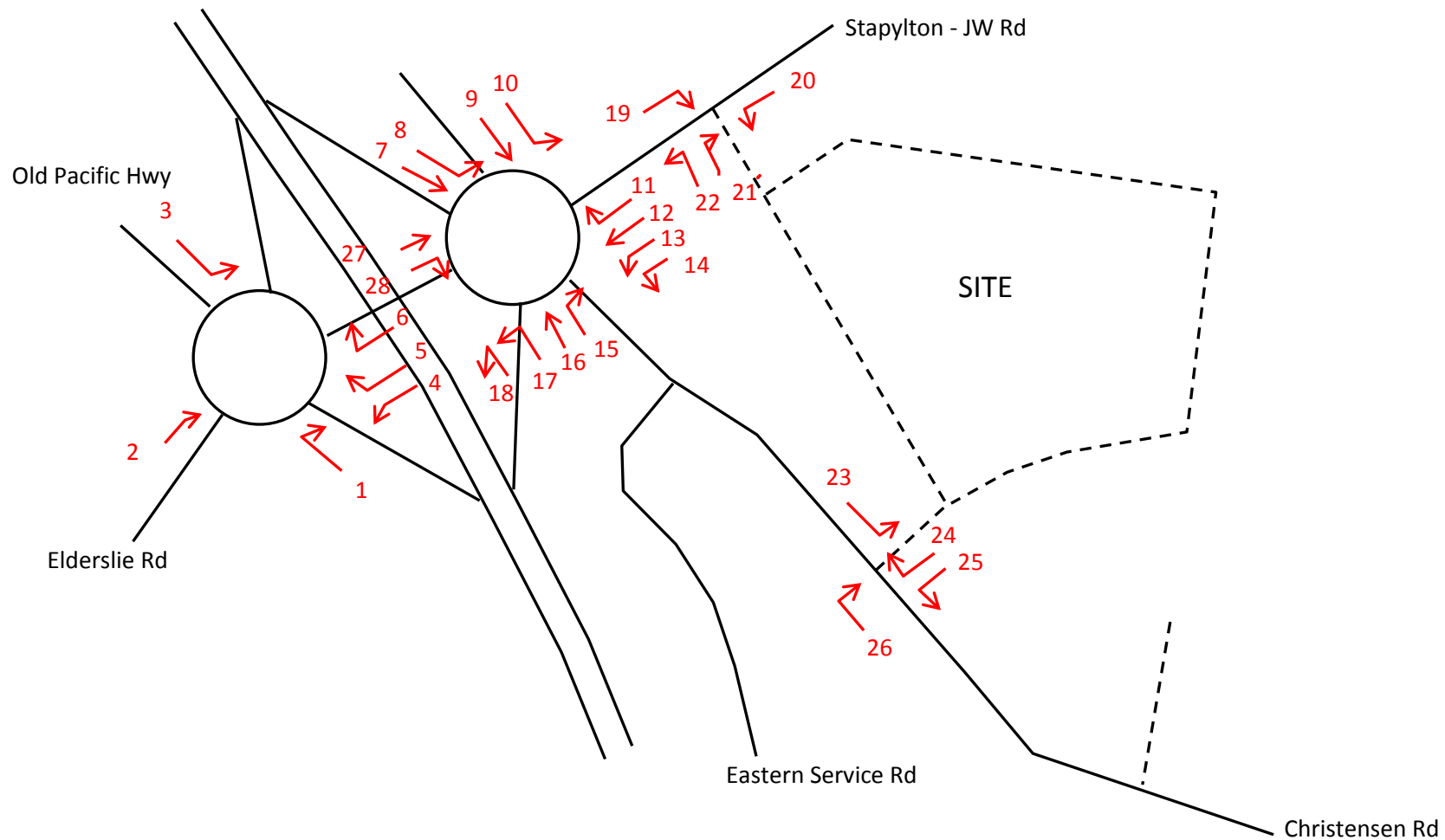


FIGURE 4.1 – KEY DIAGRAM FOR FIG 4.2

Morning peak hour

Development Stage	Intersection movement (refer to Figure 4.1)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Distribution stage 1	0.33	0.1	0.02	0.1	0.02	0.33	0	0.31	0	0.04	0.02	0.45	0.35	0.1	0.1	0	0	0	0.8	0.2	0.2	0.8	N/A	N/A	N/A	N/A	0.45	0
Distribution stage 2	0.33	0.1	0.02	0.1	0.02	0.33	0.12	0.19	0.02	0.02	0.05	0.3	0.25	0	0	0.05	0.18	0.07	0.48	0.2	0.2	0.48	N/A	N/A	N/A	N/A	0.27	0.18
Distribution stages 3 / 4	0.33	0.1	0.02	0.1	0.02	0.33	0.31	0	0.04	0	0	0	0	0	0	0.04	0.35	0.41	0	0.2	0.2	0	N/A	N/A	N/A	N/A	0	0.41
Surveyed 2018 Vol	248	232	91	652	100	267	197	234	38	60	63	273	95	31	14	36	140	24	0	0	0	0	N/A	N/A	N/A	N/A	245	176
Estimated Year 2020	263	246	96	691	106	283	209	248	40	64	67	289	101	33	15	38	148	25	0	0	0	0	N/A	N/A	N/A	N/A	260	187
Estimated Year 2023	294	275	108	774	119	317	234	278	45	71	75	324	113	37	17	43	166	28	0	0	0	0	N/A	N/A	N/A	N/A	291	209
STAGE 1	23	7	1	4	1	13	0	22	0	3	1	18	14	4	4	0	0	0	57	14	8	31	N/A	N/A	N/A	N/A	32	0
STAGE 2	58	18	4	10	2	32	21	33	4	4	5	29	24	0	0	5	17	7	84	35	19	46	N/A	N/A	N/A	N/A	48	32
STAGE 3 & 4	21	6	1	6	1	21	20	0	3	0	0	0	0	0	0	3	22	26	0	13	13	0	N/A	N/A	N/A	N/A	0	26
STAGES 1 & 2	82	25	5	14	3	45	21	55	4	6	6	46	38	4	4	5	17	7	141	49	27	77	N/A	N/A	N/A	N/A	79	32
ALL STAGES	102	31	6	20	4	65	41	55	6	6	6	46	38	4	4	7	39	33	141	62	40	77	N/A	N/A	N/A	N/A	79	58
% STAGE 1	8.9%	2.9%	1.5%	0.6%	0.7%	4.5%	0.0%	8.9%	0.0%	4.5%	1.2%	6.1%	13.6%	11.9%	26.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.3%	0.0%
% STAGES 1 & 2	31.0%	10.0%	5.1%	2.0%	2.5%	15.7%	10.1%	22.4%	8.7%	10.0%	8.4%	16.0%	37.4%	11.9%	26.3%	12.6%	11.6%	26.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	30.6%	17.0%
% ALL STAGES	34.7%	11.3%	5.7%	2.6%	3.3%	20.6%	17.4%	20.0%	13.4%	8.9%	7.5%	14.3%	33.4%	10.6%	23.5%	17.1%	23.7%	114.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	27.3%	27.5%

Afternoon peak hour

Development Stage	Intersection movement (refer to Figure 4.1)																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Distribution stage 1	0.33	0.1	0.02	0.1	0.02	0.33	0	0.31	0	0.04	0.02	0.45	0.35	0.1	0.1	0	0	0	0.8	0.2	0.2	0.8	N/A	N/A	N/A	N/A	0.45	0
Distribution stage 2	0.33	0.1	0.02	0.1	0.02	0.33	0.12	0.19	0.02	0.02	0.05	0.3	0.25	0	0	0.05	0.18	0.07	0.48	0.2	0.2	0.48	N/A	N/A	N/A	N/A	0.27	0.18
Distribution stages 3 / 4	0.33	0.1	0.02	0.1	0.02	0.33	0.31	0	0.04	0	0	0	0	0	0	0.04	0.35	0.41	0	0.2	0.2	0	N/A	N/A	N/A	N/A	0	0.41
Surveyed 2018 Vol	133	386	121	485	104	548	58	201	31	79	89	404	183	23	15	71	284	76	0	0	0	0	N/A	N/A	N/A	N/A	144	68
Estimated Year 2020	141	409	128	514	110	581	61	213	33	84	94	428	194	24	16	75	301	81	0	0	0	0	N/A	N/A	N/A	N/A	153	72
Estimated Year 2023	158	458	144	576	123	651	69	239	37	94	106	480	217	27	18	84	337	90	0	0	0	0	N/A	N/A	N/A	N/A	171	81
STAGE 1	7	2	0	9	2	29	0	7	0	1	2	40	31	9	9	0	0	0	18	4	18	70	N/A	N/A	N/A	N/A	10	0
STAGE 2	18	5	1	22	4	72	6	10	1	1	11	65	55	0	0	11	39	15	26	11	44	105	N/A	N/A	N/A	N/A	15	10
STAGE 3 & 4	6	2	0	2	0	6	6	0	1	0	0	0	0	0	0	1	7	8	0	4	4	0	N/A	N/A	N/A	N/A	0	8
STAGES 1 & 2	25	8	2	31	6	101	6	17	1	2	13	105	85	9	9	11	39	15	44	15	61	175	N/A	N/A	N/A	N/A	24	10
ALL STAGES	31	10	2	33	7	107	12	17	2	2	13	105	85	9	9	12	46	23	44	19	65	175	N/A	N/A	N/A	N/A	24	18
% STAGE 1	5.1%	0.5%	0.3%	1.7%	1.6%	5.0%	0.0%	3.2%	0.0%	1.1%	1.9%	9.2%	15.9%	36.1%	55.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.5%	0.0%
% STAGES 1 & 2	17.8%	1.9%	1.2%	6.0%	5.6%	17.4%	10.5%	8.0%	3.3%	2.3%	13.4%	24.5%	44.0%	36.1%	55.3%	14.5%	13.0%	18.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	13.5%
% ALL STAGES	19.9%	2.1%	1.3%	5.6%	5.3%	16.5%	18.0%	7.2%	5.0%	2.1%	12.0%	21.9%	39.3%	32.2%	49.4%	13.8%	13.6%	25.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.3%	21.7%

FIGURE 4.2 – TRAFFIC GENERATION & % IMPACT CALCULATIONS

5.0 ROAD NETWORK IMPACT

5.1 General

As shown in Figure 4.2, the traffic generation of the proposed development will exceed 5% of background traffic volumes at the Exit 38 interchange. On this basis, a detailed analysis of impacts is required to identify any mitigation works warranted.

Traffic modelling using SIDRA software has been carried out to determine the performance of the intersections under current and project future conditions, and identify upgrade works required to mitigate the impact of the proposal.

In accordance with Section 3.5 and Table 4 of the Guide to Traffic Impact Assessments (2017), the assessment is required to examine impacts for the anticipated year of opening of each stage and the final stage. For the purposes of this assessment it has been assumed that the first stage of development would be completed by the year 2020, and the full development by the year 2023.

It is proposed that the estate access intersection with the Stapylton – Jacob's Well Road be constructed to its ultimate layout (two through lanes in each direction plus turning lanes / traffic signal control) prior to the commencement of stage 1. This new intersection will benefit the operation of the eastern intersection at the Exit 38 interchange by 'metering' the westbound traffic flow on the Stapylton – Jacob's Well Road. The proposal to provide a new road link (through the site) linking Christensen Road to the Stapylton – Jacob's Well Road will also provide a significant improvement to the local road network, as traffic will be able to move between these roads without using the Exit 38 interchange.

5.2 SIDRA Modelling

The proposed signalised intersection with the Stapylton – Jacob's Well Road will improve the operation of the eastern roundabout at the Exit 38 interchange by bunching the traffic flow in the westbound direction. This has been reflected in the modelling by implementing a 15% bunching factor.

As discussed in Section 4.0, the Year 2023 model (with the full development) allows for the internal connection to Christensen Road and Stapylton – Jacob's Well Road. Numerous iterations to the SIDRA modelling indicates that the following works would mitigate the impact of the proposed development :

- The introduction of the proposed signalised intersection at the estate access (resulting in bunching in the westbound approach to the eastern roundabout).
- A second lane be provided in the northbound Off- Ramp approach to the western roundabout ;
- A second departure lane be provided on the Stapylton – Jacob's Well Road leg of the eastern roundabout ;
- A second approach lane be provided in the Christensen Road approach to the eastern roundabout.

Concept drawings of these modifications are shown in Figures 5.1 – 5.2.

SIDRA modelling at the Exit 38 interchange has been carried out for the following scenarios :

ESTIMATED TRIP GENERATION OF SITE

- Year 2020 AM and PM peak hour conditions, without the proposed development ;
- Year 2020 AM and PM peak hour conditions, with proposed road conditions and Stage 1 traffic;
- Year 2020 AM and PM peak hour conditions, with proposed road conditions and Stage 2 traffic;
- Year 2023 AM and PM peak hour conditions, without the proposed development ;
- Year 2023 AM and PM peak hour conditions, with the proposed road conditions and the full development.

SENSITIVITY ANALYSIS

- Year 2020 AM and PM peak hour conditions, with proposed road conditions and Stage 1 traffic;
- Year 2020 AM and PM peak hour conditions, with proposed road conditions and Stage 2 traffic;
- Year 2023 AM and PM peak hour conditions, with the proposed road conditions and the full development.

Criteria for interpreting the SIDRA results are provided in Appendix H.

Detail results of the SIDRA modelling for the development trips and the sensitivity analysis are provided as Appendix H and I. Summarised result of the SIDRA assessment are provided below in Table 5.1. and 5.2 respectively:

Table 5.1 – Summary of SIDRA Results (0.21 Trip Generation Rate)

Intersection:	Year / Period	Location Intersection	Development	Overall Degree of Saturation	Overall Level of Service	Critical Queue (m)	Off – Ramp Queuing (m)
Western	2020 AM	Existing	None	0.883	C	236	236
	2020 PM	Existing	None	0.750	B	126	18
	2023 AM	Existing	None	0.970	E	685	685
	2023 PM	Existing	None	0.797	B	147	22
	2020 AM	Existing	Stage One	0.905	C	345	320
	2020 PM	Existing	Stage One	0.764	B	137	19
	2020 AM	Upgrade B	Stage Two	0.778	B	194	38
	2020 PM	Upgrade B	Stage Two	0.782	B	157	17
	2023 AM	Upgrade B	Full	0.814	B	238	67
	2023 PM	Upgrade B	Full	0.855	B	188	20
Eastern	2020 AM	Existing	None	0.659	A	52	27
	2020 PM	Existing	None	1.101	D	471	20
	2023 AM	Existing	None	0.698	B	56	40
	2023 PM	Existing	None	1.378	F	1364	25
	2020 AM	Upgrade A	Stage One	0.666	A	60	28
	2020 PM	Upgrade A	Stage One	1.019	C	195	20
	2020 AM	Upgrade B	Stage Two	0.670	A	68	38
	2020 PM	Upgrade B	Stage Two	0.753	B	99	22
	2023 AM	Upgrade B	Full	0.911	C	213	213
	2023 PM	Upgrade B	Full	0.934	C	161	53

Table 5.2 – Summary of SIDRA Results (SENSITIVITY ANALYSIS)

Intersection:	Year / Period	Location Intersection	Development	Overall Degree of Saturation	Overall Level of Service	Critical Queue (m)	Off – Ramp Queuing (m)
Western	2020 AM	Existing	Stage One	0.917	D	428	428
	2020 PM	Existing	Stage One	0.777	B	149	20
	2023 AM	Upgrade B	Full	0.801	B	245	136
	2023 PM	Upgrade B	Full	0.920	C	228	27
Eastern	2020 AM	Upgrade A	Stage One	1.065	C	353	21
	2020 PM	Upgrade A	Stage One	0.658	A	66	33
	2020 AM	Upgrade B	Stage Two	0.751	B	62	43
	2020 PM	Upgrade B	Stage Two	0.898	B	124	25
	2023 AM	Upgrade B	Full	1.040	F	1079	884
	2023 PM	Upgrade B	Full	1.127	F	909	75

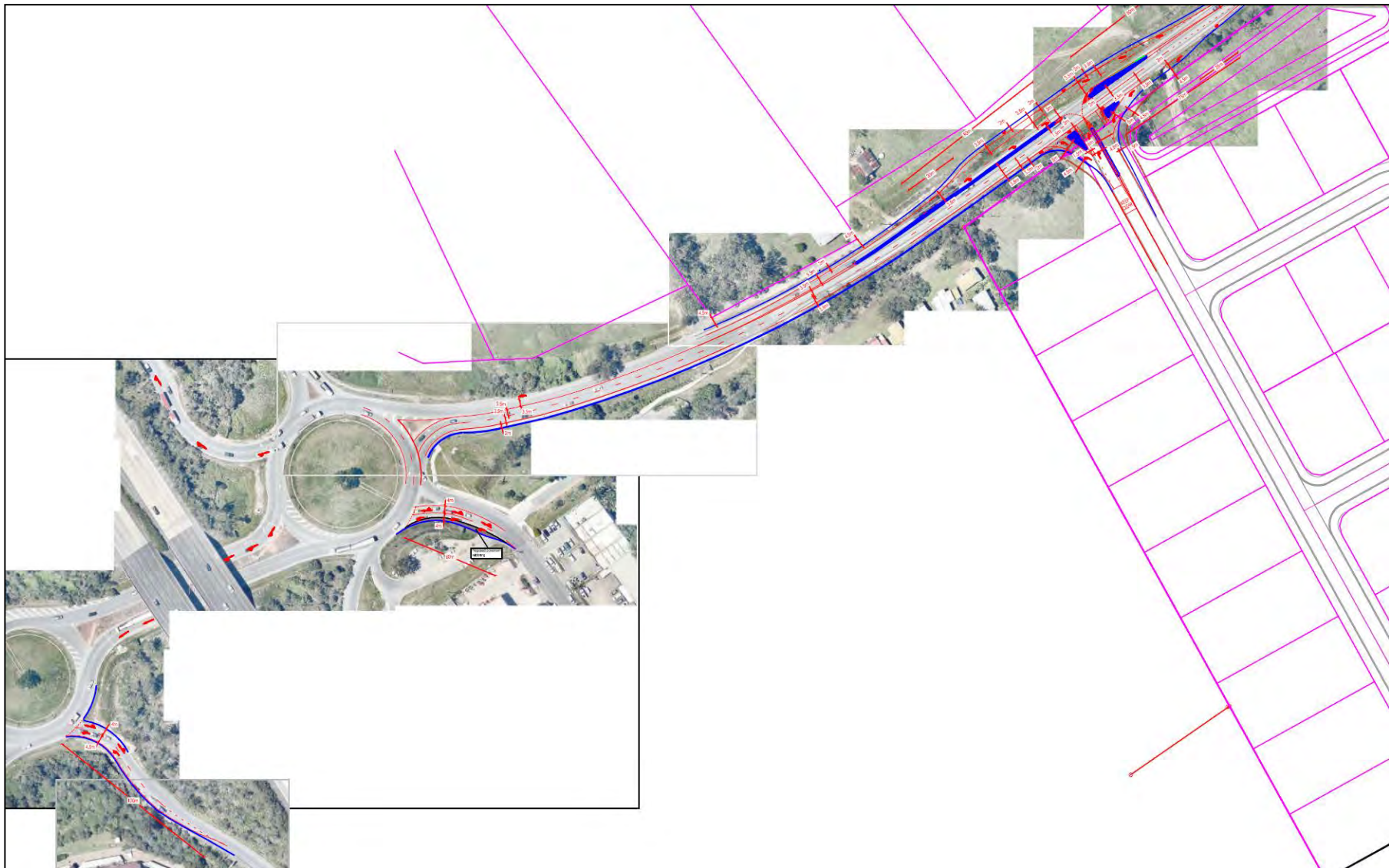


FIGURE 5.1 – PROPOSED INTERSECTION ARRANGEMENTS

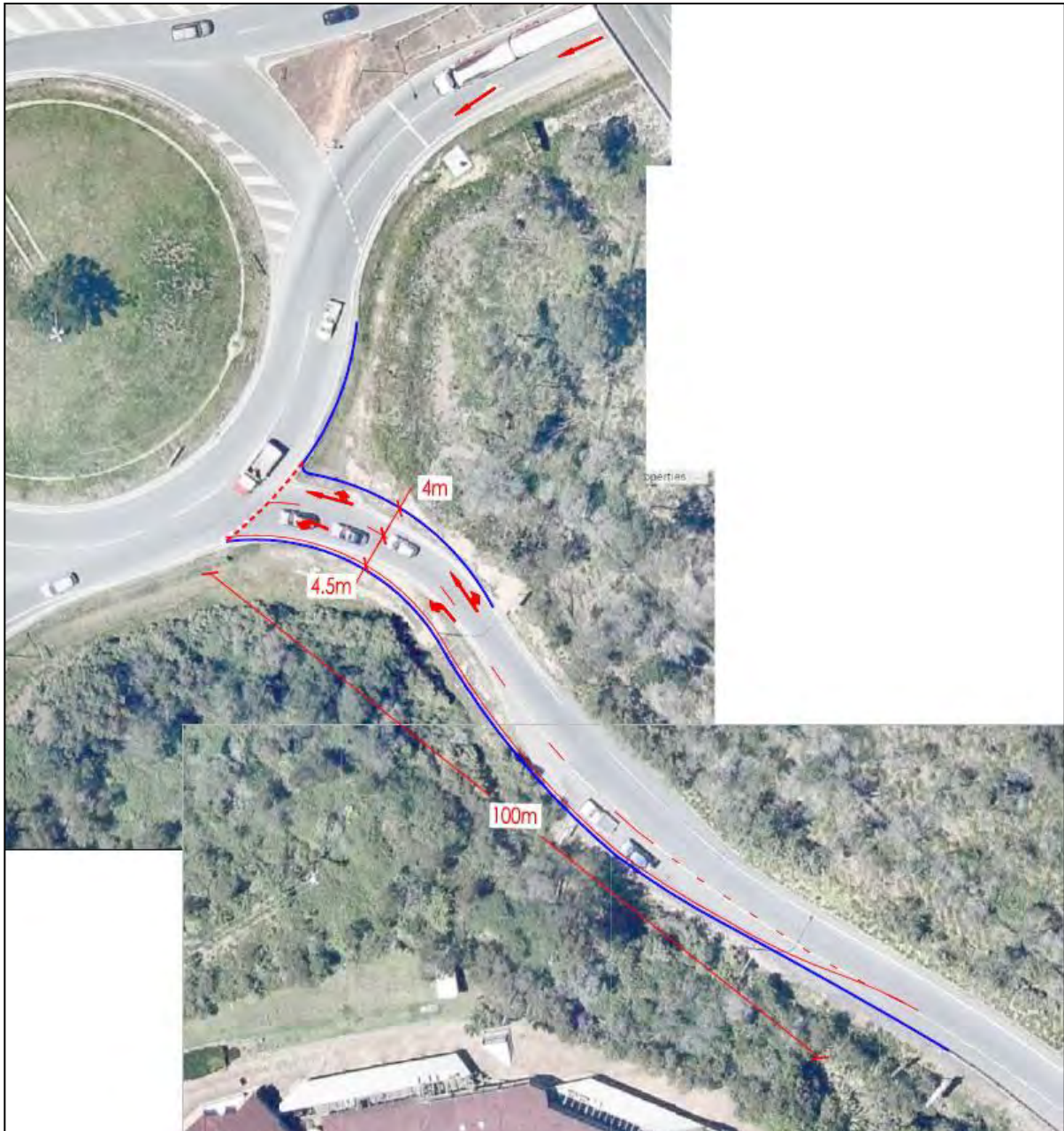


FIGURE 5.2 – PROPOSED INTERSECTION ARRANGEMENTS

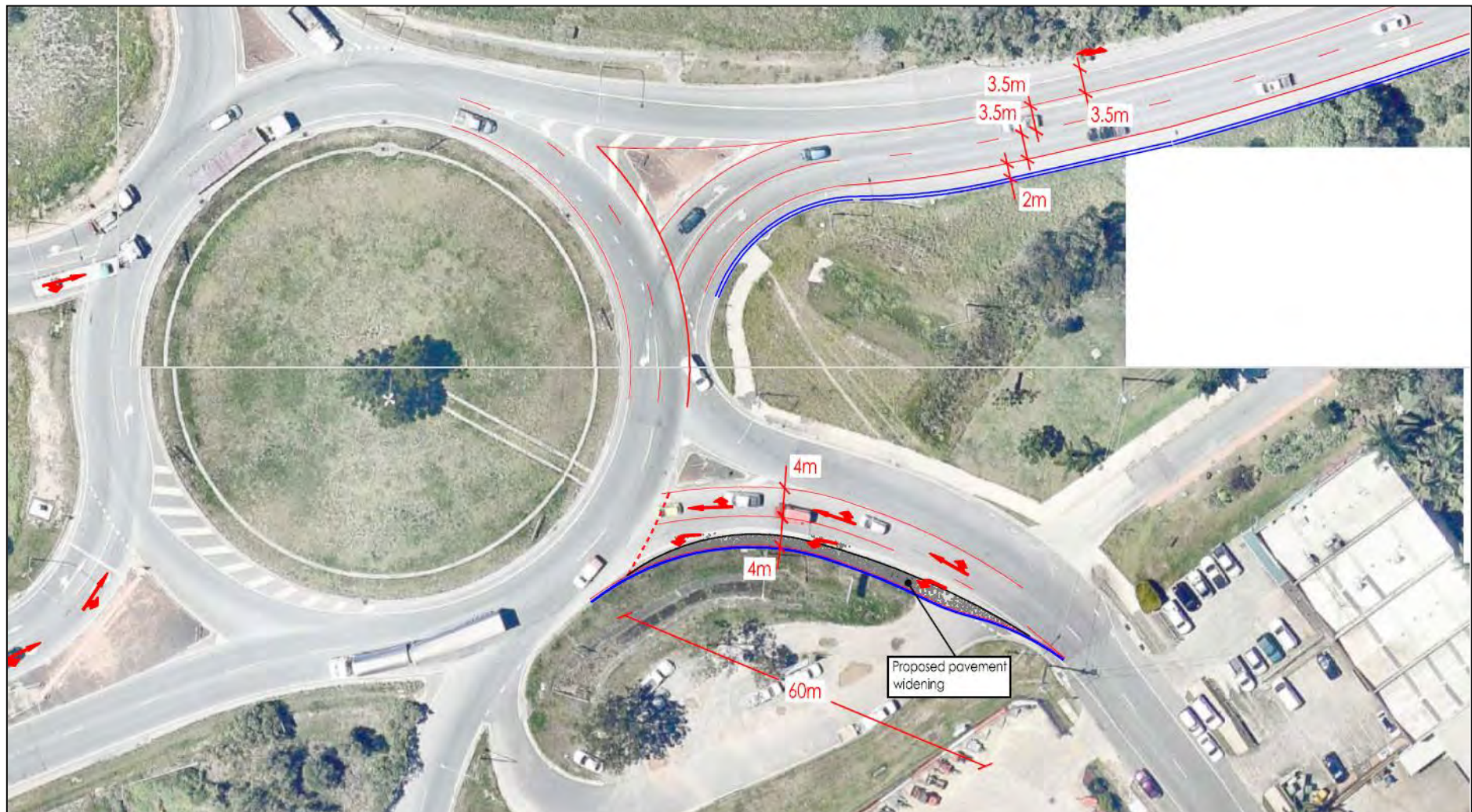


FIGURE 5.3 – PROPOSED INTERSECTION ARRANGEMENTS



FIGURE 5.4 – SIGHT DISTANCE AT PROPOSED ACCESS POINT

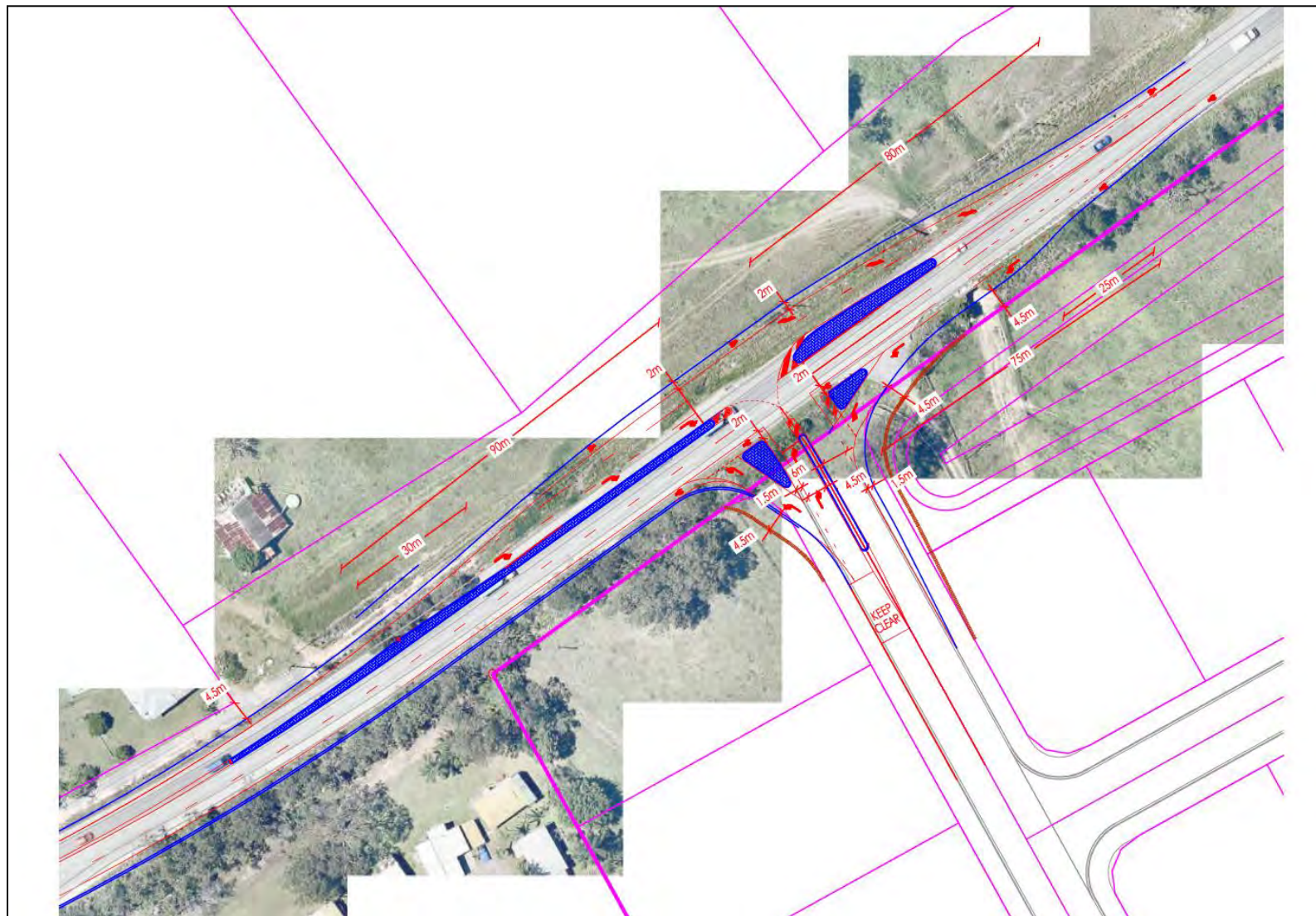


FIGURE 5.5 –PROPOSED ACCESS INTERSECTION WITH STAPYLTON JACOBS WELL ROAD

5.3 Timing of Works and Contributions

It is proposed that the following works be carried out prior to the completion of Stage 1 (UPGRADE A):

- Construction of the proposed access intersection to its ultimate four lane profile, including traffic signals.
- Extension of the second approach lane on Stapylton Jacobs Well Road between the new intersection and the eastern roundabout at the interchange.

The following works are proposed to be completed prior to the completion of Stage 2 (UPGRADE B):

- Construction of second approach lane in Christensen Road approach to the eastern roundabout.
- Construction of the second approach lane on the northbound off ramp (western side of Exit 38 interchange).

As previously discussed, the modelling has identified that the addition of a second departure lane on the Stapylton Jacobs Well Road leg of the eastern roundabout would mitigate the impact of the balance of the development. However, it is not proposed that these works be carried out as they are not consistent with TMR's future planning for the interchange. As an alternative, it is proposed that the cost of these works be contributed by the Applicant, to be paid prior to the ceiling of Stage 3 of the project. Gassman Development Perspectives have estimated the cost of these works at \$720,000.

6.0 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

- The subject site is located on the southern side of Stapylton Jacobs Well Road. The subject site is identified as Lot 1 on RP6882 and Lot 240 on W31330, and has an approximate site area of 62.65 hectares.
- It is proposed that the estate will be developed over four stages. The proposed plan of development allows for future road connections to the adjoining properties to the east which will occur in due course. It is proposed that primary access be gained via a single signalised intersection on the Stapylton – Jacob's Well Road. A road connection linking Stapylton Jacobs Well Road to Christensen Road will be constructed as part of the overall project. Stages 3 and 4 will gain access from Christensen Road.
- The intention of the report is to re-assess the impacts upon the surrounding State – controlled road network, with a view to achieving a more practical outcome with respect to road network upgrade requirements. More accurate trip generation data has been adopted through a survey of similar uses in the surrounding area. This approach is recommended by the GARID and other sources such as the NSW RMS Guide to Traffic Generating Developments.
- It is noted that other approvals in the area have either not been required to contribute to the surrounding road network or only been required to make minor contributions to a similar scale recommended in this report (Refer to Section 1.3).
- The impact of the proposed development upon the surrounding State controlled road network has been carried out in accordance with the Guide to Traffic Impacts Assessments (2017). The analysis has been carried out using up to date traffic count data (January 2018).
- The Exit 38 interchange has recently been upgraded to include an additional approach lane on the Elderslie Road approach to the western roundabout, an additional lane on the Stapylton Jacobs Well Road approach to the eastern roundabout. In addition, signal metering has been implemented on the Elderslie Road approach (underpass) to each roundabout. These upgrades have significantly improved conditions at the interchange and in particular reduced queuing on the north and southbound off ramps.
- It is proposed that a new signalised intersection be constructed on Stapylton Jacobs Well Road, serving as the primary access point to the new estate. Secondary access will be gained off Christensen road in due course as the estate develops. A new internal connection road will link Stapylton Jacobs Well Road to Christensen Road upon completion of the project. This future link road will significantly benefit the local area by allowing local traffic to move between Stapylton Jacobs Well Road and Christensen Road without using the Exit 38 interchange.

- The design of the proposed new signalised intersection on Stapylton Jacobs Well Road is consistent with TMR's future planning, and therefore will contribute to such works. The introduction of the signalised intersection during the initial stage of the intersection will also benefit the performance of the eastern roundabout at the Exit 38 interchange by 'bunching' the traffic flow in the westbound direction.
- The SIDRA modelling has identified some upgrade works required to mitigate the impact of the development. These works comprise of an additional lane on the northbound off-ramp to the western roundabout; an additional lane in the Christensen Road approach to the eastern roundabout; an additional departure lane on the Stapylton Jacobs Well leg of the eastern roundabout. These works will mitigate the impact of the proposal so that the various intersections function satisfactorily.
- The works proposed to be carried out as part of the project are consistent with TMR's planning for the local area and will benefit the performance of the Motorway interchange and benefit the local area by providing improved connectivity for local traffic. A monetary contribution is proposed in lieu of works that are not consistent with future planning.
- It is proposed that the required mitigation works be carried out in accordance with the timing discussed in Section 5.3. A monetary contribution is proposed to be made to mitigate the impact of traffic generated by the stages 3 and 4 of the development. This contribution (\$ 720,000) will be made prior to sealing of the Stage 3 subdivision plan.

APPENDICES

APPENDIX A – RPEQ CERTIFICATION
APPENDIX B – TMR CONCEPT PLANNING FOR THE STAPYLTON-JACOB'S WELL ROAD
APPENDIX C – 2018 TRAFFIC COUNT DATA (M1 EXIT 38 INTERCHANGE)
APPENDIX D – SURVEY OF IMMEDIATE CATCHMENT TO THE PROPOSED DEVELOPMENT
APPENDIX E – SURVEYED TRIP GENERATION DATA (RTE / GRIFFITH UNIVERSITY)
APPENDIX F – SENSITIVITY ANALYSIS CALCULATIONS
APPENDIX G – CRITERIA FOR INTERPRETING THE SIDRA RESULTS
APPENDIX H – DETAIL SIDRA RESULTS OF DEVELOPMENT TRAFFIC GENERATION
APPENDIX I – DETAIL SIDRA RESULTS OF SENSITIVITY ANALYSIS

APPENDIX A – RPEQ CERTIFICATION

CERTIFICATION OF TRAFFIC IMPACT ASSESSMENT REPORT REGISTERED PROFESSIONAL ENGINEER QUEENSLAND for

Project title:	
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As a professional engineer registered by the Board of Professional Engineers of Queensland pursuant to the *Professional Engineers Act 2002* as competent in my areas of nominated expertise, I understand and recognise:

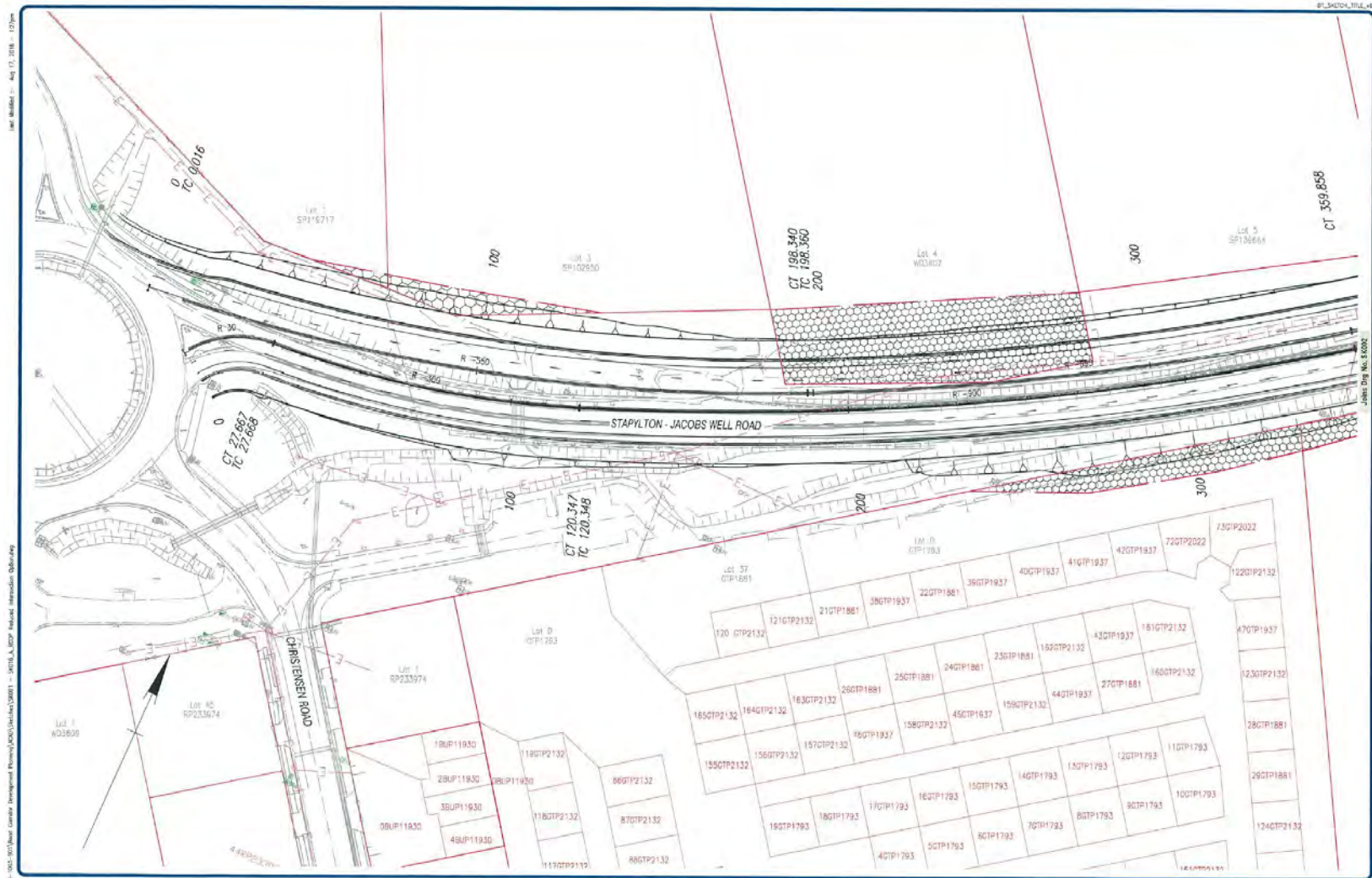
- the significant role of engineering as a profession, and that
- the community has a legitimate expectation that my certification affixed to this engineering work can be trusted, and that
- I am responsible for ensuring its preparation has satisfied all necessary standards, conduct and contemporary practice.

As the responsible RPEQ, I certify:

- I am satisfied that all submitted components comprising this traffic impact assessment, listed in the following table, have been completed in accordance with the Guide to Traffic Impact Assessment published by the Queensland Department of Transport and Main Roads and using sound engineering principles, and
- where specialised areas of work have not been under my direct supervision, I have reviewed the outcomes of the work and consider the work and its outcomes as suitable for the purposes of this traffic impact assessment, and that
- the outcomes of this traffic impact assessment are a true reflection of results of assessment, and that
- I believe the strategies recommended for mitigating impacts by this traffic impact assessment, embrace contemporary practice initiatives and will deliver the desired outcomes.

Name:	Luke Rytenskild	RPEQ No:	6293
RPEQ competencies:	Civil Engineer (Traffic Engineering)		
Signature:		Date:	13.4.18
Postal address:	Po Box 17 Surfers Paradise QLD 4217		
Email:	Luke@rytenskildtraffic.com		

APPENDIX B – TMR CONCEPT PLANNING FOR THE STAPYLTON-JACOB’S WELL ROAD



Comments:

Stapylton - Jacobs Well Road Corridor Development Planning
Reduced Intersections Option
Sheet 1 of 16

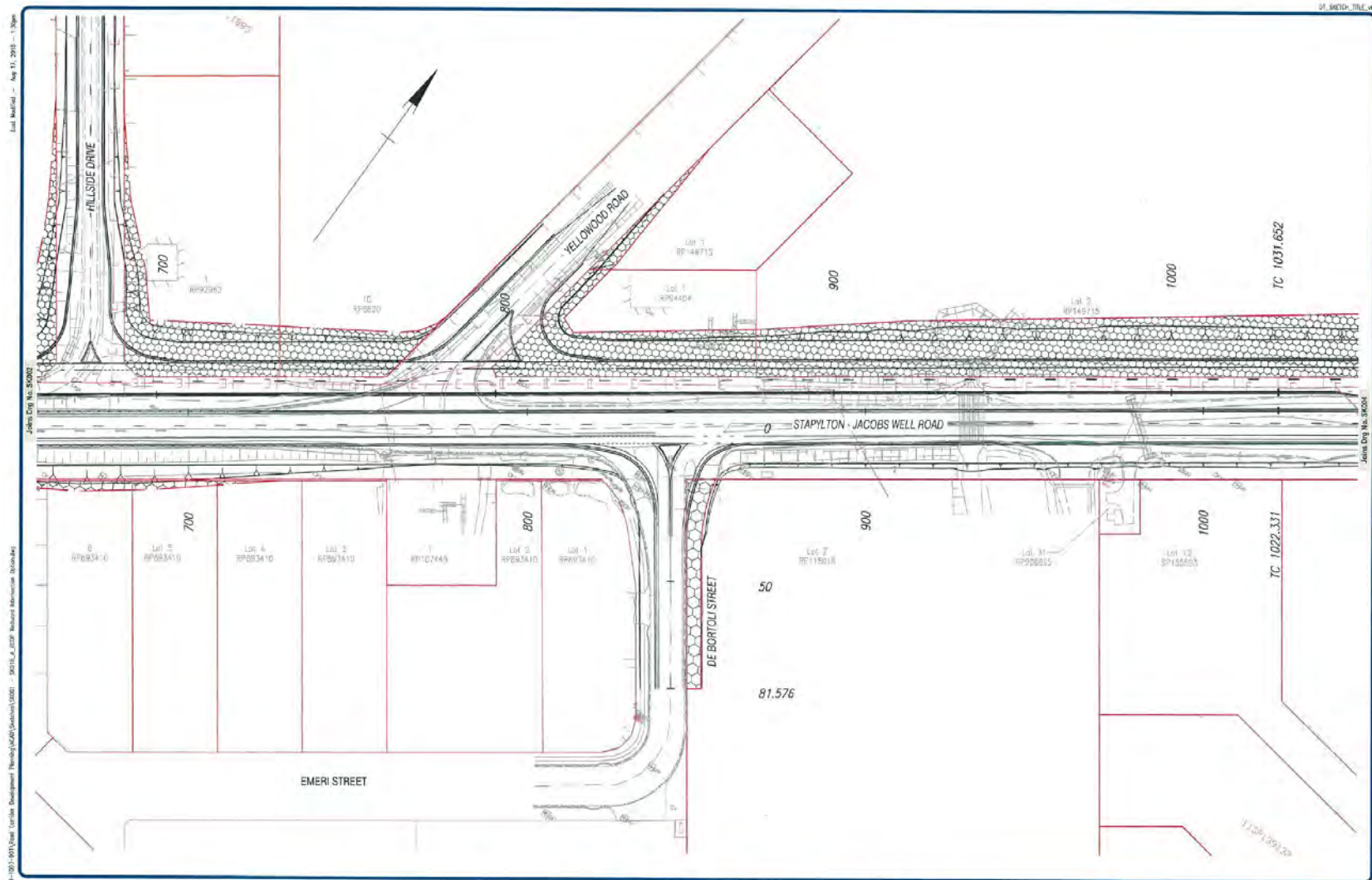


Drawing No. SK001 (A)
Drawn: S. READ
Design: S. READ
Engineer:



STAPYLTON - JACOBS WELL ROAD | 160 / 1003 / 901





Comments:

Stapylton - Jacobs Well Road Corridor Development Planning
Reduced Intersections Option
Sheet 3 of 16



Drawing No. SK003 (A)
Drawn: S. READ
Design: S. READ
Engineer:



STAPYLTON - JACOBS WELL ROAD | 160 / 1003 / 961

APPENDIX C – 2018 TRAFFIC COUNT DATA (M1 EXIT 38 INTERCHANGE)

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 1 Weather: Fine
Location: Stapylton-Jacobs Well Road/Old Pacific Highway/Stammore Road/M1 Ramps
Day/Date: Tuesday, 23 January 2018
Summary: AM Peak : Hour ending - 8:45 AM
PM Peak : Hour ending - 4:30 PM

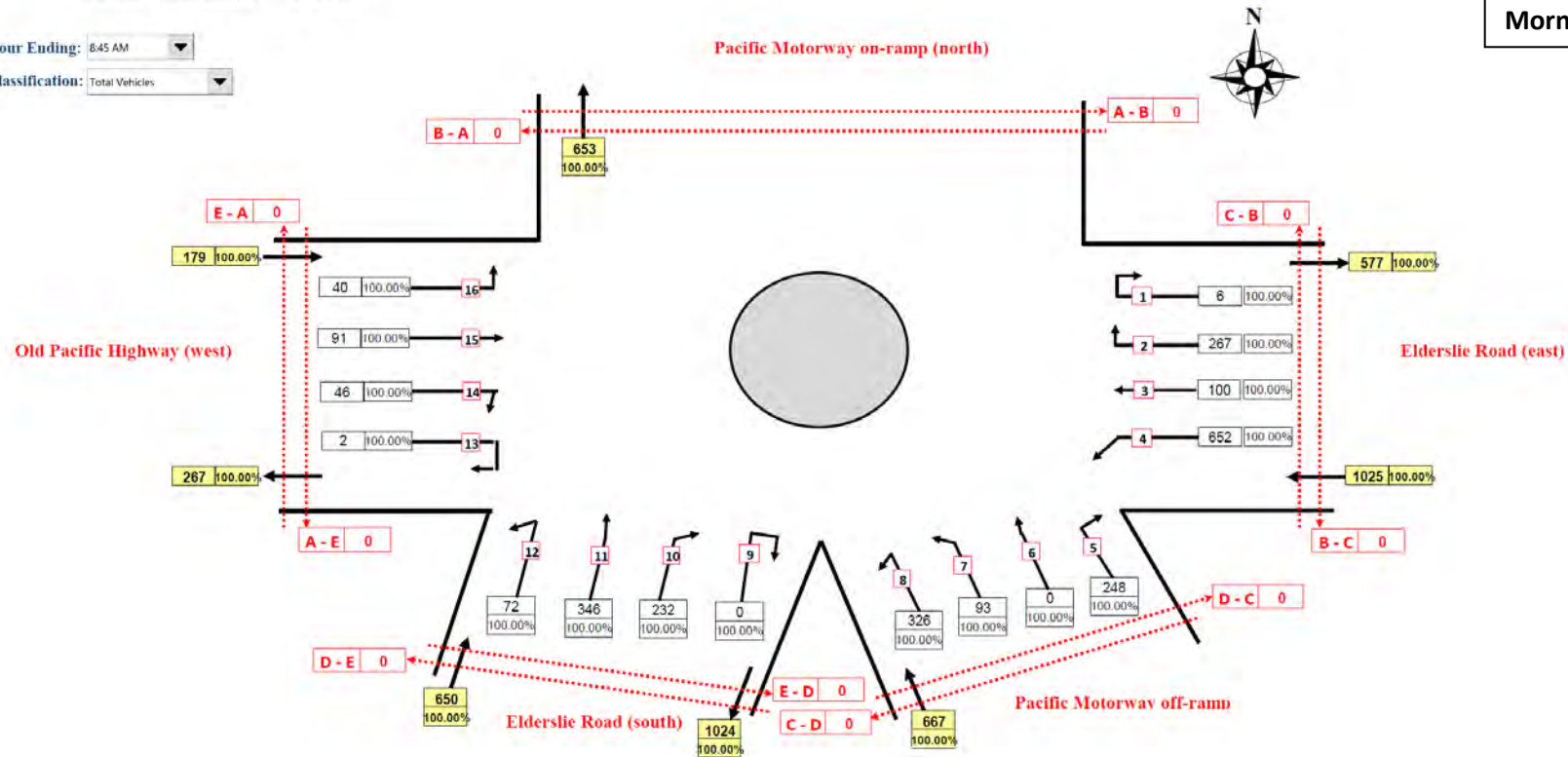
Hour Ending: 8:45 AM

Classification: Total Vehicles



Western Roundabout
Morning Peak Hour

Western Roundabout
Morning Peak Hour



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

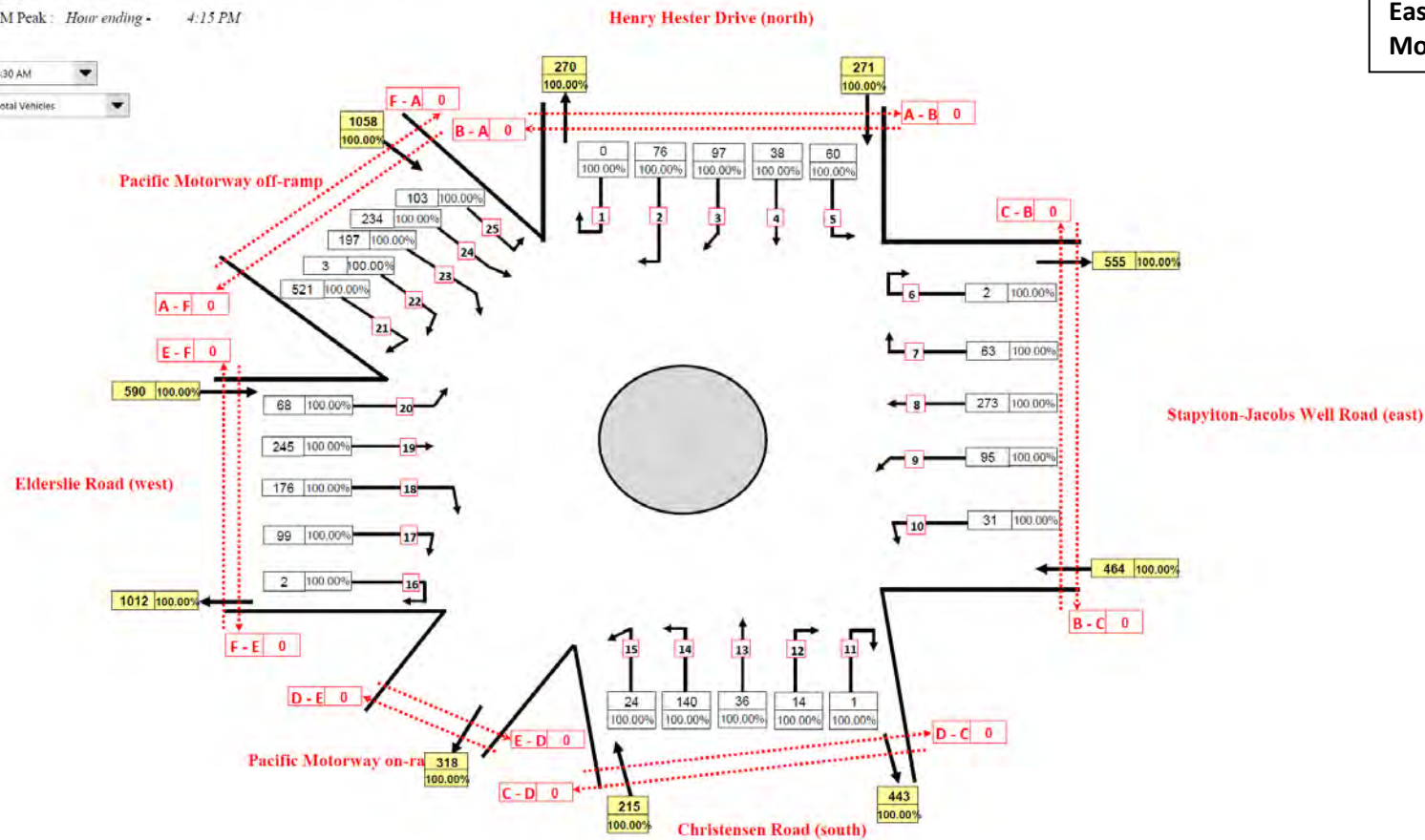
Site No.: 2 Weather: Fine
Location: Stapylton-Jacobs Well Road/Henry Hester Drive/Christensen Road/M1 Ramps
Day/Date: Tuesday, 23 January 2018
Summary: AM Peak : Hour ending - 8:30 AM
PM Peak : Hour ending - 4:15 PM

Hour Ending: 8:30 AM
Classification: Total Vehicles



Eastern Roundabout
Morning Peak Hour

Eastern Roundabout
Morning Peak Hour



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

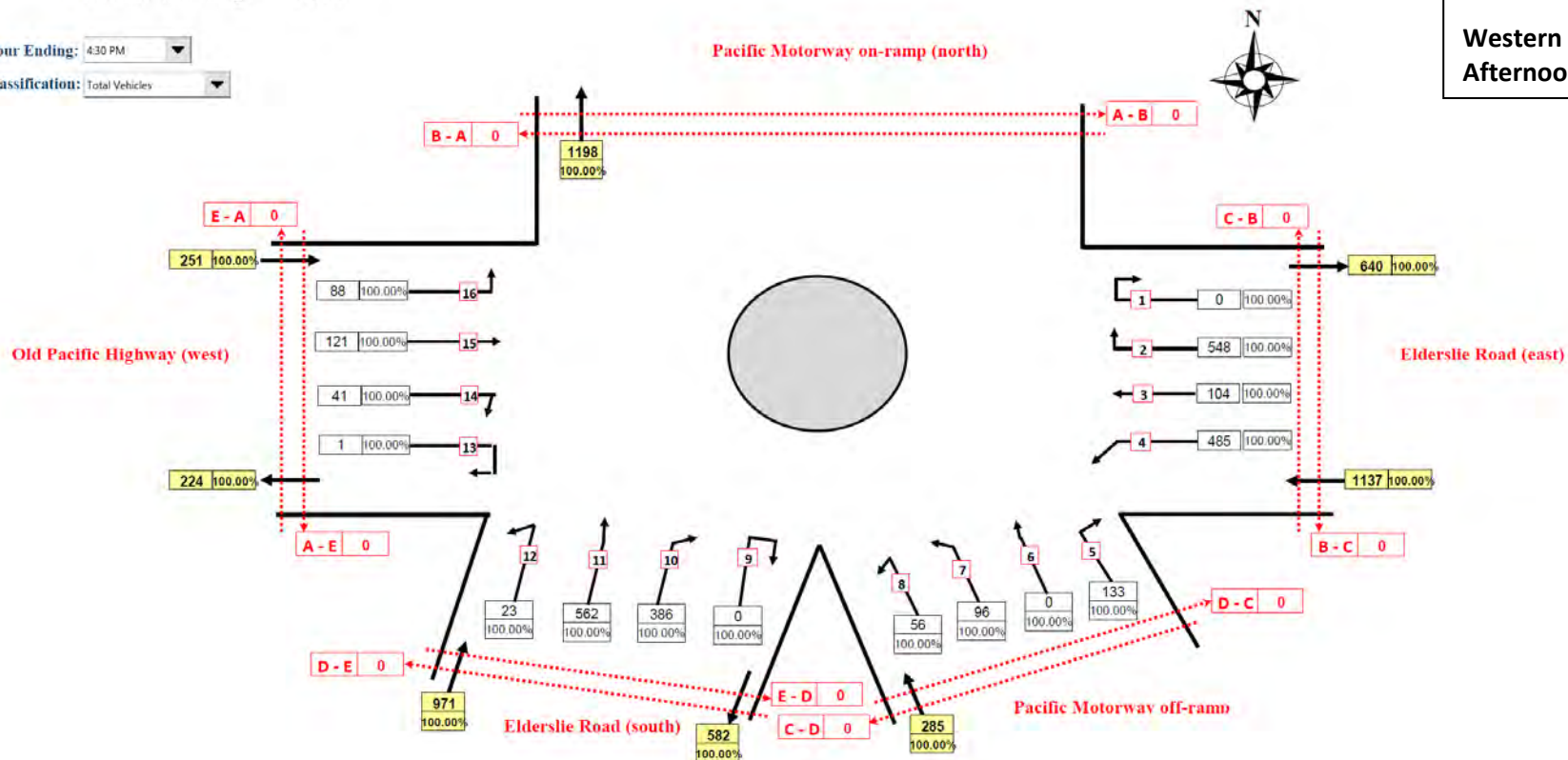


Site No.: 1 Weather: Fine
Location: Stapylton-Jacobs Well Road/Old Pacific Highway/Stannore Road/M1 Ramps
Day/Date: Tuesday, 23 January 2018
Summary: AM Peak : Hour ending - 8:45 AM
PM Peak : Hour ending - 4:30 PM

Hour Ending: 4:30 PM
Classification: Total Vehicles

Western Roundabout
Afternoon Peak Hour

Western Roundabout
Afternoon Peak Hour



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

APPENDIX D – SURVEY OF IMMEDIATE CATCHMENT TO THE PROPOSED DEVELOPMENT (CHRISTENSEN ROAD CATCHMENT)

AUTOMATIC TUBE COUNT OUTPUT

Weekly Vehicle Counts

WeeklyVehicle-29

Site: Christensen Rd Yatala.0.1NS
Description: Christensen Rd, Yatala just south of Maiella St
Filter time: 20:21 Sunday, 11 March 2018 => 21:52 Thursday, 15 March 2018
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

	Mon 12 Mar	Tue 13 Mar	Wed 14 Mar	Thu 15 Mar	Fri 16 Mar	Sat 17 Mar	Sun 18 Mar	Averages 1 - 5	1 - 7
Hour									
0000-0100	3	4	7	12	*	*	*	6.5	6.5
0100-0200	6	10	10	18	*	*	*	11.0	11.0
0200-0300	6	7	6	10	*	*	*	7.3	7.3
0300-0400	17	22	20	22	*	*	*	20.3	20.3
0400-0500	77	74	85	82	*	*	*	79.5	79.5
0500-0600	243	242	249	230	*	*	*	241.0	241.0
0600-0700	196	226	208	180	*	*	*	202.5	202.5
0700-0800	214	236	241	217	*	*	*	227.0	227.0
0800-0900	225	234	200	235	*	*	*	223.5	223.5
0900-1000	198	235	218	219	*	*	*	217.5	217.5
1000-1100	220	230	216	188	*	*	*	213.5	213.5
1100-1200	209	216	192	216	*	*	*	208.3	208.3
1200-1300	217	198	227	232	*	*	*	218.5	218.5
1300-1400	207	237	241	234	*	*	*	229.8	229.8
1400-1500	258	244	284	267	*	*	*	263.3	263.3
1500-1600	244	239	245	243	*	*	*	242.8	242.8
1600-1700	222	222	233	234	*	*	*	227.8	227.8
1700-1800	107	94	103	108	*	*	*	103.0	103.0
1800-1900	32	38	46	35	*	*	*	37.8	37.8
1900-2000	15	14	19	0	*	*	*	12.0	12.0
2000-2100	7	5	14	0	*	*	*	6.5	6.5
2100-2200	9	11	10	0	*	*	*	7.5	7.5
2200-2300	19	16	23	*	*	*	*	19.3	19.3
2300-2400	0	4	3	*	*	*	*	2.3	2.3
Totals									
0700-1900	2353	2423	2446	2428	*	*	*	2412.5	2412.5
0600-2200	2580	2679	2697	2608	*	*	*	2641.0	2641.0
0600-0000	2599	2699	2723	*	*	*	*	2662.7	2662.7
0000-0000	2951	3058	3100	*	*	*	*	3028.2	3028.2
AM Peak	0500 243	0500 242	0500 249	0800 235	*	*	*		
PM Peak	1400 258	1400 244	1400 284	*	*	*	*		

SURVEYED CATCHMENT AREAS

CATCHMENT AREA: A



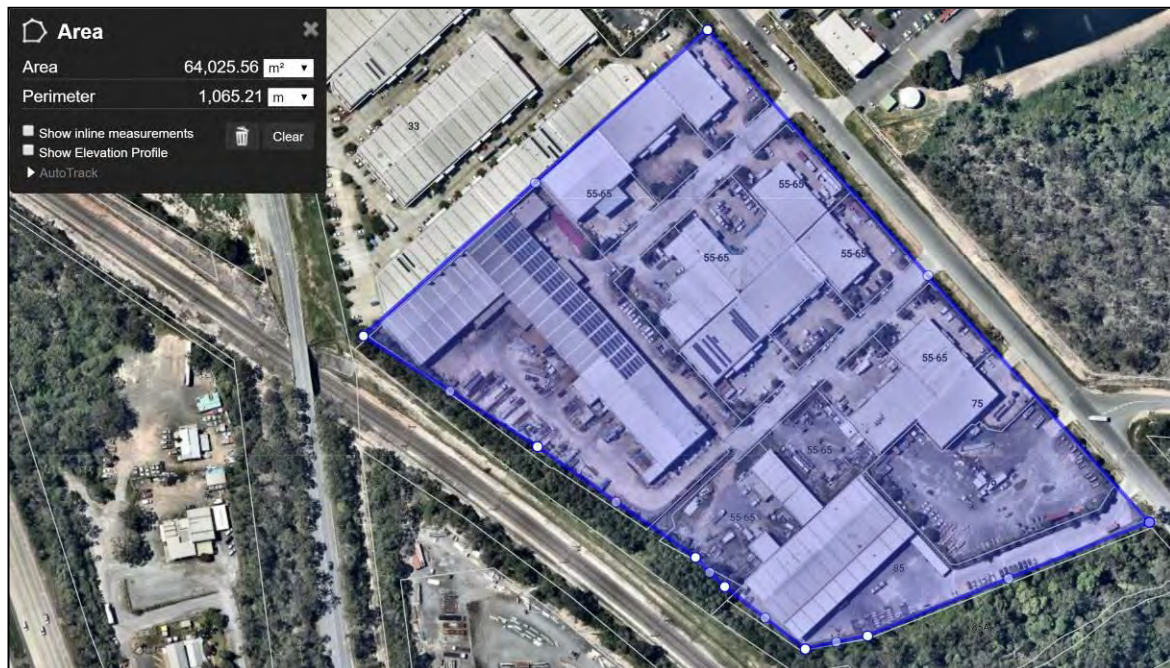
CATCHMENT AREA: B



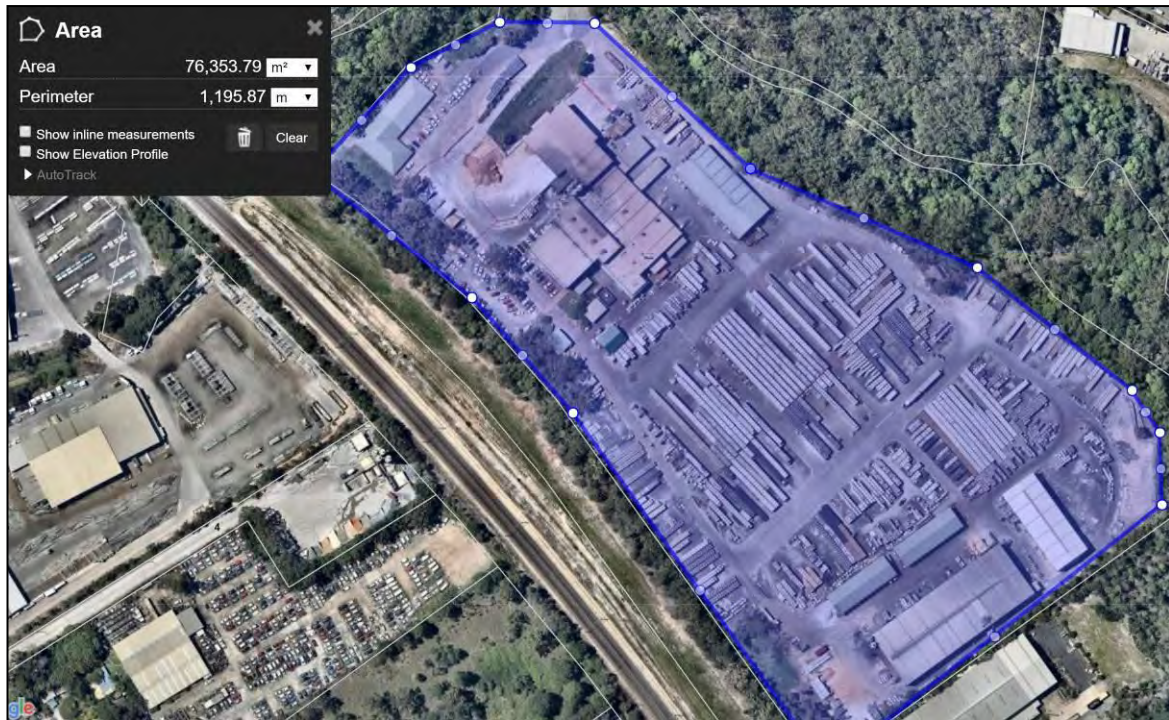
CATCHMENT AREA: C



CATCHMENT AREA: D



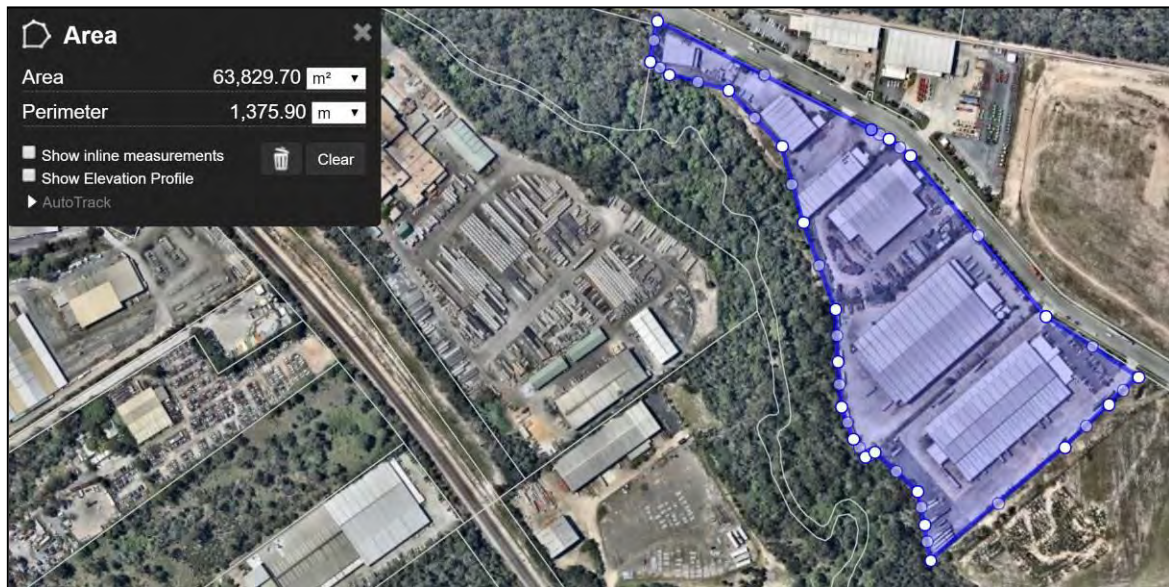
CATCHMENT AREA: E



CATCHMENT AREA: F



CATCHMENT AREA: G



APPENDIX E – SURVEYED TRIP GENERATION DATA (RTE / GRIFFITH UNIVERSITY)



Surveyed site at Motorway Circuit, Ormeau

Location:	Motorway Circuit, Ormeau
Use:	Warehouse / manufacturing
GFA:	Approx 45,000m ² GFA
Surveyed trip generation:	AM peak - 170 vehicles per hour PM peak - 190 vehicles per hour
Surveyed trip rate:	AM peak hour - 0.38 trips per 100m ² GFA PM peak hour - 0.42 trips per 100m ² GFA

Weekly Vehicle Counts

WeeklyVehicle-1052

Site: 1.0.0E 2.0.0W
Description: Multiple sites - See Header sheet for site descriptions.
Filter time: 14:14 Sunday, 22 March 2015 => 18:50 Sunday, 29 March 2015
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon 23 Mar	Tue 24 Mar	Wed 25 Mar	Thu 26 Mar	Fri 27 Mar	Sat 28 Mar	Sun 29 Mar	Averages 1 - 5	1 - 7
Hour									
0000-0100	0	4	4	8	3	0	0	3.8	2.7
0100-0200	2	0	0	0	0	0	0	0.4	0.3
0200-0300	0	3	1	2	0	0	0	1.2	0.9
0300-0400	6	11	14	11	3	0	0	9.0	6.4
0400-0500	15	20	23	16	7	0	0	16.2	11.6
0500-0600	115	127	128	124	120	0	0	122.8	87.7
0600-0700	90	100	105	89	107	0	0	98.2	70.1
0700-0800	139	143<	129	133	107	0	0	130.2	93.0
0800-0900	150	124	152	149	120	0	0	139.0	99.3
0900-1000	164<	142	136	170<	166<	0	0	155.6<	111.1<
1000-1100	132	131	159<	125	129	0	0	135.2	96.6
1100-1200	137	139	128	163	152	0<	0<	143.8	102.7
1200-1300	150	155	139	155	158	0	0	151.4	108.1
1300-1400	163	149	128	178	149	0	0	153.4	109.6
1400-1500	192<	190<	186<	197<	185<	0	0	190.0<	135.7<
1500-1600	166	181	127	146	171	0	0	158.2	113.0
1600-1700	161	165	164	145	117	0	0	150.4	107.4
1700-1800	68	55	80	59	39	0	0	60.2	43.0
1800-1900	17	31	25	22	15	0	0	22.0	15.7
1900-2000	2	6	5	7	0	0	*	4.0	3.3
2000-2100	8	2	2	0	0	0	*	2.4	2.0
2100-2200	9	5	6	5	0	0	*	5.0	4.2
2200-2300	9	11	9	7	0	0	*	7.2	6.0
2300-2400	4	10	2	6	0	0<	*	4.4	3.7
Totals									
0700-1900	1639	1605	1553	1642	1508	0	0	1589.4	1135.3
0600-2200	1748	1718	1671	1743	1615	0	*	1699.0	1214.9
0600-0000	1761	1739	1682	1756	1615	0	*	1710.6	1224.6
0000-0000	1899	1904	1852	1917	1748	0	*	1864.0	1334.2
AM Peak	0900 164	0700 143	1000 159	0900 170	0900 166	1100 0	1100 0		
PM Peak	1400 192	1400 190	1400 186	1400 197	1400 185	2300 0	* *		

* - No data.

APPENDIX F – SENSITIVITY ANALYSIS CALCULATIONS

Table F.1 – Sensitivity Analysis Peak Hour Development Traffic Generation (overall estate)
TRIG GENERATION RATE OF 0.42 TRIPS PER 100m² / PEAK HOUR

Stage	Lot Area (m2)	GFA (m2)	Morning Peak Hour			Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Cat A (STAGE 1)	115945	52175	142	77	219	44	175	219
Cat B (STAGE 2)	288165	129674	354	191	545	109	436	545
Cat C (STAGE 3)	91992	41396	113	61	174	35	139	174
Cat D (STAGE 4)	10750	4838	13	7	20	8	12	20
OVERALL ESTATE	506852	228083	623	335	958	196	762	958

Assumes 45% site cover

Peak Hour Distribution: AM Peak 65 / 35, PM Peak 20/80

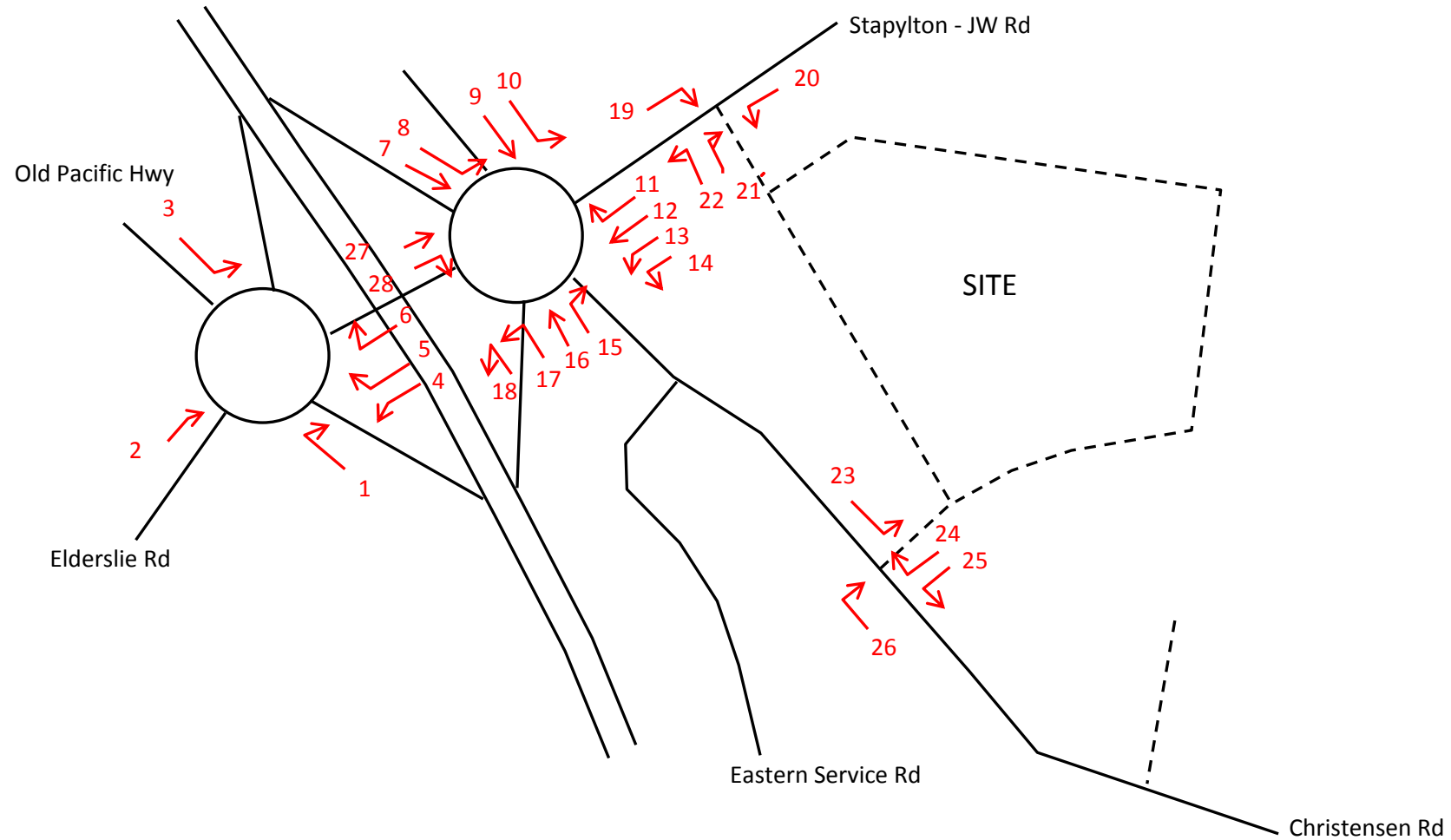


FIGURE F.1 – SENSITIVITY ANALYSIS KEY MAP (TRAFFIC DISTRIBUTION)

Morning peak hour

Development	Intersection movement (refer to Figure F.1)																											
Stage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Distribution stage 1	0.33	0.1	0.02	0.1	0.02	0.33	0	0.31	0	0.04	0.02	0.45	0.35	0.1	0.1	0	0	0	0.8	0.2	0.2	0.8	N/A	N/A	N/A	N/A	0.45	0
Distribution stage 2	0.33	0.1	0.02	0.1	0.02	0.33	0.12	0.19	0.02	0.02	0.05	0.3	0.25	0	0	0.05	0.18	0.07	0.48	0.2	0.2	0.48	N/A	N/A	N/A	N/A	0.27	0.18
Distribution stages 3 / 4	0.33	0.1	0.02	0.1	0.02	0.33	0.31	0	0.04	0	0	0	0	0	0	0.04	0.35	0.41	0	0.2	0.2	0	N/A	N/A	N/A	N/A	0	0.41
Surveyed 2018 Vol	248	232	91	652	100	267	197	234	38	60	63	273	95	31	14	36	140	24	0	0	0	0	N/A	N/A	N/A	N/A	245	176
Estimated Year 2020	263	246	96	691	106	283	209	248	40	64	67	289	101	33	15	38	148	25	0	0	0	0	N/A	N/A	N/A	N/A	260	187
Estimated Year 2023	294	275	108	774	119	317	234	278	45	71	75	324	113	37	17	43	166	28	0	0	0	0	N/A	N/A	N/A	N/A	291	209
STAGE 1	47	14	3	8	2	25	0	44	0	6	2	35	27	8	8	0	0	0	114	28	15	61	N/A	N/A	N/A	N/A	64	0
STAGE 2	117	35	7	19	4	63	42	67	7	7	10	57	48	0	0	10	34	13	170	71	38	91	N/A	N/A	N/A	N/A	96	64
STAGE 3 & 4	42	13	3	13	3	42	39	0	5	0	0	0	0	0	0	5	44	52	0	25	25	0	N/A	N/A	N/A	N/A	0	52
STAGES 1 & 2	164	50	10	27	5	88	42	111	7	13	11	92	74	8	8	10	34	13	284	99	53	153	N/A	N/A	N/A	N/A	160	64
ALL STAGES	205	62	12	39	8	130	82	111	12	13	11	92	74	8	8	15	78	65	284	124	79	153	N/A	N/A	N/A	N/A	160	115
% STAGE 1	17.9%	5.8%	3.0%	1.1%	1.4%	8.9%	0.0%	17.8%	0.0%	9.0%	2.3%	11.9%	26.7%	23.3%	51.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	24.7%	0.0%
% STAGES 1 & 2	62.3%	20.2%	10.3%	3.9%	5.0%	31.2%	20.3%	44.9%	17.6%	20.1%	16.6%	31.7%	74.0%	23.3%	51.7%	25.0%	23.1%	52.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	61.5%	34.2%
% ALL STAGES	69.8%	22.6%	11.5%	5.1%	6.6%	40.9%	34.9%	40.1%	26.9%	17.9%	14.8%	28.3%	66.1%	20.8%	46.1%	34.1%	47.2%	228.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.9%	55.2%

Afternoon peak hour

Development	Intersection movement (refer to Figure F.1)																											
Stage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Distribution stage 1	0.33	0.1	0.02	0.1	0.02	0.33	0	0.31	0	0.04	0.02	0.45	0.35	0.1	0.1	0	0	0	0.8	0.2	0.2	0.8	N/A	N/A	N/A	N/A	0.45	0
Distribution stage 2	0.33	0.1	0.02	0.1	0.02	0.33	0.12	0.19	0.02	0.02	0.05	0.3	0.25	0	0	0.05	0.18	0.07	0.48	0.2	0.2	0.48	N/A	N/A	N/A	N/A	0.27	0.18
Distribution stages 3 / 4	0.33	0.1	0.02	0.1	0.02	0.33	0.31	0	0.04	0	0	0	0	0	0	0.04	0.35	0.41	0	0.2	0.2	0	N/A	N/A	N/A	N/A	0	0.41
Surveyed 2018 Vol	133	386	121	485	104	548	58	201	31	79	89	404	183	23	15	71	284	76	0	0	0	0	N/A	N/A	N/A	N/A	144	68
Estimated Year 2020	141	409	128	514	110	581	61	213	33	84	94	428	194	24	16	75	301	81	0	0	0	0	N/A	N/A	N/A	N/A	153	72
Estimated Year 2023	158	458	144	576	123	651	69	239	37	94	106	480	217	27	18	84	337	90	0	0	0	0	N/A	N/A	N/A	N/A	171	81
STAGE 1	14	4	1	18	4	58	0	14	0	2	4	79	61	18	18	0	0	0	35	9	35	140	N/A	N/A	N/A	N/A	20	0
STAGE 2	36	11	2	44	9	144	13	21	2	2	22	131	109	0	0	22	78	30	52	22	87	209	N/A	N/A	N/A	N/A	29	20
STAGE 3 & 4	14	4	1	4	1	14	13	0	2	0	0	0	0	0	0	2	15	18	0	9	9	0	N/A	N/A	N/A	N/A	0	18
STAGES 1 & 2	50	15	3	61	12	202	13	34	2	4	25	210	170	18	18	22	78	30	87	31	122	349	N/A	N/A	N/A	N/A	49	20
ALL STAGES	65	20	4	65	13	216	26	34	4	4	25	210	170	18	18	24	93	48	87	39	131	349	N/A	N/A	N/A	N/A	49	37
% STAGE 1	10.3%	1.1%	0.7%	3.4%	3.2%	10.0%	0.0%	6.4%	0.0%	2.1%	3.7%	18.4%	31.6%	71.9%	110.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.9%	0.0%
% STAGES 1 & 2	35.8%	3.7%	2.4%	11.9%	11.1%	34.7%	21.3%	16.1%	6.6%	4.7%	26.8%	48.9%	87.8%	71.9%	110.3%	28.9%	26.1%	37.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.2%	27.2%
% ALL STAGES	40.9%	4.3%	2.7%	11.4%	10.6%	33.2%	38.3%	14.4%	10.6%	4.2%	23.9%	43.7%	78.4%	64.2%	98.4%	27.9%	27.7%	53.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	28.7%	46.1%

FIGURE F.2– SENSITIVITY ANALYSIS TRAFFIC GENERATION & % IMPACT CALCULATIONS

APPENDIX G – CRITERIA FOR INTERPRETING SIDRA RESULTS

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'		Good operation.
'B'	Good operation. Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**¹ both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

¹The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.

APPENDIX H – DETAIL SIDRA RESULTS OF DEVELOPMENT TRIP GENERATION

Exit 38 Interchange – western roundabout, without development :

- Year 2020 AM Peak Hour, existing intersection layout;
- Year 2020 PM Peak Hour, existing intersection layout;
- Year 2023 AM Peak Hour, existing intersection layout;
- Year 2023 PM Peak Hour, existing intersection layout;

Exit 38 Interchange – eastern roundabout, without development:

- Year 2020 AM Peak Hour, existing intersection layout;
- Year 2020 PM Peak Hour, existing intersection layout;
- Year 2023 AM Peak Hour, existing intersection layout;
- Year 2023 PM Peak Hour, existing intersection layout;

Western roundabout (upgraded):

- Year 2020 AM Peak Hour, with Stage 1 development;
- Year 2020 PM Peak Hour, with Stage 1 development;
- Year 2020 AM Peak Hour, with Stage 2 development;
- Year 2020 PM Peak Hour, with Stage 2 development;
- Year 2023 AM Peak Hour full development;
- Year 2023 PM Peak Hour full development;

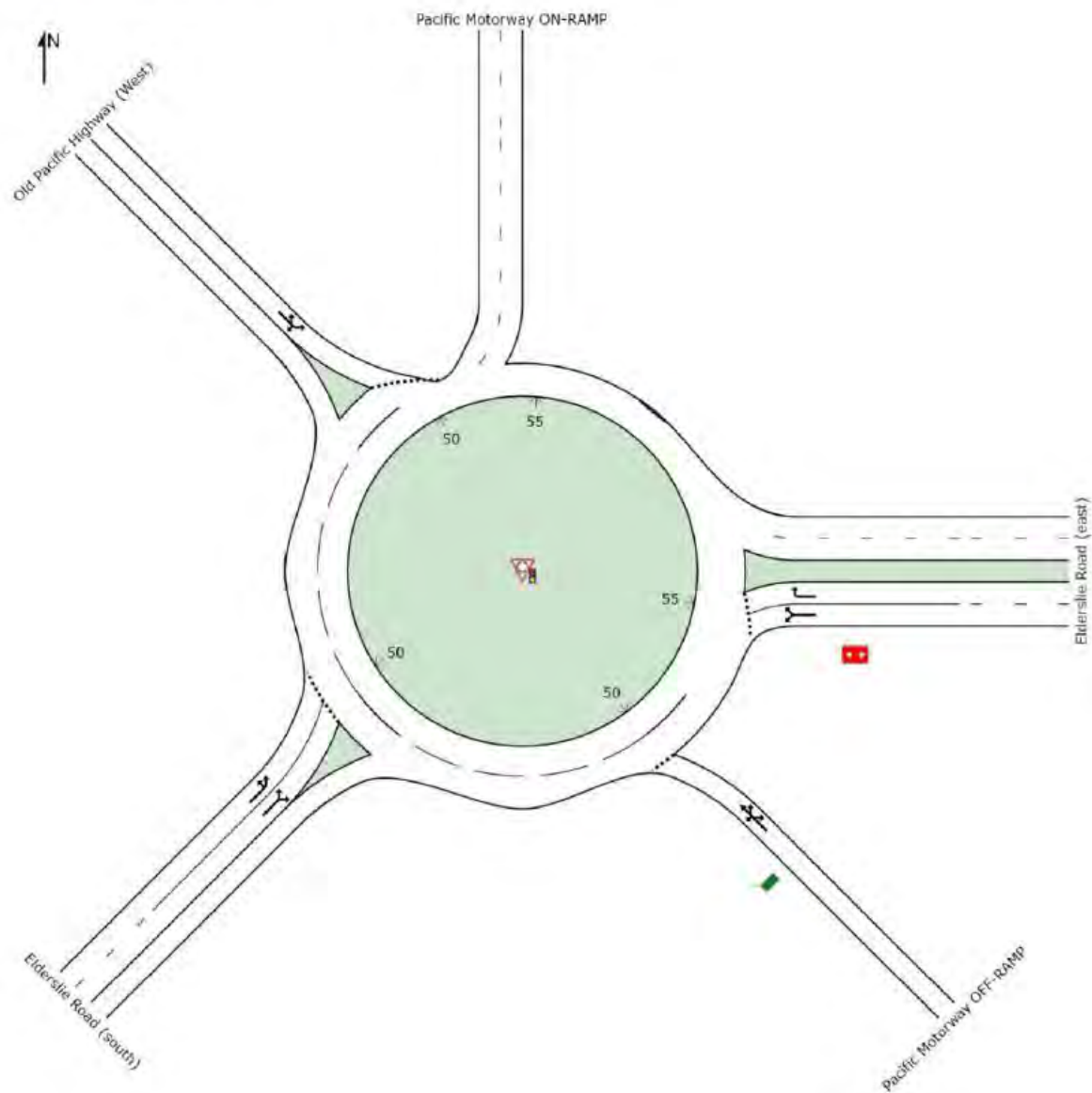
Eastern roundabout (upgraded):

- Year 2020 AM Peak Hour, with Stage 1 development (partial upgrade);
- Year 2020 PM Peak Hour, with Stage 1 development (partial upgrade);
- Year 2020 AM Peak Hour, with Stage 2 development;
- Year 2020 PM Peak Hour, with Stage 2 development;
- Year 2023 AM Peak Hour, with full development (fully upgraded intersection);
- Year 2023 PM Peak Hour, with full development (fully upgraded intersection);

YEAR 2020 WITHOUT DEVELOPMENT

 Site: Model 1 2020AM west no dev

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 Site: Model 1 2020AM west no dev

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	346	8.0	0.883	42.2	LOS D	31.5	235.6	1.00	1.56	35.5
22	T1	99	8.0	0.883	41.7	LOS D	31.5	235.6	1.00	1.56	36.5
23a	R1	1	8.0	0.883	47.8	LOS D	31.5	235.6	1.00	1.56	36.5
23b	R3	263	8.0	0.883	50.5	LOS D	31.5	235.6	1.00	1.56	37.5
Approach		709	8.0	0.883	45.2	LOS D	31.5	235.6	1.00	1.56	36.4
East: Elderslie Road (east)											
4a	L1	691	8.0	0.863	22.6	LOS C	39.6	296.1	0.96	0.78	45.2
6a	R1	106	8.0	0.863	29.0	LOS C	39.6	296.1	0.96	0.78	45.8
3	R2	283	8.0	0.396	17.9	LOS B	8.6	64.0	0.71	0.61	50.4
Approach		1080	8.0	0.863	22.0	LOS C	39.6	296.1	0.90	0.74	46.6
NorthWest: Old Pacific Highway (West)											
27b	L3	42	8.0	0.259	6.9	LOS A	1.3	9.7	0.71	0.77	52.6
27a	L1	96	8.0	0.259	5.8	LOS A	1.3	9.7	0.71	0.77	55.0
29	R2	49	8.0	0.259	13.6	LOS B	1.3	9.7	0.71	0.77	57.0
Approach		187	8.0	0.259	8.1	LOS A	1.3	9.7	0.71	0.77	55.0
SouthWest: Elderslie Road (south)											
30	L2	76	8.0	0.351	4.7	LOS A	2.2	16.8	0.67	0.47	55.0
30a	L1	367	8.0	0.351	3.9	LOS A	2.2	16.8	0.67	0.52	56.1
32a	R1	246	8.0	0.351	10.7	LOS B	2.1	15.6	0.68	0.73	54.3
Approach		689	8.0	0.351	6.4	LOS A	2.2	16.8	0.68	0.59	55.3
All Vehicles		2665	8.0	0.883	23.2	LOS C	39.6	296.1	0.85	0.92	45.5

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 2 2020PM west no dev**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	59	8.0	0.361	6.2	LOS A	2.3	17.5	0.75	0.74	52.1
22	T1	102	8.0	0.361	5.7	LOS A	2.3	17.5	0.75	0.74	54.2
23a	R1	1	8.0	0.361	11.8	LOS B	2.3	17.5	0.75	0.74	54.2
23b	R3	141	8.0	0.361	14.5	LOS B	2.3	17.5	0.75	0.74	56.3
Approach		303	8.0	0.361	9.9	LOS A	2.3	17.5	0.75	0.74	54.7
East: Elderslie Road (east)											
4a	L1	514	8.0	0.660	9.0	LOS A	15.7	117.1	0.81	0.62	53.8
6a	R1	110	8.0	0.660	15.4	LOS B	15.7	117.1	0.81	0.62	54.5
3	R2	580	8.0	0.750	19.6	LOS B	16.9	126.1	0.87	0.82	49.3
Approach		1204	8.0	0.750	14.7	LOS B	16.9	126.1	0.84	0.72	51.5
NorthWest: Old Pacific Highway (West)											
27b	L3	93	8.0	0.649	16.4	LOS B	3.7	27.5	0.90	1.08	47.0
27a	L1	128	8.0	0.649	15.4	LOS B	3.7	27.5	0.90	1.08	48.9
29	R2	43	8.0	0.649	23.1	LOS C	3.7	27.5	0.90	1.08	50.5
Approach		264	8.0	0.649	17.0	LOS B	3.7	27.5	0.90	1.08	48.5
SouthWest: Elderslie Road (south)											
30	L2	24	8.0	0.603	8.5	LOS A	6.3	46.8	0.91	0.89	53.8
30a	L1	596	8.0	0.603	7.7	LOS A	6.3	46.8	0.90	0.90	55.1
32a	R1	409	8.0	0.603	14.1	LOS B	5.1	38.1	0.87	0.98	52.2
Approach		1029	8.0	0.603	10.2	LOS B	6.3	46.8	0.89	0.93	53.9
All Vehicles		2800	8.0	0.750	12.7	LOS B	16.9	126.1	0.85	0.83	52.4

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 5 2023AM west existing without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	377	8.0	0.958	143.2	LOS F	91.6	685.3	1.00	3.18	18.3
22	T1	108	8.0	0.958	149.1	LOS F	91.6	685.3	1.00	3.18	18.6
23a	R1	1	8.0	0.958	138.2	LOS F	91.6	685.3	1.00	3.18	18.6
23b	R3	287	8.0	0.958	151.5	LOS F	91.6	685.3	1.00	3.18	18.9
Approach		773	8.0	0.958	147.1	LOS F	91.6	685.3	1.00	3.18	18.6
East: Elderslie Road (east)											
4a	L1	753	8.0	0.965	57.8	LOS E	71.5	535.0	1.00	1.16	31.9
6a	R1	116	8.0	0.965	64.2	LOS E	71.5	535.0	1.00	1.16	32.1
3	R2	308	8.0	0.442	20.4	LOS C	11.8	88.5	0.74	0.58	48.9
Approach		1177	8.0	0.965	48.6	LOS D	71.5	535.0	0.93	1.01	35.2
NorthWest: Old Pacific Highway (West)											
27b	L3	46	8.0	0.302	7.5	LOS A	1.6	11.7	0.76	0.82	52.3
27a	L1	105	8.0	0.302	6.4	LOS A	1.6	11.7	0.76	0.82	54.7
29	R2	53	8.0	0.302	14.2	LOS B	1.6	11.7	0.76	0.82	56.7
Approach		204	8.0	0.302	8.6	LOS A	1.6	11.7	0.76	0.82	54.7
SouthWest: Elderslie Road (south)											
30	L2	83	8.0	0.400	5.0	LOS A	2.7	20.2	0.73	0.50	54.8
30a	L1	400	8.0	0.400	4.2	LOS A	2.7	20.2	0.73	0.55	55.9
32a	R1	268	8.0	0.400	11.1	LOS B	2.5	18.7	0.73	0.77	54.1
Approach		751	8.0	0.400	6.7	LOS A	2.7	20.2	0.73	0.62	55.1
All Vehicles		2905	8.0	0.965	61.2	LOS E	91.6	685.3	0.89	1.47	31.4

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 6 2023PM west existing without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	64	8.0	0.415	7.4	LOS A	3.0	22.2	0.81	0.80	51.5
22	T1	111	8.0	0.415	6.9	LOS A	3.0	22.2	0.81	0.80	53.5
23a	R1	1	8.0	0.415	13.0	LOS B	3.0	22.2	0.81	0.80	53.5
23b	R3	154	8.0	0.415	15.7	LOS B	3.0	22.2	0.81	0.80	55.6
Approach		330	8.0	0.415	11.1	LOS B	3.0	22.2	0.81	0.80	54.1
East: Elderslie Road (east)											
4a	L1	560	8.0	0.681	9.0	LOS A	17.9	133.8	0.80	0.60	53.7
6a	R1	120	8.0	0.681	15.5	LOS B	17.9	133.8	0.80	0.60	54.5
3	R2	632	8.0	0.775	20.4	LOS C	19.7	147.2	0.87	0.81	48.8
Approach		1312	8.0	0.775	15.1	LOS B	19.7	147.2	0.83	0.70	51.2
NorthWest: Old Pacific Highway (West)											
27b	L3	101	8.0	0.797	26.4	LOS C	5.5	40.8	0.95	1.24	41.8
27a	L1	140	8.0	0.797	25.3	LOS C	5.5	40.8	0.95	1.24	43.3
29	R2	47	8.0	0.797	33.1	LOS C	5.5	40.8	0.95	1.24	44.6
Approach		288	8.0	0.797	26.9	LOS C	5.5	40.8	0.95	1.24	43.0
SouthWest: Elderslie Road (south)											
30	L2	26	8.0	0.694	11.8	LOS B	9.0	67.3	0.99	1.04	51.6
30a	L1	650	8.0	0.694	11.0	LOS B	9.0	67.3	0.99	1.04	52.7
32a	R1	446	8.0	0.694	17.7	LOS B	7.2	54.1	0.95	1.10	49.8
Approach		1122	8.0	0.694	13.6	LOS B	9.0	67.3	0.97	1.06	51.5
All Vehicles		3052	8.0	0.797	15.3	LOS B	19.7	147.2	0.89	0.90	50.7

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

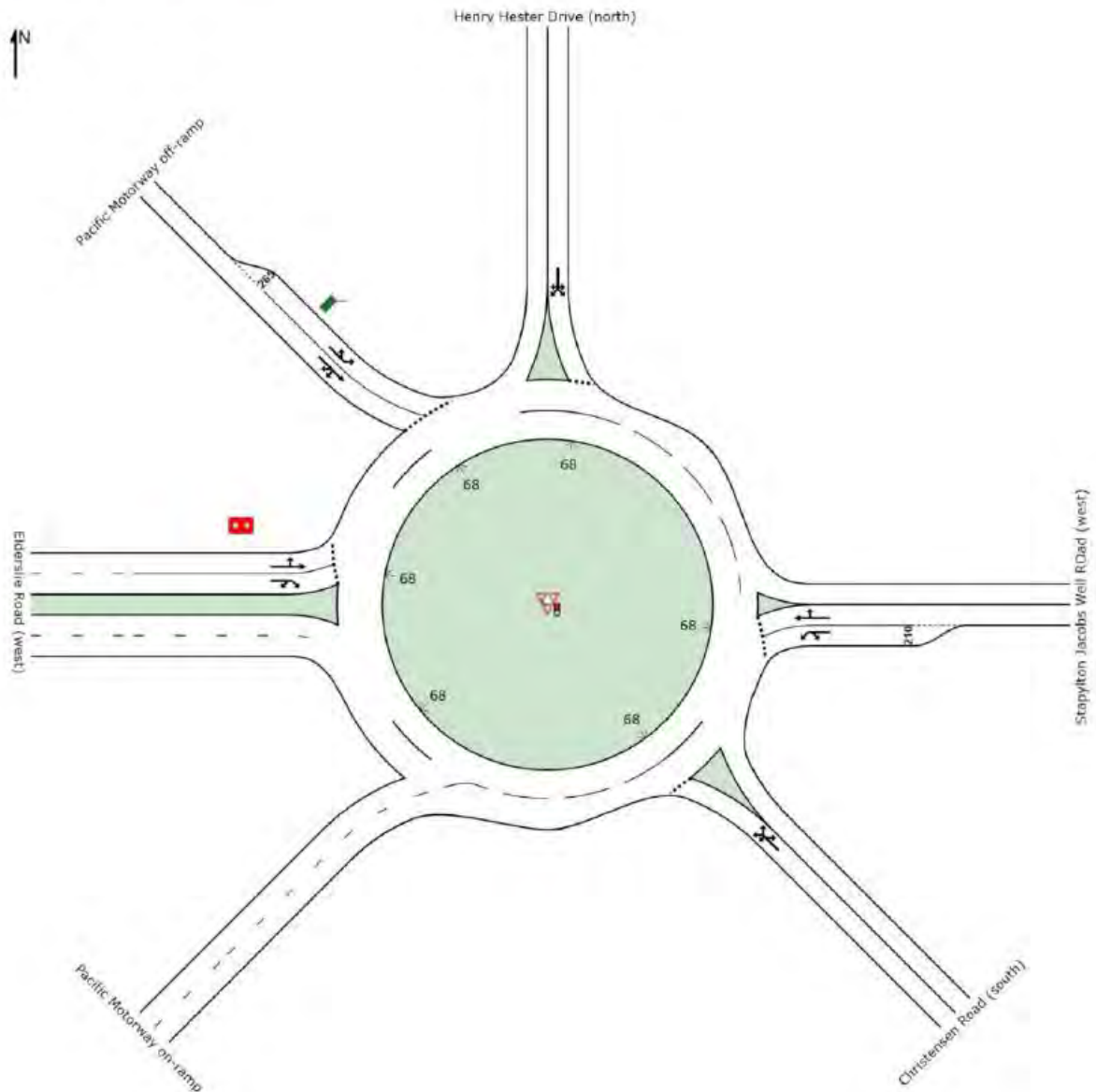
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

 Site: Model 13 2020AM east without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 Site: Model 13 2020AM east without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	85% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	25	8.0	0.344	7.0	LOS A	1.6	11.9	0.74	0.81	53.7
21a	L1	148	8.0	0.344	7.1	LOS A	1.6	11.9	0.74	0.81	55.6
23a	R1	38	8.0	0.344	13.2	LOS B	1.6	11.9	0.74	0.81	56.9
23b	R3	15	8.0	0.344	16.1	LOS B	1.6	11.9	0.74	0.81	60.0
Approach		226	8.0	0.344	8.7	LOS A	1.6	11.9	0.74	0.81	55.8
East: Stapylton Jacobs Well Road (west)											
4b	L3	33	8.0	0.261	6.8	LOS A	1.0	7.6	0.80	0.71	53.3
4a	L1	101	8.0	0.261	6.4	LOS A	1.0	7.6	0.80	0.71	56.5
5	T1	289	8.0	0.519	9.0	LOS A	3.2	23.7	0.87	0.98	55.7
6	R2	67	8.0	0.519	16.1	LOS B	3.2	23.7	0.87	0.98	57.2
Approach		490	8.0	0.519	9.3	LOS A	3.2	23.7	0.85	0.90	55.9
North: Henry Hester Drive (north)											
7	L2	64	8.0	0.474	5.8	LOS A	2.1	15.7	0.79	0.88	52.8
7a	L1	40	8.0	0.474	5.9	LOS A	2.1	15.7	0.79	0.88	54.5
9a	R1	103	8.0	0.474	12.0	LOS B	2.1	15.7	0.79	0.88	55.7
9	R2	81	8.0	0.474	13.4	LOS B	2.1	15.7	0.79	0.88	57.2
Approach		288	8.0	0.474	10.1	LOS B	2.1	15.7	0.79	0.88	55.2
NorthWest: Pacific Motorway off-ramp											
27b	L3	109	8.0	0.367	3.5	LOS A	1.5	10.9	0.52	0.36	55.0
27a	L1	248	8.0	0.367	3.0	LOS A	1.5	10.9	0.52	0.36	58.3
28	T1	209	8.0	0.608	3.6	LOS A	3.6	27.2	0.66	0.66	54.6
29	R2	1	8.0	0.608	10.7	LOS B	3.6	27.2	0.66	0.66	56.0
29b	R3	552	8.0	0.608	12.1	LOS B	3.6	27.2	0.66	0.66	57.4
Approach		1119	8.0	0.608	7.7	LOS A	3.6	27.2	0.62	0.57	56.8
West: Elderslie Road (west)											
10	L2	72	8.0	0.589	10.6	LOS B	7.0	52.3	0.91	0.91	52.4
11	T1	260	8.0	0.589	10.9	LOS B	7.0	52.3	0.91	0.91	55.4
12a	R1	187	8.0	0.659	17.7	LOS B	6.6	49.3	0.94	1.05	50.3
12b	R3	105	8.0	0.659	20.5	LOS C	6.6	49.3	0.94	1.05	52.6
Approach		624	8.0	0.659	14.5	LOS B	7.0	52.3	0.92	0.98	52.9
All Vehicles		2747	8.0	0.659	9.9	LOS A	7.0	52.3	0.76	0.77	55.5

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 14 2020PM east without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	81	8.0	1.101	209.9	LOS F	63.0	471.2	1.00	5.01	14.1
21a	L1	301	8.0	1.101	210.0	LOS F	63.0	471.2	1.00	5.01	14.2
23a	R1	75	8.0	1.101	216.1	LOS F	63.0	471.2	1.00	5.01	14.3
23b	R3	16	8.0	1.101	218.9	LOS F	63.0	471.2	1.00	5.01	14.5
Approach		473	8.0	1.101	211.3	LOS F	63.0	471.2	1.00	5.01	14.2
East: Stapylton Jacobs Well Road (west)											
4b	L3	24	8.0	0.345	7.7	LOS A	1.8	13.4	0.79	0.87	52.8
4a	L1	194	8.0	0.345	8.7	LOS A	1.8	13.4	0.79	0.87	56.0
5	T1	428	8.0	0.616	12.8	LOS B	5.6	42.1	0.92	1.12	53.3
6	R2	94	8.0	0.616	18.3	LOS B	5.6	42.1	0.92	1.12	54.6
Approach		740	8.0	0.616	12.3	LOS B	5.6	42.1	0.88	1.05	54.1
North: Henry Hester Drive (north)											
7	L2	84	8.0	0.508	6.4	LOS A	2.5	18.9	0.76	0.92	52.4
7a	L1	33	8.0	0.508	6.5	LOS A	2.5	18.9	0.76	0.92	54.2
9a	R1	130	8.0	0.508	13.2	LOS B	2.5	18.9	0.76	0.92	55.4
9	R2	77	8.0	0.508	14.0	LOS B	2.5	18.9	0.76	0.92	56.8
Approach		324	8.0	0.508	10.9	LOS B	2.5	18.9	0.76	0.92	54.8
NorthWest: Pacific Motorway off-ramp											
27b	L3	84	8.0	0.339	4.0	LOS A	1.6	12.0	0.62	0.42	54.5
27a	L1	213	8.0	0.339	3.6	LOS A	1.6	12.0	0.62	0.42	57.7
28	T1	61	8.0	0.430	3.9	LOS A	2.6	19.7	0.69	0.72	53.6
29	R2	4	8.0	0.430	11.1	LOS B	2.6	19.7	0.69	0.72	55.0
29b	R3	412	8.0	0.430	12.5	LOS B	2.6	19.7	0.69	0.72	56.3
Approach		774	8.0	0.430	8.5	LOS A	2.6	19.7	0.66	0.60	56.2
West: Elderslie Road (west)											
10	L2	89	8.0	0.472	10.1	LOS B	5.2	39.1	0.85	0.81	52.7
11	T1	153	8.0	0.472	10.4	LOS B	5.2	39.1	0.85	0.81	55.8
12a	R1	72	8.0	0.749	19.1	LOS B	12.6	94.1	0.95	0.97	48.8
12b	R3	417	8.0	0.749	21.9	LOS C	12.6	94.1	0.95	0.97	50.9
Approach		731	8.0	0.749	17.8	LOS B	12.6	94.1	0.91	0.92	51.8
All Vehicles		3042	8.0	1.101	43.4	LOS D	63.0	471.2	0.84	1.51	38.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akgelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 17 2023AM east without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	27	8.0	0.401	8.0	LOS A	2.0	15.3	0.78	0.90	53.3
21a	L1	161	8.0	0.401	8.1	LOS A	2.0	15.3	0.78	0.90	55.1
23a	R1	41	8.0	0.401	14.2	LOS B	2.0	15.3	0.78	0.90	56.4
23b	R3	16	8.0	0.401	17.0	LOS B	2.0	15.3	0.78	0.90	56.5
Approach		245	8.0	0.401	9.7	LOS A	2.0	15.3	0.78	0.90	55.4
East: Stapylton Jacobs Well Road (west)											
4b	L3	36	8.0	0.352	8.2	LOS A	1.3	10.0	0.86	0.85	52.8
4a	L1	110	8.0	0.352	7.8	LOS A	1.3	10.0	0.86	0.85	55.9
5	T1	315	8.0	0.698	13.4	LOS B	4.5	33.9	0.93	1.11	52.6
6	R2	73	8.0	0.698	20.5	LOS C	4.5	33.9	0.93	1.11	53.9
Approach		534	8.0	0.698	12.9	LOS B	4.5	33.9	0.91	1.04	53.4
North: Henry Hester Drive (north)											
7	L2	70	8.0	0.581	7.7	LOS A	2.9	21.8	0.85	0.98	51.7
7a	L1	44	8.0	0.581	7.8	LOS A	2.9	21.8	0.85	0.98	53.4
9a	R1	112	8.0	0.581	13.9	LOS B	2.9	21.8	0.85	0.98	54.6
9	R2	88	8.0	0.581	15.3	LOS B	2.9	21.8	0.85	0.98	55.9
Approach		314	8.0	0.581	12.0	LOS B	2.9	21.8	0.85	0.98	54.1
NorthWest: Pacific Motorway off-ramp											
27b	L3	119	8.0	0.417	3.8	LOS A	2.0	14.7	0.60	0.41	54.6
27a	L1	270	8.0	0.417	3.4	LOS A	2.0	14.7	0.60	0.41	57.9
28	T1	228	8.0	0.687	4.4	LOS A	5.4	40.0	0.77	0.75	54.2
29	R2	1	8.0	0.687	11.5	LOS B	5.4	40.0	0.77	0.75	55.6
29b	R3	602	8.0	0.687	13.0	LOS B	5.4	40.0	0.77	0.75	57.0
Approach		1220	8.0	0.687	8.3	LOS A	5.4	40.0	0.72	0.64	56.4
West: Elderslie Road (west)											
10	L2	78	8.0	0.542	9.7	LOS A	7.5	56.4	0.87	0.76	53.0
11	T1	283	8.0	0.542	10.0	LOS A	7.5	56.4	0.87	0.76	56.1
12a	R1	204	8.0	0.609	16.6	LOS B	7.1	53.2	0.89	0.94	50.9
12b	R3	114	8.0	0.609	19.5	LOS B	7.1	53.2	0.89	0.94	53.3
Approach		679	8.0	0.609	13.5	LOS B	7.5	56.4	0.88	0.85	53.6
All Vehicles		2992	8.0	0.698	10.8	LOS B	7.5	56.4	0.81	0.81	54.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akgelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 18 2023PM east without

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	88	8.0	1.378	696.0	LOS F	182.4	1364.1	1.00	11.03	5.1
21a	L1	328	8.0	1.378	696.1	LOS F	182.4	1364.1	1.00	11.03	5.1
23a	R1	82	8.0	1.378	702.2	LOS F	182.4	1364.1	1.00	11.03	5.1
23b	R3	17	8.0	1.378	705.0	LOS F	182.4	1364.1	1.00	11.03	5.1
Approach		515	8.0	1.378	697.4	LOS F	182.4	1364.1	1.00	11.03	5.1
East: Stapylton Jacobs Well Road (west)											
4b	L3	26	8.0	0.414	9.2	LOS A	2.3	17.1	0.82	0.93	51.6
4a	L1	211	8.0	0.414	10.5	LOS B	2.3	17.1	0.82	0.93	54.6
5	T1	467	8.0	0.742	19.4	LOS B	8.5	63.7	0.97	1.31	49.0
6	R2	102	8.0	0.742	24.7	LOS C	8.5	63.7	0.97	1.31	50.1
Approach		806	8.0	0.742	17.4	LOS B	8.5	63.7	0.93	1.20	50.5
North: Henry Hester Drive (north)											
7	L2	92	8.0	0.599	8.0	LOS A	3.3	24.4	0.82	1.00	51.2
7a	L1	36	8.0	0.599	8.1	LOS A	3.3	24.4	0.82	1.00	52.9
9a	R1	142	8.0	0.599	15.7	LOS B	3.3	24.4	0.82	1.00	54.0
9	R2	84	8.0	0.599	15.6	LOS B	3.3	24.4	0.82	1.00	55.3
Approach		354	8.0	0.599	12.9	LOS B	3.3	24.4	0.82	1.00	53.4
NorthWest: Pacific Motorway off-ramp											
27b	L3	92	8.0	0.386	4.3	LOS A	2.0	14.8	0.67	0.46	54.3
27a	L1	232	8.0	0.386	3.9	LOS A	2.0	14.8	0.67	0.46	57.4
28	T1	67	8.0	0.489	4.4	LOS A	3.3	24.9	0.75	0.75	53.4
29	R2	4	8.0	0.489	11.5	LOS B	3.3	24.9	0.75	0.75	54.7
29b	R3	450	8.0	0.489	12.9	LOS B	3.3	24.9	0.75	0.75	56.0
Approach		845	8.0	0.489	8.8	LOS A	3.3	24.9	0.72	0.64	56.0
West: Elderslie Road (west)											
10	L2	97	8.0	0.480	9.9	LOS A	5.8	43.2	0.83	0.77	52.9
11	T1	167	8.0	0.480	10.2	LOS B	5.8	43.2	0.83	0.77	55.9
12a	R1	78	8.0	0.763	19.3	LOS B	14.2	106.1	0.95	0.95	48.7
12b	R3	455	8.0	0.763	22.2	LOS C	14.2	106.1	0.95	0.95	50.8
Approach		797	8.0	0.763	17.9	LOS B	14.2	106.1	0.91	0.89	51.7
All Vehicles		3317	8.0	1.378	120.4	LOS F	182.4	1364.1	0.87	2.48	21.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akgelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 3 2020AM west stage 1 - ACTUAL

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	346	8.0	0.888	61.6	LOS E	42.8	320.3	1.00	1.85	30.3
22	T1	99	8.0	0.888	56.0	LOS E	42.8	320.3	1.00	1.85	31.0
23a	R1	1	8.0	0.888	62.1	LOS E	42.8	320.3	1.00	1.85	31.0
23b	R3	286	8.0	0.888	69.9	LOS E	42.8	320.3	1.00	1.85	31.7
Approach		732	8.0	0.888	64.1	LOS E	42.8	320.3	1.00	1.85	30.9
East: Elderslie Road (east)											
4a	L1	695	8.0	0.905	30.6	LOS C	46.2	345.6	1.00	0.91	41.3
6a	R1	107	8.0	0.905	37.0	LOS D	46.2	345.6	1.00	0.91	41.7
3	R2	296	8.0	0.430	19.0	LOS B	9.8	73.4	0.74	0.61	49.7
Approach		1098	8.0	0.905	28.1	LOS C	46.2	345.6	0.93	0.83	43.4
NorthWest: Old Pacific Highway (West)											
27b	L3	43	8.0	0.267	7.1	LOS A	1.4	10.2	0.73	0.79	52.5
27a	L1	96	8.0	0.267	6.0	LOS A	1.4	10.2	0.73	0.79	54.9
29	R2	49	8.0	0.267	13.8	LOS B	1.4	10.2	0.73	0.79	56.9
Approach		188	8.0	0.267	8.3	LOS A	1.4	10.2	0.73	0.79	54.8
SouthWest: Elderslie Road (south)											
30	L2	76	8.0	0.365	4.9	LOS A	2.4	18.0	0.70	0.49	54.9
30a	L1	367	8.0	0.365	4.1	LOS A	2.4	18.0	0.70	0.53	56.0
32a	R1	253	8.0	0.365	10.9	LOS B	2.2	16.7	0.71	0.75	54.1
Approach		696	8.0	0.365	6.6	LOS A	2.4	18.0	0.70	0.61	55.2
All Vehicles		2714	8.0	0.905	30.9	LOS C	46.2	345.6	0.88	1.05	41.7

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 4 2020PM west stage 1 - ACTUAL

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	59	8.0	0.374	6.7	LOS A	2.5	18.9	0.77	0.76	51.9
22	T1	102	8.0	0.374	6.2	LOS A	2.5	18.9	0.77	0.76	53.9
23a	R1	1	8.0	0.374	12.3	LOS B	2.5	18.9	0.77	0.76	53.9
23b	R3	148	8.0	0.374	15.0	LOS B	2.5	18.9	0.77	0.76	56.0
Approach		310	8.0	0.374	10.5	LOS B	2.5	18.9	0.77	0.76	54.5
East: Elderslie Road (east)											
4a	L1	523	8.0	0.652	8.6	LOS A	15.9	119.0	0.79	0.59	54.0
6a	R1	112	8.0	0.652	15.1	LOS B	15.9	119.0	0.79	0.59	54.8
3	R2	609	8.0	0.764	20.0	LOS C	18.3	137.1	0.87	0.82	49.1
Approach		1244	8.0	0.764	14.8	LOS B	18.3	137.1	0.83	0.70	51.5
NorthWest: Old Pacific Highway (West)											
27b	L3	93	8.0	0.681	18.7	LOS B	4.0	29.8	0.92	1.11	45.7
27a	L1	128	8.0	0.681	17.7	LOS B	4.0	29.8	0.92	1.11	47.5
29	R2	43	8.0	0.681	25.4	LOS C	4.0	29.8	0.92	1.11	49.0
Approach		264	8.0	0.681	19.3	LOS B	4.0	29.8	0.92	1.11	47.1
SouthWest: Elderslie Road (south)											
30	L2	24	8.0	0.620	9.6	LOS A	6.9	51.5	0.94	0.93	53.2
30a	L1	596	8.0	0.620	8.8	LOS A	6.9	51.5	0.93	0.94	54.4
32a	R1	411	8.0	0.620	15.2	LOS B	5.6	41.6	0.89	1.01	51.4
Approach		1031	8.0	0.620	11.3	LOS B	6.9	51.5	0.92	0.97	53.1
All Vehicles		2849	8.0	0.764	13.5	LOS B	18.3	137.1	0.86	0.84	51.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

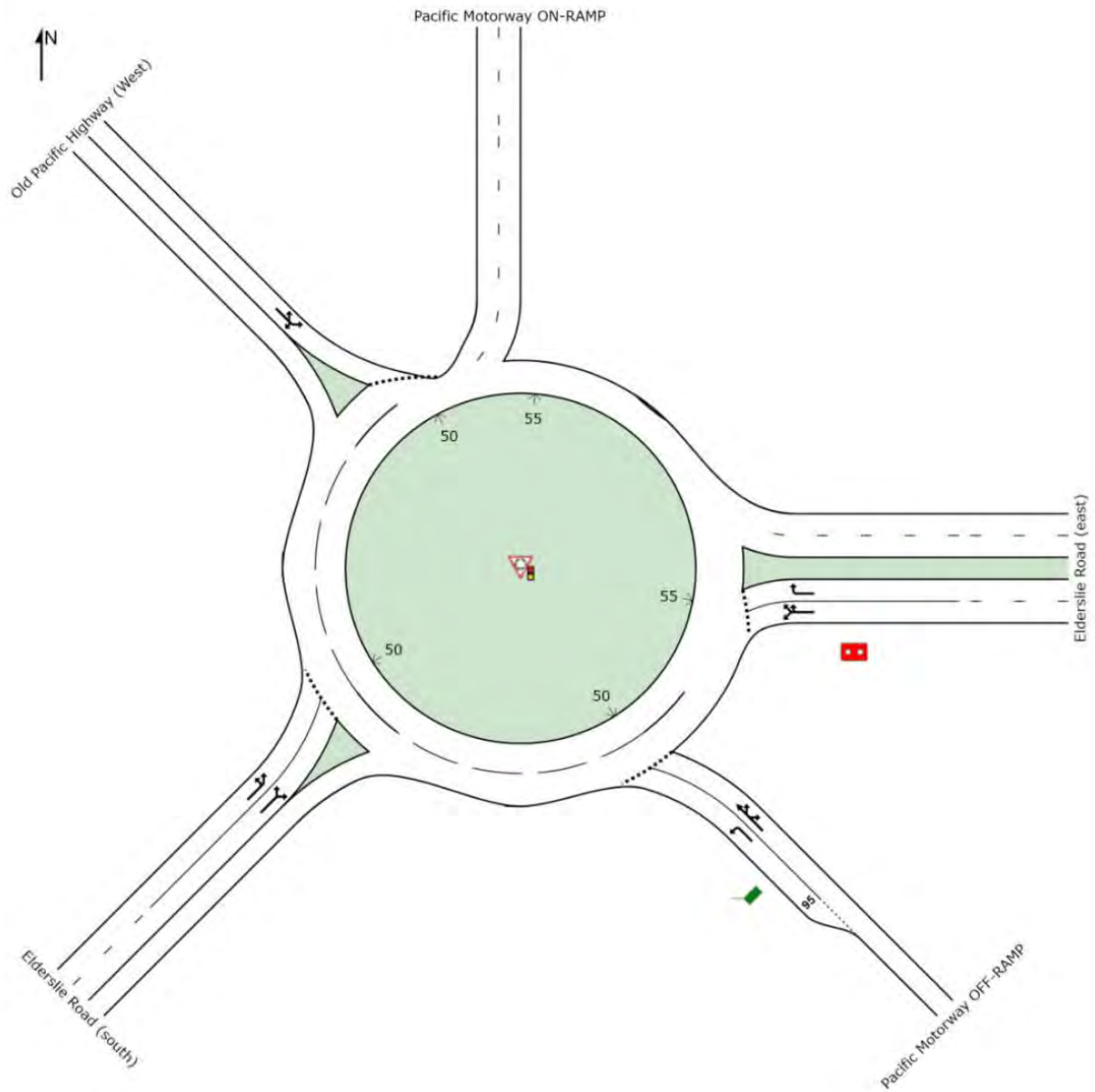
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

UPGRADE B - WESTERN ROUNDABOUT LAYOUT

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 **Site: Model 37 2020AM west stage 2 UPGRADED - ACTUAL**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	346	8.0	0.491	10.9	LOS B	4.1	31.0	0.87	0.90	51.5
22	T1	99	8.0	0.504	10.0	LOS A	5.1	37.9	0.93	0.86	50.3
23a	R1	1	8.0	0.504	16.0	LOS B	5.1	37.9	0.93	0.86	50.2
23b	R3	344	8.0	0.504	18.7	LOS B	5.1	37.9	0.93	0.86	52.0
Approach		790	8.0	0.504	14.2	LOS B	5.1	37.9	0.91	0.88	51.6
East: Elderslie Road (east)											
4a	L1	705	8.0	0.778	11.9	LOS B	25.9	194.1	0.86	0.67	51.8
6a	R1	109	8.0	0.778	18.3	LOS B	25.9	194.1	0.86	0.67	52.5
3	R2	328	8.0	0.401	14.6	LOS B	6.9	51.8	0.65	0.63	52.5
Approach		1142	8.0	0.778	13.3	LOS B	25.9	194.1	0.80	0.66	52.1
NorthWest: Old Pacific Highway (West)											
27b	L3	43	8.0	0.304	8.7	LOS A	1.6	12.1	0.79	0.87	51.6
27a	L1	100	8.0	0.304	7.6	LOS A	1.6	12.1	0.79	0.87	54.0
29	R2	49	8.0	0.304	15.4	LOS B	1.6	12.1	0.79	0.87	55.9
Approach		192	8.0	0.304	9.9	LOS A	1.6	12.1	0.79	0.87	53.9
SouthWest: Elderslie Road (south)											
30	L2	76	8.0	0.393	4.9	LOS A	2.3	17.4	0.71	0.50	54.9
30a	L1	367	8.0	0.393	4.1	LOS A	2.3	17.4	0.71	0.53	56.1
32a	R1	271	8.0	0.393	11.2	LOS B	2.2	16.2	0.71	0.81	53.8
Approach		714	8.0	0.393	6.9	LOS A	2.3	17.4	0.71	0.63	55.1
All Vehicles		2838	8.0	0.778	11.7	LOS B	25.9	194.1	0.81	0.73	52.8

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 38 2020PM west stage 2 UPGRADED - ACTUAL**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	59	8.0	0.085	6.8	LOS A	0.5	3.4	0.67	0.64	54.6
22	T1	102	8.0	0.287	6.9	LOS A	2.3	17.0	0.81	0.74	52.8
23a	R1	1	8.0	0.287	12.9	LOS B	2.3	17.0	0.81	0.74	52.7
23b	R3	166	8.0	0.287	15.6	LOS B	2.3	17.0	0.81	0.74	54.7
Approach		328	8.0	0.287	11.3	LOS B	2.3	17.0	0.79	0.72	54.1
East: Elderslie Road (east)											
4a	L1	545	8.0	0.781	12.8	LOS B	21.1	157.8	0.86	0.75	51.0
6a	R1	116	8.0	0.781	19.2	LOS B	21.1	157.8	0.86	0.75	51.7
3	R2	681	8.0	0.660	16.2	LOS B	17.5	131.0	0.77	0.63	51.5
Approach		1342	8.0	0.781	15.1	LOS B	21.1	157.8	0.81	0.69	51.3
NorthWest: Old Pacific Highway (West)											
27b	L3	93	8.0	0.782	29.0	LOS C	5.1	38.3	0.95	1.25	40.5
27a	L1	129	8.0	0.782	28.3	LOS C	5.1	38.3	0.95	1.25	42.0
29	R2	43	8.0	0.782	35.7	LOS D	5.1	38.3	0.95	1.25	43.1
Approach		265	8.0	0.782	29.8	LOS C	5.1	38.3	0.95	1.25	41.6
SouthWest: Elderslie Road (south)											
30	L2	24	8.0	0.657	12.2	LOS B	8.2	61.1	0.98	1.02	51.3
30a	L1	596	8.0	0.657	11.4	LOS B	8.2	61.1	0.98	1.03	52.4
32a	R1	416	8.0	0.657	18.8	LOS B	6.8	50.7	0.94	1.09	49.1
Approach		1036	8.0	0.657	14.4	LOS B	8.2	61.1	0.96	1.05	51.0
All Vehicles		2971	8.0	0.782	15.7	LOS B	21.1	157.8	0.88	0.87	50.5

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 11 2023AM west full dev UPGRADED - ACTUAL**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	377	8.0	0.585	16.0	LOS B	6.2	46.4	0.96	1.05	48.1
22	T1	108	8.0	0.627	17.0	LOS B	9.0	67.2	1.00	1.05	46.1
23a	R1	1	8.0	0.627	23.1	LOS C	9.0	67.2	1.00	1.05	46.1
23b	R3	398	8.0	0.627	25.8	LOS C	9.0	67.2	1.00	1.05	47.6
Approach		884	8.0	0.627	20.6	LOS C	9.0	67.2	0.98	1.05	47.6
East: Elderslie Road (east)											
4a	L1	773	8.0	0.814	13.7	LOS B	31.9	238.7	0.88	0.68	50.5
6a	R1	120	8.0	0.814	20.1	LOS C	31.9	238.7	0.88	0.68	51.2
3	R2	373	8.0	0.434	14.5	LOS B	8.2	61.2	0.64	0.62	52.6
Approach		1266	8.0	0.814	14.5	LOS B	31.9	238.7	0.81	0.66	51.2
NorthWest: Old Pacific Highway (West)											
27b	L3	52	8.0	0.359	10.0	LOS B	2.1	15.5	0.83	0.92	50.7
27a	L1	105	8.0	0.359	8.9	LOS A	2.1	15.5	0.83	0.92	53.0
29	R2	53	8.0	0.359	16.7	LOS B	2.1	15.5	0.83	0.92	54.8
Approach		210	8.0	0.359	11.2	LOS B	2.1	15.5	0.83	0.92	52.8
SouthWest: Elderslie Road (south)											
30	L2	83	8.0	0.453	5.6	LOS A	3.0	22.3	0.76	0.60	54.6
30a	L1	400	8.0	0.453	4.8	LOS A	3.0	22.3	0.76	0.62	55.8
32a	R1	299	8.0	0.453	11.9	LOS B	2.7	20.3	0.76	0.89	53.6
Approach		782	8.0	0.453	7.6	LOS A	3.0	22.3	0.76	0.72	54.8
All Vehicles		3142	8.0	0.814	14.3	LOS B	31.9	238.7	0.85	0.80	51.1

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 12 2023PM west full dev UPGRADED - ACTUAL

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	64	8.0	0.107	7.3	LOS A	0.5	4.0	0.68	0.69	54.2
22	T1	111	8.0	0.354	7.5	LOS A	2.8	20.7	0.86	0.80	52.4
23a	R1	1	8.0	0.354	13.6	LOS B	2.8	20.7	0.86	0.80	52.3
23b	R3	185	8.0	0.354	16.3	LOS B	2.8	20.7	0.86	0.80	54.3
Approach		361	8.0	0.354	12.0	LOS B	2.8	20.7	0.83	0.78	53.7
East: Elderslie Road (east)											
4a	L1	593	8.0	0.785	12.2	LOS B	25.2	188.6	0.87	0.71	51.0
6a	R1	127	8.0	0.785	18.6	LOS B	25.2	188.6	0.87	0.71	51.6
3	R2	739	8.0	0.785	20.8	LOS C	25.2	188.6	0.87	0.80	49.0
Approach		1459	8.0	0.785	17.1	LOS B	25.2	188.6	0.87	0.75	50.0
NorthWest: Old Pacific Highway (West)											
27b	L3	103	8.0	0.855	34.9	LOS C	6.6	49.0	0.97	1.36	38.2
27a	L1	140	8.0	0.855	33.8	LOS C	6.6	49.0	0.97	1.36	39.5
29	R2	47	8.0	0.855	41.6	LOS D	6.6	49.0	0.97	1.36	40.5
Approach		290	8.0	0.855	35.5	LOS D	6.6	49.0	0.97	1.36	39.2
SouthWest: Elderslie Road (south)											
30	L2	26	8.0	0.744	14.4	LOS B	10.7	80.3	1.00	1.12	49.8
30a	L1	650	8.0	0.744	13.6	LOS B	10.7	80.3	1.00	1.13	50.9
32a	R1	456	8.0	0.744	20.4	LOS C	8.5	63.3	0.99	1.19	48.1
Approach		1132	8.0	0.744	16.3	LOS B	10.7	80.3	0.99	1.15	49.7
All Vehicles		3242	8.0	0.855	17.9	LOS B	25.2	188.6	0.92	0.95	49.1

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

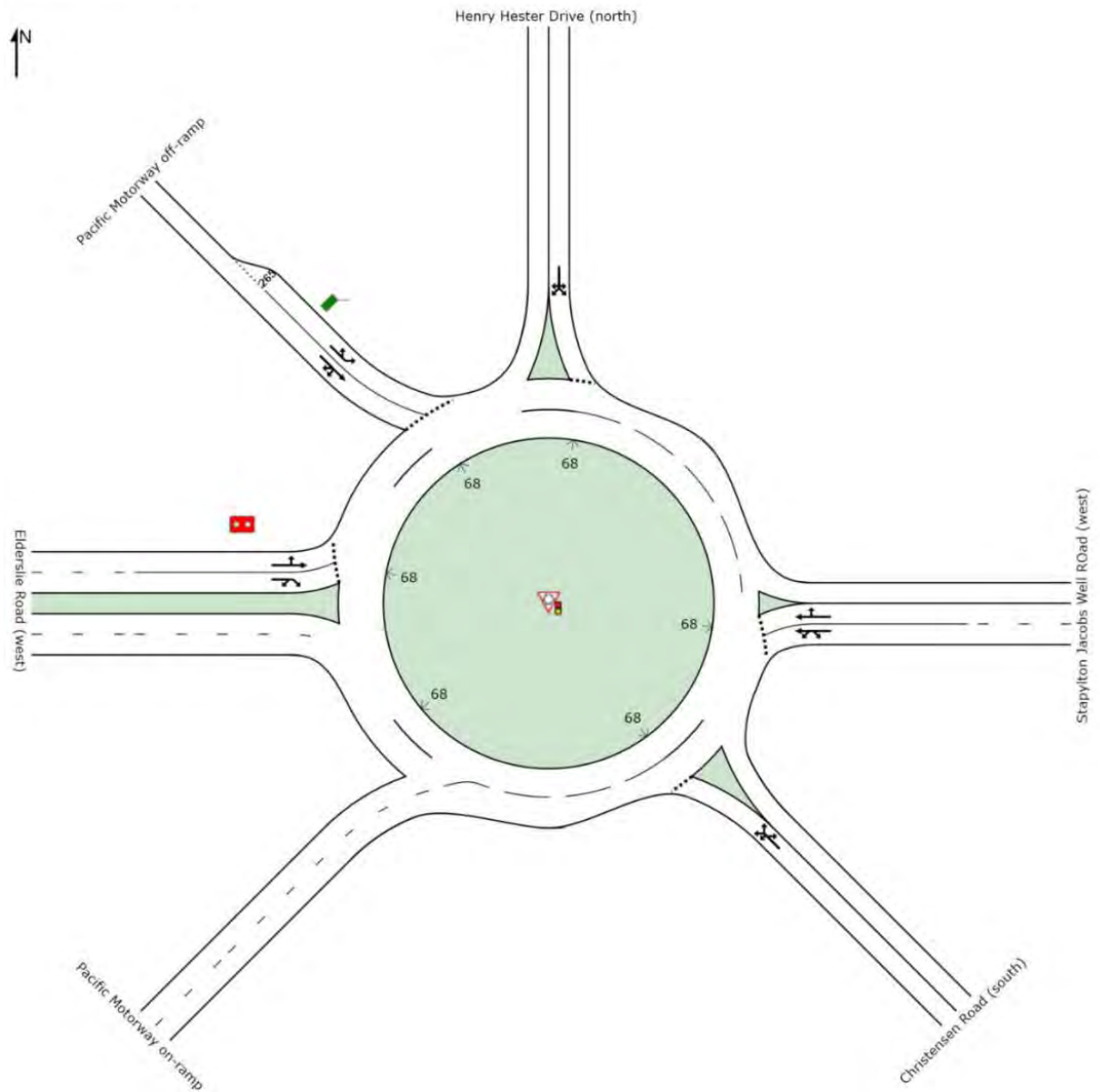
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

UPGRADE A – EASTERN ROUNDABOUT

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 Site: Model 21 2020AM east stage 1 UPGRADE A - ACTUAL

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	25	8.0	0.322	5.8	LOS A	1.4	10.6	0.71	0.71	54.0
21a	L1	148	8.0	0.322	5.9	LOS A	1.4	10.6	0.71	0.71	55.9
23a	R1	38	8.0	0.322	12.0	LOS B	1.4	10.6	0.71	0.71	57.2
23b	R3	19	8.0	0.322	14.8	LOS B	1.4	10.6	0.71	0.71	60.4
Approach		230	8.0	0.322	7.6	LOS A	1.4	10.6	0.71	0.71	56.3
East: Stapylton Jacobs Well Road (west)											
4b	L3	37	8.0	0.457	7.6	LOS A	2.3	17.5	0.83	0.80	52.9
4a	L1	115	8.0	0.457	7.2	LOS A	2.3	17.5	0.83	0.80	56.0
5	T1	307	8.0	0.457	7.4	LOS A	2.3	17.5	0.84	0.81	56.4
6	R2	68	8.0	0.457	14.2	LOS B	1.5	11.3	0.85	0.81	56.9
Approach		527	8.0	0.457	8.2	LOS A	2.3	17.5	0.84	0.81	56.1
North: Henry Hester Drive (north)											
7	L2	67	8.0	0.480	5.7	LOS A	2.1	16.0	0.79	0.87	52.8
7a	L1	40	8.0	0.480	5.8	LOS A	2.1	16.0	0.79	0.87	54.5
9a	R1	103	8.0	0.480	11.9	LOS B	2.1	16.0	0.79	0.87	55.7
9	R2	81	8.0	0.480	13.4	LOS B	2.1	16.0	0.79	0.87	57.2
Approach		291	8.0	0.480	10.1	LOS B	2.1	16.0	0.79	0.87	55.2
NorthWest: Pacific Motorway off-ramp											
27b	L3	109	8.0	0.395	3.5	LOS A	1.6	12.1	0.54	0.37	54.9
27a	L1	270	8.0	0.395	3.1	LOS A	1.6	12.1	0.54	0.37	58.2
28	T1	209	8.0	0.621	3.6	LOS A	3.8	28.1	0.68	0.67	54.5
29	R2	1	8.0	0.621	10.8	LOS B	3.8	28.1	0.68	0.67	56.0
29b	R3	552	8.0	0.621	12.2	LOS B	3.8	28.1	0.68	0.67	57.3
Approach		1141	8.0	0.621	7.7	LOS A	3.8	28.1	0.64	0.57	56.7
West: Elderslie Road (west)											
10	L2	72	8.0	0.650	11.2	LOS B	8.0	59.7	0.93	0.96	52.0
11	T1	292	8.0	0.650	11.5	LOS B	8.0	59.7	0.93	0.96	54.9
12a	R1	187	8.0	0.666	17.8	LOS B	6.6	49.6	0.94	1.06	50.2
12b	R3	105	8.0	0.666	20.6	LOS C	6.6	49.6	0.94	1.06	52.5
Approach		656	8.0	0.666	14.7	LOS B	8.0	59.7	0.94	1.01	52.7
All Vehicles		2845	8.0	0.666	9.6	LOS A	8.0	59.7	0.76	0.76	55.5

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 22 2020PM east stage 1 UPGRADE A - ACTUAL**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	81	8.0	1.019	81.6	LOS F	26.1	195.6	1.00	2.75	26.5
21a	L1	301	8.0	1.019	81.7	LOS F	26.1	195.6	1.00	2.75	27.0
23a	R1	75	8.0	1.019	87.8	LOS F	26.1	195.6	1.00	2.75	27.3
23b	R3	25	8.0	1.019	90.7	LOS F	26.1	195.6	1.00	2.75	28.0
Approach		482	8.0	1.019	83.1	LOS F	26.1	195.6	1.00	2.75	27.0
East: Stapylton Jacobs Well ROad (west)											
4b	L3	33	8.0	0.593	10.1	LOS B	4.6	34.3	0.82	1.00	50.8
4a	L1	255	8.0	0.593	11.5	LOS B	4.6	34.3	0.82	1.00	53.7
5	T1	468	8.0	0.593	11.9	LOS B	4.6	34.3	0.82	1.00	53.9
6	R2	96	8.0	0.593	19.2	LOS B	3.3	24.7	0.83	1.00	54.5
Approach		852	8.0	0.593	12.5	LOS B	4.6	34.3	0.82	1.00	53.8
North: Henry Hester Drive (north)											
7	L2	85	8.0	0.513	6.4	LOS A	2.5	19.0	0.77	0.92	52.4
7a	L1	33	8.0	0.513	6.5	LOS A	2.5	19.0	0.77	0.92	54.2
9a	R1	130	8.0	0.513	13.2	LOS B	2.5	19.0	0.77	0.92	55.4
9	R2	77	8.0	0.513	14.0	LOS B	2.5	19.0	0.77	0.92	56.8
Approach		325	8.0	0.513	11.0	LOS B	2.5	19.0	0.77	0.92	54.8
NorthWest: Pacific Motorway off-ramp											
27b	L3	84	8.0	0.350	4.1	LOS A	1.7	12.5	0.63	0.42	54.5
27a	L1	220	8.0	0.350	3.6	LOS A	1.7	12.5	0.63	0.42	57.7
28	T1	61	8.0	0.435	4.0	LOS A	2.7	20.1	0.69	0.72	53.6
29	R2	4	8.0	0.435	11.2	LOS B	2.7	20.1	0.69	0.72	54.9
29b	R3	412	8.0	0.435	12.6	LOS B	2.7	20.1	0.69	0.72	56.3
Approach		781	8.0	0.435	8.5	LOS A	2.7	20.1	0.67	0.61	56.2
West: Elderslie Road (west)											
10	L2	89	8.0	0.498	10.2	LOS B	5.5	41.3	0.86	0.82	52.6
11	T1	163	8.0	0.498	10.5	LOS B	5.5	41.3	0.86	0.82	55.7
12a	R1	72	8.0	0.757	19.3	LOS B	12.7	94.9	0.95	0.98	48.7
12b	R3	417	8.0	0.757	22.2	LOS C	12.7	94.9	0.95	0.98	50.8
Approach		741	8.0	0.757	17.9	LOS B	12.7	94.9	0.92	0.93	51.7
All Vehicles		3181	8.0	1.019	23.3	LOS C	26.1	195.6	0.83	1.14	47.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

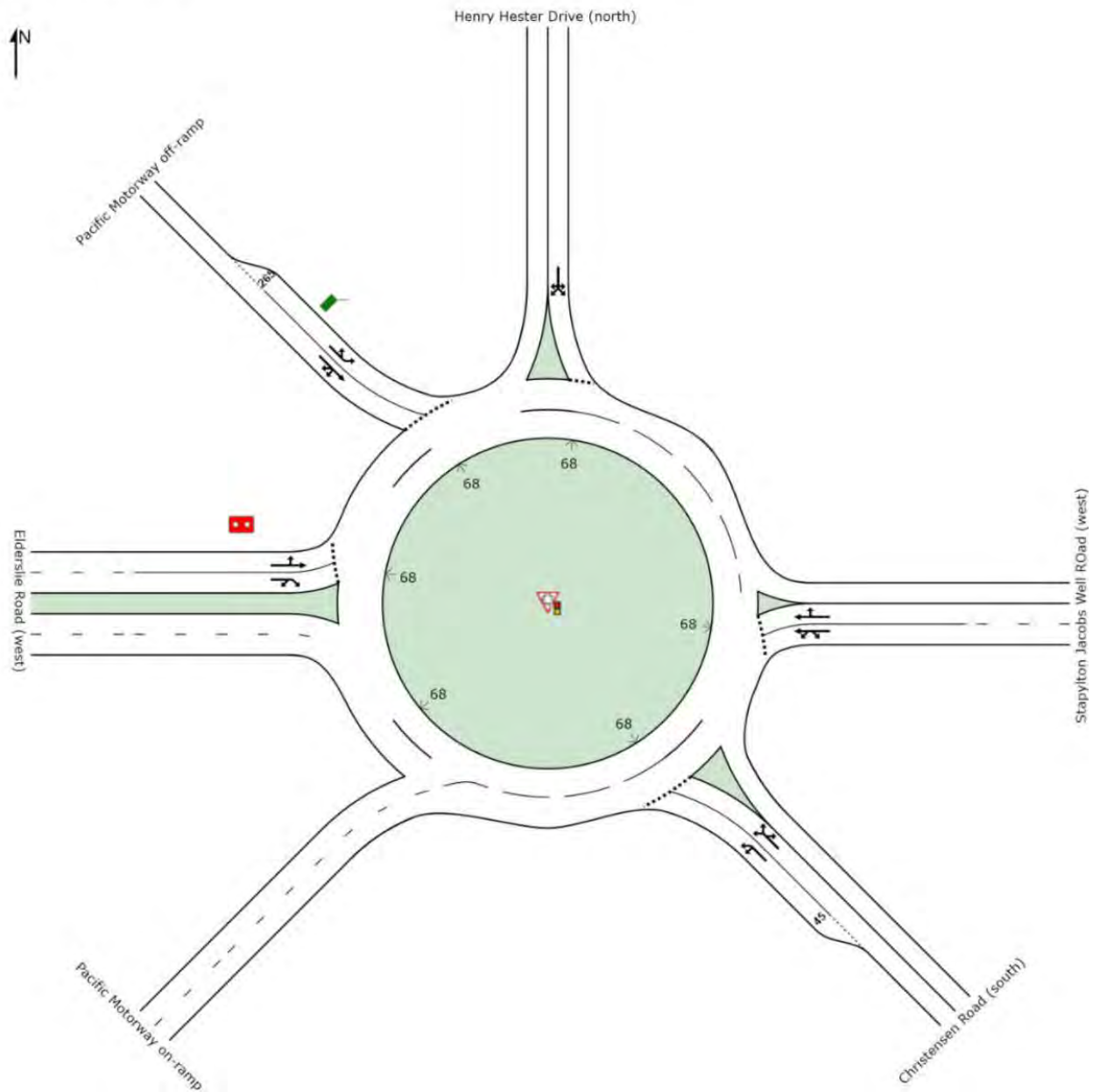
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

UPGRADE B – EASTERN ROUNDABOUT

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 Site: Model 21 2020AM east stage 2 UPGRADE B - ACTUAL

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	32	8.0	0.165	5.1	LOS A	0.9	6.5	0.73	0.55	54.9
21a	L1	165	8.0	0.165	5.3	LOS A	0.9	6.5	0.72	0.61	56.2
23a	R1	43	8.0	0.165	12.0	LOS B	0.7	5.2	0.69	0.78	55.8
23b	R3	19	8.0	0.165	14.9	LOS B	0.7	5.2	0.69	0.78	58.7
Approach		259	8.0	0.165	7.1	LOS A	0.9	6.5	0.71	0.64	56.2
East: Stapylton Jacobs Well ROad (west)											
4b	L3	37	8.0	0.563	9.1	LOS A	3.1	23.5	0.88	0.97	52.6
4a	L1	139	8.0	0.563	8.7	LOS A	3.1	23.5	0.88	0.97	55.6
5	T1	336	8.0	0.563	8.7	LOS A	3.1	23.5	0.88	0.94	56.0
6	R2	73	8.0	0.563	15.4	LOS B	1.9	14.6	0.89	0.91	56.5
Approach		585	8.0	0.563	9.6	LOS A	3.1	23.5	0.88	0.95	55.7
North: Henry Hester Drive (north)											
7	L2	71	8.0	0.534	6.8	LOS A	2.6	19.6	0.83	0.94	52.3
7a	L1	44	8.0	0.534	6.9	LOS A	2.6	19.6	0.83	0.94	54.0
9a	R1	103	8.0	0.534	13.0	LOS B	2.6	19.6	0.83	0.94	55.2
9	R2	81	8.0	0.534	14.4	LOS B	2.6	19.6	0.83	0.94	56.6
Approach		299	8.0	0.534	11.0	LOS B	2.6	19.6	0.83	0.94	54.7
NorthWest: Pacific Motorway off-ramp											
27b	L3	109	8.0	0.451	4.0	LOS A	2.2	16.7	0.63	0.42	54.4
27a	L1	303	8.0	0.451	3.6	LOS A	2.2	16.7	0.63	0.42	57.6
28	T1	230	8.0	0.670	4.4	LOS A	5.1	38.1	0.78	0.74	54.3
29	R2	1	8.0	0.670	11.6	LOS B	5.1	38.1	0.78	0.74	55.7
29b	R3	552	8.0	0.670	13.0	LOS B	5.1	38.1	0.78	0.74	57.1
Approach		1195	8.0	0.670	8.1	LOS A	5.1	38.1	0.73	0.63	56.4
West: Elderslie Road (west)											
10	L2	72	8.0	0.624	10.5	LOS B	9.1	68.3	0.90	0.84	52.5
11	T1	340	8.0	0.624	10.8	LOS B	9.1	68.3	0.90	0.84	55.5
12a	R1	219	8.0	0.629	16.9	LOS B	7.4	55.2	0.91	0.97	50.8
12b	R3	105	8.0	0.629	19.8	LOS B	7.4	55.2	0.91	0.97	53.1
Approach		736	8.0	0.629	13.8	LOS B	9.1	68.3	0.90	0.89	53.3
All Vehicles		3074	8.0	0.670	10.0	LOS A	9.1	68.3	0.81	0.79	55.3

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 22 2020PM east stage 2 UPGRADE B - ACTUAL

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	96	8.0	0.553	8.8	LOS A	3.2	24.2	0.87	0.98	53.8
21a	L1	340	8.0	0.553	9.1	LOS A	3.2	24.2	0.88	0.99	54.7
23a	R1	86	8.0	0.553	15.9	LOS B	2.3	17.4	0.89	1.00	53.7
23b	R3	25	8.0	0.553	18.8	LOS B	2.3	17.4	0.89	1.00	56.5
Approach		547	8.0	0.553	10.6	LOS B	3.2	24.2	0.88	0.99	54.5
East: Stapylton Jacobs Well ROad (west)											
4b	L3	33	8.0	0.714	14.4	LOS B	7.1	52.8	0.87	1.15	48.0
4a	L1	310	8.0	0.714	16.1	LOS B	7.1	52.8	0.87	1.15	50.5
5	T1	533	8.0	0.714	16.0	LOS B	7.1	52.8	0.88	1.13	51.0
6	R2	107	8.0	0.714	23.0	LOS C	4.8	35.6	0.88	1.11	51.9
Approach		983	8.0	0.714	16.7	LOS B	7.1	52.8	0.88	1.13	50.9
North: Henry Hester Drive (north)											
7	L2	86	8.0	0.538	7.1	LOS A	2.8	20.7	0.79	0.95	52.1
7a	L1	34	8.0	0.538	7.2	LOS A	2.8	20.7	0.79	0.95	53.8
9a	R1	130	8.0	0.538	13.6	LOS B	2.8	20.7	0.79	0.95	55.0
9	R2	77	8.0	0.538	14.7	LOS B	2.8	20.7	0.79	0.95	56.4
Approach		327	8.0	0.538	11.4	LOS B	2.8	20.7	0.79	0.95	54.4
NorthWest: Pacific Motorway off-ramp											
27b	L3	84	8.0	0.372	4.3	LOS A	1.9	14.2	0.66	0.45	54.3
27a	L1	230	8.0	0.372	3.9	LOS A	1.9	14.2	0.66	0.45	57.4
28	T1	67	8.0	0.450	4.2	LOS A	3.0	22.3	0.73	0.74	53.5
29	R2	4	8.0	0.450	11.4	LOS B	3.0	22.3	0.73	0.74	54.9
29b	R3	412	8.0	0.450	12.8	LOS B	3.0	22.3	0.73	0.74	56.2
Approach		797	8.0	0.450	8.6	LOS A	3.0	22.3	0.71	0.62	56.1
West: Elderslie Road (west)											
10	L2	89	8.0	0.520	10.2	LOS B	6.0	44.7	0.87	0.82	52.6
11	T1	178	8.0	0.520	10.5	LOS B	6.0	44.7	0.87	0.82	55.7
12a	R1	82	8.0	0.753	19.3	LOS B	13.2	98.8	0.96	0.96	48.7
12b	R3	417	8.0	0.753	22.2	LOS C	13.2	98.8	0.96	0.96	50.8
Approach		766	8.0	0.753	17.8	LOS B	13.2	98.8	0.93	0.91	51.8
All Vehicles		3420	8.0	0.753	13.6	LOS B	13.2	98.8	0.84	0.92	53.1

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 23 2023AM east full dev UPGRADED V2**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	60	8.0	0.215	6.0	LOS A	1.4	10.1	0.80	0.66	54.6
21a	L1	200	8.0	0.215	6.4	LOS A	1.4	10.1	0.79	0.71	55.7
23a	R1	48	8.0	0.215	13.4	LOS B	1.2	8.6	0.78	0.82	55.3
23b	R3	20	8.0	0.215	16.3	LOS B	1.2	8.6	0.78	0.82	58.2
Approach		328	8.0	0.215	8.0	LOS A	1.4	10.1	0.79	0.72	55.6
East: Stapylton Jacobs Well Road (west)											
4b	L3	40	8.0	0.764	26.4	LOS C	7.7	57.3	0.95	1.24	42.6
4a	L1	148	8.0	0.764	26.0	LOS C	7.7	57.3	0.95	1.24	44.6
5	T1	361	8.0	0.764	28.9	LOS C	7.7	57.3	0.95	1.23	43.9
6	R2	76	8.0	0.764	36.4	LOS D	5.3	39.4	0.95	1.21	43.2
Approach		625	8.0	0.764	28.9	LOS C	7.7	57.3	0.95	1.23	43.9
North: Henry Hester Drive (north)											
7	L2	76	8.0	0.806	20.3	LOS C	6.2	46.4	0.95	1.20	44.5
7a	L1	50	8.0	0.806	20.4	LOS C	6.2	46.4	0.95	1.20	45.8
9a	R1	112	8.0	0.806	26.5	LOS C	6.2	46.4	0.95	1.20	46.6
9	R2	88	8.0	0.806	27.9	LOS C	6.2	46.4	0.95	1.20	47.6
Approach		326	8.0	0.806	24.5	LOS C	6.2	46.4	0.95	1.20	46.3
NorthWest: Pacific Motorway off-ramp											
27b	L3	119	8.0	0.314	4.8	LOS A	2.4	17.9	0.72	0.54	54.2
27a	L1	325	8.0	0.911	11.6	LOS B	28.5	213.5	0.88	0.84	51.0
28	T1	269	8.0	0.911	17.4	LOS B	28.5	213.5	1.00	1.08	48.1
29	R2	1	8.0	0.911	24.6	LOS C	28.5	213.5	1.00	1.08	49.2
29b	R3	602	8.0	0.911	26.0	LOS C	28.5	213.5	1.00	1.08	50.3
Approach		1316	8.0	0.911	18.8	LOS B	28.5	213.5	0.94	0.97	50.3
West: Elderslie Road (west)											
10	L2	78	8.0	0.718	19.8	LOS B	18.3	136.6	0.96	0.75	46.6
11	T1	341	8.0	0.718	20.1	LOS C	18.3	136.6	0.96	0.75	49.0
12a	R1	283	8.0	0.870	36.0	LOS D	20.9	156.5	1.00	1.07	41.1
12b	R3	114	8.0	0.870	38.8	LOS D	20.9	156.5	1.00	1.07	42.6
Approach		816	8.0	0.870	28.2	LOS C	20.9	156.5	0.98	0.91	44.8
All Vehicles		3411	8.0	0.911	22.4	LOS C	28.5	213.5	0.94	1.00	47.7

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 24 2023PM east full dev UPGRADED V2

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	111	8.0	0.653	13.5	LOS B	4.8	36.3	0.94	1.11	50.5
21a	L1	374	8.0	0.653	13.1	LOS B	4.8	36.3	0.93	1.09	51.8
23a	R1	94	8.0	0.653	18.4	LOS B	3.1	23.2	0.92	1.05	52.0
23b	R3	26	8.0	0.653	21.3	LOS C	3.1	23.2	0.92	1.05	54.6
Approach		605	8.0	0.653	14.3	LOS B	4.8	36.3	0.93	1.08	51.7
East: Stapylton Jacobs Well Road (west)											
4b	L3	35	8.0	0.934	56.5	LOS E	21.5	161.0	0.98	2.13	31.3
4a	L1	296	8.0	0.934	59.3	LOS E	21.5	161.0	0.98	2.13	32.3
5	T1	572	8.0	0.934	53.5	LOS D	21.5	161.0	0.98	1.93	34.4
6	R2	115	8.0	0.934	55.4	LOS E	11.9	88.8	0.98	1.76	36.5
Approach		1018	8.0	0.934	55.5	LOS E	21.5	161.0	0.98	1.98	33.9
North: Henry Hester Drive (north)											
7	L2	94	8.0	0.717	13.7	LOS B	4.9	36.6	0.90	1.11	48.0
7a	L1	38	8.0	0.717	13.8	LOS B	4.9	36.6	0.90	1.11	49.5
9a	R1	142	8.0	0.717	19.9	LOS B	4.9	36.6	0.90	1.11	50.5
9	R2	84	8.0	0.717	21.4	LOS C	4.9	36.6	0.90	1.11	51.7
Approach		358	8.0	0.717	18.0	LOS B	4.9	36.6	0.90	1.11	50.0
NorthWest: Pacific Motorway off-ramp											
27b	L3	92	8.0	0.232	4.7	LOS A	1.2	9.2	0.68	0.54	54.4
27a	L1	244	8.0	0.671	5.8	LOS A	7.1	53.0	0.83	0.77	54.3
28	T1	79	8.0	0.671	7.1	LOS A	7.1	53.0	0.92	0.90	53.6
29	R2	4	8.0	0.671	14.3	LOS B	7.1	53.0	0.92	0.90	55.0
29b	R3	450	8.0	0.671	15.7	LOS B	7.1	53.0	0.92	0.90	56.4
Approach		869	8.0	0.671	11.0	LOS B	7.1	53.0	0.87	0.82	55.3
West: Elderslie Road (west)											
10	L2	97	8.0	0.456	8.8	LOS A	6.1	45.6	0.81	0.69	53.7
11	T1	191	8.0	0.456	9.1	LOS A	6.1	45.6	0.81	0.69	56.9
12a	R1	96	8.0	0.672	16.5	LOS B	13.6	102.0	0.89	0.77	50.4
12b	R3	455	8.0	0.672	19.3	LOS B	13.6	102.0	0.89	0.77	52.6
Approach		839	8.0	0.672	15.4	LOS B	13.6	102.0	0.87	0.74	53.3
All Vehicles		3689	8.0	0.934	25.5	LOS C	21.5	161.0	0.91	1.19	46.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE ACCESS / STAPYLTON JACOBS WELL ROAD INTERSECTION

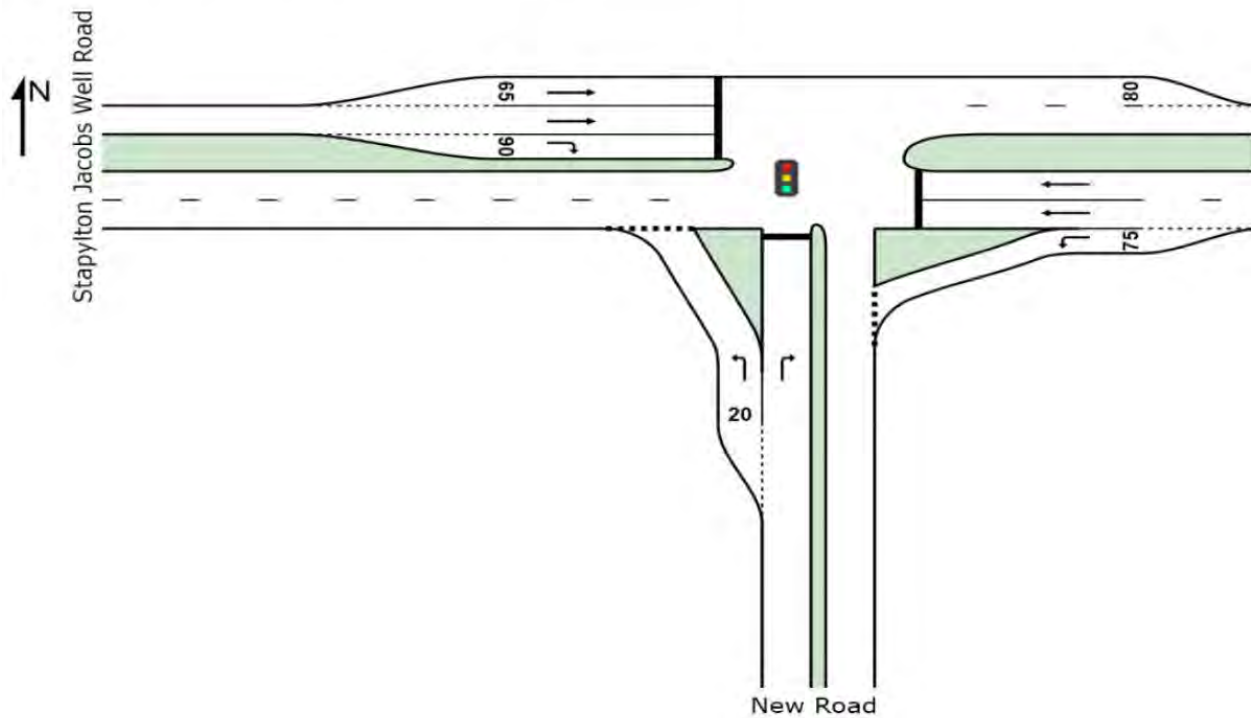
2020AM PEAK – STAGE ONE

2020PM PEAK – STAGE ONE

2030AM PEAK – FULL DEVELOPMENT

2030PM PEAK – FULL DEVELOPMENT

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

 **Site: Model 31A 2020 AM Peak (SJW Rd - New Rd Int) - STAGE 1 - ACTUAL**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	32	15.0	0.035	7.7	LOS A	0.2	1.3	0.42	0.63	52.1
3	R2	8	15.0	0.029	22.2	LOS C	0.1	1.1	0.88	0.65	43.0
Approach		40	15.0	0.035	10.6	LOS B	0.2	1.3	0.51	0.63	50.0
East: Stapylton Jacobs Well Road											
4	L2	15	15.0	0.014	6.9	LOS A	0.1	0.4	0.34	0.60	52.5
5	T1	490	15.0	0.546	14.9	LOS B	4.4	35.0	0.92	0.76	48.2
Approach		505	15.0	0.546	14.7	LOS B	4.4	35.0	0.90	0.75	48.3
West: Stapylton Jacobs Well Road											
11	T1	590	15.0	0.408	5.5	LOS A	4.7	36.9	0.59	0.50	55.0
12	R2	58	15.0	0.234	23.3	LOS C	1.1	8.6	0.92	0.73	42.5
Approach		648	15.0	0.408	7.1	LOS A	4.7	36.9	0.62	0.52	53.6
All Vehicles		1193	15.0	0.546	10.4	LOS B	4.7	36.9	0.73	0.62	51.1

MOVEMENT SUMMARY

 **Site: Model 31B 2020 PM Peak (SJW Rd - New Rd Int) - STAGE 1 - ACTUAL**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	72	15.0	0.086	8.8	LOS A	0.5	3.9	0.52	0.66	51.3
3	R2	18	15.0	0.066	22.4	LOS C	0.3	2.5	0.89	0.68	42.9
Approach		90	15.0	0.086	11.5	LOS B	0.5	3.9	0.59	0.67	49.4
East: Stapylton Jacobs Well Road											
4	L2	5	15.0	0.004	6.8	LOS A	0.0	0.1	0.31	0.58	52.6
5	T1	740	15.0	0.824	21.0	LOS C	8.5	67.2	1.00	1.04	44.7
Approach		745	15.0	0.824	20.9	LOS C	8.5	67.2	1.00	1.04	44.7
West: Stapylton Jacobs Well Road											
11	T1	496	15.0	0.343	5.3	LOS A	3.8	29.6	0.57	0.48	55.2
12	R2	18	15.0	0.073	22.6	LOS C	0.3	2.6	0.89	0.68	42.9
Approach		514	15.0	0.343	5.9	LOS A	3.8	29.6	0.58	0.49	54.7
All Vehicles		1349	15.0	0.824	14.6	LOS B	8.5	67.2	0.81	0.80	48.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 34A 2030 AM Peak (SJW Rd - New Rd Int) - ULTIMATE - ACTUAL**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	77	15.0	0.090	8.8	LOS A	0.5	4.2	0.52	0.66	51.3
3	R2	40	15.0	0.146	22.8	LOS C	0.7	5.8	0.90	0.71	42.7
Approach		117	15.0	0.146	13.6	LOS B	0.7	5.8	0.65	0.68	48.0
East: Stapylton Jacobs Well Road											
4	L2	62	15.0	0.060	7.5	LOS A	0.3	2.3	0.41	0.63	52.3
5	T1	681	15.0	0.759	18.4	LOS B	7.2	56.9	0.98	0.94	46.1
Approach		743	15.0	0.759	17.5	LOS B	7.2	56.9	0.93	0.92	46.6
West: Stapylton Jacobs Well Road											
11	T1	815	15.0	0.563	6.1	LOS A	7.3	57.5	0.65	0.57	54.6
12	R2	141	15.0	0.569	24.8	LOS C	2.9	22.6	0.97	0.82	41.8
Approach		956	15.0	0.569	8.8	LOS A	7.3	57.5	0.70	0.60	52.2
All Vehicles		1816	15.0	0.759	12.7	LOS B	7.3	57.5	0.79	0.74	49.5

MOVEMENT SUMMARY

 **Site: Model 34B 2030 PM Peak (SJW Rd - New Rd Int) - ULTIMATE - ACTUAL**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	175	15.0	0.242	10.5	LOS B	1.9	14.7	0.58	0.71	50.2
3	R2	65	15.0	0.297	29.1	LOS C	1.6	12.4	0.95	0.74	39.8
Approach		240	15.0	0.297	15.5	LOS B	1.9	14.7	0.68	0.72	46.9
East: Stapylton Jacobs Well Road											
4	L2	19	15.0	0.016	6.7	LOS A	0.1	0.5	0.27	0.59	52.7
5	T1	1026	15.0	0.714	15.3	LOS B	11.4	90.3	0.90	0.83	48.0
Approach		1045	15.0	0.714	15.1	LOS B	11.4	90.3	0.89	0.83	48.1
West: Stapylton Jacobs Well Road											
11	T1	644	15.0	0.382	4.4	LOS A	5.2	40.8	0.48	0.42	55.9
12	R2	44	15.0	0.222	29.0	LOS C	1.1	8.3	0.94	0.73	39.9
Approach		688	15.0	0.382	6.0	LOS A	5.2	40.8	0.51	0.44	54.5
All Vehicles		1973	15.0	0.714	12.0	LOS B	11.4	90.3	0.73	0.68	50.0

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX I – DETAIL SIDRA RESULTS OF SENSITIVITY ANALYSIS

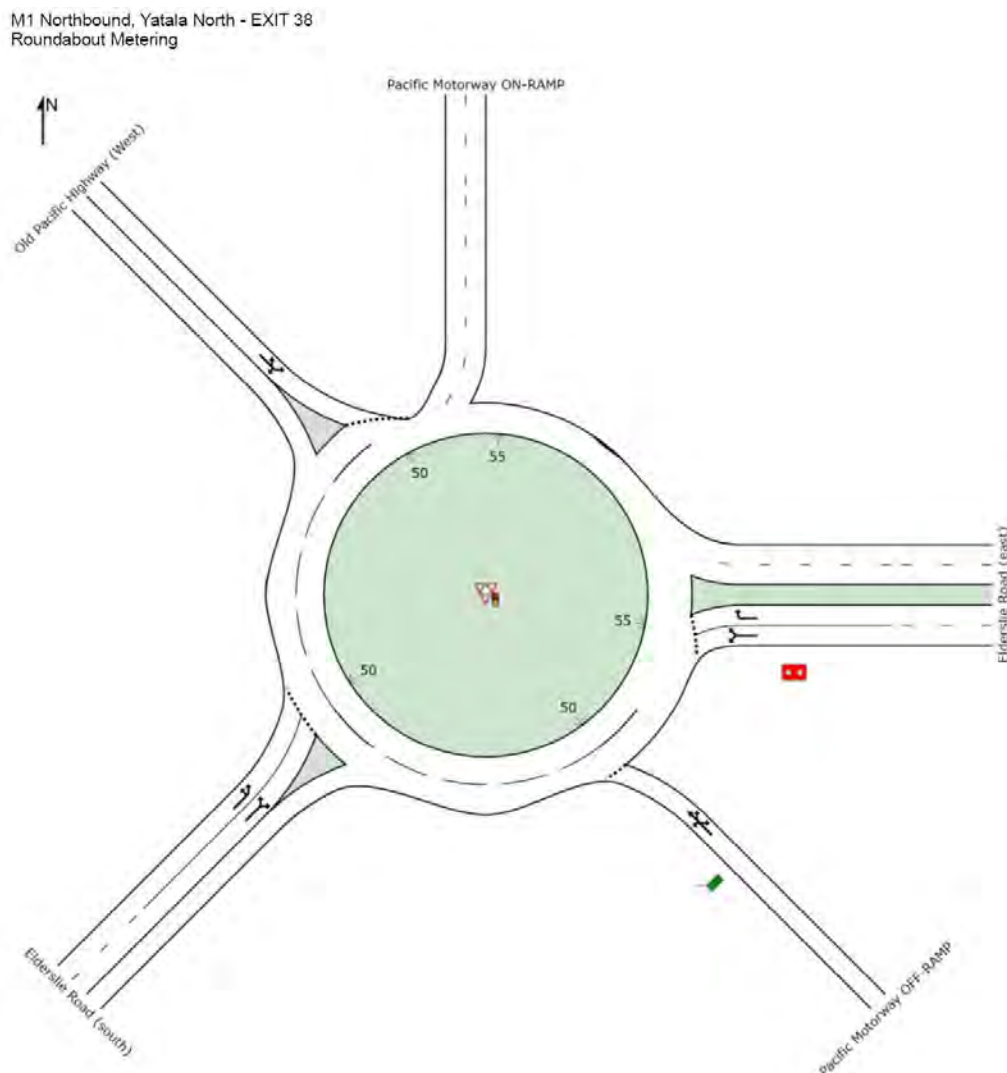
Western roundabout (upgraded):

- Year 2020 AM Peak Hour, with Stage 1 - EXISTING;
- Year 2020 PM Peak Hour, with Stage 1 - EXISTING;
- Year 2023 AM Peak Hour full development – UPGRADE B;
- Year 2023 PM Peak Hour full development – UPGRADE B;

Eastern roundabout:

- Year 2020 AM Peak Hour, with Stage 1 development UPGRADE A;
- Year 2020 PM Peak Hour, with Stage 1 development UPGRADE A;
- Year 2020 AM Peak Hour, with Stage 2 development UPGRADE B;
- Year 2020 PM Peak Hour, with Stage 2 development UPGRADE B;
- Year 2023 AM Peak Hour, with full development UPGRADE B;
- Year 2023 PM Peak Hour, with full development UPGRADE B;

EXISTING – WESTERN ROUNDABOUT



MOVEMENT SUMMARY

 **Site: Model 3 2020AM west stage 1**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	346	8.0	0.917	83.3	LOS F	57.3	428.6	1.00	2.21	25.9
22	T1	99	8.0	0.917	75.7	LOS E	57.3	428.6	1.00	2.21	26.5
23a	R1	1	8.0	0.917	81.8	LOS F	57.3	428.6	1.00	2.21	26.4
23b	R3	310	8.0	0.917	91.6	LOS F	57.3	428.6	1.00	2.21	27.0
Approach		756	8.0	0.917	85.7	LOS F	57.3	428.6	1.00	2.21	26.4
East: Elderslie Road (east)											
4a	L1	699	8.0	0.910	32.4	LOS C	48.8	364.7	1.00	0.91	40.5
6a	R1	108	8.0	0.910	38.8	LOS D	48.8	364.7	1.00	0.91	40.9
3	R2	308	8.0	0.446	19.5	LOS B	10.7	79.9	0.74	0.61	49.4
Approach		1115	8.0	0.910	29.4	LOS C	48.8	364.7	0.93	0.83	42.7
NorthWest: Old Pacific Highway (West)											
27b	L3	42	8.0	0.277	7.3	LOS A	1.4	10.6	0.74	0.81	52.4
27a	L1	99	8.0	0.277	6.3	LOS A	1.4	10.6	0.74	0.81	54.8
29	R2	49	8.0	0.277	14.0	LOS B	1.4	10.6	0.74	0.81	56.8
Approach		190	8.0	0.277	8.5	LOS A	1.4	10.6	0.74	0.81	54.8
SouthWest: Elderslie Road (south)											
30	L2	76	8.0	0.377	5.0	LOS A	2.5	18.9	0.72	0.50	54.8
30a	L1	367	8.0	0.377	4.2	LOS A	2.5	18.9	0.72	0.54	55.9
32a	R1	260	8.0	0.377	11.1	LOS B	2.3	17.4	0.73	0.77	54.0
Approach		703	8.0	0.377	6.8	LOS A	2.5	18.9	0.72	0.62	55.1
All Vehicles		2764	8.0	0.917	37.6	LOS D	57.3	428.6	0.88	1.15	38.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 4 2020PM west stage 1

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	59	8.0	0.388	7.2	LOS A	2.7	20.4	0.80	0.78	51.5
22	T1	102	8.0	0.388	6.7	LOS A	2.7	20.4	0.80	0.78	53.6
23a	R1	1	8.0	0.388	12.8	LOS B	2.7	20.4	0.80	0.78	53.5
23b	R3	155	8.0	0.388	15.5	LOS B	2.7	20.4	0.80	0.78	55.7
Approach		317	8.0	0.388	11.1	LOS B	2.7	20.4	0.80	0.78	54.2
East: Elderslie Road (east)											
4a	L1	532	8.0	0.645	8.3	LOS A	16.2	121.0	0.78	0.57	54.2
6a	R1	114	8.0	0.645	14.8	LOS B	16.2	121.0	0.78	0.57	55.0
3	R2	638	8.0	0.777	20.5	LOS C	19.9	149.2	0.87	0.81	48.8
Approach		1284	8.0	0.777	15.0	LOS B	19.9	149.2	0.82	0.69	51.4
NorthWest: Old Pacific Highway (West)											
27b	L3	93	8.0	0.716	21.6	LOS C	4.4	32.7	0.93	1.15	44.2
27a	L1	129	8.0	0.716	20.5	LOS C	4.4	32.7	0.93	1.15	45.8
29	R2	43	8.0	0.716	28.3	LOS C	4.4	32.7	0.93	1.15	47.2
Approach		265	8.0	0.716	22.1	LOS C	4.4	32.7	0.93	1.15	45.5
SouthWest: Elderslie Road (south)											
30	L2	24	8.0	0.638	10.6	LOS B	7.4	55.7	0.96	0.97	52.5
30a	L1	596	8.0	0.638	9.7	LOS A	7.4	55.7	0.96	0.97	53.7
32a	R1	413	8.0	0.638	16.5	LOS B	6.1	45.4	0.92	1.04	50.6
Approach		1033	8.0	0.638	12.4	LOS B	7.4	55.7	0.94	1.00	52.3
All Vehicles		2899	8.0	0.777	14.3	LOS B	19.9	149.2	0.87	0.85	51.4

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

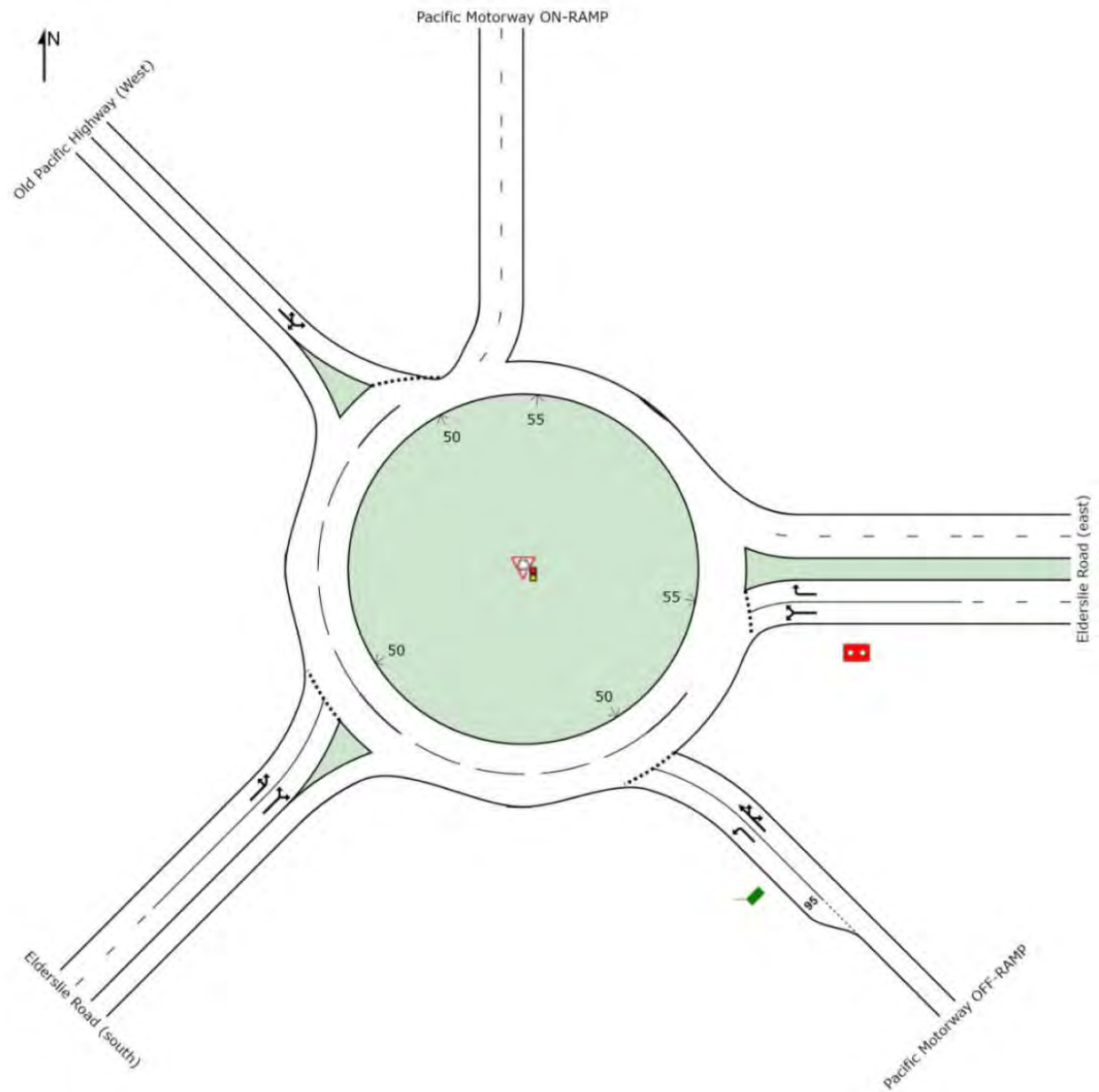
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

UPGRADE B – WESTERN ROUNDABOUT

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 Site: Model 11 2023AM west full dev UPGRADED

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	377	8.0	0.617	20.7	LOS C	7.5	55.8	1.00	1.13	45.3
22	T1	108	8.0	0.768	32.9	LOS C	18.3	136.8	1.00	1.37	39.0
23a	R1	1	8.0	0.768	39.0	LOS D	18.3	136.8	1.00	1.37	39.0
23b	R3	492	8.0	0.768	41.7	LOS D	18.3	136.8	1.00	1.37	40.1
Approach		978	8.0	0.768	32.6	LOS C	18.3	136.8	1.00	1.27	41.7
East: Elderslie Road (east)											
4a	L1	792	8.0	0.801	12.5	LOS B	32.8	245.5	0.85	0.62	51.4
6a	R1	124	8.0	0.801	18.9	LOS B	32.8	245.5	0.85	0.62	52.1
3	R2	438	8.0	0.485	14.4	LOS B	10.2	76.1	0.65	0.60	52.7
Approach		1354	8.0	0.801	13.7	LOS B	32.8	245.5	0.79	0.62	51.9
NorthWest: Old Pacific Highway (West)											
27b	L3	46	8.0	0.415	12.8	LOS B	2.6	19.6	0.88	0.98	49.0
27a	L1	117	8.0	0.415	11.7	LOS B	2.6	19.6	0.88	0.98	51.0
29	R2	53	8.0	0.415	19.5	LOS B	2.6	19.6	0.88	0.98	52.7
Approach		216	8.0	0.415	13.9	LOS B	2.6	19.6	0.88	0.98	51.0
SouthWest: Elderslie Road (south)											
30	L2	83	8.0	0.510	6.5	LOS A	3.7	27.4	0.82	0.73	54.3
30a	L1	400	8.0	0.510	5.7	LOS A	3.7	27.4	0.82	0.74	55.7
32a	R1	330	8.0	0.510	13.1	LOS B	3.2	24.2	0.81	0.97	52.7
Approach		813	8.0	0.510	8.8	LOS A	3.7	27.4	0.82	0.83	54.3
All Vehicles		3361	8.0	0.801	18.0	LOS B	32.8	245.5	0.86	0.88	48.8

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 12 2023PM west full dev UPGRADED

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Pacific Motorway OFF-RAMP											
21	L2	64	8.0	0.118	9.1	LOS A	0.6	4.7	0.73	0.73	52.9
22	T1	111	8.0	0.432	10.0	LOS A	3.7	27.8	0.93	0.85	50.8
23a	R1	1	8.0	0.432	16.0	LOS B	3.7	27.8	0.93	0.85	50.8
23b	R3	219	8.0	0.432	18.7	LOS B	3.7	27.8	0.93	0.85	52.7
Approach		395	8.0	0.432	14.7	LOS B	3.7	27.8	0.90	0.83	52.2
East: Elderslie Road (east)											
4a	L1	625	8.0	0.813	13.5	LOS B	30.6	228.9	0.87	0.70	49.9
6a	R1	133	8.0	0.813	19.9	LOS B	30.6	228.9	0.87	0.70	50.6
3	R2	848	8.0	0.813	22.3	LOS C	30.6	228.9	0.87	0.78	48.2
Approach		1606	8.0	0.813	18.7	LOS B	30.6	228.9	0.87	0.74	49.0
NorthWest: Old Pacific Highway (West)											
27b	L3	101	8.0	0.920	58.5	LOS E	9.6	72.2	0.98	1.65	30.8
27a	L1	144	8.0	0.920	57.5	LOS E	9.6	72.2	0.98	1.65	31.6
29	R2	47	8.0	0.920	65.2	LOS E	9.6	72.2	0.98	1.65	32.3
Approach		292	8.0	0.920	59.1	LOS E	9.6	72.2	0.98	1.65	31.5
SouthWest: Elderslie Road (south)											
30	L2	26	8.0	0.817	21.6	LOS C	14.7	110.1	1.00	1.30	45.5
30a	L1	650	8.0	0.817	20.8	LOS C	14.7	110.1	1.00	1.30	46.5
32a	R1	466	8.0	0.817	29.3	LOS C	11.9	88.7	1.00	1.35	43.3
Approach		1142	8.0	0.817	24.3	LOS C	14.7	110.1	1.00	1.32	45.1
All Vehicles		3435	8.0	0.920	23.5	LOS C	30.6	228.9	0.93	1.02	45.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

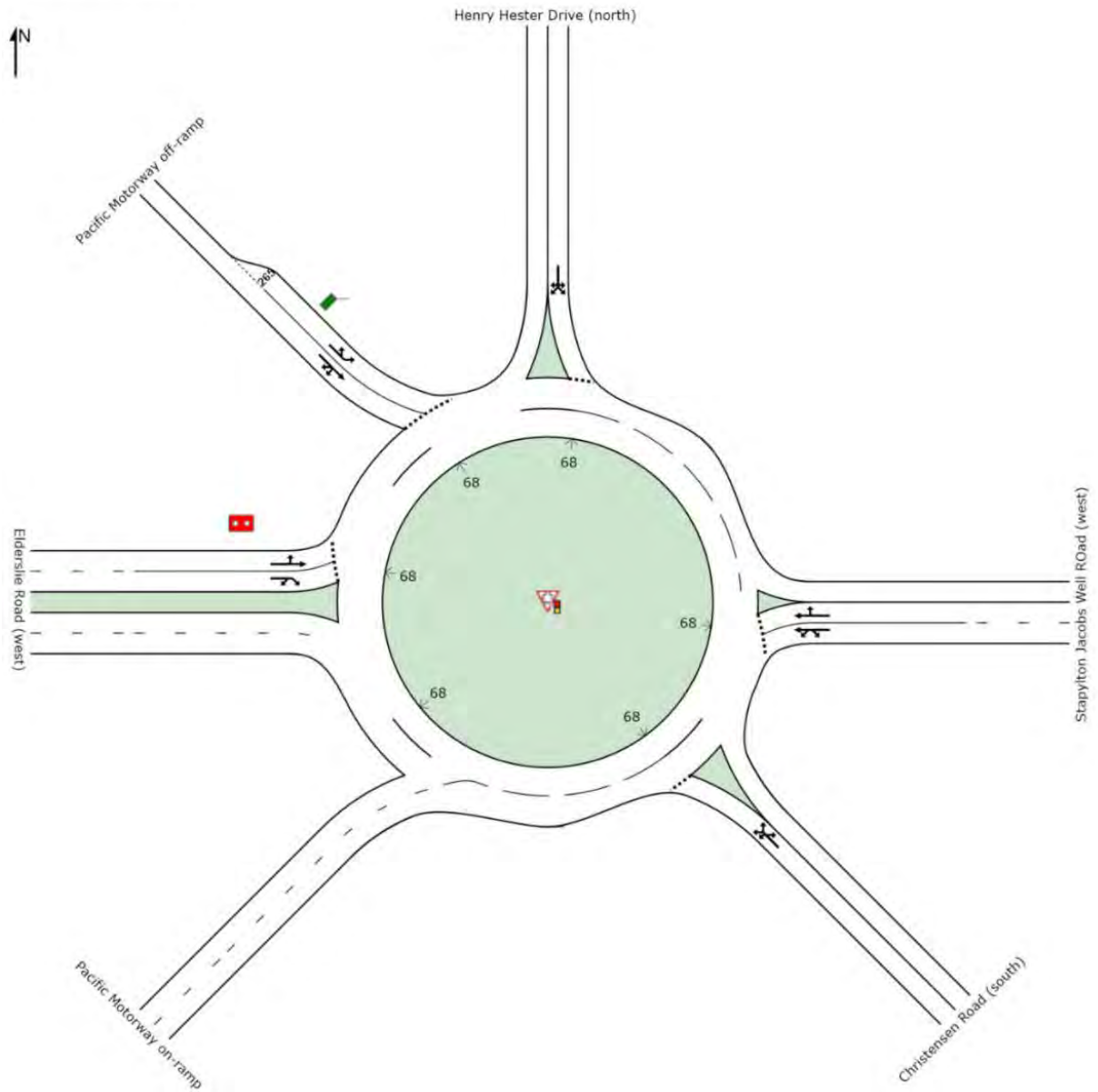
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

UPGRADE A – EASTERN ROUNDABOUT

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 **Site: Model 21 2020AM east stage 1 UPGRADE A - SENSITIVITY**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	25	8.0	0.340	6.1	LOS A	1.6	11.9	0.74	0.75	53.8
21a	L1	148	8.0	0.340	6.2	LOS A	1.6	11.9	0.74	0.75	55.6
23a	R1	38	8.0	0.340	12.3	LOS B	1.6	11.9	0.74	0.75	56.9
23b	R3	23	8.0	0.340	15.2	LOS B	1.6	11.9	0.74	0.75	60.1
Approach		234	8.0	0.340	8.1	LOS A	1.6	11.9	0.74	0.75	56.0
East: Stapylton Jacobs Well Road (west)											
4b	L3	41	8.0	0.495	7.5	LOS A	2.7	20.2	0.84	0.80	52.9
4a	L1	128	8.0	0.495	7.1	LOS A	2.7	20.2	0.84	0.80	56.0
5	T1	324	8.0	0.495	7.4	LOS A	2.7	20.2	0.85	0.81	56.3
6	R2	78	8.0	0.495	14.5	LOS B	1.7	13.0	0.86	0.83	56.7
Approach		571	8.0	0.495	8.3	LOS A	2.7	20.2	0.85	0.81	56.0
North: Henry Hester Drive (north)											
7	L2	70	8.0	0.495	6.1	LOS A	2.3	17.3	0.80	0.90	52.7
7a	L1	40	8.0	0.495	6.2	LOS A	2.3	17.3	0.80	0.90	54.4
9a	R1	103	8.0	0.495	12.3	LOS B	2.3	17.3	0.80	0.90	55.6
9	R2	81	8.0	0.495	13.7	LOS B	2.3	17.3	0.80	0.90	57.0
Approach		294	8.0	0.495	10.4	LOS B	2.3	17.3	0.80	0.90	55.1
NorthWest: Pacific Motorway off-ramp											
27b	L3	109	8.0	0.433	3.8	LOS A	2.0	14.8	0.60	0.40	54.6
27a	L1	292	8.0	0.433	3.4	LOS A	2.0	14.8	0.60	0.40	57.8
28	T1	209	8.0	0.645	4.0	LOS A	4.4	32.7	0.74	0.70	54.3
29	R2	1	8.0	0.645	11.2	LOS B	4.4	32.7	0.74	0.70	55.7
29b	R3	552	8.0	0.645	12.6	LOS B	4.4	32.7	0.74	0.70	57.1
Approach		1163	8.0	0.645	7.9	LOS A	4.4	32.7	0.69	0.60	56.5
West: Elderslie Road (west)											
10	L2	72	8.0	0.658	11.1	LOS B	8.9	66.4	0.93	0.92	52.0
11	T1	324	8.0	0.658	11.4	LOS B	8.9	66.4	0.93	0.92	54.9
12a	R1	187	8.0	0.625	17.2	LOS B	6.6	49.1	0.92	1.02	50.6
12b	R3	105	8.0	0.625	20.0	LOS B	6.6	49.1	0.92	1.02	52.9
Approach		688	8.0	0.658	14.3	LOS B	8.9	66.4	0.93	0.97	53.0
All Vehicles		2950	8.0	0.658	9.7	LOS A	8.9	66.4	0.79	0.77	55.4

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 22 2020PM east stage 1 UPGRADE A - SENSITIVITY**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	81	8.0	1.065	146.9	LOS F	47.3	353.5	1.00	4.05	18.4
21a	L1	301	8.0	1.065	147.0	LOS F	47.3	353.5	1.00	4.05	18.6
23a	R1	75	8.0	1.065	153.1	LOS F	47.3	353.5	1.00	4.05	18.7
23b	R3	34	8.0	1.065	155.9	LOS F	47.3	353.5	1.00	4.05	19.0
Approach		491	8.0	1.065	148.5	LOS F	47.3	353.5	1.00	4.05	18.6
East: Stapylton Jacobs Well Road (west)											
4b	L3	42	8.0	0.628	10.8	LOS B	5.1	38.5	0.83	1.03	50.4
4a	L1	255	8.0	0.628	12.2	LOS B	5.1	38.5	0.83	1.03	53.2
5	T1	507	8.0	0.628	12.6	LOS B	5.1	38.5	0.84	1.03	53.4
6	R2	98	8.0	0.628	19.8	LOS B	3.6	27.3	0.84	1.03	54.1
Approach		902	8.0	0.628	13.2	LOS B	5.1	38.5	0.83	1.03	53.3
North: Henry Hester Drive (north)											
7	L2	86	8.0	0.519	6.5	LOS A	2.6	19.1	0.77	0.93	52.4
7a	L1	33	8.0	0.519	6.6	LOS A	2.6	19.1	0.77	0.93	54.1
9a	R1	130	8.0	0.519	13.3	LOS B	2.6	19.1	0.77	0.93	55.3
9	R2	77	8.0	0.519	14.1	LOS B	2.6	19.1	0.77	0.93	56.7
Approach		326	8.0	0.519	11.0	LOS B	2.6	19.1	0.77	0.93	54.7
NorthWest: Pacific Motorway off-ramp											
27b	L3	84	8.0	0.361	4.1	LOS A	1.8	13.1	0.64	0.43	54.4
27a	L1	227	8.0	0.361	3.7	LOS A	1.8	13.1	0.64	0.43	57.6
28	T1	61	8.0	0.439	4.0	LOS A	2.7	20.4	0.70	0.73	53.5
29	R2	4	8.0	0.439	11.2	LOS B	2.7	20.4	0.70	0.73	54.9
29b	R3	412	8.0	0.439	12.6	LOS B	2.7	20.4	0.70	0.73	56.2
Approach		788	8.0	0.439	8.5	LOS A	2.7	20.4	0.68	0.61	56.2
West: Elderslie Road (west)											
10	L2	89	8.0	0.518	10.3	LOS B	5.8	43.3	0.87	0.83	52.6
11	T1	173	8.0	0.518	10.6	LOS B	5.8	43.3	0.87	0.83	55.6
12a	R1	72	8.0	0.758	19.4	LOS B	12.7	95.1	0.96	0.99	48.7
12b	R3	417	8.0	0.758	22.2	LOS C	12.7	95.1	0.96	0.99	50.8
Approach		751	8.0	0.758	17.8	LOS B	12.7	95.1	0.92	0.93	51.7
All Vehicles		3258	8.0	1.065	33.3	LOS C	47.3	353.5	0.84	1.35	42.1

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

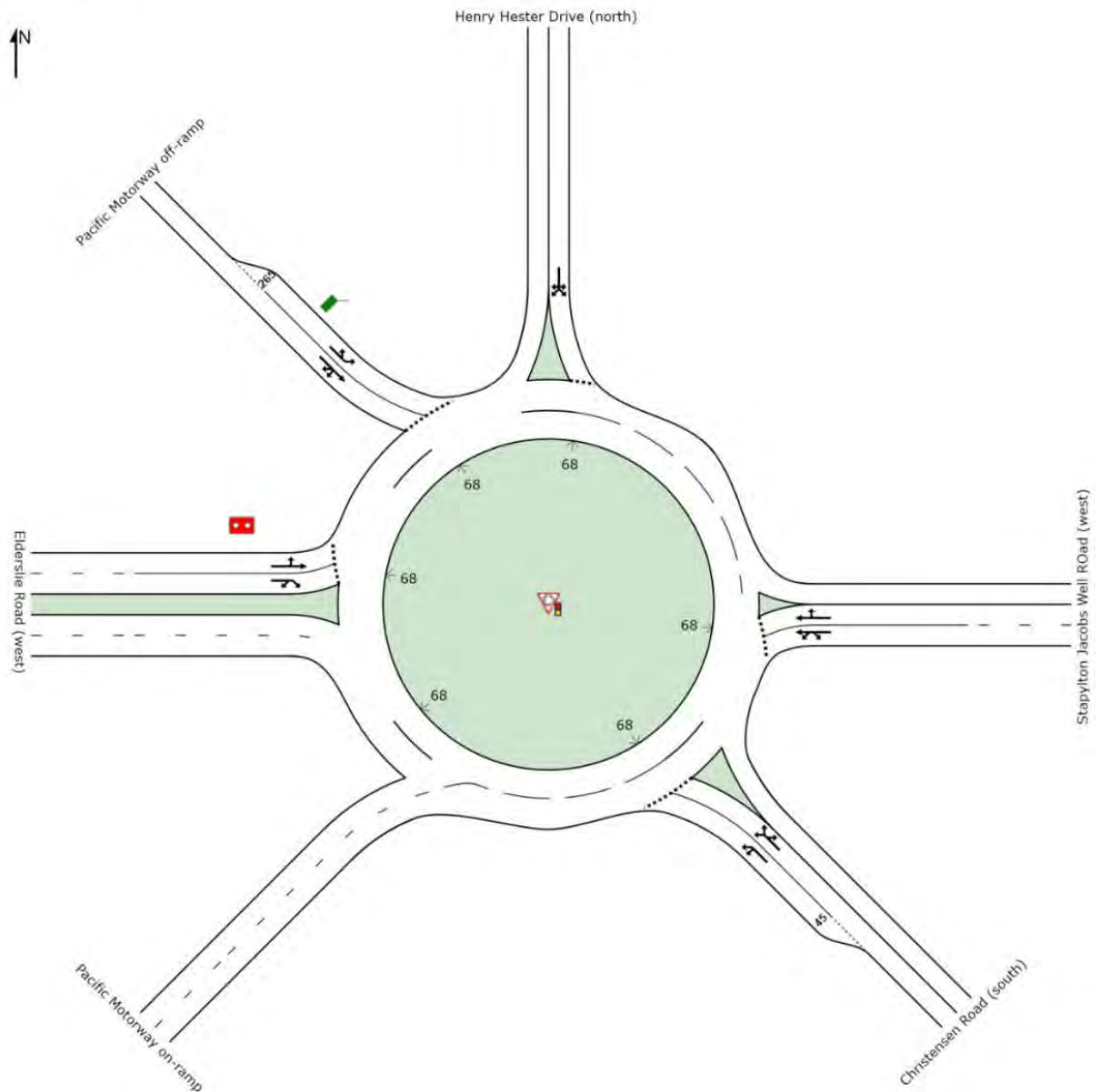
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

UPGRADE B – EASTERN ROUNDABOUT

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering



MOVEMENT SUMMARY

 Site: Model 35 2020AM east Stage 2 UPGRADE B - SENSITIVITY

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	38	8.0	0.193	5.5	LOS A	1.1	8.1	0.76	0.59	54.7
21a	L1	182	8.0	0.193	5.7	LOS A	1.1	8.1	0.75	0.64	56.0
23a	R1	48	8.0	0.193	12.4	LOS B	0.9	6.4	0.72	0.80	55.4
23b	R3	23	8.0	0.193	15.3	LOS B	0.9	6.4	0.72	0.80	58.3
Approach		291	8.0	0.193	7.5	LOS A	1.1	8.1	0.75	0.67	55.9
East: Stapylton Jacobs Well Road (west)											
4b	L3	41	8.0	0.751	15.9	LOS B	4.8	36.1	0.94	1.15	47.9
4a	L1	176	8.0	0.751	16.0	LOS B	4.8	36.1	0.94	1.15	50.5
5	T1	382	8.0	0.751	15.6	LOS B	4.8	36.1	0.94	1.12	51.2
6	R2	88	8.0	0.751	22.1	LOS C	3.0	22.2	0.94	1.09	52.3
Approach		687	8.0	0.751	16.5	LOS B	4.8	36.1	0.94	1.13	51.0
North: Henry Hester Drive (north)											
7	L2	77	8.0	0.628	9.0	LOS A	3.2	23.6	0.88	1.02	51.1
7a	L1	47	8.0	0.628	9.1	LOS A	3.2	23.6	0.88	1.02	52.8
9a	R1	103	8.0	0.628	15.2	LOS B	3.2	23.6	0.88	1.02	53.9
9	R2	81	8.0	0.628	16.6	LOS B	3.2	23.6	0.88	1.02	55.2
Approach		308	8.0	0.628	13.0	LOS B	3.2	23.6	0.88	1.02	53.3
NorthWest: Pacific Motorway off-ramp											
27b	L3	109	8.0	0.550	4.4	LOS A	3.2	24.1	0.70	0.47	54.0
27a	L1	395	8.0	0.550	4.0	LOS A	3.2	24.1	0.70	0.47	57.2
28	T1	251	8.0	0.684	4.8	LOS A	5.8	43.3	0.81	0.77	54.3
29	R2	1	8.0	0.684	12.0	LOS B	5.8	43.3	0.81	0.77	55.7
29b	R3	552	8.0	0.684	13.4	LOS B	5.8	43.3	0.81	0.77	57.1
Approach		1308	8.0	0.684	8.2	LOS A	5.8	43.3	0.77	0.65	56.3
West: Elderslie Road (west)											
10	L2	72	8.0	0.647	10.9	LOS B	8.3	62.2	0.90	0.90	52.1
11	T1	283	8.0	0.647	11.2	LOS B	8.3	62.2	0.90	0.90	55.1
12a	R1	251	8.0	0.507	15.4	LOS B	7.4	55.2	0.85	0.77	51.8
12b	R3	105	8.0	0.507	18.2	LOS B	7.4	55.2	0.85	0.77	54.3
Approach		711	8.0	0.647	13.7	LOS B	8.3	62.2	0.87	0.84	53.4
All Vehicles		3305	8.0	0.751	11.5	LOS B	8.3	62.2	0.84	0.83	54.2

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 36 2020PM east Stage 2 UPGRADE B - SENSITIVITY

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	111	8.0	0.707	13.3	LOS B	4.7	35.4	0.93	1.10	50.6
21a	L1	379	8.0	0.707	12.8	LOS B	4.7	35.4	0.93	1.09	52.0
23a	R1	97	8.0	0.707	17.6	LOS B	2.9	21.7	0.94	1.06	52.4
23b	R3	34	8.0	0.707	20.4	LOS C	2.9	21.7	0.94	1.06	55.0
Approach		621	8.0	0.707	14.0	LOS B	4.7	35.4	0.93	1.09	52.0
East: Stapylton Jacobs Well Road (west)											
4b	L3	42	8.0	0.898	33.6	LOS C	16.7	124.9	0.95	1.74	38.6
4a	L1	364	8.0	0.898	35.7	LOS D	16.7	124.9	0.95	1.74	40.2
5	T1	638	8.0	0.898	32.6	LOS C	16.7	124.9	0.96	1.60	42.0
6	R2	120	8.0	0.898	37.3	LOS D	9.6	71.9	0.96	1.49	43.8
Approach		1164	8.0	0.898	34.1	LOS C	16.7	124.9	0.96	1.64	41.5
North: Henry Hester Drive (north)											
7	L2	88	8.0	0.577	8.2	LOS A	3.1	22.9	0.82	0.98	51.5
7a	L1	35	8.0	0.577	8.3	LOS A	3.1	22.9	0.82	0.98	53.2
9a	R1	130	8.0	0.577	14.4	LOS B	3.1	22.9	0.82	0.98	54.3
9	R2	77	8.0	0.577	15.8	LOS B	3.1	22.9	0.82	0.98	55.7
Approach		330	8.0	0.577	12.4	LOS B	3.1	22.9	0.82	0.98	53.7
NorthWest: Pacific Motorway off-ramp											
27b	L3	84	8.0	0.411	4.6	LOS A	2.2	16.5	0.70	0.49	54.0
27a	L1	248	8.0	0.411	4.2	LOS A	2.2	16.5	0.70	0.49	57.2
28	T1	74	8.0	0.471	4.6	LOS A	3.3	24.5	0.77	0.77	53.4
29	R2	4	8.0	0.471	11.7	LOS B	3.3	24.5	0.77	0.77	54.8
29b	R3	412	8.0	0.471	13.2	LOS B	3.3	24.5	0.77	0.77	56.1
Approach		822	8.0	0.471	8.8	LOS A	3.3	24.5	0.74	0.66	55.9
West: Elderslie Road (west)											
10	L2	89	8.0	0.526	9.5	LOS A	6.3	47.0	0.86	0.79	53.1
11	T1	202	8.0	0.526	9.8	LOS A	6.3	47.0	0.86	0.79	56.2
12a	R1	92	8.0	0.710	17.7	LOS B	12.6	94.0	0.93	0.88	49.7
12b	R3	417	8.0	0.710	20.5	LOS C	12.6	94.0	0.93	0.88	51.9
Approach		800	8.0	0.710	16.3	LOS B	12.6	94.0	0.91	0.85	52.7
All Vehicles		3737	8.0	0.898	19.5	LOS B	16.7	124.9	0.88	1.10	49.2

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: Model 23 2023AM east full dev UPGRADED V2 - SENS

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	92	8.0	0.282	6.3	LOS A	1.8	13.7	0.83	0.70	54.5
21a	L1	239	8.0	0.282	6.8	LOS A	1.8	13.7	0.82	0.76	55.5
23a	R1	59	8.0	0.282	13.9	LOS B	1.6	11.7	0.80	0.86	54.9
23b	R3	31	8.0	0.282	16.7	LOS B	1.6	11.7	0.80	0.86	57.7
Approach		421	8.0	0.282	8.4	LOS A	1.8	13.7	0.82	0.77	55.4
East: Stapylton Jacobs Well ROAD (west)											
4b	L3	44	8.0	0.915	63.9	LOS E	17.2	128.4	0.98	1.75	30.2
4a	L1	184	8.0	0.915	63.4	LOS E	17.2	128.4	0.98	1.75	31.2
5	T1	407	8.0	0.915	65.0	LOS E	17.2	128.4	0.98	1.67	31.2
6	R2	84	8.0	0.915	72.3	LOS E	10.7	80.3	0.98	1.58	31.4
Approach		719	8.0	0.915	65.4	LOS E	17.2	128.4	0.98	1.68	31.2
North: Henry Hester Drive (north)											
7	L2	83	8.0	0.977	96.6	LOS F	19.1	142.9	0.99	2.20	24.0
7a	L1	56	8.0	0.977	95.7	LOS F	19.1	142.9	0.99	2.20	24.3
9a	R1	112	8.0	0.977	102.7	LOS F	19.1	142.9	0.99	2.20	24.6
9	R2	88	8.0	0.977	104.2	LOS F	19.1	142.9	0.99	2.20	24.8
Approach		339	8.0	0.977	100.5	LOS F	19.1	142.9	0.99	2.20	24.5
NorthWest: Pacific Motorway off-ramp											
27b	L3	119	8.0	0.347	11.1	LOS B	2.7	20.4	0.75	0.64	51.5
27a	L1	381	8.0	1.005	74.4	LOS E	118.2	884.3	0.90	2.25	28.4
28	T1	310	8.0	1.005	118.6	LOS F	118.2	884.3	1.00	3.35	22.0
29	R2	1	8.0	1.005	118.3	LOS F	118.2	884.3	1.00	3.35	22.2
29b	R3	602	8.0	1.005	127.2	LOS F	118.2	884.3	1.00	3.35	22.4
Approach		1413	8.0	1.005	101.3	LOS F	118.2	884.3	0.95	2.82	24.8
West: Elderslie Road (west)											
10	L2	78	8.0	1.040	211.0	LOS F	144.3	1079.6	0.98	4.14	14.2
11	T1	477	8.0	1.040	211.3	LOS F	144.3	1079.6	0.98	4.14	14.4
12a	R1	290	8.0	0.976	81.5	LOS F	36.9	276.1	1.00	1.42	28.2
12b	R3	114	8.0	0.976	84.3	LOS F	36.9	276.1	1.00	1.42	28.9
Approach		959	8.0	1.040	156.9	LOS F	144.3	1079.6	0.99	2.99	18.3
All Vehicles		3851	8.0	1.040	98.2	LOS F	144.3	1079.6	0.96	2.37	25.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Model 24 2023PM east full dev UPGRADED V2 - SENS**

M1 Northbound, Yatala North - EXIT 38
Roundabout Metering

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Christensen Road (south)											
21	L2	136	8.0	0.823	25.6	LOS C	8.3	62.0	0.99	1.35	43.5
21a	L1	421	8.0	0.823	24.5	LOS C	8.3	62.0	0.98	1.30	44.9
23a	R1	106	8.0	0.823	28.4	LOS C	5.0	37.5	0.96	1.21	46.0
23b	R3	35	8.0	0.823	31.2	LOS C	5.0	37.5	0.96	1.21	47.9
Approach		698	8.0	0.823	25.6	LOS C	8.3	62.0	0.98	1.29	44.9
East: Stapylton Jacobs Well Road (west)											
4b	L3	44	8.0	1.127	271.6	LOS F	121.6	909.5	1.00	6.33	11.5
4a	L1	381	8.0	1.127	273.2	LOS F	121.6	909.5	1.00	6.33	11.6
5	T1	677	8.0	1.127	273.6	LOS F	121.6	909.5	1.00	5.82	11.8
6	R2	127	8.0	1.127	280.8	LOS F	84.1	628.8	1.00	5.41	11.9
Approach		1229	8.0	1.127	274.1	LOS F	121.6	909.5	1.00	5.95	11.7
North: Henry Hester Drive (north)											
7	L2	133	8.0	0.839	20.5	LOS C	7.2	53.7	0.94	1.26	44.5
7a	L1	40	8.0	0.839	20.6	LOS C	7.2	53.7	0.94	1.26	45.8
9a	R1	142	8.0	0.839	26.7	LOS C	7.2	53.7	0.94	1.26	46.6
9	R2	84	8.0	0.839	28.1	LOS C	7.2	53.7	0.94	1.26	47.7
Approach		399	8.0	0.839	24.3	LOS C	7.2	53.7	0.94	1.26	46.0
NorthWest: Pacific Motorway off-ramp											
27b	L3	92	8.0	0.255	5.1	LOS A	1.5	11.5	0.74	0.60	54.1
27a	L1	282	8.0	0.738	7.6	LOS A	10.0	75.0	0.91	0.86	53.4
28	T1	93	8.0	0.738	9.6	LOS A	10.0	75.0	1.00	1.00	52.6
29	R2	4	8.0	0.738	16.7	LOS B	10.0	75.0	1.00	1.00	53.9
29b	R3	450	8.0	0.738	18.1	LOS B	10.0	75.0	1.00	1.00	55.2
Approach		921	8.0	0.738	12.8	LOS B	10.0	75.0	0.95	0.92	54.3
West: Elderslie Road (west)											
10	L2	97	8.0	0.555	10.8	LOS B	8.5	63.7	0.87	0.72	52.2
11	T1	228	8.0	0.555	11.1	LOS B	8.5	63.7	0.87	0.72	55.2
12a	R1	105	8.0	0.733	19.6	LOS B	17.1	127.6	0.94	0.80	48.6
12b	R3	455	8.0	0.733	22.4	LOS C	17.1	127.6	0.94	0.80	50.7
Approach		885	8.0	0.733	17.9	LOS B	17.1	127.6	0.92	0.77	51.6
All Vehicles		4132	8.0	1.127	94.9	LOS F	121.6	909.5	0.96	2.48	25.5

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE ACCESS / STAPYLTON JACOBS WELL ROAD INTERSECTION

2020AM PEAK – STAGE ONE

2020PM PEAK – STAGE ONE

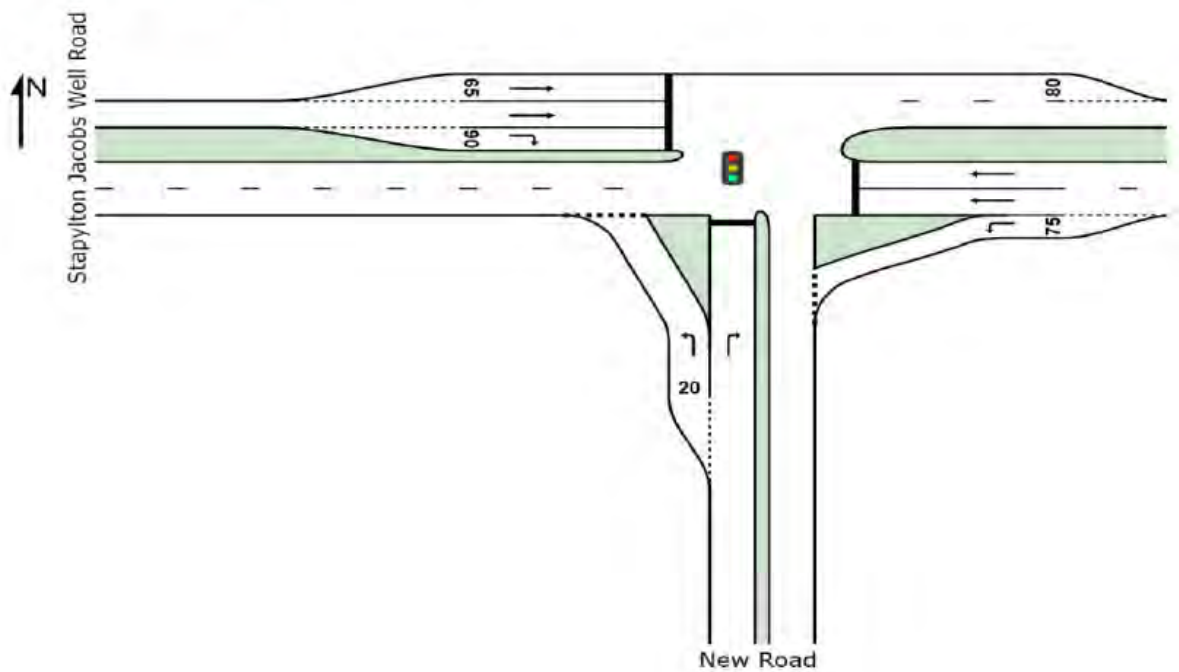
2023 AM PEAK – FULL DEVELOPMENT

2023 PM PEAK – FULL DEVELOPMENT

2033AM PEAK – FULL DEVELOPMENT

2033PM PEAK – FULL DEVELOPMENT

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Model 31A 2020 AM Peak (SJW Rd - New Rd Int) - STAGE 1

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
 Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	61	15.0	0.066	7.8	LOS A	0.3	2.5	0.43	0.64	52.0
3	R2	15	15.0	0.055	22.4	LOS C	0.3	2.1	0.88	0.67	42.9
Approach		76	15.0	0.066	10.6	LOS B	0.3	2.5	0.52	0.65	50.0
East: Stapylton Jacobs Well Road											
4	L2	28	15.0	0.027	7.2	LOS A	0.1	0.9	0.37	0.61	52.4
5	T1	490	15.0	0.546	14.9	LOS B	4.4	35.0	0.92	0.76	48.2
Approach		518	15.0	0.546	14.5	LOS B	4.4	35.0	0.89	0.75	48.4
West: Stapylton Jacobs Well Road											
11	T1	590	15.0	0.408	5.5	LOS A	4.7	36.9	0.59	0.50	55.0
12	R2	114	15.0	0.460	24.1	LOS C	2.2	17.7	0.95	0.77	42.1
Approach		704	15.0	0.460	8.5	LOS A	4.7	36.9	0.65	0.55	52.4
All Vehicles		1298	15.0	0.546	11.0	LOS B	4.7	36.9	0.74	0.63	50.6

Level of Service (LOS) Method: Delay (HCM 2000).
 Vehicle movement LOS values are based on average delay per movement
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

 **Site: Model 31A 2020 AM Peak (SJW Rd - New Rd Int) - STAGE 1**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
 Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Variable Phasing

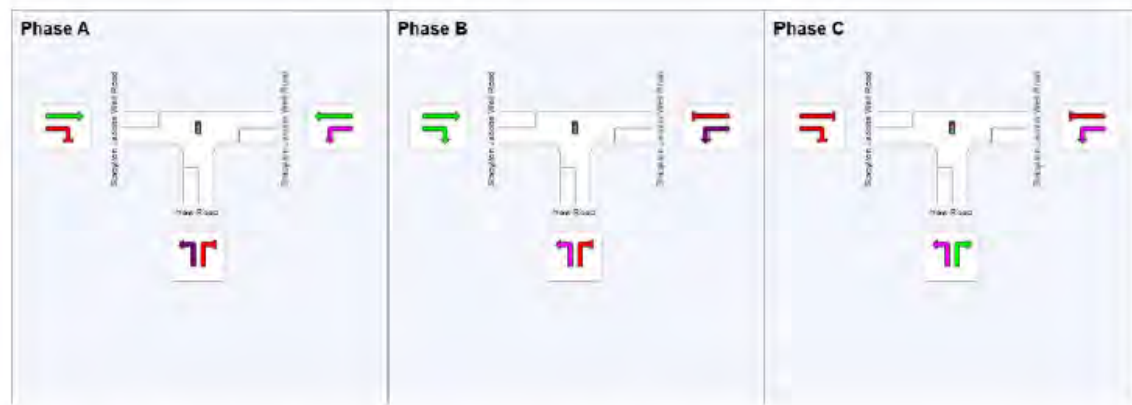
Movement Class: All Movement Classes

Input Sequence: A, B, C

Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	No	Yes	No
Phase Change Time (sec)	24	0	12
Green Time (sec)	10	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	16	12	12
Phase Split	40 %	30 %	30 %



MOVEMENT SUMMARY

 **Site: Model 31B 2020 PM Peak (SJW Rd - New Rd Int) - STAGE 1**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	140	15.0	0.167	9.0	LOS A	1.0	8.1	0.55	0.69	51.2
3	R2	35	15.0	0.128	22.7	LOS C	0.6	5.0	0.90	0.71	42.7
Approach		175	15.0	0.167	11.7	LOS B	1.0	8.1	0.62	0.69	49.2
East: Stapylton Jacobs Well Road											
4	L2	9	15.0	0.008	6.8	LOS A	0.0	0.2	0.31	0.59	52.6
5	T1	740	15.0	0.824	21.0	LOS C	8.5	67.2	1.00	1.04	44.7
Approach		749	15.0	0.824	20.8	LOS C	8.5	67.2	0.99	1.04	44.7
West: Stapylton Jacobs Well Road											
11	T1	496	15.0	0.343	5.3	LOS A	3.8	29.6	0.57	0.48	55.2
12	R2	35	15.0	0.141	22.9	LOS C	0.6	5.1	0.90	0.71	42.7
Approach		531	15.0	0.343	6.5	LOS A	3.8	29.6	0.59	0.49	54.2
All Vehicles		1455	15.0	0.824	14.5	LOS B	8.5	67.2	0.80	0.80	48.3

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

 **Site: Model 31B 2020 PM Peak (SJW Rd - New Rd Int) - STAGE 1**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Variable Phasing

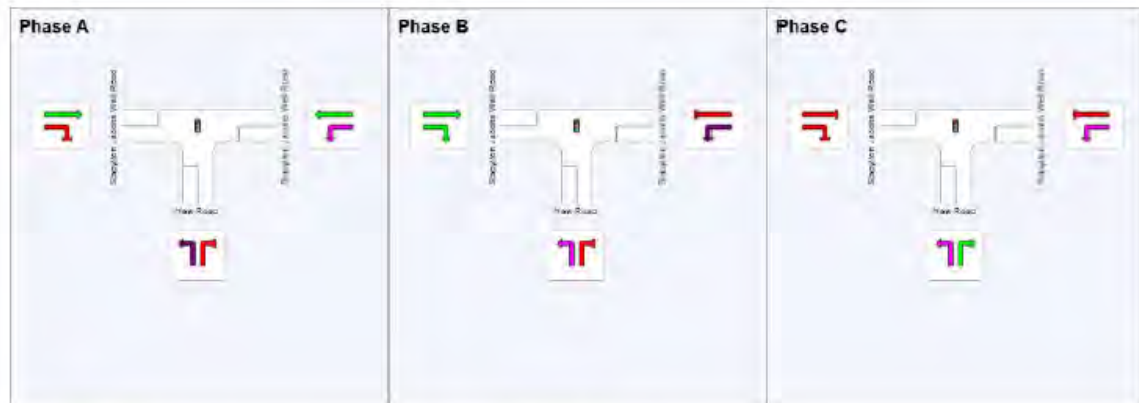
Movement Class: All Movement Classes

Input Sequence: A, B, C

Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	No	Yes	No
Phase Change Time (sec)	24	0	12
Green Time (sec)	10	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	16	12	12
Phase Split	40 %	30 %	30 %



MOVEMENT SUMMARY

 **Site: Model 32A 2023 AM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	153	15.0	0.164	8.2	LOS A	0.9	7.5	0.49	0.67	51.7
3	R2	79	15.0	0.288	23.4	LOS C	1.5	11.7	0.93	0.75	42.4
Approach		232	15.0	0.288	13.4	LOS B	1.5	11.7	0.64	0.70	48.1
East: Stapylton Jacobs Well Road											
4	L2	124	15.0	0.140	8.5	LOS A	0.8	6.5	0.51	0.67	51.5
5	T1	512	15.0	0.815	22.4	LOS C	5.9	46.5	1.00	1.01	43.9
Approach		636	15.0	0.815	19.7	LOS B	5.9	46.5	0.90	0.95	45.2
West: Stapylton Jacobs Well Road											
11	T1	657	15.0	0.454	5.7	LOS A	5.4	42.6	0.61	0.52	54.9
12	R2	284	15.0	0.764	25.3	LOS C	6.2	48.6	0.99	0.96	41.6
Approach		941	15.0	0.764	11.6	LOS B	6.2	48.6	0.72	0.65	50.1
All Vehicles		1809	15.0	0.815	14.7	LOS B	6.2	48.6	0.78	0.76	48.0

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

 **Site: Model 32A 2023 AM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection

Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Variable Phasing

Movement Class: All Movement Classes

Input Sequence: A, B, C

Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	No	Yes	No
Phase Change Time (sec)	27	0	15
Green Time (sec)	7	9	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	13	15	12
Phase Split	33 %	38 %	30 %



MOVEMENT SUMMARY

 **Site: Model 32B 2023 PM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	349	15.0	0.448	9.8	LOS A	3.7	29.5	0.60	0.74	50.6
3	R2	131	15.0	0.598	30.6	LOS C	3.4	26.5	0.99	0.82	39.1
Approach		480	15.0	0.598	15.5	LOS B	3.7	29.5	0.71	0.76	46.8
East: Stapylton Jacobs Well Road											
4	L2	39	15.0	0.033	6.9	LOS A	0.2	1.3	0.30	0.60	52.7
5	T1	830	15.0	0.578	13.0	LOS B	8.1	64.3	0.83	0.72	49.5
Approach		869	15.0	0.578	12.7	LOS B	8.1	64.3	0.81	0.71	49.6
West: Stapylton Jacobs Well Road											
11	T1	525	15.0	0.312	4.2	LOS A	4.0	31.3	0.46	0.39	56.1
12	R2	87	15.0	0.439	29.9	LOS C	2.2	17.1	0.97	0.76	39.5
Approach		612	15.0	0.439	7.9	LOS A	4.0	31.3	0.53	0.45	53.0
All Vehicles		1961	15.0	0.598	11.9	LOS B	8.1	64.3	0.70	0.64	49.9

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

 **Site: Model 32B 2023 PM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Variable Phasing

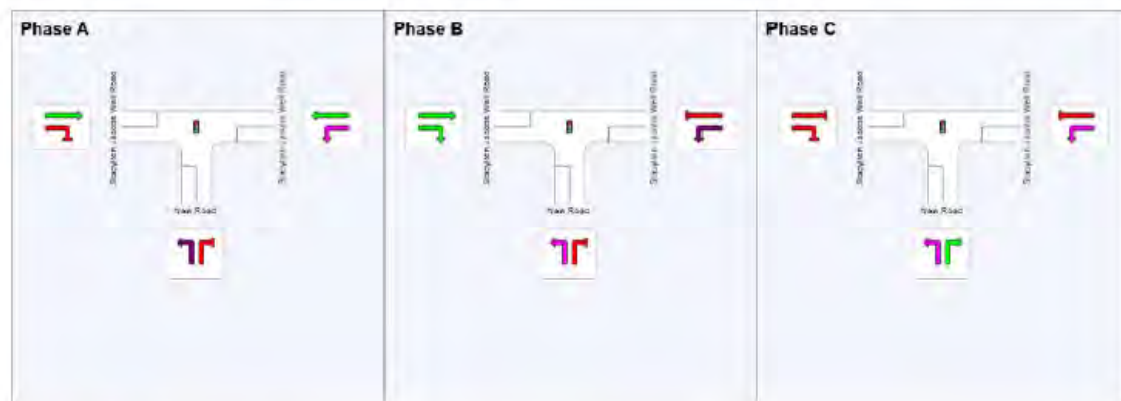
Movement Class: All Movement Classes

Input Sequence: A, B, C

Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	No	Yes	No
Phase Change Time (sec)	24	0	12
Green Time (sec)	20	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	26	12	12
Phase Split	52 %	24 %	24 %



MOVEMENT SUMMARY

 **Site: Model 33A 2033 AM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	153	15.0	0.170	8.7	LOS A	1.2	9.5	0.47	0.67	51.4
3	R2	79	15.0	0.361	29.4	LOS C	1.9	15.2	0.96	0.75	39.7
Approach		232	15.0	0.361	15.7	LOS B	1.9	15.2	0.64	0.70	46.7
East: Stapylton Jacobs Well Road											
4	L2	124	15.0	0.128	8.3	LOS A	0.9	7.0	0.43	0.66	51.7
5	T1	665	15.0	0.712	20.5	LOS C	8.2	64.5	0.96	0.88	44.9
Approach		789	15.0	0.712	18.6	LOS B	8.2	64.5	0.88	0.85	45.9
West: Stapylton Jacobs Well Road											
11	T1	854	15.0	0.507	4.9	LOS A	7.7	60.6	0.53	0.47	55.6
12	R2	284	15.0	0.661	25.4	LOS C	6.7	53.3	0.95	0.86	41.5
Approach		1138	15.0	0.661	10.0	LOS A	7.7	60.6	0.64	0.57	51.2
All Vehicles		2159	15.0	0.712	13.7	LOS B	8.2	64.5	0.73	0.68	48.7

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

 **Site: Model 33A 2033 AM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Variable Phasing

Movement Class: All Movement Classes

Input Sequence: A, B, C

Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	No	Yes	No
Phase Change Time (sec)	31	0	19
Green Time (sec)	13	13	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	19	19	12
Phase Split	38 %	38 %	24 %



MOVEMENT SUMMARY

 **Site: Model 33B 2033 PM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: New Road											
1	L2	349	15.0	0.491	11.4	LOS B	4.5	35.5	0.69	0.76	49.5
3	R2	131	15.0	0.598	30.6	LOS C	3.4	26.5	0.99	0.82	39.1
Approach		480	15.0	0.598	16.7	LOS B	4.5	35.5	0.77	0.78	46.2
East: Stapylton Jacobs Well Road											
4	L2	39	15.0	0.033	6.9	LOS A	0.2	1.3	0.30	0.60	52.7
5	T1	1079	15.0	0.751	16.5	LOS B	12.7	100.1	0.92	0.88	47.2
Approach		1118	15.0	0.751	16.2	LOS B	12.7	100.1	0.90	0.87	47.4
West: Stapylton Jacobs Well Road											
11	T1	683	15.0	0.406	4.5	LOS A	5.6	44.1	0.49	0.43	55.9
12	R2	87	15.0	0.439	29.9	LOS C	2.2	17.1	0.97	0.76	39.5
Approach		770	15.0	0.439	7.4	LOS A	5.6	44.1	0.55	0.47	53.4
All Vehicles		2368	15.0	0.751	13.4	LOS B	12.7	100.1	0.76	0.72	48.9

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

 **Site: Model 33B 2033 PM Peak (SJW Rd - New Rd Int) - ULTIMATE**

17450 - Stapylton Jacobs Well Road / New Road Signalised Intersection
 Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program

Sequence: Variable Phasing

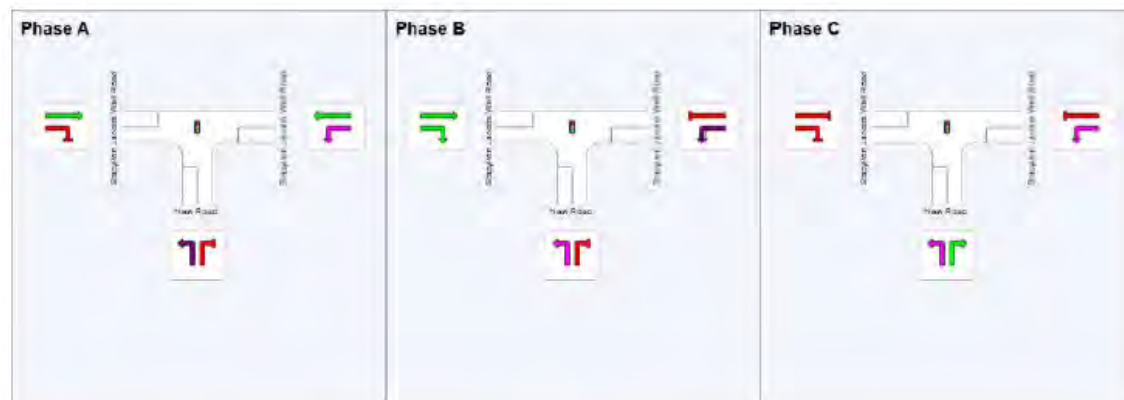
Movement Class: All Movement Classes

Input Sequence: A, B, C

Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	No	Yes	No
Phase Change Time (sec)	24	0	12
Green Time (sec)	20	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	26	12	12
Phase Split	52 %	24 %	24 %



Planning Act 2016 – Appeal provisions

The following provisions are the **appeal rights** as defined in the Planning Act 2016, schedule 2.

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—

- (a) matters that may be appealed to—
 - (i) either a tribunal or the P&E Court; or
 - (ii) only a tribunal; or
 - (iii) only the P&E Court; and
- (b) the person—
 - (i) who may appeal a matter (the **appellant**); and
 - (ii) who is a respondent in an appeal of the matter; and
 - (iii) who is a co-respondent in an appeal of the matter; and
 - (iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The **appeal period** is—

- (a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or
- (b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or
- (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or
- (d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or
- (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or
- (f) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note—

See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

- (5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.
- (6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—
 - (a) the adopted charge itself; or
 - (b) for a decision about an offset or refund—
 - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
 - (ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

- (1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—
 - (a) is in the approved form; and
 - (b) succinctly states the grounds of the appeal.
- (2) The notice of appeal must be accompanied by the required fee.
- (3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—
 - (a) the respondent for the appeal; and
 - (b) each co-respondent for the appeal; and
 - (c) for an appeal about a development application under schedule 1, table 1, item 1—each principal submitter for the development application; and
 - (d) for an appeal about a change application under schedule 1, table 1, item 2—each principal submitter for the change application; and
 - (e) each person who may elect to become a co-respondent for the appeal, other than an eligible submitter who is not a principal submitter in an appeal under paragraph (c) or (d); and
 - (f) for an appeal to the P&E Court—the chief executive; and
 - (g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.
- (4) The **service period** is—
 - (a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or
 - (b) otherwise—10 business days after the appeal is started.
- (5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).
- (6) A person elects to be a co-respondent by filing a notice of election, in the approved form, within 10 business days after the notice of appeal is given to the person.
- (7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Other appeals

- (1) Subject to this chapter, schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

- (2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.
- (3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

- (4) In this section—

decision includes—

- (a) conduct engaged in for the purpose of making a decision; and
- (b) other conduct that relates to the making of a decision; and
- (c) the making of a decision or the failure to make a decision; and
- (d) a purported decision; and
- (e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

- (a) is final and conclusive; and
- (b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise, whether by the Supreme Court, another court, a tribunal or another entity; and
- (c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, a tribunal or another entity on any ground.

232 Rules of the P&E Court

- (1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.
- (2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

Schedule 1 Appeals

1 Appeal rights and parties to appeals

- (1) Table 1 states the matters that may be appealed to—
 - (a) the P&E court; or
 - (b) a tribunal.
- (2) However, table 1 applies to a tribunal only if the matter involves—
 - (a) the refusal, or deemed refusal of a development application, for—
 - i a material change of use for a classified building; or
 - ii operational work associated with building work, a retaining wall, or a tennis court; or
 - (b) a provision of a development approval for—
 - i a material change of use for a classified building; or
 - ii operational work associated with building work, a retaining wall, or a tennis court; or
 - (c) if a development permit was applied for—the decision to give a preliminary approval for—
 - i a material change of use for a classified building; or
 - ii operational work associated with building work, a retaining wall, or a tennis court; or

- (d) development condition if—
 - i the development approval is only for a material change of use that involves the use of a building classified under the Building Code as a class 2 building; and
 - ii the building is, or is proposed to be, not more than 3 storeys; and
 - iii the proposed development is for not more than 60 sole-occupancy units; or
 - (e) a decision for, or a deemed refusal of, an extension application for a development approval that is only for a material change of use of a classified building; or
 - (f) a decision for, or a deemed refusal of, a change application for a development approval that is only for a material change of use of a classified building; or
 - (g) a matter under this Act, to the extent the matter relates to the Building Act, other than a matter under that Act that may or must be decided by the Queensland Building and Construction Commission; or
 - (h) a decision to give an enforcement notice—
 - i in relation to a matter under paragraphs (a) to (g); or
 - ii under the Plumbing and Drainage Act; or
 - (i) an infrastructure charges notice; or
 - (j) the refusal, or deemed refusal, of a conversion application; or
 - (k) a matter prescribed by regulation.
- (3) Also, table 1 does not apply to a tribunal if the matter involves—
- (a) for a matter in subsection (2)(a) to (d)—
 - i a development approval for which the development application required impact assessment; and
 - ii a development approval in relation to which the assessment manager received a properly made submission for the development application; or
 - (b) a provision of a development approval about the identification or inclusion, under a variation approval, of a matter for the development.
- (4) Table 2 states the matters that may be appealed only to the P&E Court.
- (5) Table 3 states the matters that may be appealed only to the tribunal.
- (6) In each table—
- (a) column 1 states the appellant in the appeal; and
 - (b) column 2 states the respondent in the appeal; and
 - (c) column 3 states the co-respondent (if any) in the appeal; and
 - (d) column 4 states the co-respondents by election (if any) in the appeal.
- (7) If the chief executive receives a notice of appeal under section 230(3)(f), the chief executive may elect to be a co-respondent in the appeal.
- (8) In this section—

storey see the Building Code, part A1.1.

Table 1
Appeals to the P&E Court and, for certain matters, to a tribunal

1. Development applications

For a development application other than a development application called in by the minister, an appeal may be made against—

- (a) the refusal of all or part of the development application; or
- (b) the deemed refusal of the development application; or
- (c) a provision of the development approval; or
- (d) if a development permit was applied for—the decision to give a preliminary approval.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant	The assessment manager	If the appeal is about a concurrence agency's referral response—the concurrence agency	1. A concurrence agency that is not a co-respondent 2. If a chosen assessment manager is the respondent—the prescribed assessment manager 3. Any eligible advice agency for the application 4. Any eligible submitter for the application

2. Change applications

For a change application other than a change application made to the P&E Court or called in by the Minister, an appeal may be made against—

- (a) the responsible entity's decision on the change application; or
- (b) a deemed refusal of a change application.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1. The applicant 2. If the responsible entity is the assessment manager—an affected entity that gave a pre-request notice or response notice	The responsible entity	If an affected entity starts the appeal—the applicant	1. A concurrence agency for the development application 2. If a chosen assessment manager is the respondent—the prescribed assessment manager 3. A private certifier for the development application 4. Any eligible advice agency for the change application 5. Any eligible submitter for the change application

3. Extension applications For an extension application other than an extension application called in by the Minister, an appeal may be made against— (a) The assessment manager's decision on the extension application; or (b) A deemed refusal of the extension application.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1. The applicant 2. For a matter other than a deemed refusal of an extension application—a concurrence agency, other than the chief executive, for the application	The assessment manager	If a concurrence agency starts the appeal—the applicant	If a chosen assessment manager is the respondent—the prescribed assessment manager
4. Infrastructure charges notices An appeal may be made against an infrastructure charges notice on 1 or more of the following grounds— (a) the notice involved an error relating to— (i) the application of the relevant adopted charge; or Examples of errors in applying an adopted charge: ▪ the incorrect application of gross floor area for a non-residential development ▪ applying an incorrect 'use category', under a regulation, to the development (ii) the working out of extra demand, for section 120; or (iii) an offset or refund; or (b) there was no decision about an offset or refund; or (c) if the infrastructure charges notice states a refund will be given—the timing for giving the refund; or (d) the amount of the charge is so unreasonable that no reasonable relevant local government could have imposed the amount.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The person given the infrastructure charges notice	The local government that gave the infrastructure charges notice	—	—
5. Conversion applications An appeal may be made against— (a) the refusal of a conversion application; or (b) a deemed refusal of a conversion application.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant	The local government to which the conversion application was made	—	—
6. Enforcement notices An appeal may be made against the decision to give an enforcement notice.			

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The person given the enforcement notice	The enforcement authority	—	If the enforcement authority is not the local government for the premises in relation to which the offence is alleged to have happened—the local government

**Table 2
Appeals to the P&E Court only**

1. Appeals from tribunal

An appeal may be made against a decision of a tribunal, other than a decision under section 252, on the ground of—

- (a) an error or mistake in law on the part of the tribunal; or
- (b) jurisdictional error.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A party to the proceedings for the decision	The other party to the proceedings for the decision	—	—

2. Eligible submitter appeals

For a development application or change application other than an application decided by the P&E Court or called in by the Minister, an appeal may be made against the decision to approve the application, to the extent the decision relates to—

- (a) any part of the development application or change application that required impact assessment; or
- (b) a variation request

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1. For a development application—an eligible submitter for the development application 2. For a change application—an eligible submitter for the change application	1. For a development application—the assessment manager 2. For a change application—the responsible entity	1. The applicant 2. If the appeal is about a concurrence agency's referral response—the concurrence agency	Another eligible submitter for the application

3. Eligible submitter and eligible advice agency appeals

For a development application or change application other than an application decided by the P&E Court or called in by the Minister, an appeal may be made against a provision of the development approval, or a failure to include a provision in the development approval, to the extent the matter relates to—

- (a) any part of the development application or the change application, that required impact assessment; or
- (b) a variation request.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
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1. For a development application—an eligible submitter for the development application 2. For a change application—an eligible submitter for the change application 3. An eligible advice agency for the development application or change application	1. For a development application—the assessment manager 2. For a change application—the responsible entity	1. The applicant 2. If the appeal is about a concurrence agency's referral response—the concurrence agency	Another eligible submitter for the application
4. Compensation claims An appeal may be made against— (a) a decision under section 32 about a compensation claim; or (b) a decision under section 265 about a claim for compensation; or (c) a deemed refusal of a claim under paragraph (a) or (b).			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person dissatisfied with the decision	The local government to which the claim was made	—	—
5. Registered premises An appeal may be made against a decision of the Minister under chapter 7, part 4.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1. A person given a decision notice about the decision 2. If the decision is to register premises or renew the registration of premises—an owner or occupier of premises in the affected area for the registered premises who is dissatisfied with the decision	The Minister	—	If an owner or occupier starts the appeal—the owner of the registered premises
6. Local laws An appeal may be made against a decision of a local government, or conditions applied, under a local law about— (a) the use of premises, other than a use that is the natural and ordinary consequence of prohibited development; or (b) the erection of a building or other structure.			

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who— (a) applied for the decision; and (b) is dissatisfied with the decision or conditions.	The local government	—	—
Table 3 Appeals and tribunal only			
1. Building advisory agency appeals An appeal may be made against giving a development approval for building work to the extent the building work required code assessment against the building assessment provisions.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A building advisory agency for the development application related to the approval	The assessment manager	The applicant	1. A concurrence agency for the development application related to the approval 2. A private certifier for the development application related to the approval
2. Inspection of building work An appeal may be made against a decision of a building certifier or referral agency about the inspection of building work that is the subject of a building development approval under the Building Act.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant for the development approval	The person who made the decision	—	—
3. Certain decisions under the Building Act and the Plumbing and Drainage Act An appeal may be made against— (a) a decision under the Building Act, other than a decision made by the Queensland Building and Construction Commission, if an information notice about the decision was given or required to be given under that Act; or (b) a decision under the Plumbing and Drainage Act, part 4 or 5, if an information notice about the decision was given or required to be given under that Act.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who received, or was entitled to receive, an information notice about the decision	The person who made the decision	—	—
4. Local government failure to decide application under the Building Act An appeal may be made against a local government's failure to decide an application under the Building Act within the period required under that Act.			

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who was entitled to receive notice of the decision	The local government to which the application was made	—	—

Department of State Development, Manufacturing, Infrastructure and Planning

Statement of reasons for application 1710-2228 SPD

(Given under section 83 of the *Planning Act 2016*)

Departmental role: Responsible entity

Applicant details

Applicant name: KS8 Pty Ltd

Applicant contact details: C/ Gassman Development Perspectives
PO Box 392
BEENLEIGH QLD 4207
admin@gassman.com.au

Location details

Street address: 31 Yellowwood Road, 60 Stapylton Jacobs Well Road and 82 Christensen Road, Stapylton, QLD 4207

Real property description: Lot 1 on RP6882, Lot 240 on W31320 and Lot 4 on RP6843

Local government area: Gold Coast City Council

Development details

Minor Change Application

Preliminary approval Material Change of Use to override the Planning scheme for Industry uses

Assessment matters

Aspect of development requiring code assessment	Applicable codes
1. Material Change of Use	State Development and Assessment Provision (SDAP) version 2.1, effective 11 August 2017 State code 1: Development in a state-controlled road environment State code 6: Protection of state transport networks

Reasons for the Department of State Development, Manufacturing, Infrastructure and Planning's response:

The reasons for the response are:

- The development complies with the relevant performance-based planning outcomes of State Code 1 and 6 of the State Development Assessment Provisions, version 2.1, effective 11 August 2017.
- Assessment of the application determined that it was a minor change consistent with the Concurrence agency response dated 22 November 2012
- The proposed traffic impacts of the development have been adequately mitigated through the conditioning of road works in accordance with the applicable standards.

Response:

Nature of Approval	Nature of Response	Date of Response
Development Permit	Changed referral agency response with conditions	11 October 2018

Relevant material:

-
- Development application material
 - State Development Assessment Provisions published by the Department of Infrastructure, Local Government and Planning
 - *Planning Act 2016*
 - *Planning Regulation 2017*

Changed referral agency responseOur reference: 1710-2228 SPD

Referral agency response—with conditions(Given under section 56 of the *Planning Act 2016*)

Date of original response: 22 November 2012

Original reference: TMR11-000540

The development application described below was properly referred to the Department of Transport and Main Roads on 7 December 2011.

Applicant details

Applicant name: Patricia Hester

Applicant contact details: C/- Gassman Development Perspectives
PO Box 392
BEENLIEGH QLD 4201
admin@gassman.com.au

Location details

Street address: 31 Yellowwood Road, 60 Stapylton Jacobs Well Road and 82 Christensen Road, Stapylton, QLD 4207

Real property description: Lot 1 on RP6882, Lot 240 on W31320 and Lot 4 on RP6843

Local government area: Gold Coast City Council

Application details

Preliminary approval: Material change of use to override the Planning Scheme for Industry uses

Referral triggers

The development application was referred to the department under the following provisions of the Planning Regulation 2017:

Conditions

Under section 56(1)(b)(i) of the *Planning Act 2016* (the Act), the conditions set out in Attachment 1 must be attached to any development approval.

Reasons for imposing conditions

The department must set out the reasons for the decision to impose conditions. These reasons are set out in Attachment 2.

Advice to the assessment manager

Under section 56(3) of the Act, the department offers advice about the application to the assessment manager—see Attachment 3.

Approved plans and specifications

The department requires that the plans and specifications set out below and enclosed must be attached to any development approval.

Drawing/report title	Prepared by	Date	Reference no.	Version/issue
Aspect of development: Preliminary approval				
Functional Road Layout Plan and Stormwater Drainage Layout Plan – Sheet 1 of 2	Gassman Development Perspectives	24/7/2018	5738 ENG BE1 SK-004	B
Functional Road Layout Plan and Stormwater Drainage Layout Plan – Sheet 2 of 2	Gassman Development Perspectives	24/7/2018	5738 ENG BE1 SK-005	B
Typical Cross Sections of Stapylton Jacobs Well Road	Gassman Development Perspectives	24/7/2018	5738 ENG BE1 SK-006	B
Stapylton Jacobs Well Road – Extension of Second Approach Lane Between Eastern Roundabout and Site Access	Rytenskild Traffic Engineering	18/7/2018	17450-01C.3	-
Site Based Stormwater Management Plan – Development Application for Reconfiguration of Lot (38 Industrial Lots)	Gassman Development Perspectives	29 August 2018	5738	3
Landuse Classification and Staging Plan	Gassman Development Perspectives	23/08/2018	5738 P 001	D
Traffic Impact Assessment	Rytenskild Traffic Engineering	13/4/2018	17450	3

enc Attachment 1—Changed conditions to be imposed
 Attachment 2—Changed reasons for imposing conditions
 Attachment 3—Changed advice to the applicant
 Approved plans and specifications

Attachment 1—Changed conditions to be imposed

No.	Conditions of development approval	Condition timing
Preliminary approval for Material change of use to override the Planning Scheme for Industry uses		
State-controlled road—The chief executive administering the <i>Planning Act 2016</i> nominates the Director-General of The Department of Transport and Main Roads to be the enforcement authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following conditions:		
1.	Development must be carried out generally in accordance with the following plans and reports, except as modified by these concurrence agency conditions: • Generations Industrial Park Place Code, prepared by Gassman Development Perspectives, date November 2012 • Landuse Classification and Staging Plan, prepared by Gassman Development Perspectives, dated 23/08/2018, reference 5738 P 001 and revision D • Plan No.5093 P00 10A, entitled Land Use Classification and Staging Plan Stapylton Jacobs Well Road, Stapylton, Generations Industrial Park, prepared by Gassman Development Perspectives, dated 06-11-12 • Drawing No. KO31 — Project No. AA003837 — Issue 02, entitled <i>Stapylton — Jacobs Well Road Intersection Interim Road Upgrade</i>, prepared by Hyder Consulting, dated 25.07.12 • Drawing No. KO32 — Project No. AA003837 — Issue 02, entitled <i>Stapylton — Jacobs Well Road Intersection Interim Road Upgrade</i>, prepared by Hyder Consulting, dated 10.08.12	Prior to the commencement of use and to be maintained at all times
2.	(a) The Stapylton Jacobs Well Road and De Bortoli Street intersection must be upgraded to include a Channelised Right Turn. The intersection must be designed and constructed in accordance with Figure 13.60 Channelised Right Turn (CHR) on a Two Lane Rural Road and as per Chapter 13 of the Department of Transport and Main Roads' <i>Road Plannign and Design Practice</i> as shown in Drawing No. KO32 — Project No. AA003837 — Issue 02, entitled <i>Stapylton — Jacobs Well Road Intersection Interim Road Upgrade</i>, prepared by Hyder Consulting, dated 10.08.12 (b) The intersection must be provided by the applicant at no cost to the Department of Transport and Main roads (c) All adjustments and/or relocations to existing services within the state-controlled road as a result of development are at the applicant's expense	Prior to submitting the Plan of Survey to the local government for approval for Stage 1.

No.	Conditions of development approval	Condition timing
3	(a) The applicant must provide a signalised intersection located between Stapylton Jacobs Well Road and Lot 1 on RP6882 as shown in Drawing No. KO31 – Project No. AA003837 – Issue 02, entitled <i>Stapylton – Jacobs Well Road Intersection Interim Road Upgrade</i>, prepared by Hyder Consulting, dated 25.07.12 (b) The intersection must be designed and constructed generally in accordance with the Department of Transport and Main Roads' Road Planning and Design Manual including the Interim Guide to Road Planning and Design Practice (c) The intersection must be provided by the applicant at no cost to the Department of Transport and Main Roads. (d) All adjustments and/or relocations to existing services within the state-controlled road as a result of the development are at the applicant's expense (e) All land identified as road on Drawing No. KO31 – Project No. AA003837 – Issue 02, entitled <i>Stapylton – Jacobs Well Road Intersection Interim Road Upgrade</i>, prepared by Hyder Consulting, dated 25.07.12 is to be dedicated as road reserve	Prior to submitting the Plan of Survey to the local government for approval for Stage 2.
2.	(a) Road works comprising upgrade to Stapylton-Jacobs Well Road as an urban arterial road with four lanes, divided median between eastern Exit 38 interchange roundabout, a signalised intersection at the site entrance and a second departure lane in the northbound off-ramp to the western roundabout, must be provided generally in accordance with the following plans: • Functional Road Layout Plan and Stormwater Drainage Layout Plan – Sheet 1 of 2 prepared by Gassman Development Perspectives dated 24/7/2018, reference 5738 ENG BE1 SK-004 and revision B; • Functional Road Layout Plan and Stormwater Drainage Layout Plan – Sheet 2 of 2 prepared by Gassman Development Perspectives dated 24/7/2018, reference 5738 ENG BE1 SK-005 and revision B • Typical Cross Sections of Stapylton Jacobs Well Road prepared by Gassman Development Perspectives dated 24/7/2018, reference 5738 ENG BE1 SK-006 and revision B • Stapylton Jacobs Well Road – Extension of Second Approach Lane Between Eastern Roundabout and Site Access, prepared by Rytenschild Traffic Engineering, dated 18/7/2018, reference 17450-01C.3. • Figure 5.2 Proposed Intersection Arrangements of the Traffic Impact Assessment prepared by	(a) and (b) Prior to submitting the Plan of Survey for Stage 1 to the local government for approval.

No.	Conditions of development approval	Condition timing
	Rytenskild Traffic Engineering, dated 13/04/2018, reference 17450 and revision 3. (b) The road works must be designed and constructed in accordance with Road Planning and Design Manual (2nd edition), Department of Transport and Main Roads, 2016.	
3.	Direct access is not permitted between Stapylton Jacobs Well Road and the subject site at any location other than permitted intersection location in accordance with Condition 2 above.	At all times
4.	The existing vehicular property access located between Lot 1 on RP6882 and Stapylton Jacobs Well Road is to be used for rural purposes only.	Until construction of the new intersection is complete in accordance with Condition 3
4.	The existing vehicular property access located between Lot 1 on RP6882 and Stapylton Jacobs Well Road must be permanently close and removed by the applicant.	Prior to submitting the Plan of Survey to the local government for approval of Stage 1.
5.	(a) The development must be in accordance with the Site Based Stormwater Management Plan – Development Application for Reconfiguration of Lot (38 Industrial Lots), prepared by Gassman Development Perspectives, dated 29 August 2018, reference 5738 and revision 3. Stormwater Management Plan Entitled Generations Industrial Park – Stormwater Management Plan prepared by Hyder Consulting and dated 20 June 2012 and Drawing No. C037 – Project No. AA003837 – Issue 01, entitled Stapylton Jacobs Well Culvert Upgrade, prepared by Hyder Consulting dated 15.06.12. Stormwater management for the development must ensure no worsening or actionable nuisance to the state-controlled road network caused by peak discharges, flood levels, frequency/duration of flooding, flow velocities, water quality, sedimentation and scour effects. Subject to the following amendments; (i) The existing 3000 X 2700 RCBC cattle underpass in Stapylton Jacobs Well Road is to be removed and replaced by drainage pipeline under Stapylton Jacobs Well Road in accordance with Department of Transport and Main Roads' Road Drainage Manual (b) Any excavation, filling, paving, landscaping, construction or any other works to the land must not: (i) create any new discharge points for stormwater runoff onto the state-controlled road; (ii) interfere with and/or cause damage to the existing stormwater drainage on the state-controlled road;	(a) Prior to submitting the Plan of Survey to the local government for approval for Stage 4 or by the year 2024, whichever occurs first (a) At all times (b) At all times (c) Prior to obtaining a final inspection certificate or certificate of classification whichever is applicable, or prior to the commencement of use, whichever occurs first

No.	Conditions of development approval	Condition timing
	(iii) surcharge any existing culvert or drain on the state-controlled road; (iv) reduce the quality of stormwater discharge onto the state-controlled road. (c) The applicant must provide RPEQ certification to the Department of Transport and Main roads that the development has been designed and constructed in accordance with parts (a) and (b) of this condition	
6.	The Land Requirement area as shown in plan TP Sketch 1003/TP12020 prepared by the Department of Transport and Main Roads and dated 27 September 2012 must be kept free of any permanent buildings, structures and improvements (including car parks, swimming pools and advertising signs) above and below the ground at all times.	Prior to the commencement of use and to be maintained at all times
7.	The applicant must provide a monetary contribution for all stages of the proposed development towards mitigating the impact of the proposed development on the safety and efficiency of the state-controlled road network. In particular, the contribution is required to mitigate the impacts on Stapylton Jacobs Well Road and the Yatala (North) Interchange. The monetary contribution to be paid, is to be calculated in accordance with the following equation: $R \times C2 / C1$ Where: - R is the sum equal to \$45.94 per square metre of Total Use Area (TUA) of each building or premises for the relevant Stage; - C1 is the Consumer Price Index (All Groups) for Brisbane index number as published by the Australian Bureau of Statistics for the quarter ending immediately prior to the date of this original Concurrence Agency Response; - C2 is the Consumer Price Index (All Groups) for Brisbane index number as published by the Australian Bureau of Statistics for the quarter ending immediately prior to the date on which the Transport Infrastructure is being paid. - * As defined in the Gold Coast Planning Scheme 2003 as amended. This contribution must be paid to the Department of Transport and Main Roads (South Coast Region).	Prior to obtaining a final inspection certificate or certificate of classification, whichever is applicable, or prior to the commencement of use, whichever occurs first.

Attachment 2—Changed Advice to the assessment manager

General advice	
1.	Under section 43 of the Transport Infrastructure Act 1994, a local government must obtain the Department of Transport and Main Roads' approval if it intends to approve the erection, alteration or operation of an advertising sign or other advertising device that would be visible from a motorway; and beyond the boundaries of the motorway; and reasonably likely to create a traffic hazard for the motorway.
2.	Under section 33 of the Transport Infrastructure Act 1994, written approval is required from the Department of Transport and Main Roads to carry out road works, including road access works, on a state-controlled road. Please contact the Department of Transport and Main Roads on 5596 9500 to make an application for road works approval. This approval must be obtained prior to commencing any works on the state-controlled road reserve. The approval process may require the approval of engineering designs of the proposed works, certified by a Registered Professional Engineer of Queensland (RPEQ).
3.	An application for a Road Corridor Permit is required for any ancillary works and encroachments on the state-controlled road under section 50(2) and Schedule 6 of the Transport Infrastructure Act 1994 and Part 5 and Schedule 1 of the Transport Infrastructure (State-Controlled Roads) Regulation 2006. Please contact the Department of Transport and Main Roads on 5596 9500 to make an application for a Road Corridor Permit. Ancillary works and encroachments include but are not limited to advertising signs or other advertising devices, paths or bikeways, buildings/shelters, vegetation clearing, landscaping and planting.
4.	Mandatory Part (MP) 4.4 of the Queensland Development Code (QDC) commenced on 1 September 2010 and applies to building work for the construction or renovation of a residential building in a designated transport noise corridor. MP4.4 seeks to ensure that the habitable rooms of Class 1, 2, 3 and 4 buildings located in a transport noise corridor are designed and constructed to reduce transport noise. Transport noise corridor means land designated under Chapter 88 of the Building Act 1975 as a transport noise corridor. Information about transport noise corridors is available at state and local government offices. A free online search tool can be used to find out whether a property is located in a designated transport noise corridor. This tool is available at the Department of Local Government and Planning website (http://www.dlgp.qld.gov.au/building/transport-noise-corridor-search-tool.html) and allows searches on a registered lot number and/or property address to determine whether and how the QDC applies to the land.
5.	Pursuant to Section 580 of the Sustainable Planning Act 2009 it is a development offence to contravene a development approval, including any condition in the approval.
6.	Pursuant to Section 80 of the Transport Infrastructure Act 1994, the construction, augmentation, alteration or maintenance of a public utility plant on a state-controlled road reserve, must be in accordance with the Department of Transport and Main Roads' requirements.



Department of
**State Development,
Manufacturing,
Infrastructure and Planning**

Our reference: 1710-2228 SPD
Your reference: 5738

11 October 2018

KS8 Pty Ltd
C/ Gassman Development Perspectives
PO Box 392
BEENLEIGH QLD 4207
admin@gassman.com.au

Attention: Mr Barry Craddock

Dear Mr Craddock

Decision notice—change application

(Given under section 83 of the *Planning Act 2016*)

Your change application under section 78 of the *Planning Act 2016* for the development approval dated 22 November 2012 was made to the Department of State Development, Manufacturing, Infrastructure and Planning on 27 October 2017.

Decision for change application

Date of decision:	11 October 2018
Decision details:	Make the change and amend existing conditions

The changes agreed to are:

1. The removal of conditions 2, 5, 8 and 9.
2. Update to condition 3 to include road works comprising of upgrade to Stapylton-Jacobs Well Road as an urban arterial road with four lanes, divided median between eastern Exit 38 interchange roundabout, a signalised intersection at the site entrance and a second departure lane in the northbound off-ramp to the western roundabout
3. Update to condition 7 to reference latest stormwater management plan

For further information please contact Hugh Campbell, Senior Planning Officer, on 3452 7695 or via email BrisbaneSARA@dsdmip.qld.gov.au who will be pleased to assist.

Yours sincerely

A handwritten signature in black ink, appearing to be 'T. Cavallaro', with a large loop and a trailing flourish.

Tamara Cavallaro
A/Planning Manager – SARA Brisbane Region

cc Gold Coast City Council, mail@goldcoast.qld.gov.au

enc Referral agency response showing the change
Approved plans and specifications
Appeal provisions