

PLANS AND DOCUMENTS
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DEVELOPMENT APPROVAL

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Traffic Report

Bushman Drive & Wyatt Road

CEB06678



Prepared for
Pacific International Development
Corporation Pty Ltd

9 November 2018

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1 Introduction

1.1 Context

Cardno has been engaged by Pacific International Development Corporation Pty Ltd (Pacifiq) to provide traffic and transport advice in relation to a proposed residential development at 24 Bushman Drive and 68 Wyatt Road, located in Jimboomba.

The purpose of this traffic report is to identify an access and movement strategy for the proposed development, including the road hierarchy, cross sections, and public and active transport networks.

1.2 References

The following documents have been referenced, in preparation of this traffic report:

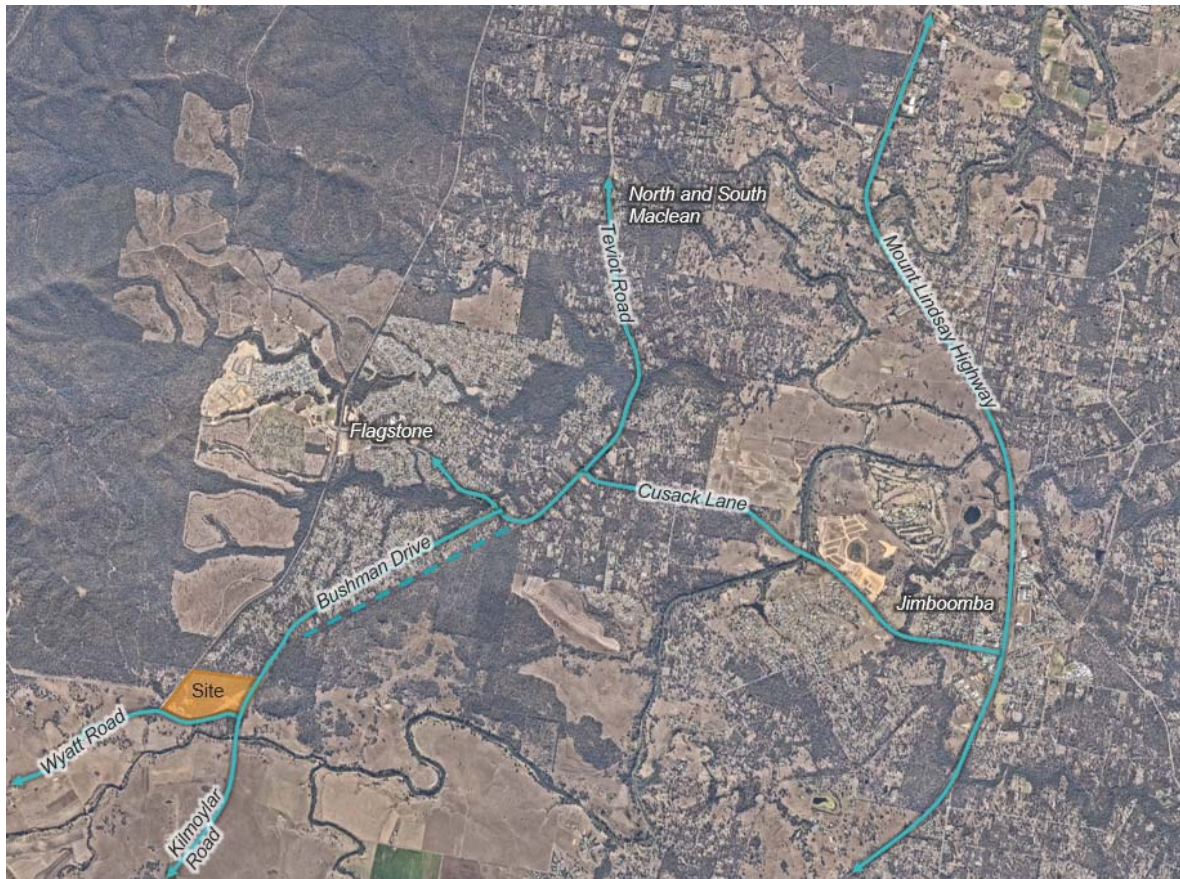
- > Department of Main Roads Preconstruction Processes Manual (PPM) Chapter 2 Pre-Project Planning, June 2005.
- > Economic Development Queensland (EDQ) Street and Movement Network PDA Guideline no. 06 DRAFT February 2018.

2 Proposed Development

2.1 Site Location

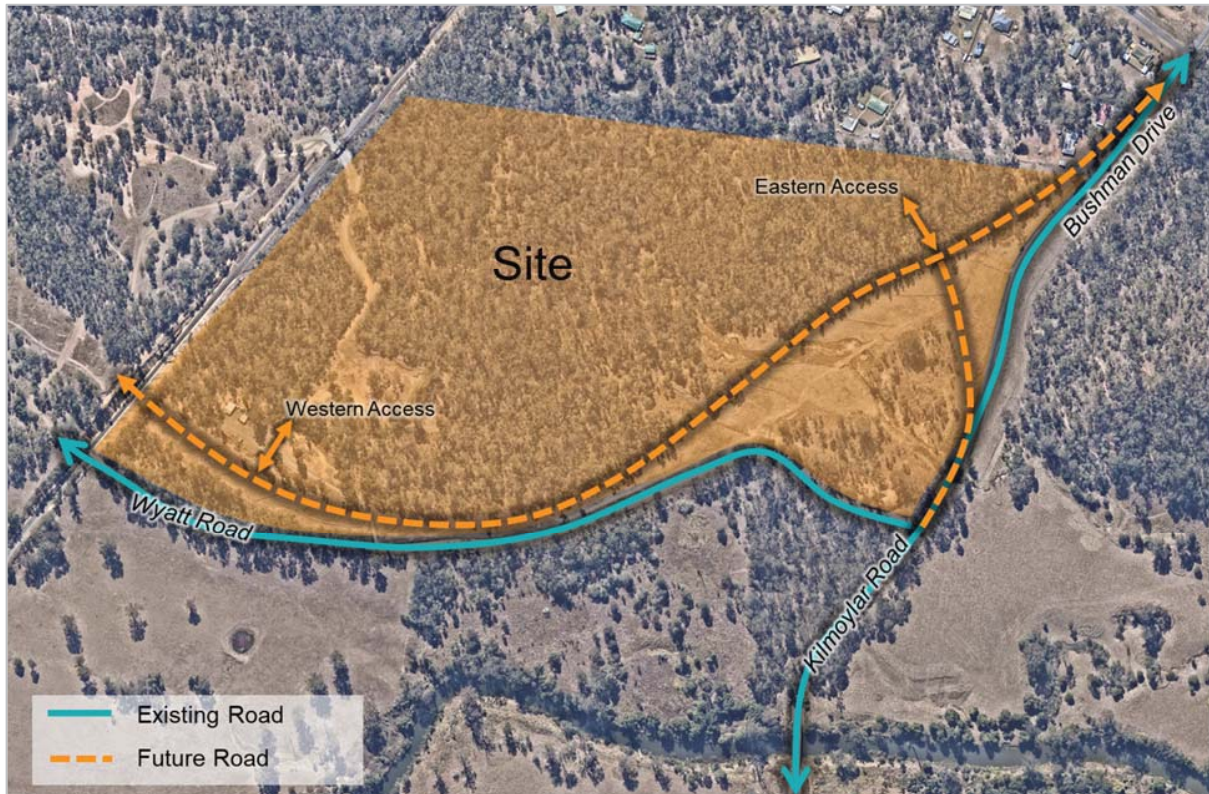
Figure 2-1 illustrates the site location in the context of the broader road network surrounding the proposed site.

Figure 2-1 Site Location



Wyatt Road is currently an unsealed, low volume road. Future planning includes a staged upgrade to an ultimate four lane cross section and an extension of Teviot Road as shown above. The proposed development considers the future realignment of Wyatt Road, which will include the realignment of Kilmoylar Road to form a new intersection with Wyatt Road / Bushman Drive. The existing and future road network along the site frontage is illustrated on Figure 2-2.

Figure 2-2 Realignment of Wyatt Road



Note the site boundary is indicative only. Source: Nearmaps.

2.2 Land Uses

The proposed staging and site layout is illustrated on Figure 2-3. The site layout is included in full scale at Appendix A for further detail. Table 2-1 summarises the residential land use yields for the proposed development.

Figure 2-3 Site Layout

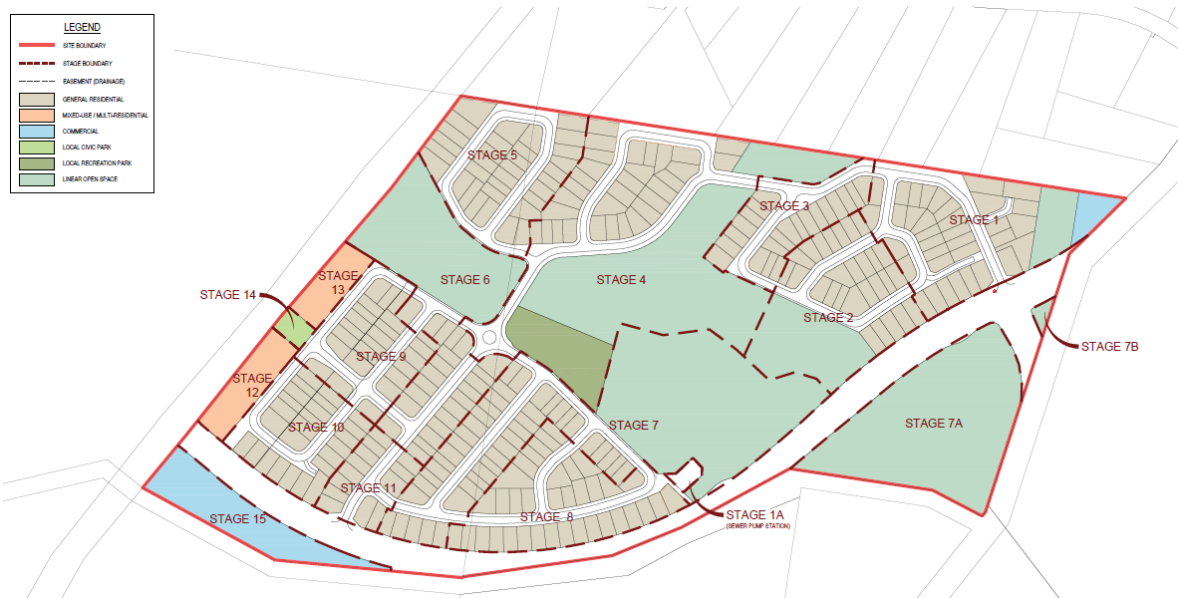


Table 2-1 Development Land Use - Residential

Land Use Type	Yield
Residential – low density	264 dwellings
Residential – Duplex	78 dwellings
Residential – medium density	40 dwellings
Total	382 dwellings

It is noted that the site includes two commercial lots, which will be subject to a future MCU application. The approximate site areas for these sites are identified in Table 2-2.

Table 2-2 Development Land Use – Future

Land Use Type	Site Area
Commercial 1 (Stage 15)	1.145 ha
Commercial 2 (Stage 1)	0.2033 ha
Total	1.3503 ha

The proposed development plans are included at Appendix A.

2.3 Development Access

The proposed development is proposed to gain vehicular access via new intersections with Wyatt Road and Bushman Drive. Figure 2-2 above shows the indicative locations of the development access intersections.

Development access to the external road network and operational assessment of the access intersections are included in Section 3.

2.4 Internal Road Network

Internal links and road typologies have been developed generally in accordance with EDQ guidelines as described in Section 4.

2.5 Public Transport Integration

The development site is considered to be provided with adequate public transport coverage with bus routes located along the external road network (Wyatt Road and Bushman Drive). Additionally, it is understood that a future rail station is to be located adjacent to the proposed medium density residential lots.

The public transport network and coverage is detailed in Section 5.

2.6 Active Transport Connections

The proposed development will provide active transport paths along the internal road network, which will create a connection between the proposed site and external transport network. Additional off road connections are proposed, where appropriate, to facilitate more direct connections and recreational paths.

Active transport connections are discussed in Section 6.

3 Traffic Analysis

3.1 Background Traffic Volumes

To understand the traffic conditions within proximity to the proposed development, Cardno has obtained preliminary future year daily volumes from EDQ. The provided traffic volumes represent an ultimate design horizon with future development in the Greater Flagstone priority development area.

The information available to date does not include peak hour turning data, and daily traffic volumes have therefore been estimated based on the following principles:

- > AM and PM 1-hour peak period volumes identified using a 10:1 daily to peak ratio.
- > Turn volumes estimated based on high order review of previous model data.

EDQ is currently in the process of developing an updated strategic transport model for the Greater Flagstone area. Traffic volumes adopted for the assessment are therefore estimated based on the best information available at the time of this report. Intersection turn volumes should therefore be considered indicative only, and may vary based on the revised strategic model. The estimated background volumes have been plotted and included Appendix B.

3.2 Development Traffic Volumes

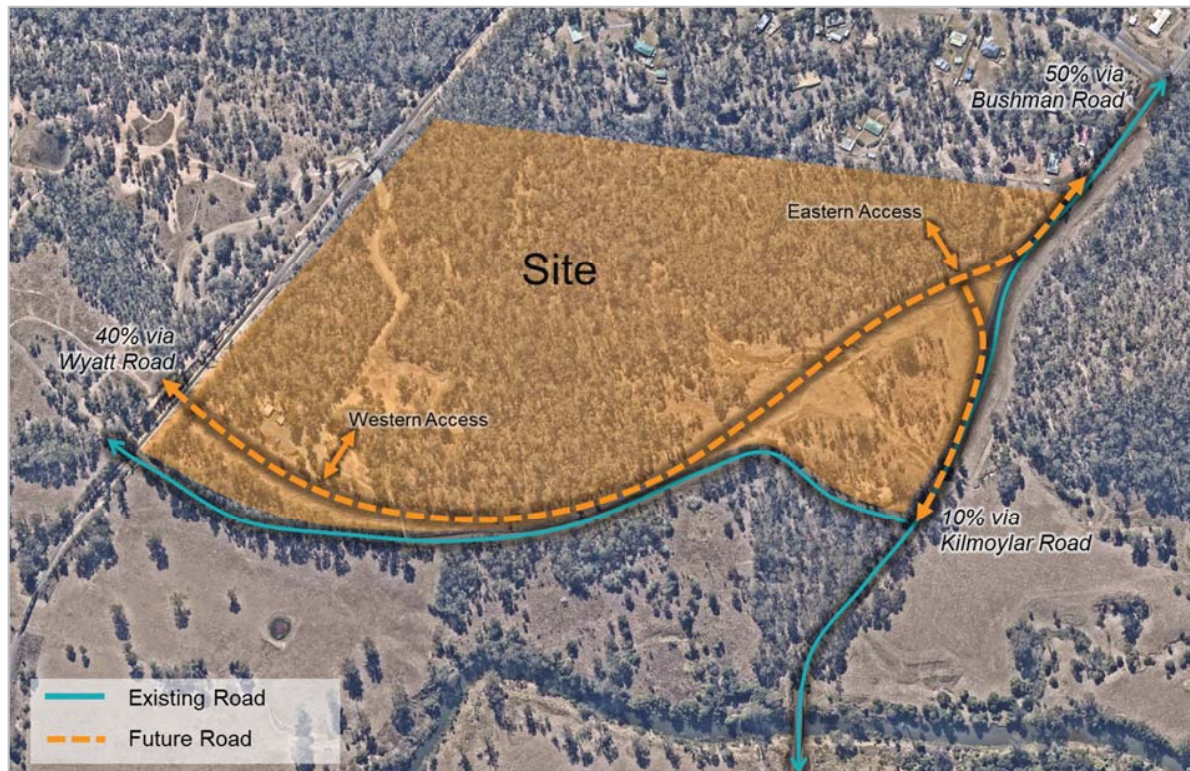
3.2.1 External Distribution

The external distribution from the site has been estimated, as follows:

- > 50% to/from Bushman Drive (North)
- > 40% to/from Wyatt Road (West)
- > 10% to/from Kilmoylar Road (South).

Figure 3-1 illustrates the external traffic distribution adopted for the purpose of assessing the ultimate access requirements.

Figure 3-1 External Distribution

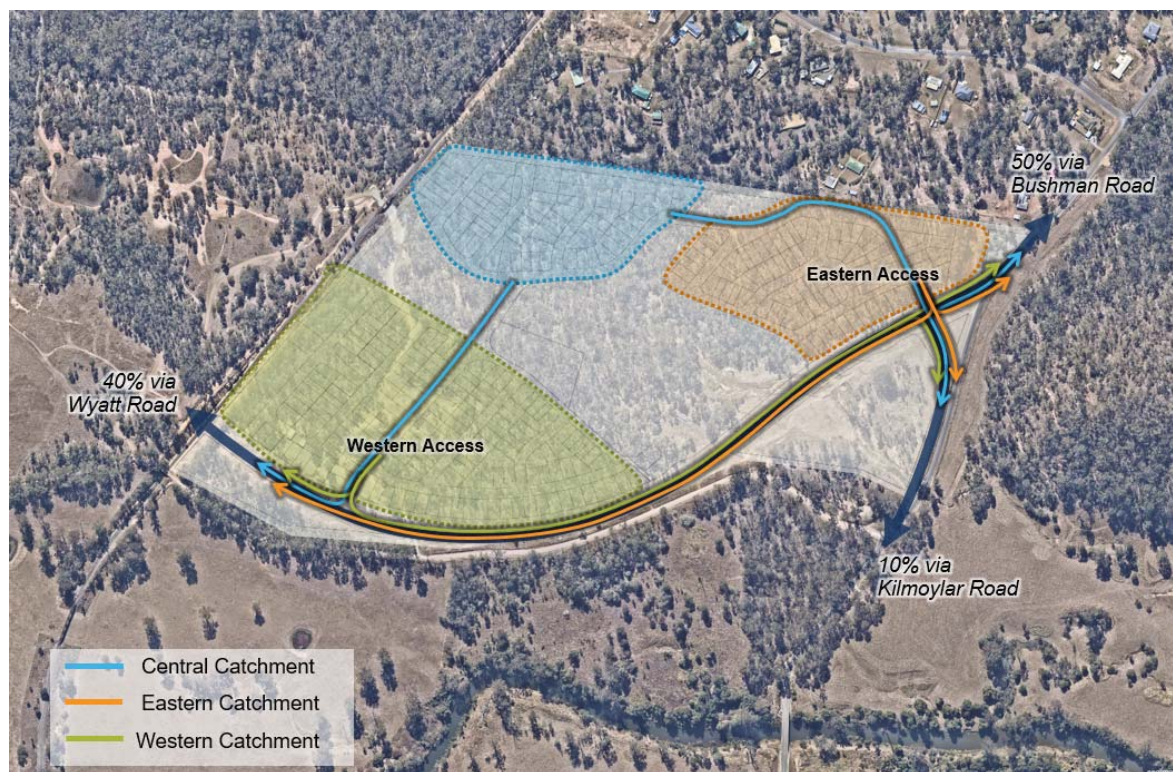


Note the site boundary is indicative only. Source: Nearmaps.

3.2.2 Access Distribution

Figure 3-3 illustrates the development access distribution, which has been based on the respective location of internal catchments within the development.

Figure 3-2 Development Access Distribution



Note the site boundary is indicative only. Source: Nearmaps.

3.2.3 Directional Distribution

The directional distribution of residential traffic is based on generally adopted industry standards for commuter peak periods, nominally 7-8am and 5-6pm, which has been summarised in Table 3-1.

Table 3-1 Directional Distribution – Residential Use

Period	In	Out
AM peak period	20%	80%
PM peak period	80%	20%

More recent data from similar residential developments indicate a more even directional distribution, around 30% in / 70% out in the AM peak and 60% in / 40% out in the PM peak. The adopted distribution is considered to represent a conservative assessment scenario.

3.2.4 Traffic Generation

The peak generation rates for the proposed development have referenced the Department of Main Roads Preconstruction Processes Manual (PPM) Chapter 2 Pre-Project Planning, June 2005.

A summary of the peak traffic generation is included in Table 3-2.

Table 3-2 Development Generation

Land Use Type	Yield	Peak Generation Rate	Peak Generation	Source
Residential – low density	267 dwellings	0.80 vph / dwelling	214 vph	PPM
Residential – duplex	84 dwellings	0.60 vph / dwelling	50 vph	PPM
Residential – medium density	40 dwellings	0.60 vph / dwelling	24 vph	PPM
Total	391 dwellings	-	288 vph	-

Development volume plots are provided at Appendix B.

Potential commercial land uses, are subject to assessment as part of future MCU applications for these sites and are excluded from the traffic analysis at this stage.

3.3 Operational Assessment

3.3.1 Intersection Analysis

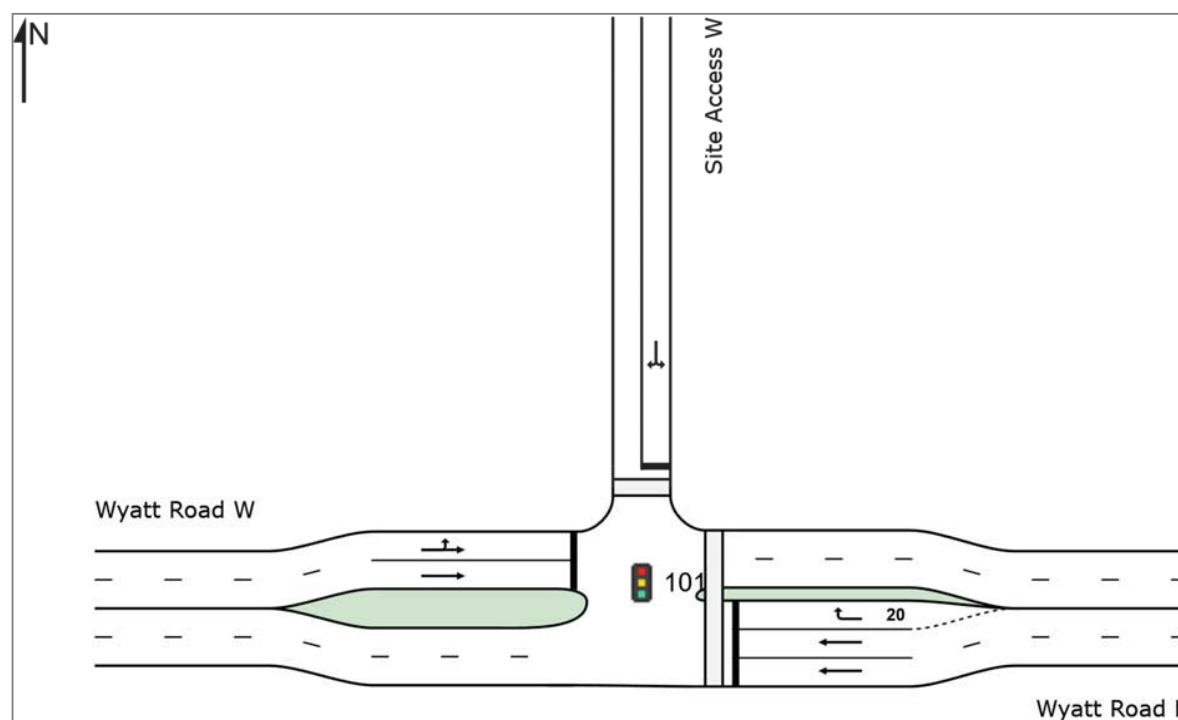
The performance of the development access intersections have been analysed using SIDRA Intersection 8.0 (SIDRA), which is an industry recognised tool that estimates the capacity and performance of intersections, based on input parameters, including geometry and traffic volumes.

This report identifies the ultimate design requirements for the proposed development access intersections have incorporated an ultimate four lane configuration for Wyatt Road and Bushman Drive. It should be noted that staged upgrading of the external road network may require alternative interim intersection configurations.

This report is based on the most recent traffic volume data available at the current time, with estimates to identify peak hour turning volumes from daily traffic volume information provided by EDQ. It is understood that EDQ is in the process of updating the strategic transport modelling for the region, which may change background traffic volumes, and impact the design requirements of the access intersections.

Figure 3-3 illustrates the proposed ultimate SIDRA layout for the western development access.

Figure 3-3 Adopted SIDRA Layout Network – Wyatt Road / Western Development Access intersection



The SIDRA results are summarised in Table 3-3.

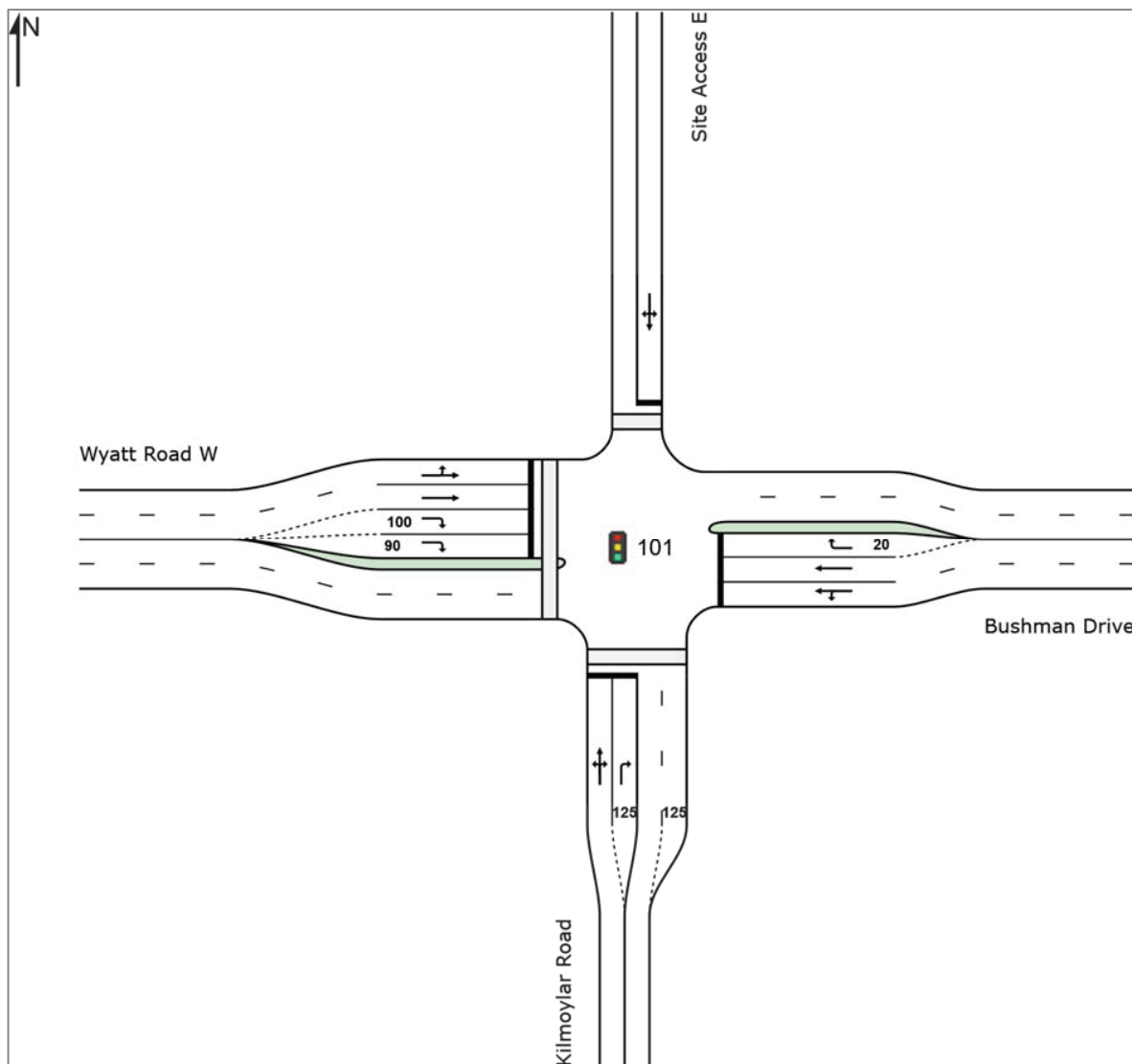
Table 3-3 SIDRA Results – Wyatt Road / Western Development Access intersection

Scenario	AM Peak Period			PM Peak Period		
	DOS	Average Delay	95 th %ile Queue	DOS	Average Delay	95 th %ile Queue
With Development	0.612	12 sec	102 m	0.540	11 sec	87 m

The results in Table 3-3 indicate that the proposed form for the western development access intersection can operate within the acceptable performance capacity threshold (DOS $\leq$ 0.90 for signals), as well as maintaining the 95th percentile queue within the available queue storage. The detailed SIDRA analysis results are included at Appendix C.

Figure 3-4 illustrates the adopted SIDRA layout for the eastern development access.

Figure 3-4 Adopted SIDRA Layout Network – Bushman Drive / Eastern Development Access intersection



The SIDRA results are summarised in Table 3-4.

Table 3-4 SIDRA Results – Bushman Drive / Eastern Development Access intersection

Scenario	AM Peak Period			PM Peak Period		
	DOS	Average Delay	95 th %ile Queue	DOS	Average Delay	95 th %ile Queue
With Development	0.826	36 sec	128m	0.842	43 sec	212m

The results in Table 3-4 indicate that the proposed form for the eastern development access intersection can operate within the acceptable performance capacity threshold (DOS $\leq$ 0.90 for signals), as well as maintaining the 95th percentile queue within the available queue storage. The detailed SIDRA analysis results are included at Appendix C.

3.3.2 External Road Network

Infrastructure planning for the Greater Flagstone Priority Development Area includes significant upgrades to the external road network and the long term development impact will be catered for by new or upgraded links.

It is proposed that the development will use Bushman Drive to access the arterial road network temporarily until the extension of Teviot Road from Homestead Drive to Bushman Drive is built and improvements of Wyatt Road and Kilmoylar Road are facilitated.

The suitability to use Bushman Drive for interim access has been assessed in the Interim Access Assessment, included at Appendix D. That assessment confirms that Bushman Drive can accommodate the development traffic in the interim and recommends a series of maintenance and minor enhancement works to off-set any impacts associated with an increase traffic volume from the development site.

4 Internal Road Network

4.1 Road Hierarchy and Cross Sections

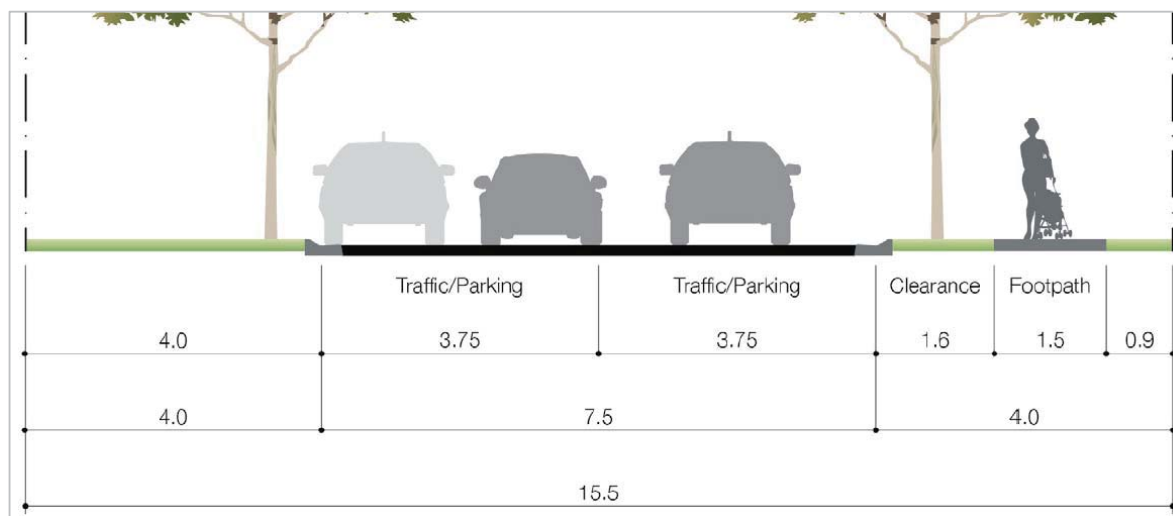
The internal road hierarchy has been identified based on the road function, location, and traffic carrying volumes. With consideration of the EDQ Street and Movement Network PDA Guideline, the road hierarchy and corresponding cross sections for the internal road network have been identified on Figure 4-1 and is described in the following sections. For ease of reference, the road hierarchy map is also available in larger scale at Appendix E.

Figure 4-1 Internal Road Hierarchy



The road typologies have been developed generally consistent with the EDQ Neighbourhood Access Street – 7.5m. The cross section for this link type is illustrated on Figure 4-2.

Figure 4-2 Cross Section – Neighbourhood Access Street (Type 1A)



Source: Figure 7A, EDQ Street and Movement Network PDA Guideline no. 06 DRAFT February 2018.

Table 4-1 details the design features associated with the proposed Neighbourhood Access Street Type 1A, which are generally consistent with the EDQ Neighbourhood Access Street – 7.5m. The development exceeds and improves the minimum EDQ requirements by providing additional shared path facilities. The proposed active transport network is described in Section 5 of this report.

Table 4-1 Design Considerations – Neighbourhood Access Street (Type 1A)

Design Consideration	EDQ Guideline	Development Proposal	Comments
Traffic Lanes	2 x 3.75m traffic lanes	2 x 3.75m traffic lanes	-
Median	Nil	Nil	-
Breakdown Lane	Nil	Nil	-
Parking	Informal on-street	Informal on-street	-
Cycle	Nil	1 x 2.5m shared path (one side)	-
Pedestrian	1 x 1.5m footpath (one side)	1 x 1.5m footpath (one side) 1 x 2.5m shared path (one side)	As indicated on the active transport plan, additional shared paths are proposed at higher demand locations.
Verge	2 x 4.0m verge (both sides)	1 x 4.0m verge (one side) 1 x 5.0m verge (one side)	The verge width has been increased one side to accommodate a shared path
Road Reserve	15.5m	16.5m	The road reserve has been widened to accommodate a shared path

Table 4-2 details the design features associated with the proposed Neighbourhood Access Street Type 1B, which are consistent with the EDQ Neighbourhood Access Street – 7.5m. The development exceeds and improves the minimum EDQ requirements by providing additional footpath facilities at higher demand locations near the future rail station. The proposed active transport network is described in Section 5 of this report.

Table 4-2 Design Considerations – Neighbourhood Access Street (Type 1B)

Design Consideration	EDQ Guideline	Development Proposal	Comments
Traffic Lanes	2 x 3.75m traffic lanes	2 x 3.75m traffic lanes	-
Median	Nil	Nil	-
Breakdown Lane	Nil	Nil	-
Parking	Informal on-street	Informal on-street	-
Cycle	Nil	Nil	-
Pedestrian	1 x 1.5m footpath (one side)	1 x 1.5m footpath (one side)	As indicated on the active transport plan, additional footpaths are proposed at higher demand locations.
Verge	2 x 4.0m verge (both sides)	2 x 4.0m verge (both sides)	-
Road Reserve	15.5m	15.5m	-

Table 4-3 details the design features associated with the proposed Neighbourhood Access Street Type 1C, which are slightly modified from the EDQ Neighbourhood Access Street – 7.5m. The variation relates to a reduced verge width adjacent to open space where services are required on one side only. The development exceeds and improves the minimum EDQ requirements in relation to active transport facilities by providing additional paths in the open space adjacent to the road. Supplementary recreational paths would be located in the open space adjacent to the road, and would not form part of the road reserve.

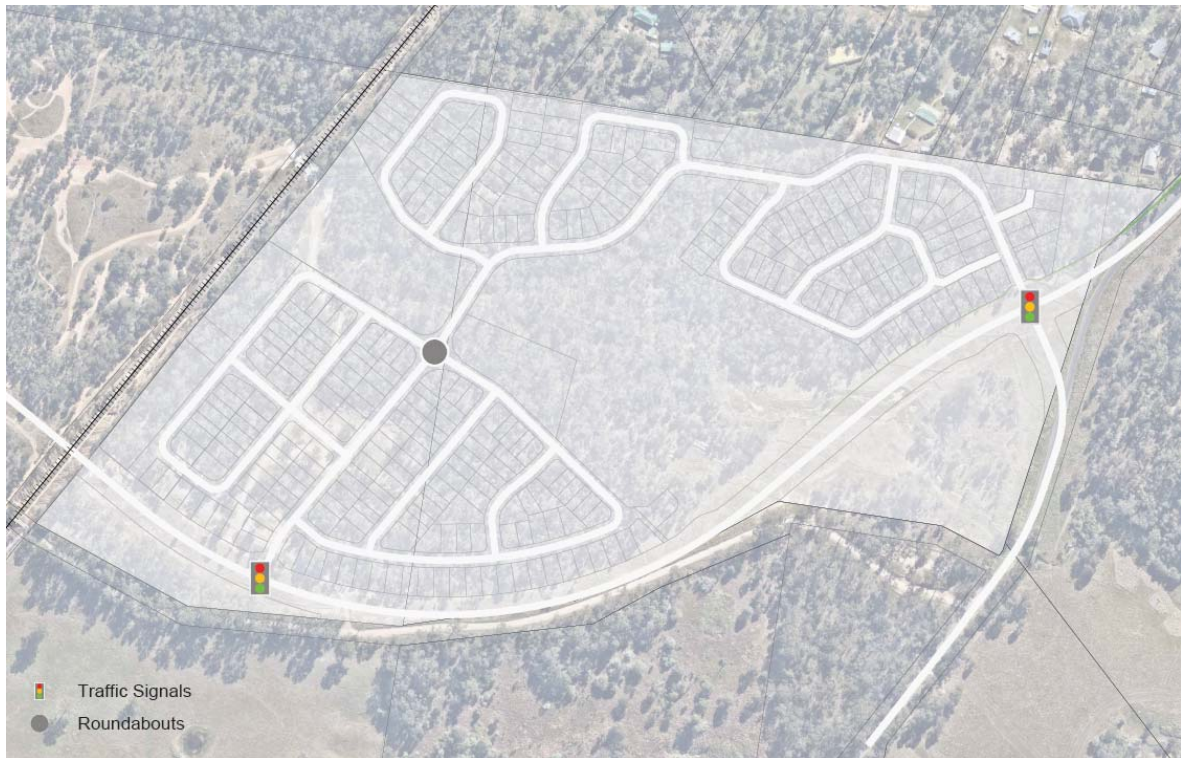
Table 4-3 Design Considerations – Neighbourhood Access Street (Type 1C)

Design Consideration	EDQ Guideline	Development Proposal	Comments
Traffic Lanes	2 x 3.75m traffic lanes	2 x 3.75m traffic lanes	-
Median	Nil	Nil	-
Breakdown Lane	Nil	Nil	-
Parking	Informal on-street	Informal on-street	-
Cycle	Nil	Nil	-
Pedestrian	1 x 1.5m footpath (one side)	1 x 1.5m footpath (one side)	-
Verge	2 x 4.0m verge (both sides)	1 x 4.0m verge (one side) 1 x 2.0m verge (one side)	4.0m verge reduced to 2.0m along park frontage. As indicated on the active transport plan, additional recreational paths are proposed at some locations. These facilities would be provided in the open space.
Road Reserve	15.5m	13.5m	15.5m road reserve has been reduced to reflect a 2.0m verge along the open space.

4.2 Internal Intersections

Figure 4-4 documents the indicative intersection forms proposed for the site. For ease of reference, a larger scale figure is provided at Appendix E.

Figure 4-3 Indicative Intersection Forms

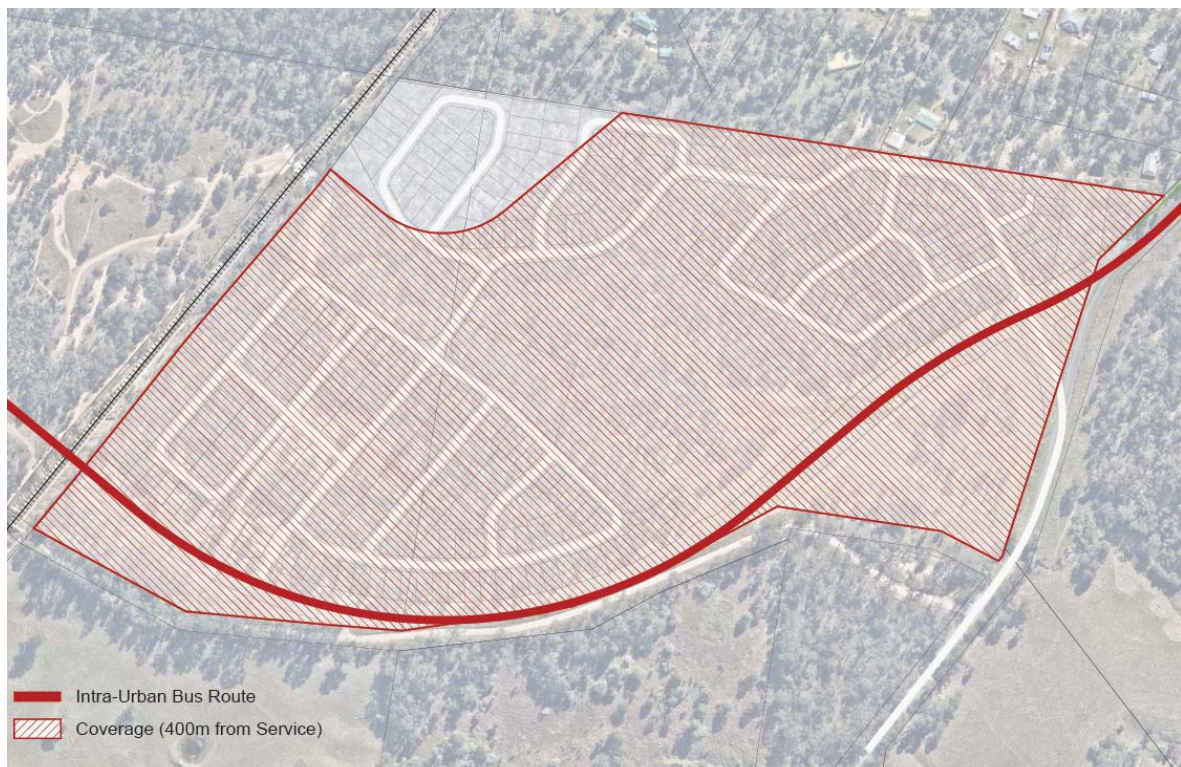


5 Public Transport Connections

The relatively small scale of the development ensures that adequate public transport coverage can be provided with a bus route on the external road network. Proposed locations for bus stops for this service would be near the proposed development access intersections along Wyatt Road and Bushman Drive.

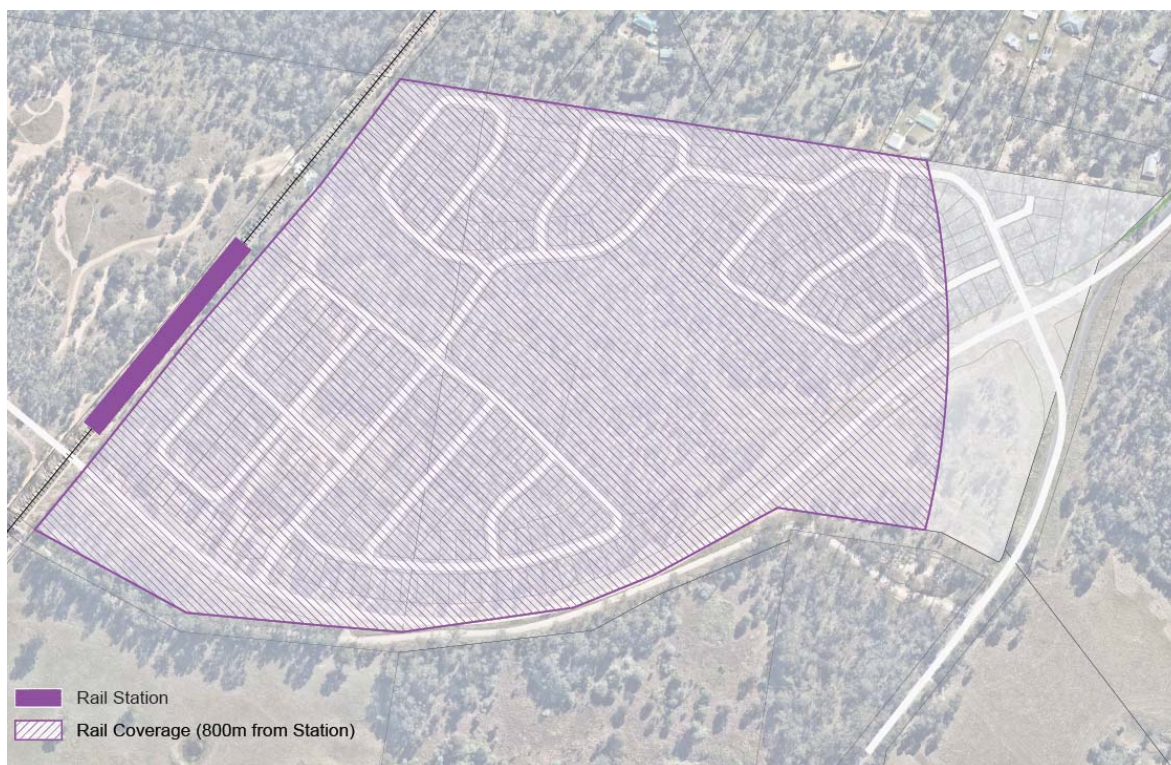
Figure 5-1 illustrates the public transport coverage for the proposed development, assuming a 400m catchment from a potential bus route. The public transport coverage associated with bus transport is shown on a larger scale image at Appendix E.

Figure 5-1 Public Transport Coverage - Bus



Furthermore, it is understood that a future rail station is to be located adjacent to the proposed medium density residential lots. The coverage of this station is based on an 800m walking catchment as illustrated on Figure 5-2.

Figure 5-2 Public Transport Coverage – Rail



Combined, the proposed bus and rail coverage provides excellent public transport connectivity with adequate coverage for the residential dwelling within the site.

Considering actual bus stop locations, the following is proposed:

- > Permanent stops constructed outside the alignment of the ultimate form of Wyatt Road to be provided:
 - Eastbound: approximately mid-way along the site frontage to maximise the catchment area for this site
 - Westbound: on the departure side of the Kilmoylar Road intersection such that patrons can use the signalised intersection to cross the road.
- > Temporary stops at the western end, to improve coverage in the interim until permanent facilities are delivered via interchange facilities at the future rail station. Those temporary stops will make use of available road space in the road reserve under a staged construction approach where only one carriageway of Wyatt Road is initially constructed.

6 Active Transport Connections

The proposed pedestrian and shared paths have been guided by the proposed road hierarchy and corresponding cross sections for the development. The internal pedestrian network will provide well-considered and high standard connections between the proposed site, external road network, public bus stops, and future rail station.

Longer term planning for the Wyatt Road-Bushman Drive-Teviot Road connection includes a separated two way cycle track. This future connection is included along the site frontage in the ultimate active transport network. It is anticipated that footpaths will be provided along the external network to facilitate access to bus stops. The location and extend of such will be determined at the detailed design stage.

Figure 6-1 illustrates the active transport network, including connections to surrounding attractions. Appendix E includes a larger scale drawing for supporting information.

Figure 6-1 Active Transport Network



7 Conclusion

This report outlines the access and movement strategy for the proposed residential development at 24 Bushman Drive and 68 Wyatt Road.

This document sets out an integrated movement network to satisfy all traffic and transport infrastructure requirements for the site, including:

- > an effective road network which manages through traffic and provides for local access;
- > efficient, accessible bus and rail facilities, to reduce reliance on private vehicle use;
- > safe, legible pedestrian and cycling infrastructure to encourage active transport and meet strategic targets for the region.

Interim access is proposed via the existing Bushman Drive. It is considered that with increased maintenance and some minor enhancements to the shoulders at intersection, that Bushman Drive can accommodate the full development of this site prior to the need to complete the Teviot Road connection.

The proposed transport network has been developed in line with EDQ standards and targets, with external infrastructure designed with sufficient capacity for ultimate traffic demands. The network is therefore considered to adequately meet or exceed the long term transport needs for the proposed development.

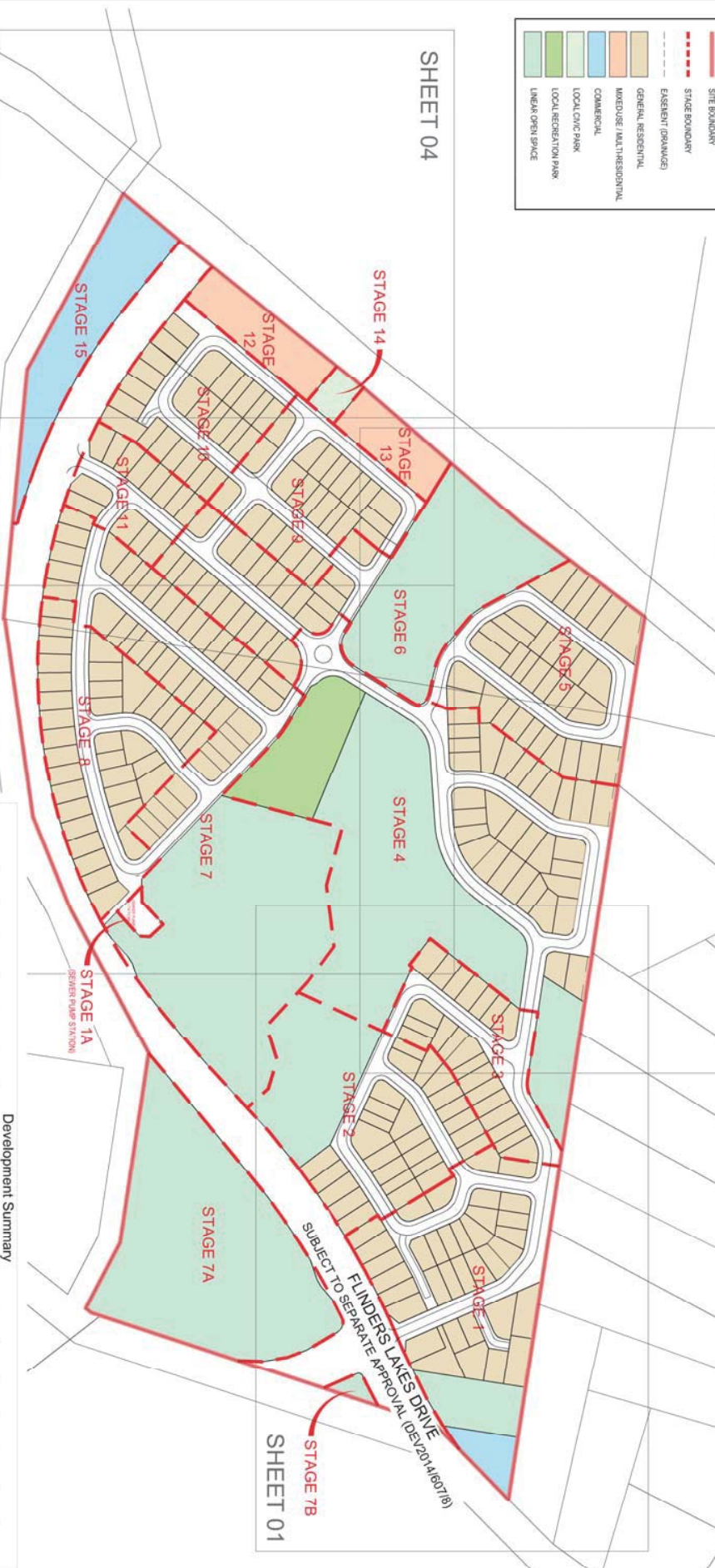
APPENDIX

A

DEVELOPMENT PLANS

LEGEND	
	SITE BOUNDARY
	STAGE BOUNDARY
	EASEMENT (DRAINAGE)
	GENERAL RESIDENTIAL
	MIXED USE / MULTI-RESIDENTIAL
	COMMERCIAL
	LOCAL CIVIC PARK
	LOCAL RECREATION PARK
	LINEAR OPEN SPACE

SHEET 02



Development Summary

STAGE	1	1A	2	3	4	5	6	7	7A	8	9	10	11	12	13	14	15	TOTALS
Area of Park	0.385 ha	0.000 ha	1.045 ha	-	4.178 ha	-	1.891 ha	3.345 ha	3.222 ha	0.060 ha	-	-	-	-	-	-	-	14.348 ha
Area of Road	0.276 ha	-	0.294 ha	0.271 ha	0.566 ha	0.114 ha	0.101 ha	0.265 ha	-	0.242 ha	0.250 ha	0.172 ha	0.101 ha	-	-	-	-	2.817 ha
Residential Lots	35	-	27	21	31	33	23	41	-	36	24	25	13	-	-	-	-	309
Commercial Lots	-	-	-	-	-	-	-	-	-	-	-	-	-	(1)	(1)	-	-	(2)
Stage Area	3.244 ha	0.000 ha	2.893 ha	1.444 ha	7.209 ha	2.453 ha	3.354 ha	3.665 ha	3.223 ha	0.060 ha	1.297 ha	1.643 ha	0.449 ha	0.572 ha	0.423 ha	0.129 ha	1.465 ha	38.453 ha

Park Area Table

Lot No	900	901	902	903	904	905	907	908
Area	0.129 ha	0.165 ha	1.691 ha	7.423 ha	0.473 ha	0.381 ha	3.222 ha	0.062 ha
Total Park	14.348 ha							



SCALE: 1:1000

PROJECT NAME

CLIENT

R.P. DESCRIPTION

ASSOCIATED CONSULTANTS

DRAWING TITLE

Bulman + Wyatt

PACIFIQ

LOT 24 ON SP142997
AND
LOT 1 ON RP49296

NOTE:
THIS PLAN WAS PREPARED FOR PLANNING PURPOSES ONLY. IT IS SUBJECT TO THE REQUIREMENTS OF THE LOCAL GOVERNMENT AND THE REQUIREMENTS OF THE LOCAL GOVERNMENT. THE LOCAL GOVERNMENT IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION ON THIS PLAN FOR ANY PURPOSES OTHER THAN PLANNING. THE LOCAL GOVERNMENT IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION ON THIS PLAN FOR ANY PURPOSES OTHER THAN PLANNING.

FOR THE PURPOSE OF THIS PLAN, THE LOCAL GOVERNMENT IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION ON THIS PLAN FOR ANY PURPOSES OTHER THAN PLANNING.

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urban solutions
urban & regional planning
Project Coordination

SUBDIVISION
PROPOSAL PLAN
(Page 1 of 5)

23305-PP-S001

APPENDIX

B

TRAFFIC VOLUME PLOTS

APPENDIX

C

SIDRA RESULTS

SITE LAYOUT

Site: 101 [Western Access AM Peak]

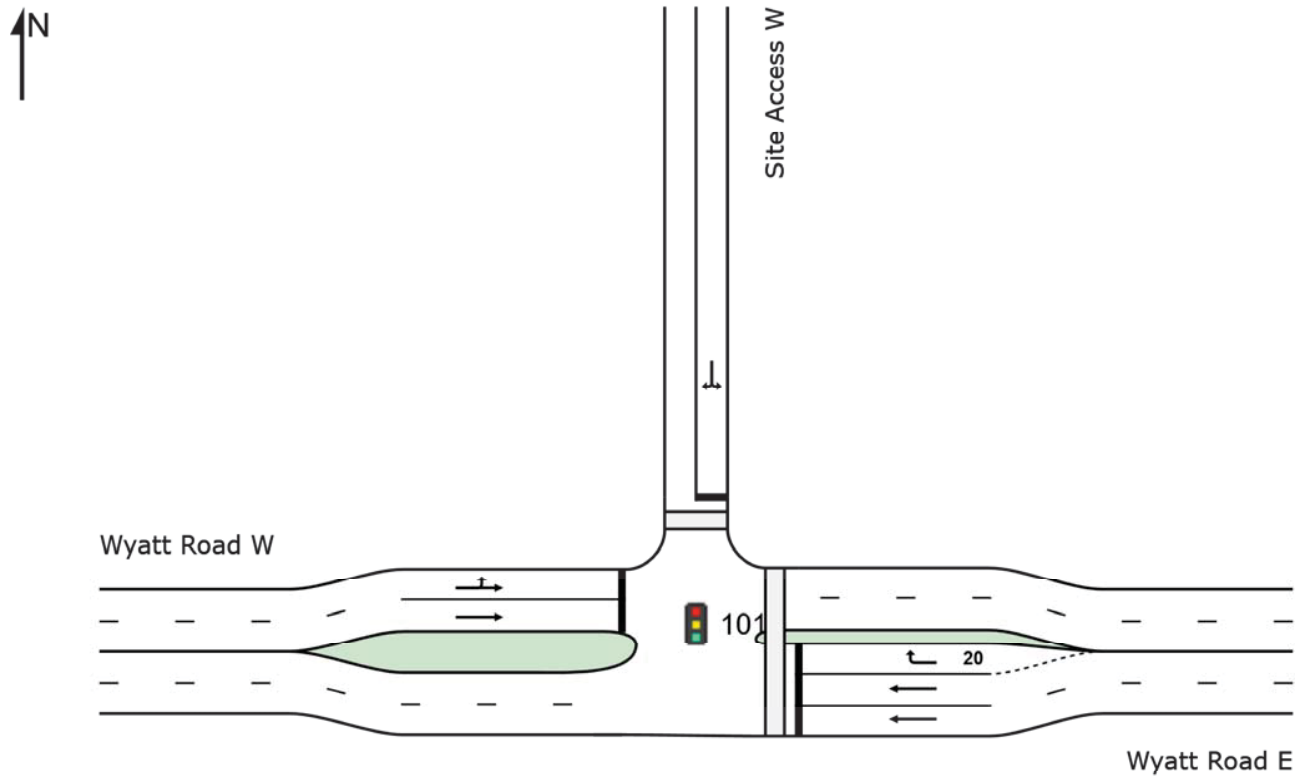
Wyatt Road / Site Access W, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated



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Organisation: CARDNO (QLD) PTY LTD | Created: Thursday, 8 November 2018 10:05:29 AM

Project: \\aubnecfs05\tnt\$\Current Jobs\CEB06678 - Flinders Transport Modelling\CEB06678 14 Bushman ROL\Analysis\SIDRA
\\6678_SID_20181108.sip8

PHASING SUMMARY

Site: 101 [Western Access AM Peak]

Wyatt Road / Site Access W, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B, C

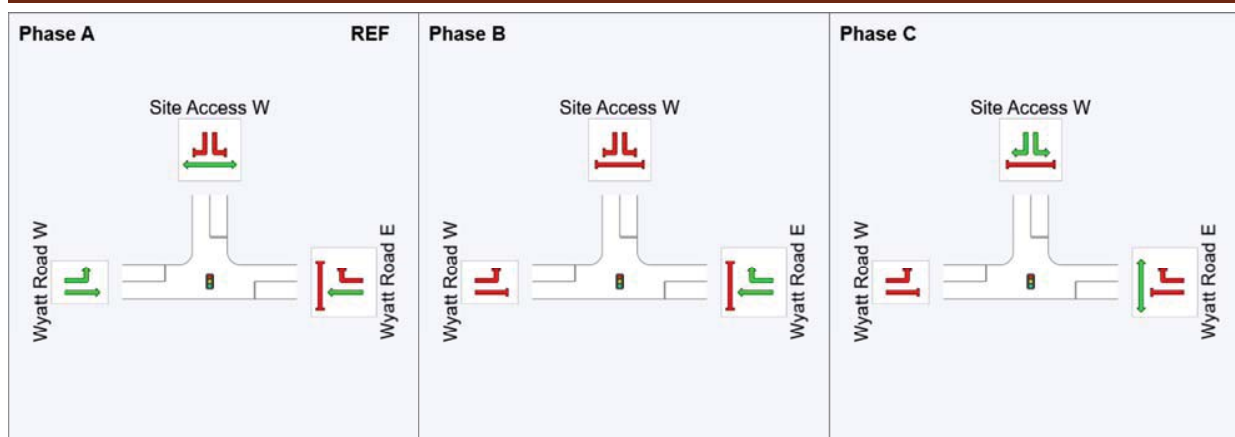
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	42	54
Green Time (sec)	36	6	10
Phase Time (sec)	42	12	16
Phase Split	60%	17%	23%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

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LANE SUMMARY

Site: 101 [Western Access AM Peak]

Wyatt Road / Site Access W, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Lane Use and Performance													
	Demand Flows			Deg.	Lane	Average	Level of	95% Back of Queue		Lane	Lane	Cap.	Prob.
	Total	HV	Cap.	Satn	Util.	Delay	Service	Veh	Dist	Config	Length	Adj.	Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Wyatt Road E													
Lane 1	434	3.0	1312	0.331	100	4.8	LOS A	6.0	42.9	Full	875	0.0	0.0
Lane 2	414	3.0	1252 ¹	0.331	100	4.7	LOS A	5.6	40.5	Full	875	0.0	0.0
Lane 3	21	3.0	156	0.135	100	39.5	LOS C	0.7	5.1	Short	20	0.0	NA
Approach	869	3.0		0.331		5.6	LOS A	6.0	42.9				
North: Site Access W													
Lane 1	159	3.0	260	0.612	100	38.0	LOS C	5.4	39.1	Full	1050	0.0	0.0
Approach	159	3.0		0.612		38.0	LOS C	5.4	39.1				
West: Wyatt Road W													
Lane 1	587	3.0	980	0.599	100	13.1	LOS A	14.2	101.6	Full	800	0.0	0.0
Lane 2	589	3.0	984	0.599	100	12.9	LOS A	14.2	102.0	Full	800	0.0	0.0
Approach	1177	3.0		0.599		13.0	LOS A	14.2	102.0				
Intersection	2205	3.0		0.612		11.9	LOS A	14.2	102.0				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

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

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.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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PHASING SUMMARY

Site: 101 [Western Access PM Peak]

Wyatt Road / Site Access W, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B, C

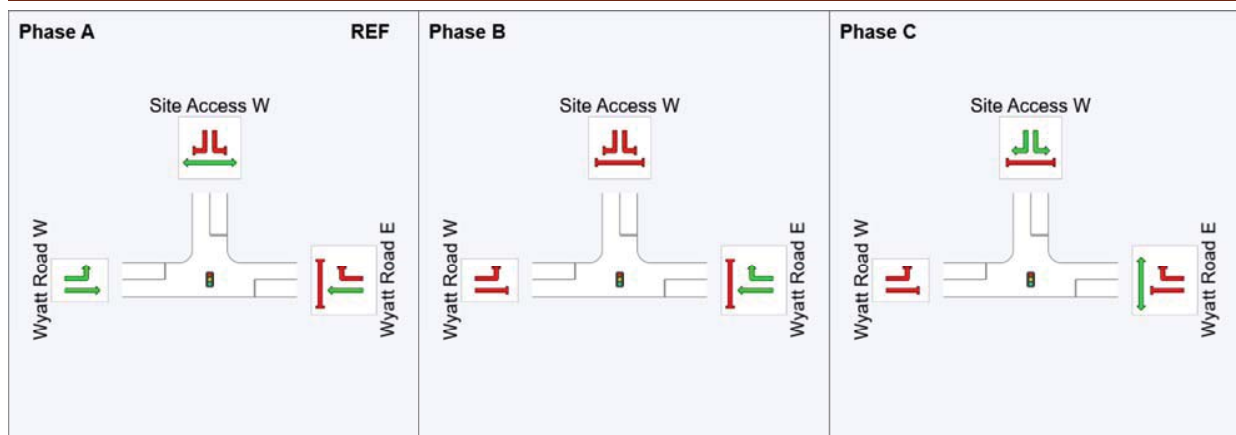
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	42	54
Green Time (sec)	36	6	10
Phase Time (sec)	42	12	16
Phase Split	60%	17%	23%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

 Normal Movement	 Permitted/Opposed
 Slip/Bypass-Lane Movement	 Opposed Slip/Bypass-Lane
 Stopped Movement	 Turn On Red
 Other Movement Class (MC) Running	 Undetected Movement
 Mixed Running & Stopped MCs	 Continuous Movement
 Other Movement Class (MC) Stopped	 Phase Transition Applied

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LANE SUMMARY

Site: 101 [Western Access PM Peak]

Wyatt Road / Site Access W, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Lane Use and Performance													
	Demand Flows			Deg.	Lane	Average	Level of	95% Back of Queue		Lane	Lane	Cap.	Prob.
	Total	HV	Cap.	Satn	Util.	Delay	Service	Veh	Dist	Config	Length	Adj.	Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Wyatt Road E													
Lane 1	556	3.0	1312	0.424	100	5.2	LOS A	8.4	60.0	Full	875	0.0	0.0
Lane 2	478	3.0	1129 ¹	0.424	100	4.9	LOS A	6.8	48.8	Full	875	0.0	0.0
Lane 3	84	3.0	156	0.540	100	41.5	LOS C	3.0	21.6	Short	20	0.0	NA
Approach	1118	3.0		0.540		7.8	LOS A	8.4	60.0				
North: Site Access W													
Lane 1	40	3.0	260	0.154	100	35.0	LOS C	1.2	9.0	Full	1050	0.0	0.0
Approach	40	3.0		0.154		35.0	LOS C	1.2	9.0				
West: Wyatt Road W													
Lane 1	520	3.0	969	0.537	100	13.1	LOS A	12.0	86.0	Full	800	0.0	0.0
Lane 2	528	3.0	984	0.537	100	12.3	LOS A	12.2	87.3	Full	800	0.0	0.0
Approach	1048	3.0		0.537		12.7	LOS A	12.2	87.3				
Intersection	2206	3.0		0.540		10.6	LOS A	12.2	87.3				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

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

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.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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SITE LAYOUT

Site: 101 [Eastern Access AM Peak]

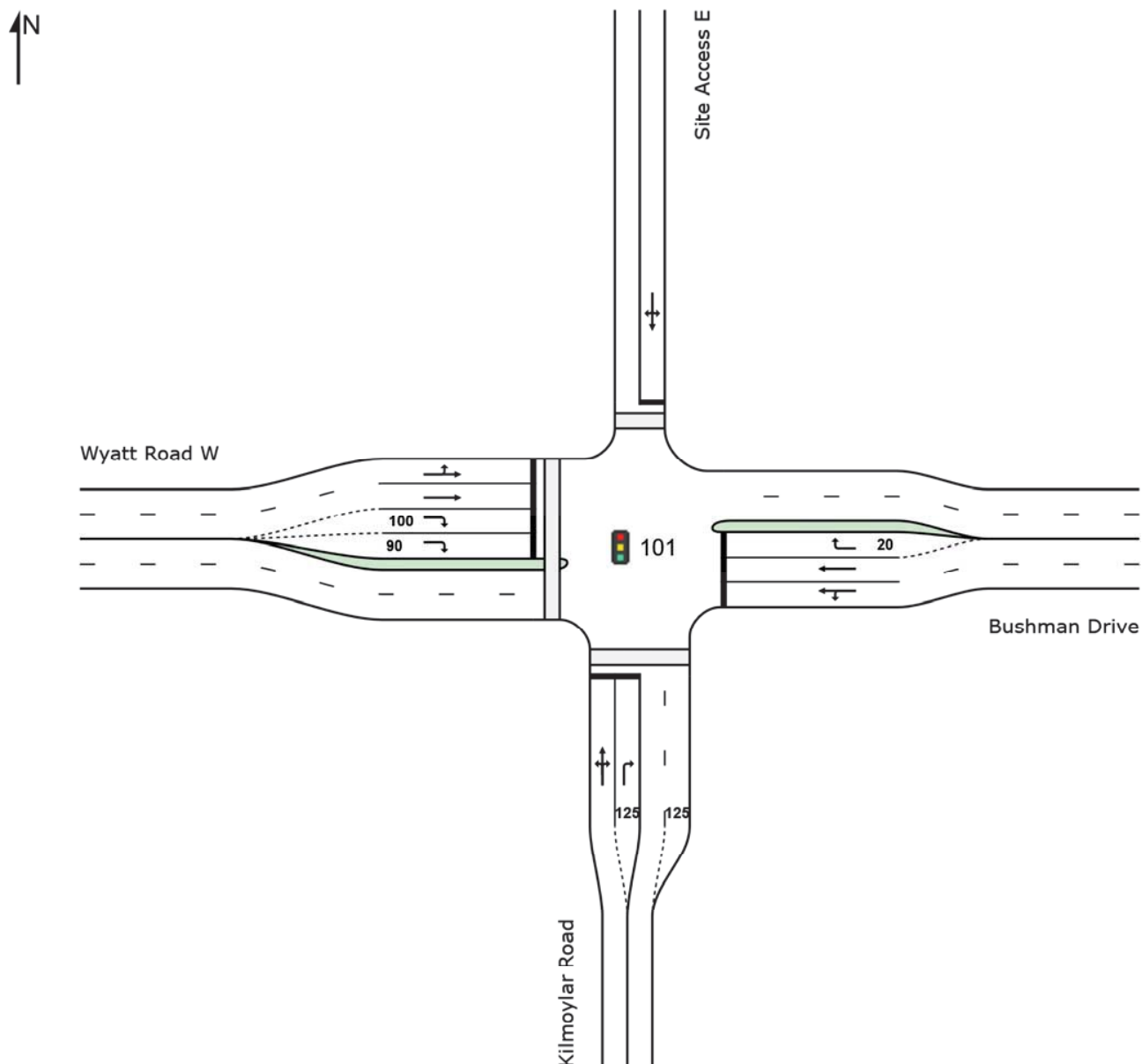
Wyatt Road / Site Access E, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated



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PHASING SUMMARY

 **Site: 101 [Eastern Access AM Peak]**

Wyatt Road / Site Access E, Jimboomba
Bushman ROL
Prepared by Christina Johansson
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

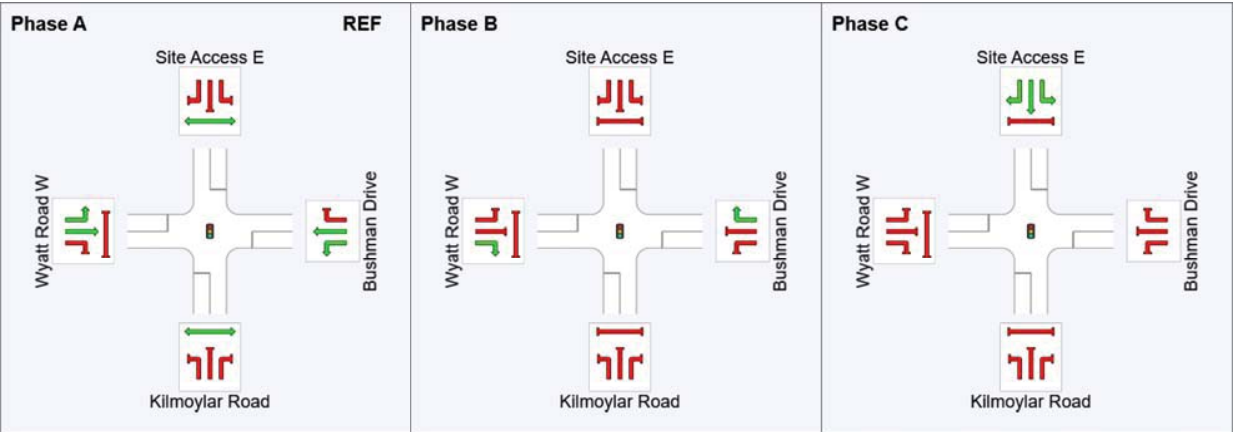
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, B1*, B2*, C, D
Output Phase Sequence: A, B, C, D
(* Variable Phase)

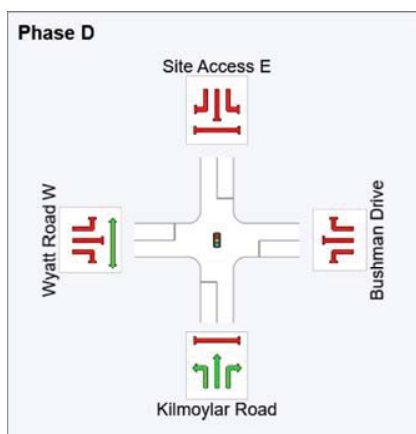
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	31	47	59
Green Time (sec)	25	10	6	15
Phase Time (sec)	31	16	12	21
Phase Split	39%	20%	15%	26%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence





REF: Reference Phase

VAR: Variable Phase



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LANE SUMMARY

Site: 101 [Eastern Access AM Peak]

Wyatt Road / Site Access E, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance													
	Demand Total veh/h	Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Veh	Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Kilmoylar Road													
Lane 1	282	3.0	341	0.826	100	45.7	LOS D	12.1	86.7	Full	500	0.0	0.0
Lane 2	282	3.0	341	0.826	100	45.8	LOS D	12.1	86.6	Short	125	0.0	NA
Approach	563	3.0		0.826		45.7	LOS D	12.1	86.7				
East: Bushman Drive													
Lane 1	399	8.7	529	0.755	100	33.7	LOS C	15.2	114.1	Full	800	0.0	0.0
Lane 2	441	3.0	584 ¹	0.755	100	28.8	LOS C	16.4	117.6	Full	800	0.0	0.0
Lane 3	13	3.0	227	0.056	100	39.7	LOS C	0.4	3.2	Short	20	0.0	NA
Approach	853	5.7		0.755		31.2	LOS C	16.4	117.6				
North: Site Access E													
Lane 1	85	13.9	127	0.669	100	48.3	LOS D	3.6	28.2	Full	1050	0.0	0.0
Approach	85	13.9		0.669		48.3	LOS D	3.6	28.2				
West: Wyatt Road W													
Lane 1	465	3.0	597	0.779	100	30.1	LOS C	17.9	128.2	Full	875	0.0	0.0
Lane 2	466	3.0	598	0.779	100	30.1	LOS C	17.9	128.4	Full	875	0.0	0.0
Lane 3	126	3.0	227	0.554	68 ⁶	43.0	LOS D	4.9	35.0	Short	100	0.0	NA
Lane 4	186	3.0	227	0.817	100	48.7	LOS D	8.0	57.8	Short	90	0.0	NA
Approach	1242	3.0		0.817		34.2	LOS C	17.9	128.4				
Intersection	2743	4.2		0.826		36.1	LOS C	17.9	128.4				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

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

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.

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁶ Lane under-utilisation due to downstream effects

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PHASING SUMMARY

 **Site: 101 [Eastern Access PM Peak]**

Wyatt Road / Site Access E, Jimboomba
Bushman ROL
Prepared by Christina Johansson
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

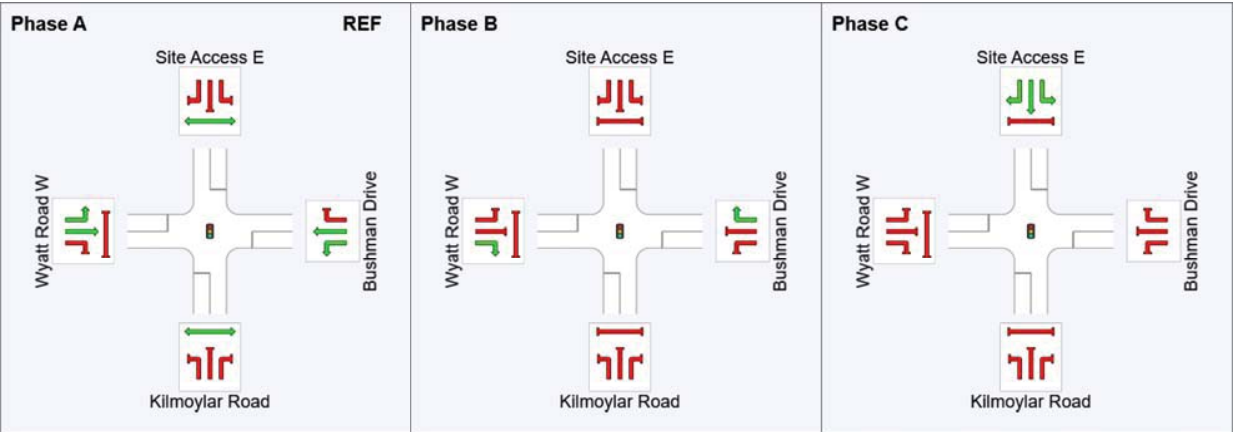
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, B1*, B2*, C, D
Output Phase Sequence: A, B, C, D
(* Variable Phase)

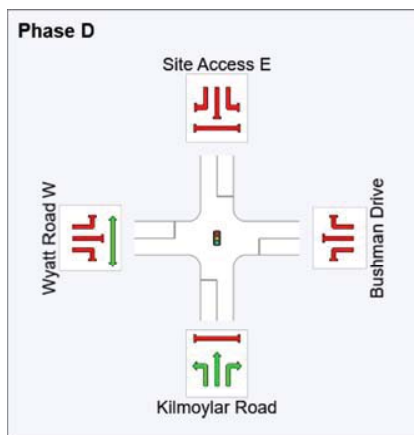
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	48	70	82
Green Time (sec)	42	16	6	22
Phase Time (sec)	48	22	12	28
Phase Split	44%	20%	11%	25%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

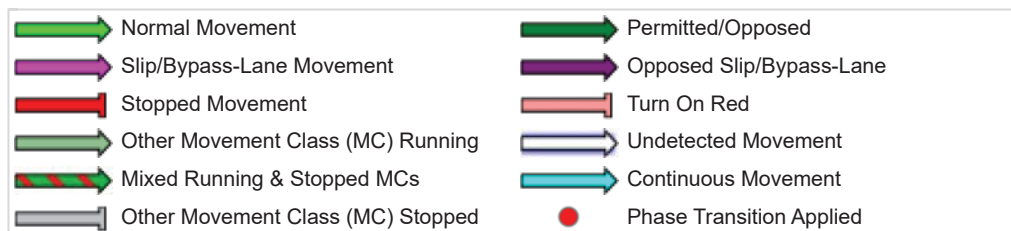
Output Phase Sequence





REF: Reference Phase

VAR: Variable Phase



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LANE SUMMARY

Site: 101 [Eastern Access PM Peak]

Wyatt Road / Site Access E, Jimboomba

Bushman ROL

Prepared by Christina Johansson

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance													
	Demand Flows			Deg.	Lane	Average	Level of	95% Back of Queue		Lane	Lane	Cap.	Prob.
	Total	HV	Cap.	Satn	Util.	Delay	Service	Veh	Dist	Config	Length	Adj.	Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Kilmoylar Road													
Lane 1	307	3.0	364	0.842	100	58.5	LOS E	17.7	127.1	Full	500	0.0	0.0
Lane 2	306	3.0	364	0.842	100	58.7	LOS E	17.7	126.9	Short	125	0.0	NA
Approach	613	3.0		0.842		58.6	LOS E	17.7	127.1				
East: Bushman Drive													
Lane 1	550	6.8	672	0.818	100	40.0	LOS C	28.6	211.6	Full	800	0.0	0.0
Lane 2	550	3.0	673 ¹	0.818	100	35.8	LOS C	27.5	197.7	Full	800	0.0	0.0
Lane 3	52	3.0	264	0.195	100	50.9	LOS D	2.5	17.8	Short	20	0.0	NA
Approach	1152	4.8		0.818		38.5	LOS C	28.6	211.6				
North: Site Access E													
Lane 1	20	14.4	92	0.217	100	62.5	LOS E	1.1	8.6	Full	1050	0.0	0.0
Approach	20	14.4		0.217		62.5	LOS E	1.1	8.6				
West: Wyatt Road W													
Lane 1	315	3.0	723	0.435	100	27.4	LOS B	12.5	89.5	Full	875	0.0	0.0
Lane 2	318	3.0	730	0.435	100	27.0	LOS B	12.6	90.4	Full	875	0.0	0.0
Lane 3	146	3.0	264	0.553	68 ⁶	54.0	LOS D	7.5	54.0	Short	100	0.0	NA
Lane 4	216	3.0	264	0.816	100	61.0	LOS E	12.4	89.0	Short	90	0.0	NA
Approach	995	3.0		0.816		38.5	LOS C	12.6	90.4				
Intersection	2779	3.8		0.842		43.1	LOS D	28.6	211.6				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

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

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.

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁶ Lane under-utilisation due to downstream effects

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APPENDIX

D

INTERIM ACCESS ASSESSMENT

Interim Access Assessment

Bushman Drive & Wyatt Road
Residential Development

CEB06678



Prepared for
Pacific International Development
Corporation Pty Ltd

9 November 2018

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Pty Ltd

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Effective Date 9/11/2018

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Senior Principal, Transport

Date Approved 9/11/2018

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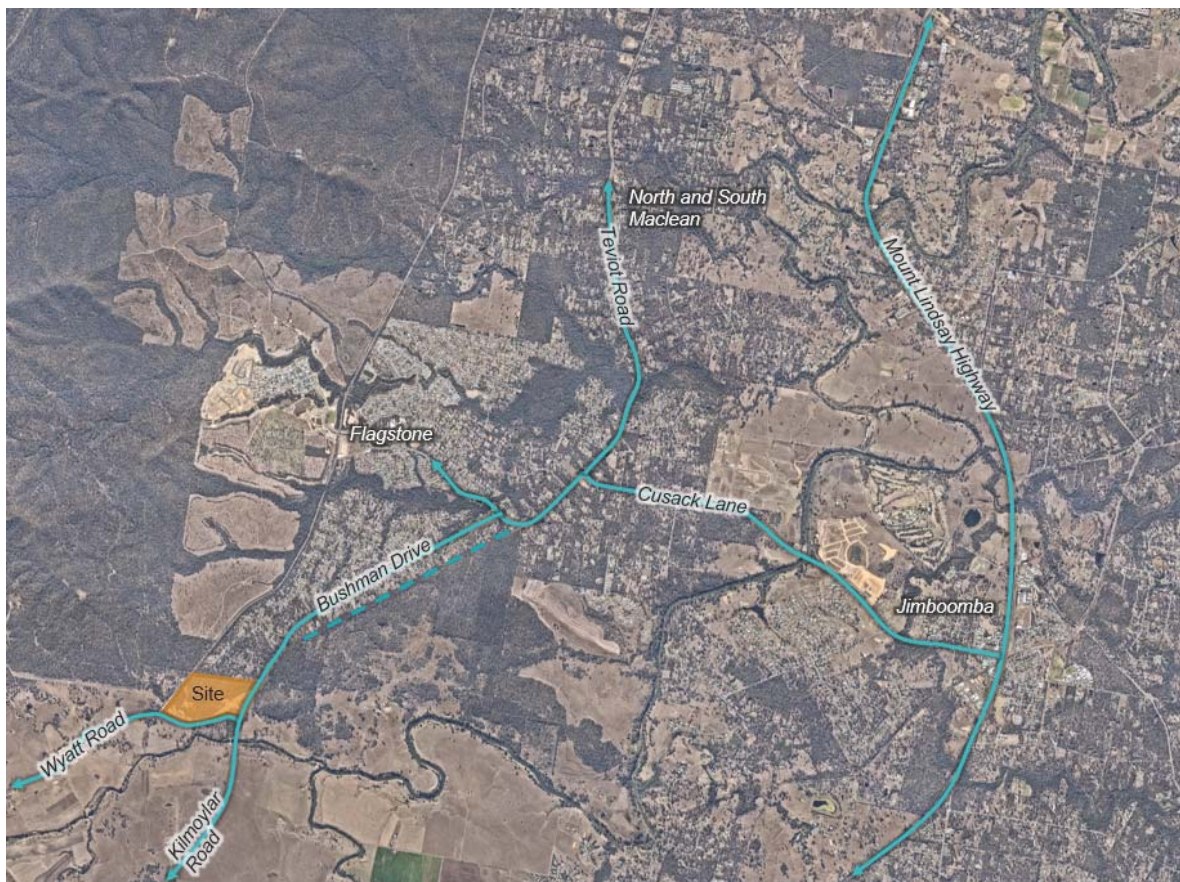
1 Introduction

1.1 Context

Cardno has been engaged by Pacific International Development Corporation Pty Ltd (Pacifiq) to provide traffic and transport advice in relation to a proposed residential development at 24 Bushman Drive and 68 Wyatt Road, Jimboomba.

Figure 1-1 illustrates the site location in the context of the broader road network surrounding the proposed development site.

Figure 1-1 Site Location



It is proposed that the development will use Bushman Drive to access the arterial road network temporarily until the extension of Teviot Road from Homestead Drive to Bushman Drive is built and improvements of Wyatt Road and Kilmoylar Road are facilitated.

The future Teviot Road extension will run parallel with Bushman Drive, as shown on Figure 1-1, and will remove longer distance trips from Bushman Drive. In the interim, the majority of traffic will travel to and from the north along Bushman Drive to reach external destinations. Whilst it is recognised that a small component of traffic will use Kilmoylar Road, it is anticipated that the volume of traffic to the south will be negligible in the context of existing and short term land use and network connections.

This report assesses the suitability of Bushman Drive in its current form as the proposed development's primary connection to the external road network.

2 Existing Situation

2.1 Overview

A site inspection was completed to identify the existing conditions along Bushman Drive. The road extent and side streets are identified on Figure 2-1.

Figure 2-1 Site Locality



The typical road configuration is shown on Figure 2-2.

Figure 2-2 Existing Road Cross-Section



2.2 Cross-Section

Bushman Drive generally provides 2 x 3.0m traffic lanes within a 6.0 – 7.0m sealed carriageway. Visual inspection indicates a road formation at around 9.0m with partially sealed shoulders (0-0.5m wide). A total road reserve of 30m is provided at the southern end, narrowing to 20m in the northern section of the road.

2.3 Vehicle Speed

The road has a posted speed of 70km/h at its northern end and through the rural residential area, increasing to 80km/h south of Teviot Road. Recently traffic data collected by Austraffic on Bushman Drive 170m south of Homestead Drive in the period Tuesday 9 October 2018 to Monday 15 October 2018 indicates an average speed of 61.2km/h and an 85 percentile speed of 69km/h. Further detailed traffic data is included at Appendix A for reference.

2.4 Traffic Volume and Vehicle Composition

Traffic counts conducted by Austraffic on Bushman Drive 170m south of Homestead Drive in the period Tuesday 9 October 2018 to Monday 15 October 2018, shows that, Bushman Drive carries an average seven day daily traffic volume of 3,200 vehicles per day (vpd) at its northern end. The traffic volume comprises largely light vehicles with around 5% heavy vehicles. Further detailed traffic data is included at Appendix A for reference.

2.5 Pedestrian and Cycle

There are no formal facilities available for active transport, and traffic survey and site investigations indicates that the current pedestrian and cyclist demand is minimal.

Seven-day traffic surveys were completed by Austraffic in the period Tuesday 9 October 2018 to Monday 15 October 2018), using pneumatic tube counters to collect speed, class and volume data. This data identified an average of 30 cycle movements per day. The tube counters are not able to collect pedestrian data.

Intersection turning movement data collected at the Drover Crescent (north) / Bushman Drive intersection captured one pedestrian movement and zero cycle movements in a six hour period.

The low pedestrian and cycle volumes identified in the traffic surveys were consistent with site inspection observations. Detailed traffic data is included at Appendix A for reference.

2.6 Parking

Bushman Drive is fronted by large residential lots. The setback of houses, long driveways and large lots provides ample opportunity for resident and visitor parking. This results in a very limited demand for on-street parking which was evident at the site inspection.

The road and verge cross-section does not permit traditional kerbside parking, although parking in the verge can be accommodated between the drainage channel and property boundary.

2.7 Intersections

Intersections are typically provided in a give-way arrangement with Bushman Drive being the priority road. Turns into side streets are accommodated in the through traffic lane, with no specific turn lane provision on Bushman Drive.

Austrroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings has been consulted to determine the turn lane requirements for the existing situation. Assessment has been completed at the following locations:

- > Shearer Court / Bushman Drive intersection
- > Drover Crescent (north) / Bushman Drive intersection
- > Drover Crescent (south) / Bushman Drive intersection
- > Whittling Court / Bushman Drive intersection
- > Blacksmith Court / Bushman Drive intersection.

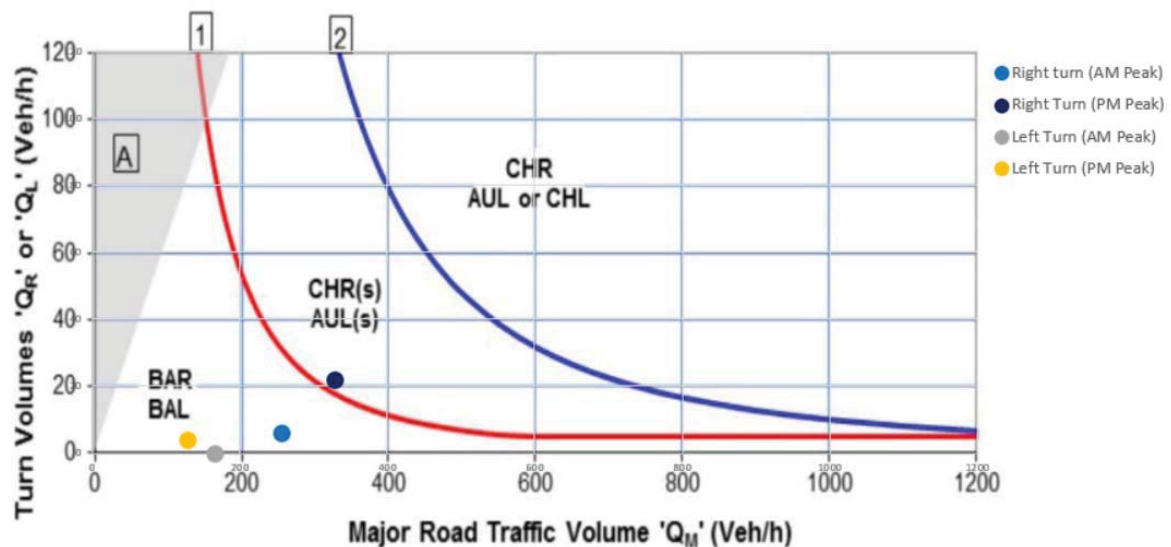
Assessment has been based on the "*Warrants for turn treatments on major roads at unsignalised intersections 70 km/h < Design Speed < 100 km/h*" chart which has been adopted from the Austrroads guidelines and is described as appropriate for higher-speed urban roads, including those on the urban fringe and lower speed rural roads.

Intersection turning movement traffic counts have been collected by Austraffic on Tuesday 9 October 2018 at the Drover Crescent (north) / Bushman Drive intersection and on Wednesday 31 October 2018 at the remaining four intersections and are used as a basis for the traffic analysis. Traffic counts and volume plots are included at Appendix A for reference.

2.7.1 Shearer Court / Bushman Drive intersection

The intersection analysis of Shearer Court / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 2-3.

Figure 2-3 Turn Warrant Assessment - Shearer Court -existing situation

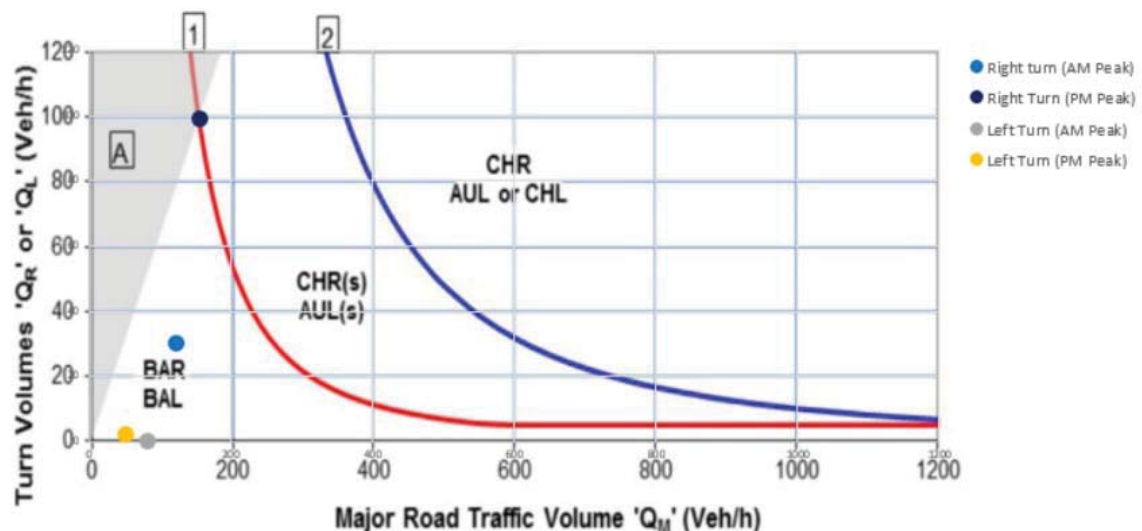


The assessment indicates that a right turn treatment is currently warranted at the Shearer Court / Bushman Drive intersection under Austroads guidance. This is an existing deficiency.

2.7.2 Drover Crescent (north) / Bushman Drive intersection

The intersection analysis of Drover Crescent (north) / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 2-4.

Figure 2-4 Turn Warrant Assessment - Drover Crescent (north) - existing situation

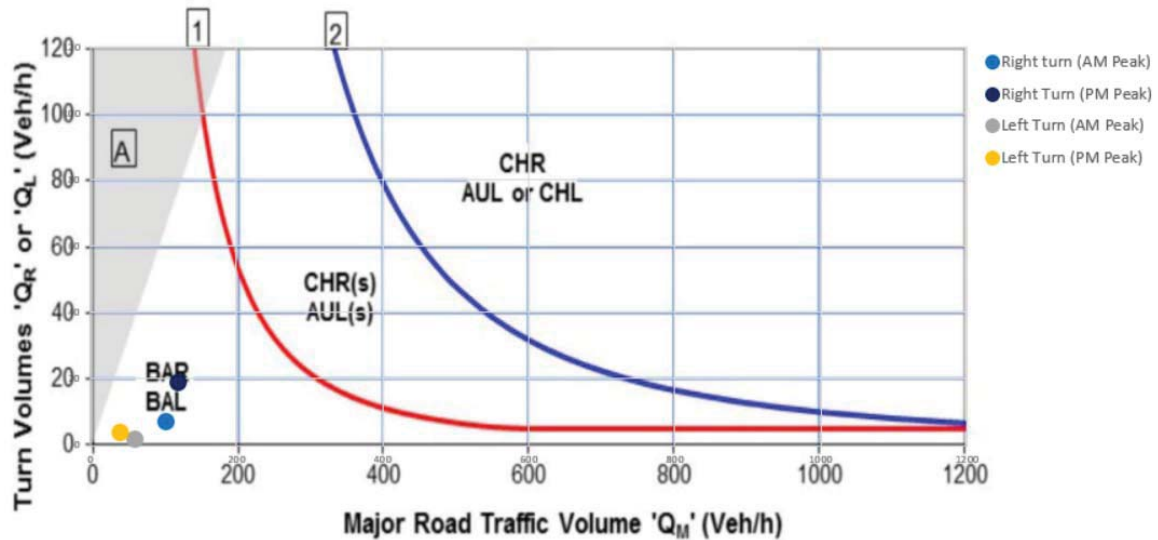


The assessment indicates that a right turn treatment is currently warranted at the Drover Crescent (north) / Bushman Drive intersection under Austroads guidance. This is an existing deficiency.

2.7.3 Drover Crescent (south) / Bushman Drive intersection

The intersection analysis of Drover Crescent (south) / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 2-5.

Figure 2-5 Turn Warrant Assessment - Drover Crescent (south) - existing situation

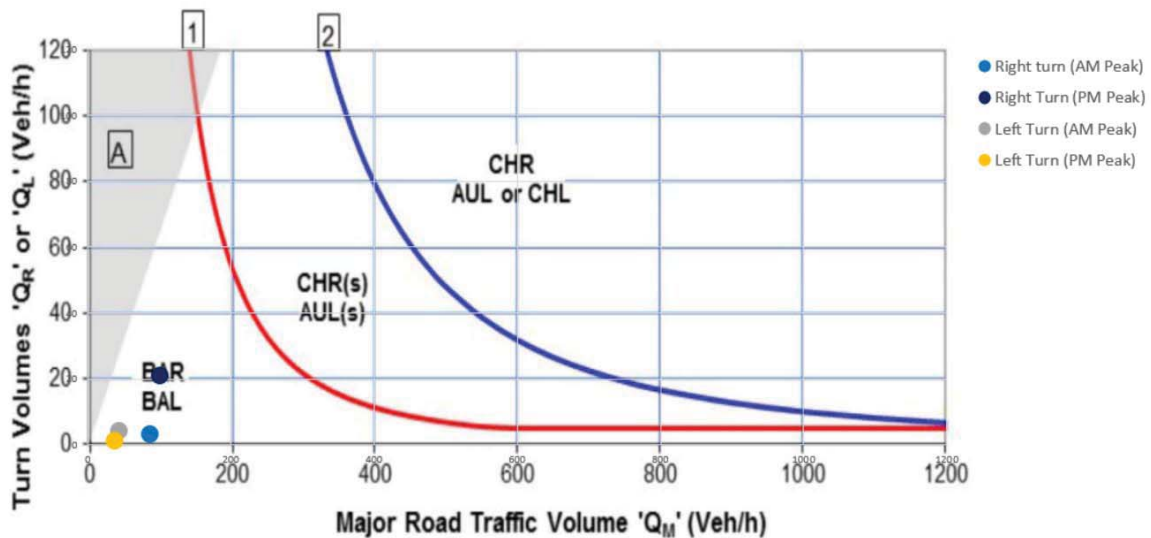


The assessment indicates that turn lane provisions are not currently warranted at the Drover Crescent (south) / Bushman Drive intersection under Austroads guidance.

2.7.4 Whittling Court / Bushman Drive intersection

The intersection analysis of Whittling Court / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 2-6.

Figure 2-6 Turn Warrant Assessment - Whittling Court - existing situation

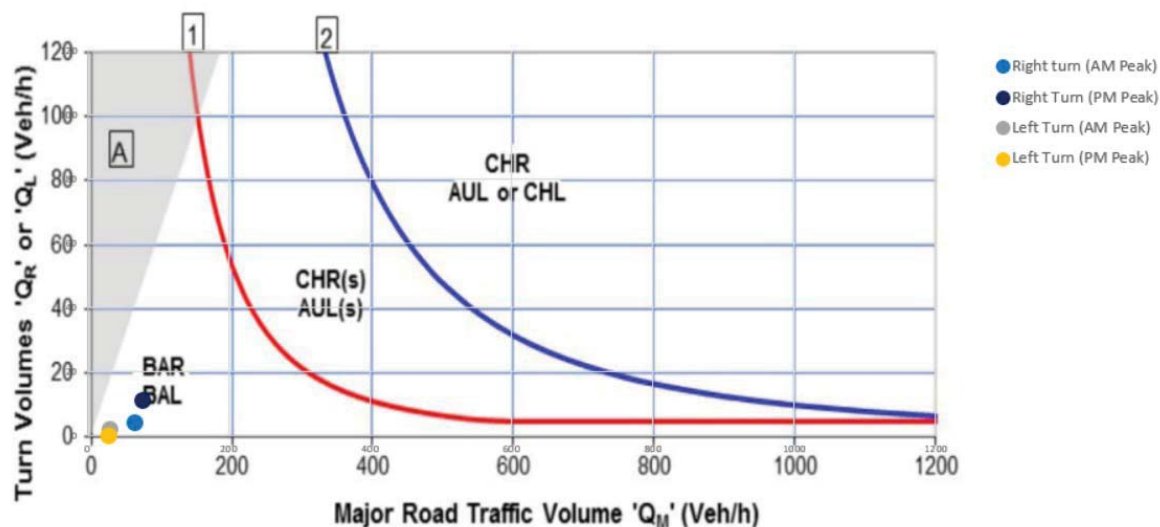


The assessment indicates that turn lane provisions are not currently warranted at the Whittling Court / Bushman Drive intersection under Austroads guidance.

2.7.5 Blacksmith Court / Bushman Drive intersection.

The intersection analysis of Blacksmith Court / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 2-7.

Figure 2-7 Turn Warrant Assessment - Blacksmith Court - existing situation



The assessment indicates that turn lane provisions are not currently warranted at the Blacksmith Court / Bushman Drive intersection under Austroads guidance.

2.8 Sight Distance

The available Safe Intersection Sight Distance (SISD) was measured at the following locations along Bushman Drive:

- > Blacksmith Court: greater than 200m south and north available
- > Whittling Court: approximately 200m south and 180m north available
- > Drover Crescent (southern intersection): greater than 200 south and approximately 160m north available
- > Drover Crescent (northern intersection): approximately 120m south and 140m north available
- > Shearer Court: approximately 180m south and north available.

Austroads identifies a SISD requirement of 181m for an 80km/h design speed (posted speed 70km/h). This is reduced to 151m for a 60km/h posted speed. Although the sight distance is typically adequate, advance warning signage is provided on the Bushman Drive to alert drivers of minor road intersections.

It is noted that the SISD at Drover Crescent (north and south) is substandard for the currently posted speed of 70km/h. It may be therefore relevant to reduce the posted speed to reduce the sight distance requirement to meet the existing conditions. The site inspection also revealed that the visibility at Drover Crescent (north) is obscured by vegetation. Minor clearing would improve visibility from the side street to the north at the Drover Crescent (northern) intersection.

2.9 Crashes

Crash data has been obtained from the Queensland Government data base. This includes the location and characteristics of crashes within Queensland for all reported road traffic crashes from 1 January 2001 to 31 December 2017, (property damage only crashes to 31 December 2010).

No crashes were reported on Bushman Drive in the 16 year period, indicating a very low crash risk based on historical use.

2.10 General Condition

A site inspection was completed on 18 October 2018. The assessment indicated some deterioration of the existing road surface, shoulders and linemarking, as depicted on Figures 2-8, 2-9 and 2-10.

Figure 2-8 Deterioration or loss of shoulders



Figure 2-9 Faded linemarking and missing signage at intersections



Figure 2-10 Intermittent pavement deterioration



The current conditions would be improved by maintenance of the road surface and shoulders. A commitment to regular grading of the shoulders would also improve the ability of errant vehicles to traverse the unsealed shoulders and permit additional width for passing of stopped vehicles waiting to turn right or in the event of a breakdown.

2.11 Road Hierarchy and Design Standards

Historically, and consistent with the superseded Beaudesert Planning Scheme, Bushman Drive has been defined as a local road and is designed to a rural access road standard without kerb and channel.

The road ownership has since passed to Logan City Council and the road hierarchy has been redefined as an Urban Collector single carriageway.

Figures 2-11 and 2-12 illustrate the equivalent standard road cross-sections in the current Logan City Council planning scheme.

Figure 2-11 Rural Access

ELEMENT	DESIGN AADT			
	1-150	150-500	500-1000	1000-3000
TRAFFIC LANES	6.0	6.2	7.0	7.0
	1 x 6.0	2 x 3.1	2 x 3.5	2 x 3.5
TOTAL SHOULDER	1.0	1.5	1.5	2.0
MINIMUM SEALED SHOULDER	0.0	0.5	0.5	1.0
TOTAL CARRIAGEWAY	8.0	9.2	10.0	11.0

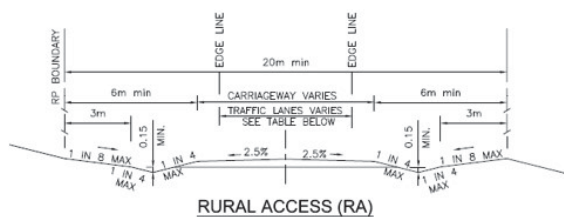
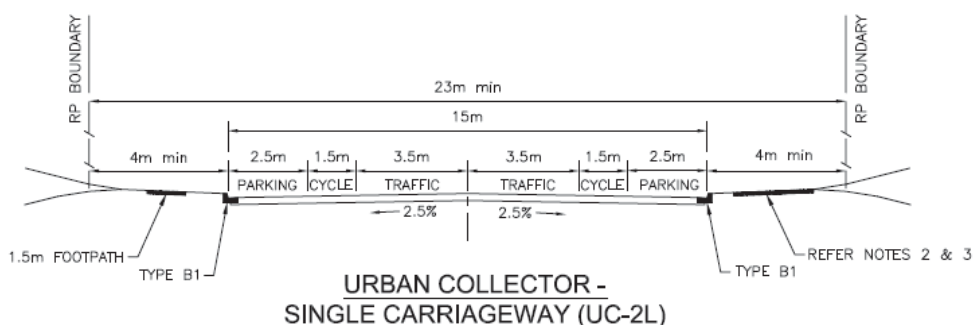


Figure 2-12 Urban Collector – Single Carriageway



The current design standard of Bushman Drive is consistent with a rural access allowing a daily traffic volume of 1-500 vehicles per day (depending on the location). For the current traffic volume (around 3,200vpd), to be consistent with the current planning scheme, the road would need to be widened to allow 2 x 3.5m traffic lanes and 1.0m sealed shoulders (2.0m total), in accordance with rural access (1,000-3,000vpd), resulting in a road formation of 11m. This would require shoulder construction works and relocation of existing table drains and driveway crossings

A more realistic standard is to retain the current 6.0-7.0m seal and allow for grading of shoulders to permit 1.0-1.5m unsealed shoulders within the current 9.0m formation. Longer term planning could provide for 2 x 3.5m traffic lanes plus 1.0m sealed shoulders, to be completed as part of resurfacing works, when required.

Review of aerial imagery indicates that, in the period 2012 – 2015, Logan City Council has completed upgrades from a 1 x 6.0m traffic lane to 2 x 3.0m traffic lanes and provided edge line-marking to permit a higher order road function. This indicates an acceptance of a lower standard design for the existing traffic volume and function.

The road is currently designated as an urban collector. The design standard (as illustrated on Figure 2-12 above) for this road type is inconsistent with the current design, function and use of the road. An urban collector road hierarchy is more typical for a built up, higher density urban area, where provision of on-street parking, bicycle and pedestrian provision needs to be accommodated.

3 Interim Future Conditions

3.1 Forecast Change in Traffic

The development proposes a mix of low and medium density residential uses. The peak trip generation rates for the intended land uses have been identified from the Department of Main Roads Preconstruction Processes Manual (PPM) Chapter 2 Pre-Project Planning, June 2005. Daily traffic volumes have been identified using a 10:1 daily to peak traffic conversion factor.

A summary of the development traffic generation is included in Table 3-1.

Table 3-1 Development Generation

Land Use Type	Yield	Peak Generation Rate	Peak Generation	Daily Generation
Residential – low density	267 dwellings	0.80 vph / dwelling	214 vph	2,136 vpd
Residential – duplex	84 dwellings	0.60 vph / dwelling	50 vph	504 vpd
Residential – medium density	40 dwellings	0.60 vph / dwelling	24 vph	240 vpd
Total	391 dwellings	-	288 vph	2,880 vpd

The long term traffic distribution will include trips to developing areas located to the south and west of the proposed site. In the interim, it is anticipated that the majority of trips will be to and from the north via Bushman Drive.

The following sections documents a comparison of interim traffic volumes against the form of road provision for Bushman Drive in regards to road function, safety and maintenance.

3.2 Cross-Section

Bushman Drive carries an average daily traffic volume of 3,200vpd at its northern end. The development would ultimately add around 2,900vpd, resulting in a total traffic volume of approximately 6,000vpd. It is noted that the proposed development would be implemented in stages and the traffic volume generated by early stages would be significantly less.

Logan City Council has recently improved the cross-section from a single unmarked traffic lane to two formal traffic lanes with centre and edge linemarking, to support the redefined function to an urban collector (previously defined as a local road of significance).

The traffic volume with development of around 6,000vpd is within the acceptable limit for the redefined function as an urban collector.

3.3 Pedestrian and Cycle Facilities

There are no formal facilities provided for active transport along Bushman Drive. The extension of Teviot Road will provide improved pedestrian and bicycle facilities in the longer term.

3.4 Parking

There are no formal facilities provided for parking along Bushman Drive. The development is not anticipated to require additional facilities for on-street parking outside of the development site.

3.5 Intersections

Similar to the assessment of current conditions, the development impact on intersection form has been assessed based on Austroads turn warrant requirements, to determine if additional turn treatments are required to safely cater for an increased through volume with development traffic. As documented in Table 3-1 above the development has potential to generate a one hour traffic flow at around 288 vehicles per hour in the AM and PM peak hours.

The directional distribution of residential traffic is based on generally adopted industry standards for commuter peak periods, nominally 7-8am and 5-6pm, which has been summarised in Table 3-2.

Table 3-2 Directional Distribution – Residential Use

Period	In	Out
AM peak period	20%	80%
PM peak period	80%	20%

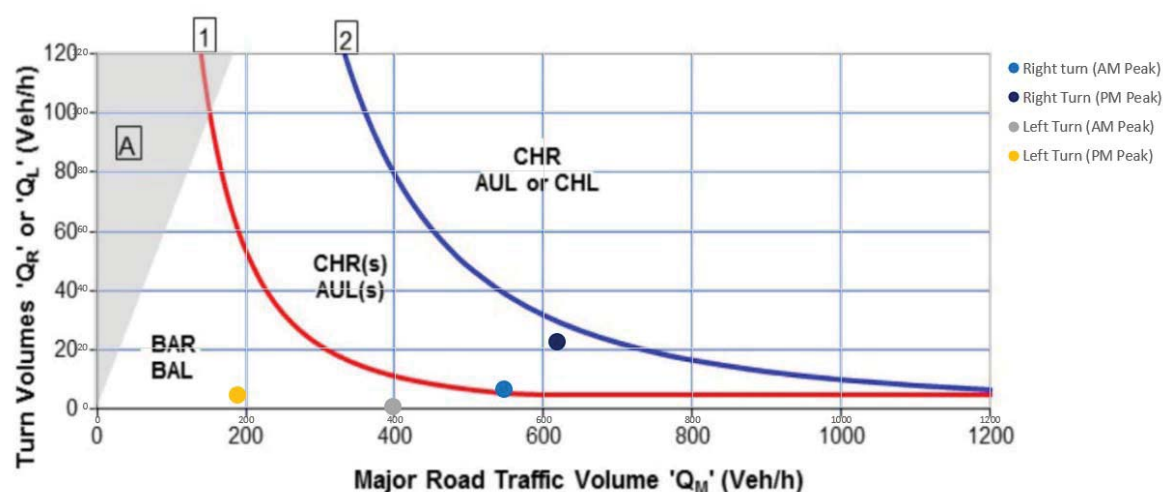
It is noted that more recent data collected at similar sites indicates a more even directional distribution. The values adopted above represents worst case scenario and provides a more conservative assessment.

It is further noted that for the interim access scenario all development traffic is assumed to travel north via Bushman Drive and that no reduction has been made to account for traffic using Kilmoylar Drive to access external destinations located to the south of the site.

3.5.2 Shearer Court / Bushman Drive intersection

The intersection analysis of Shearer Court / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 3-1.

Figure 3-1 Turn Warrant Assessment - Shearer Court– with development

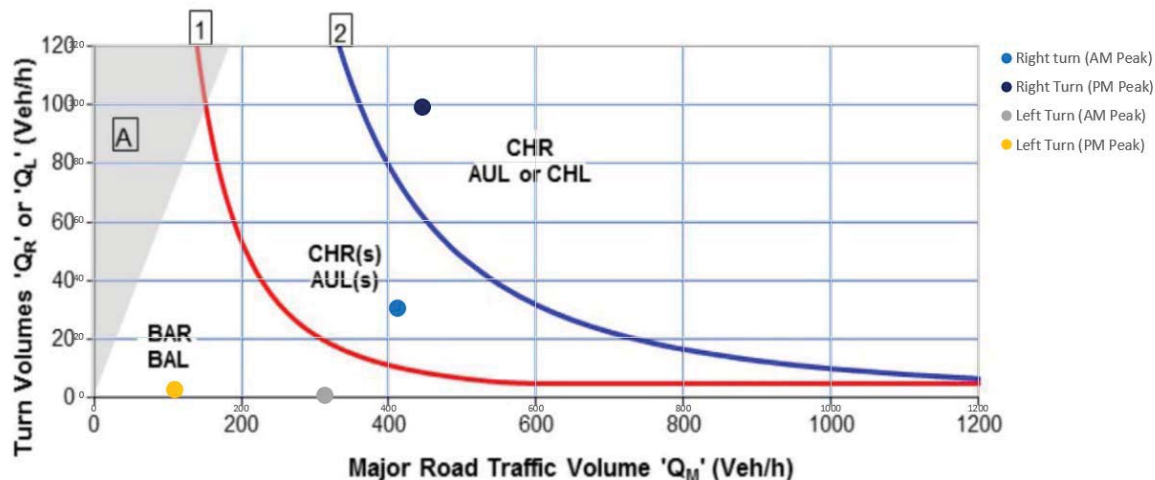


Assessment of current conditions indicates that a right turn treatment is warranted at the Shearer Court / Bushman Drive intersection under Austroads guidance. The intersection does not provide any turn lanes and this is a deficiency in the existing situation. The development would increase the through traffic demand and would further support the need for a right turn lane treatment at this location, as is confirmed on Figure 3-1.

3.5.3 Drover Crescent (north) / Bushman Drive intersection

The intersection analysis of Drover Crescent (north) / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 3-2.

Figure 3-2 Turn Warrant Assessment - Drover Crescent (north) – with development

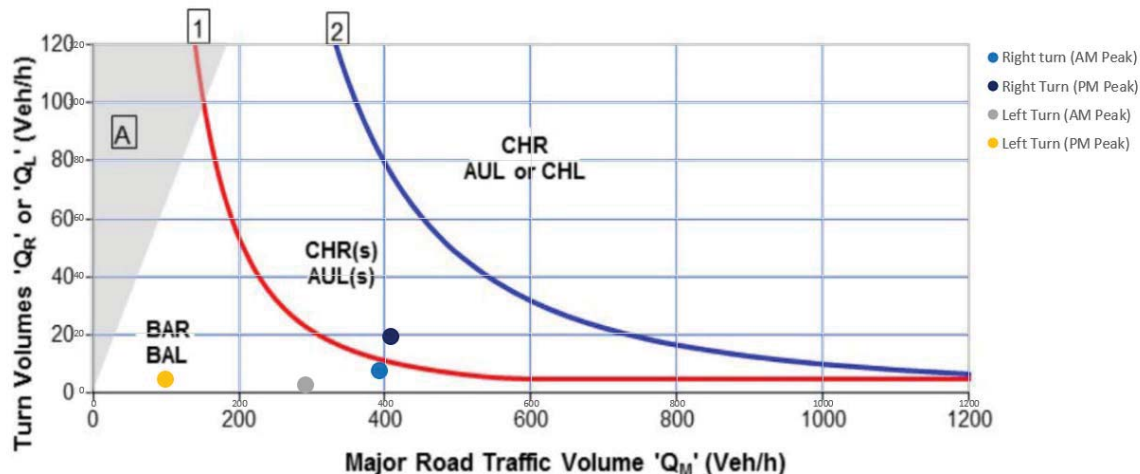


The assessment indicates that a right turn treatment is currently warranted at the Drover Crescent (north) / Bushman Drive intersection under Austroads guidance. The development would increase the through traffic demand and would further support the need for a right turn lane treatment at this location, as is confirmed on Figure 3-2.

3.5.4 Drover Crescent (south) / Bushman Drive intersection

The intersection analysis of Drover Crescent (south) / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 3-3.

Figure 3-3 Turn Warrant Assessment - Drover Crescent (south) – with development

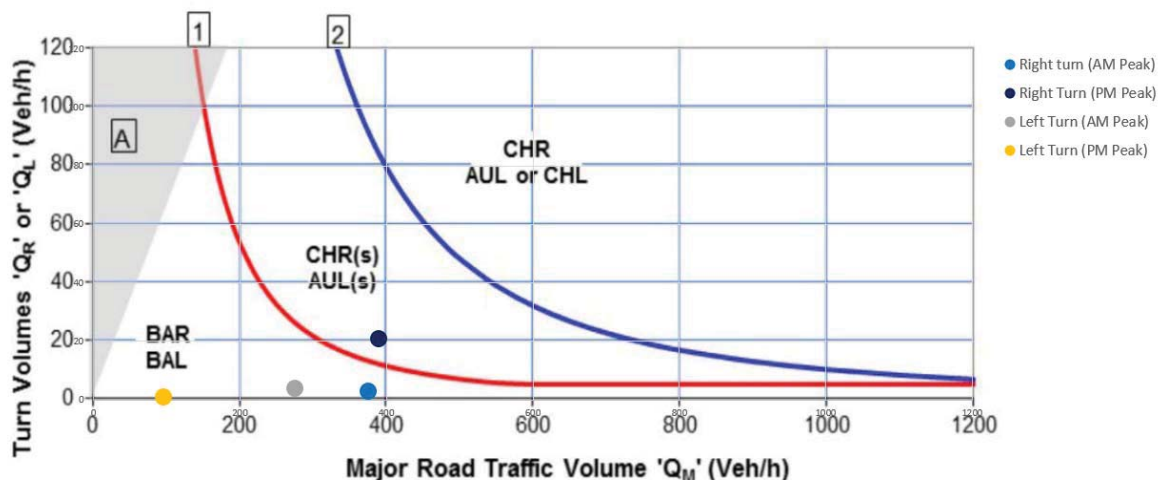


No specific turn lane provision currently exists at Drover Crescent (south) / Bushman Drive, as all turns are executed from the single approach lane in both the north and southbound directions. Assessment based on current traffic volumes confirms that turn lanes are not required for the existing traffic demand. The development increases the traffic volumes and, as illustrated on Figure 3-3, a turn lane provision is required for the with development traffic volumes interim access scenario.

3.5.5 Whittling Court / Bushman Drive intersection

The intersection analysis of Whittling Court / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 3-4.

Figure 3-4 Turn Warrant Assessment - Whittling Court– with development

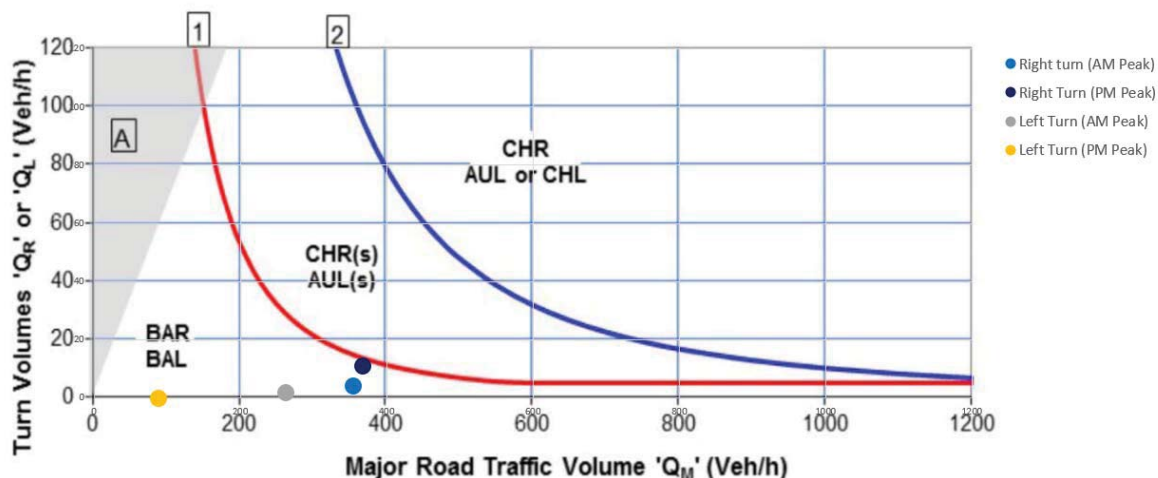


Assessment based on current traffic volumes confirms that turn lanes are not required for the existing demand. The current layout without turn lanes is therefore adequate without development. The development increases the traffic volumes at this location and triggers the need for a right turn treatment at this location.

3.5.6 Blacksmith Court / Bushman Drive intersection.

The intersection analysis of Blacksmith Court / Bushman Drive was undertaken to determine turn warrant provisions as shown on Figure 3-5.

Figure 3-5 Turn Warrant Assessment - Blacksmith Court – with development



No specific turn lane provision currently exists at Blacksmith Court / Bushman Drive, as all turns are executed from the single approach lane in both the north and southbound directions. Assessment based on current traffic volumes confirms that turn lanes are not required for the existing situation and, as illustrated on Figure 3-5 will not be required for with development traffic volumes under the interim access scenario.

3.5.7 Summary

The outcome of the turn warrant analysis is summarised in Table 3-3 for the existing and with development interim access scenarios, identifying treatments as either a Basic Auxiliary Left / Right (BAL / BAR) without a designated turn lane or as channelised turn lane treatments CHL / CHR. For lower turn volumes a reduced length short (s) turn lane is considered adequate under Austroads guidelines.

Table 3-3 Turn Warrant Analysis - summary

Location	Existing	With Development
Shearer Court / Bushman Drive intersection	CHR(s) / BAL	CHR(s) / BAL
Drover Crescent (north) / Bushman Drive intersection	CHR(s) / BAL	CHR / BAL
Drover Crescent (south) / Bushman Drive intersection	BAR / BAL	CHR(s) / BAL
Whittling Court / Bushman Drive intersection	BAR / BAL	CHR(s) / BAL
Blacksmith Court / Bushman Drive intersection	BAR / BAL	BAR / BAL

3.6 Sight Distance

A sight inspection indicates that the sight distance at Drover Crescent is substandard for the currently posted speed limit. The development does not impact the sight distance but the increased traffic volume would further support a reduced speed limit and regular clearing of vegetation to keep sight lines clear. There may also be opportunity to reduce the set back of the give-way line to improve visibility.

3.7 General Condition

Review of the current conditions identify some deterioration of the existing road surface, shoulders and linemarking. The development would increase the need for regular maintenance, including road surface and linemarking improvements.

4 Conclusion

4.1 Summary

Bushman Drive generally provides 2 x 3.0m traffic lanes within a 6.0 – 7.0m seal and currently carries around 3,200 vpd.

The current traffic composition indicates a relatively low traffic volume and low heavy vehicle use. Recent improvements have formalised two traffic lanes by provision of a centreline and added edge linemarking

Under the proposed interim arrangement where the proposed development utilises Bushman Drive as its connection to and from the north, up to 2,900 vpd may be added to existing flows, bringing total interim volumes to around 6,000 vpd. It is considered that Bushman Drive can safely and efficiently carry this traffic volume, subject to increased maintenance and some minor upgrades.

Maintenance of the road surface and shoulder unsealed improvements to permit 1.0-1.5m unsealed shoulders within the current 9.0m formation is recommended.

Pedestrian and cycle facilities are not provided in the current design. Longer term planning for the region includes improved active transport facilities along the extension of Teviot Road which runs parallel with Bushman Drive. It does not appear to be economic to retrofit such facilities to Bushman Drive when they will be bypassed in future.

The sight distances at Drover Crescent (north and south intersections) are below standard for a 70km/h posted speed. This would be improved by a reduction in the posted speed limit to 60km/h, or by vegetation clearance to meet 70km/h.

Right turn facilities at intersections are currently not provided along the road. Assessment indicates that right turn facilities would be warranted (under Austroads guidance) at the Drover Crescent (north) / Bushman Drive and Shearer Court / Bushman Drive intersections to accommodate the existing traffic demand. The development would further increase the demand for right turn treatments at this locations and in addition trigger the Austroads turn lane warrants at the Drover Crescent (south) / Bushman Drive and Whittling Court / Bushman Drive intersections. Given the temporary duration of additional traffic on Bushman Drive, it is suggested that a cost efficient method to provide for passing of propped right turning vehicles be considered, by shoulder widening as either sealed or unsealed pavement, as opposed to construction of a full CHR(s) or CHR as per Austroads guidance.

A site inspection indicates some deterioration of the existing road surface, shoulders and linemarking which should be addressed in the maintenance program. The development would increase the need for regular maintenance and should reasonably provide contribution to support further works.

4.2 Mitigation Measures

It is recommended that the developer contribute to a road maintenance program to improve the existing condition of Bushman Drive which will then be sufficient to accommodate the proposed development for a temporary duration until either Teviot Road is constructed or development beyond that considered herein occurs to the south.

Maintenance works include:

- > Road shoulder fill and grading to permit a traversable shoulder at 1.0-1.5m within the current 9.0m formation (approximate).
- > Increased frequency of regular maintenance to improve existing deterioration of the road surface, linemarking and signage.
- > Refresh of line marking at side roads.
- > Unsealed widening of shoulders in vicinity of intersections, including the Shearer Court / Bushman Drive, Drover Crescent (north) / Bushman Drive, Drover Crescent (south) / Bushman Drive intersection and Whittling Court / Bushman Drive intersections.
- > Vegetation clearance at intersections for sight distance.

The above works would significantly improve the existing condition of Bushman Drive and would reasonably off-set any impacts associated with an increased traffic volume from the development site.

APPENDIX

A

TRAFFIC VOLUMES

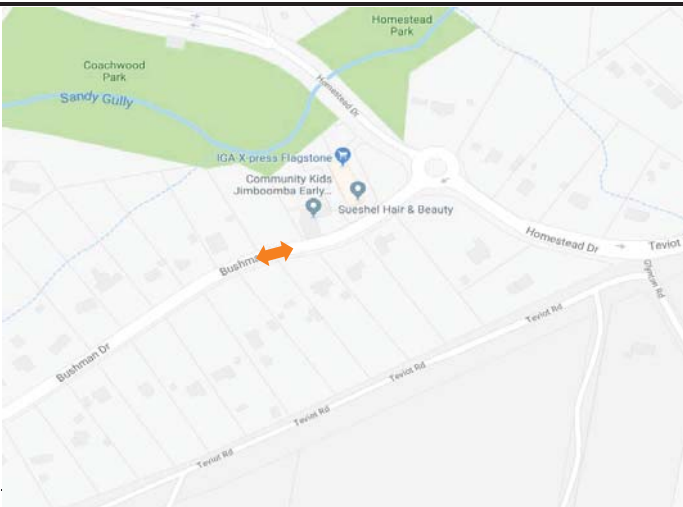
Traffic Count Site Summary

[for tube counters]

STREET NAME :	Bushman Drive	LOCATION:	170m South of Homestead Drive (70kmh)
SUBURB:	Jimboomba	START DATE :	Tuesday 09 Oct 2018
FILE NAME :	14908-2.txt	FINISH DATE :	Monday 15 Oct 2018
SITE ID NUMBER :	2	SPEED ZONE :	70
PREPARED BY :	Austraffic	ROAD CLASSIFICATION:	
DATE:	19/10/2018		

		DIRECTION OF TRAVEL		
		TWO-WAY	Northbound	Southbound
TRAFFIC VOLUME:	Week Days Only Average	3,396	1,669	1,726
[VEH/DAY]	Total Survey Average	3,181	1,565	1,616
WEEK DAY PEAK	8:00	292	198	94
HOUR VOLUME: AM	15:00	348	126	239
PEAK DAY		Fri 12 Oct 2018	Fri 12 Oct 2018	Fri 12 Oct 2018
PEAK DAY VOLUME		3506	1712	1794
WEEKDAY PACE	15Kph Pace Starts	53	54	52
	% Pace Volume	78%	80%	76%
TOTAL SPEEDS:	85th Percentile	69	68	68
Km/Hr	Average	61.2	62.2	60.2
95th Percentile	Tuesday 09/10/18	72.1	73.9	72.5
	Wednesday 10/10/18	73.9	73.8	72.0
	Thursday 11/10/18	72.0	73.6	72.7
	Friday 12/10/18	73.5	74.5	72.3
	Saturday 13/10/18	72.2	73.9	72.8
	Sunday 14/10/18	73.6	73.1	73.9
	Monday 15/10/18	71.3	72.9	71.9
CLASSIFICATION % *:	Week Days CLASS 1 %	92.8%	92.7%	92.9%
	Week Days Commercial	5.2%	5.3%	5.1%
NOTES : (OBSERVATIONS)				
* CLASS 1 - Short Vehicles up to 5.5m Commercial - Classes 3 to 12 inclusive				

Automatic Traffic Counts - Site Data

Site No:	2		North Point
Date:	Tuesday 09 Oct 2018		
Start Time:	0:00		
Officer:	ATS		
Road:	Bushman Drive		
Suburb:	Jimboomba		
LOCATION:	170m South of Homestead Drive (70kmh)		
Map/GPS Ref:	S27.817267, E152.965657		
Comments:			

TRAFFIC VOLUME / CLASSIFICATION DATA

SPEED DATA

Copyright Australia, 1983-2016 (Data, 3.1.18; 2.3.4)

Traffic Volumes (Existing)

Blacksmith Court			Whitting Court			Driver Crescent (S)			Driver Crescent (N)			Shearer Court			Bushman Drive											
(0)	2	L	(1)	4	L	(1)	0	14	(4)	2	L	(1)	3	7	(2)	0	80	(30)	(4)	0	L	(3)	1	24	(19)	
(31)	32	T	(38)	44	T	(41)	60	T	(41)	60	T	(3)	7	L	(52)	83	T	R	L	(130)	167	T	R	L	(15)	
R	4	R	R	3	R	R	3	(21)	R	7	(19)	R	7	(13)	R	0	80	R	30	(99)	41	(104)	R	6	(22)	(195)
T	33	T	T	42	T	T	42	(74)	T	41	(104)	T	41	(104)	T	91	T	R	6	(22)	91	(195)	T	91	(195)	

Traffic Volumes (With Development)

Blacksmith Court				Whitting Court				Driver Crescent (S)				Driver Crescent (N)				Shearer Court											
(0)	2	L	T	(1)	4	L	T	(1)	0	14	L	T	(1)	3	7	L	T	(2)	0	80	L	T	(3)	1	24	L	T
(89)	262			(5)	274			(4)	290				(2)	59				(30)	110				(4)	397			
Bushman Drive				Bushman Drive				Bushman Drive				Bushman Drive				Bushman Drive											
R	4			R	3			R	3	(21)			R	7				R	30				R	6			
T	91			T	100			T	100	(304)			T	100				T	99				T	6			
					(278)				(292)																		

APPENDIX

E

MOVEMENT NETWORK



Road Hierarchy

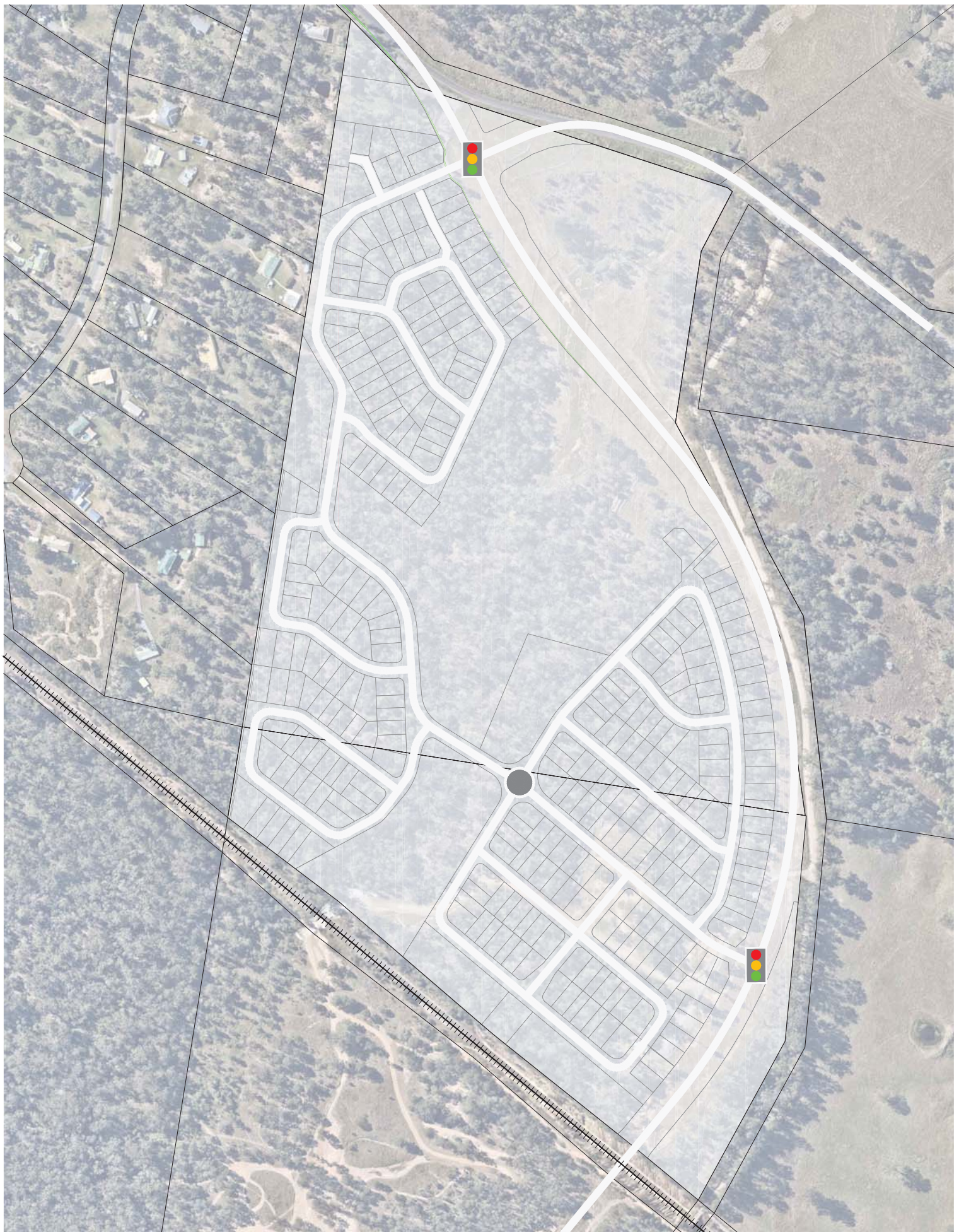
Flinders Transport Modelling
Job No: CEB06678 | Date: 7/11/2018



Neighbourhood Access Street - Type 1A

Neighbourhood Access Street - Type 1B

Neighbourhood Access Street - Type 1C



Indicative Intersection Types

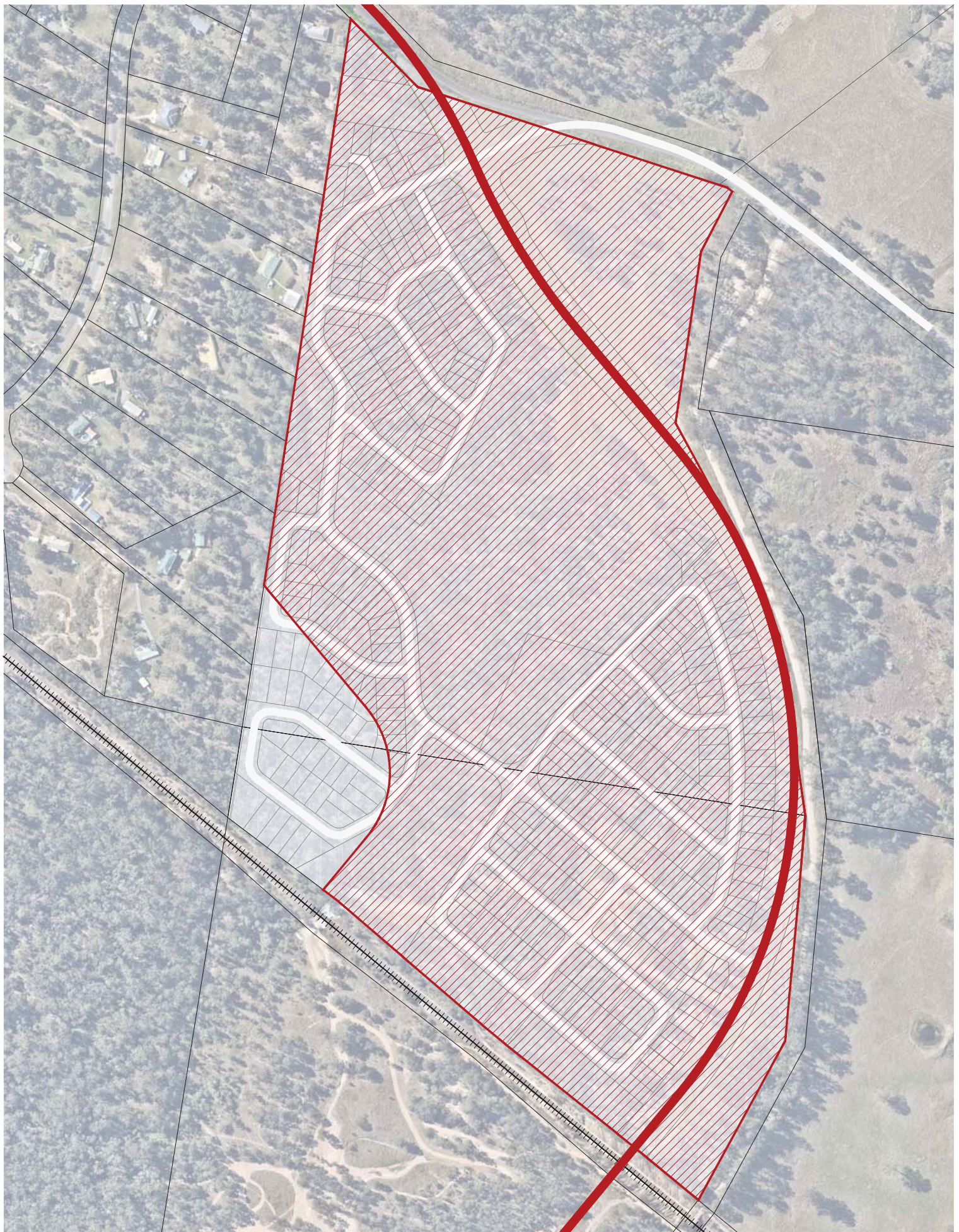
← Bushman Drive Residential Development
Job No: CEB06678 | Date: 7/11/2018



Traffic Signals



Roundabouts



Public Transport Coverage (Bus)

⌂ Bushman Drive Residential Development
Job No: CEB06678 | Date: 7/11/2018

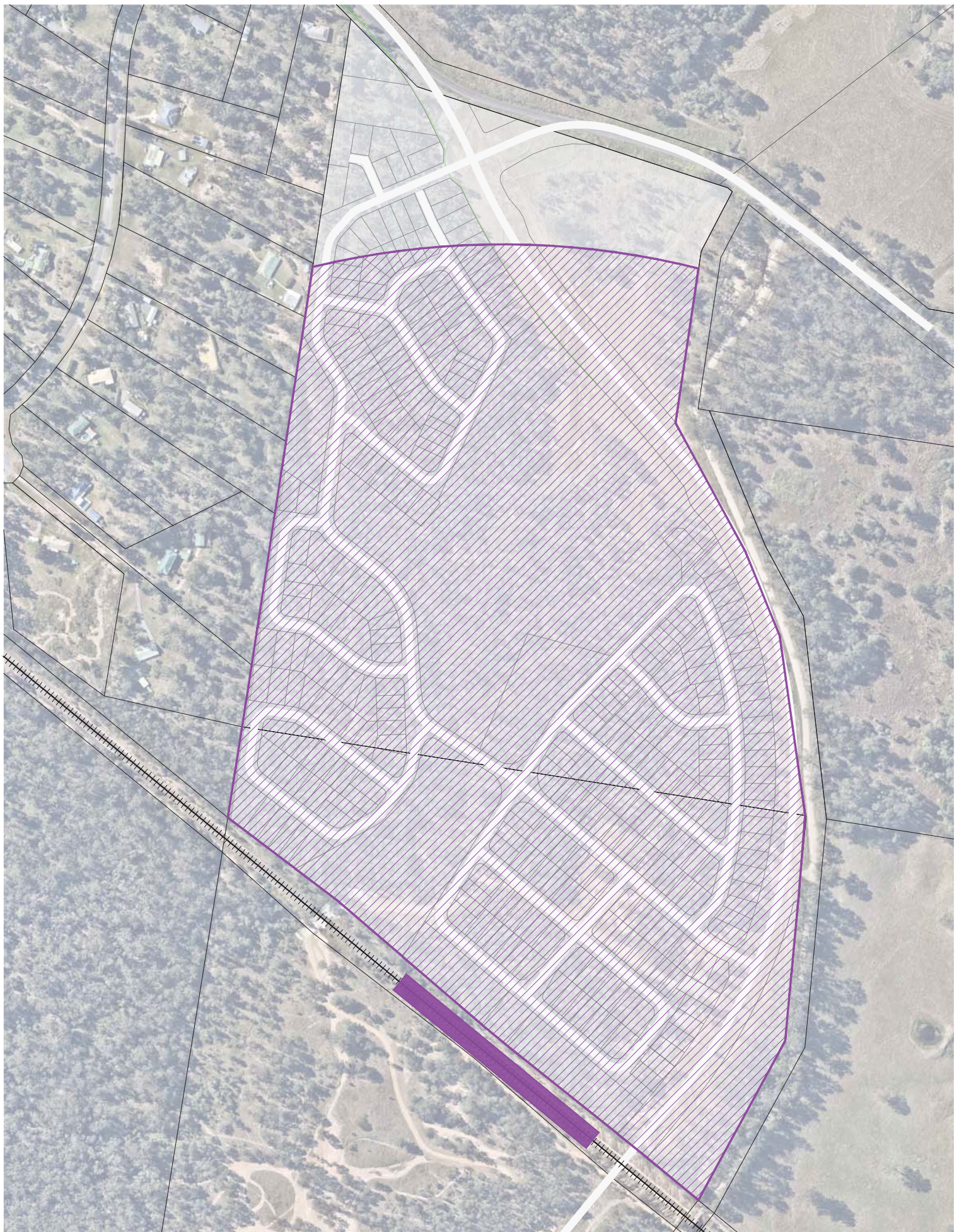


Intra-Urban Bus Route



Coverage (400m from Service)





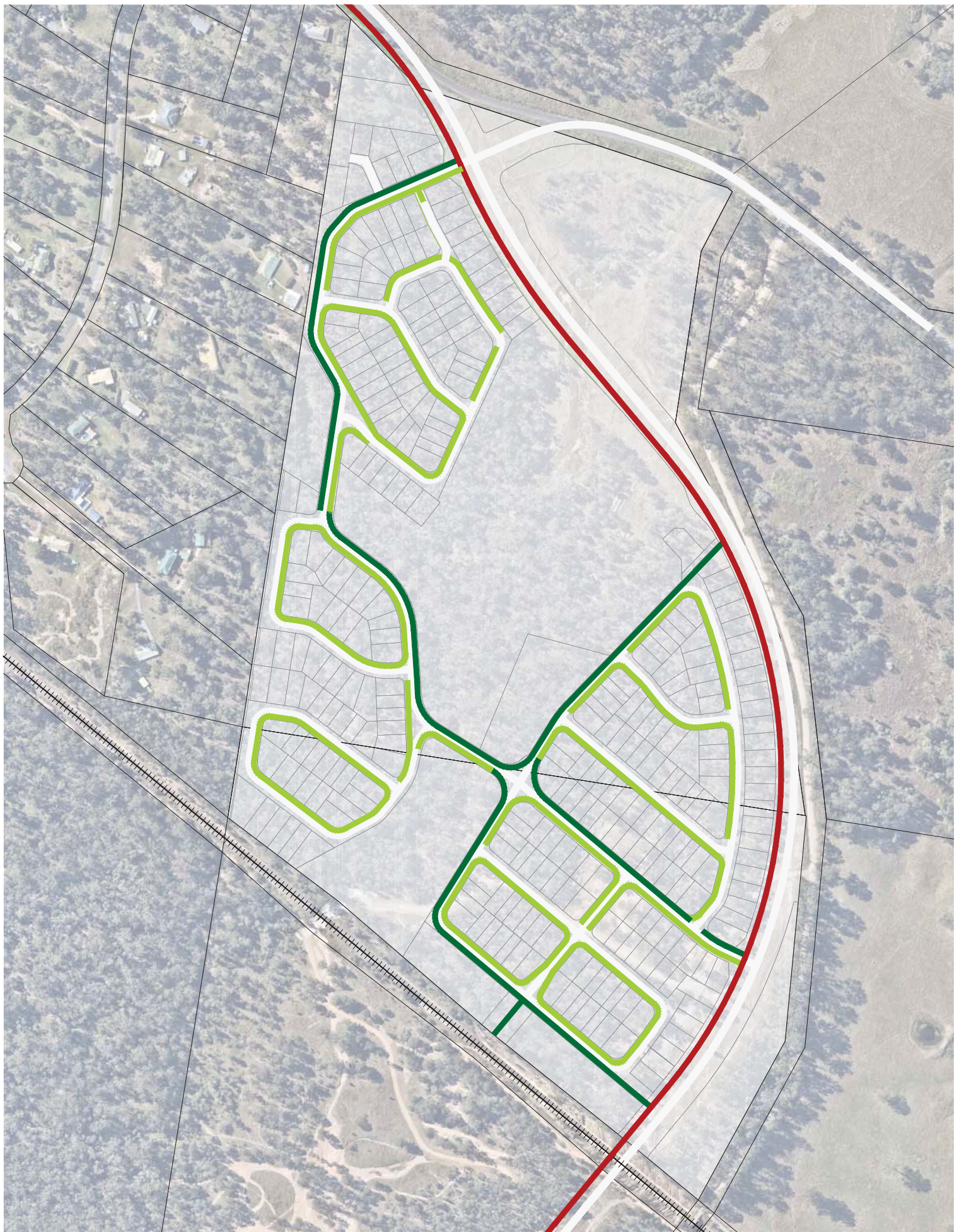
Public Transport Network (Rail)
Bushman Drive Residential Development
Job No: CEB06678 | Date: 7/11/2018



Rail Station



Rail Coverage (800m from Station)



Bike Hierarchy

⌚ Bushman Drive Residential Development
Job No: CEB06678 | Date: 7/11/2018



-  Two Way Cycle Track
-  Shared Path
-  Footpath