53-61 RAWSON STREET, EPPING

Transport Impact Assessment

Prepared for: Canjs Pty Ltd

Ref: 301400281 | Date: 1 May 2024

Revision

Revision	Date	Comment	Prepared By	Reviewed By	Approved By
A	24 August 2023	Final	William Xie, Ingrid Bissaker	Ingrid Bissaker, Chris Wilson	Chris Wilson
B	29 April 2024	Final	William Xie, Sunny Hong	Sunny Hong, Chris Wilson	Chris Wilson
C	1 May 2024	Final	William Xie, Sunny Hong	Sunny Hong, Chris Wilson	Chris Wilson

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For and on behalf of

Stantec Australia Pty Ltd

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Acknowledgment of Country

In the spirit of reconciliation, Stantec acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples.

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A Planning Proposal has been lodged with Parramatta City Council (Council) to amend the current planning controls for the current site located at 53-61 Rawson Street, Epping. The Proposal seeks to amend the planning controls in the Parramatta Local Environment Plan (LEP) 2023 to permit mixed-use development on land currently zoned E1 (Local Centre)[1] and increase the maximum floor space ratio and height controls that currently apply to the site. The indicative development yield is around 420 apartments and around 13,700 square metres of non-residential uses.

This report has been prepared as an update to the August 2023 report and in addition to the RFI response provided on 19 February 2024, to reflect the revised planning proposal responding to Council's RFI of December 2023 and including the additional non-residential floor space of 0.5:1. The August 2023 report and RFI response letter, provided on 19 February 2024, assessed a development yield of around 420 apartments and 9,100 square metres of non-residential uses.

A comparison between the previous development yield and the updated development yield is summarised at the end of this executive summary.

A key strategic merit of the development is the opportunity to promote sustainable travel given the high-density mixed-use nature of the development within a strategic centre; and within 200 metres of a rail interchange that provides convenient access to local and regional residential, commuter, retail and recreational centres.

The design currently allows for a single consolidated driveway along the southern boundary of the site at Rawson Street aligned with the DCP 2011 service lane. In accordance with DCP 2011, the service lane could be extended along the western boundary of the site to Carlingford Road. As confirmed by the Flood Assessment Report prepared by GRC Hydro dated June 2023, the service lane is subject to flooding events and hence is not recommended for use by general vehicles. Notwithstanding, it is recommended the service lane is open for use by service vehicles to remove service vehicles from Rawson Street and separate these movements from general vehicles accessing the basement car park and pedestrians travelling along Rawson Street, with controls in place to close the service lane during flooding events.

The proposal incorporates around 548 parking spaces over five basement levels. The car park will provide parking for residents, staff and visitors with access control (roller doors/ boom gates) to ensure secure access and separation of users.

The proposed development could be expected to generate in the order of 309 and 559 vehicle trips respectively in the AM and PM peak hours (including service vehicle trips). When considering that 25 per cent of retail traffic is passing trade and hence while they are included in the total generation, they are not "new" trips on the road network, the development results in 273 and 450 "new" vehicle trips respectively in the AM and PM peak hours.

The proposed traffic anticipated to travel through the key surrounding intersections is expected to be minor, contributing up to three per cent additional traffic compared to existing traffic volumes.

The proposed site will have a net increase in vehicle generation of around 132 and 138 new vehicle trips respectively in the AM and PM peak hours compared to existing land uses on site. For the purpose of modelling the traffic impact of the development, the proposed redevelopment has been assessed based on having a net increase in vehicle generation of around 185 and 193 vehicle trips respectively in the weekday AM and PM peak hours. The differential in traffic uplift is based on the existing commercial building with ground floor retail generating low traffic volumes (one and nine vehicle trips during each peak hour), however the new commercial and specialty retail land use is assessed based on full traffic yield as per traffic generation rates agreed with Transport for NSW and Council.

The existing pedestrian crossing along Rawson Street on the southern edge of the Council car park currently operates near or at capacity during weekday peak hours during the high pedestrian volumes traveling to / from the rail and bus interchange at Beecroft Road. The development proposes to deliver pedestrian operated signals to better manage the

[1] Parramatta LEP 2011 classified the site as B2 – Local Centre, updated to E1 – Local Centre as part of LEP 2023

flow of traffic and pedestrians. These signals present a significant benefit to the operation of Rawson Street generally during peak periods and would improve access to both existing and future development within the town centre.

The traffic assessment considers uplift in background traffic generated by potential developments within Epping Town Centre, resulting in a further uplift of 249 and 296 vehicles in the weekday AM and PM peak hour.

Traffic analysis presented in this report indicates it is clear the development has a relatively minor impact on the operation of surrounding intersections, with or without background traffic growth from developments within the town centre, with exception of the Carlingford Road/ Rawson Street/ Ray Road intersection during the AM peak hour specifically due to the limited capacity of the right turn from Rawson Street to Carlingford Road to accommodate an uplift in traffic. Notwithstanding, the provision of a third eastbound lane along Carlingford Road between Rawson Street and Beecroft Road would result in increased capacity for vehicles exiting Rawson Street and allow for similar performance of the intersection following development of the site, however may not deliver enough capacity to accommodate all potential development within the town centre.

In the context of the broader aspirations surrounding development within Epping Town Centre, as well as aspirations surrounding development that promotes sustainable travel given proximity to a rail and bus interchange and integrated land uses that co-locates jobs, housing and retail, thereby containing trips internally to Epping, the impacts of the Planning Proposal can, on this assessment be satisfactorily managed.

Epping Town Centre has experienced significant uplift in development over the past 10 years, however TfNSW traffic volume viewer count stations evidence that background traffic volumes have had no discernible growth for more than a decade. It is evident that the capacity constraints of the key intersections in Epping Town Centre have displaced non-essential traffic to other regional routes to accommodate newly generated traffic from within the centre. This is not unlike other capacity restrained centre in Sydney metropolitan area such as Chatswood Town Centre and the capacity constrained Pacific Highway.

Further review of traffic data collated along Carlingford Road between 2019 and 2023 indicates there has been no change in traffic volumes and further, that COVID 19 has had no impact. Whilst the traffic modelling undertaken in this assessment is a theoretical assessment of the potential impact, the growth in Epping over the past decade has evidenced that any additional traffic from developments along Rawson Street will simply continue to displace non-essential traffic with no discernible net growth.

Previous and Updated Development Yield Comparison

Table A summarises the change in development yield between the updated development yield and previous yield assessed in the August 2023 report and RFI response letter provided on 19 February 2024.

Table A – Development yield comparison

	August 2023 report/ RFI response letter Development Yield	Updated Development Yield
Residential	420 units	420 units
Commercial	2,757 sqm GFA	7,430 sqm GFA
Retail	6,343 sqm GFA	6,247 sqm GFA

Table B summarises the comparison between the net increase in vehicle trips between the previous and updated development yield. The updated development yield results in an additional 41 trips in the AM peak and 29 trips in the PM peak compared to the previous development yield assessed in the August 2023 report and RFI response letter.

Table B – Traffic generation comparison

	August 2023 report/ RFI response letter Development Yield		Updated Development Yield	
	AM	**PM**	**AM**	**PM**
Net increase in vehicle trips compared to existing (used for SIDRA assessment)	144	164	185	193

Table C and D summarises the Level of Service (LOS) of each of the key intersections for the previous and updated development yields respectively. As the results show, the differences in LOS between the two development yield schemes are minor. There will be some improvements at the intersection between Carlingford Road and Beecroft Road for Scenario 4 AM peak and the intersection between Carlingford Road and Midson Road for Scenario 2 AM peak. The LOS at the intersection between Carlingfor Road and Midson Road for Scenario 2 PM peak will go from LOS D to E.

Table C – Level of Service for previous development yield

Intersection	**Peak**	**Level of Service**			
		Existing	**Scenario 2**	**Scenario 3**	**Scenario 4**
Carlingford Rd/ Beecroft Rd	AM	D	D	D	E
	PM	D	D	E	E
Carlingford Rd/ Ray Rd/ Rawson St	AM	C	D	D	F
	PM	B	C	C	C
Carlingford Rd/ Midson Rd	AM	D	E	E	E
	PM	D	D	D	E
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	C	C	C	C
	PM	D	D	E	E
Rawson Street/ Bridge St	AM	B	B	B	B
	PM	B	B	A	B
Rawson Street pedestrian crossing (signalised)	AM	C [1]	A [2]	E [1]	A [2]
	PM	C [1]	A [2]	F [1]	A [2]
Rawson Street Site Access	AM	N/a	A	N/a	B
	PM	N/a	B	N/a	A

Table D – Level of Service for updated development yield

Intersection	Peak	Level of Service			
		Existing	Scenario 2	Scenario 3	Scenario 4
Carlingford Rd/ Beecroft Rd	AM	D	D	D	D
	PM	D	D	E	E
Carlingford Rd/ Ray Rd/ Rawson St	AM	C	D	D	F
	PM	B	C	C	C
Carlingford Rd/ Midson Rd	AM	D	D	E	E
	PM	D	E	D	E
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	C	C	C	C
	PM	D	D	E	E
Rawson Street/ Bridge St	AM	B	B	B	B
	PM	B	B	A	B
Rawson Street pedestrian crossing (signalised)	AM	C [1]	A [2]	E [1]	A [2]
	PM	C [1]	A [2]	F [1]	A [2]
Rawson Street Site Access	AM	N/a	A	N/a	B
	PM	N/a	B	N/a	B

1. Introduction

1.1 Background and Proposal

A Planning Proposal has been lodged with Parramatta City Council (Council) to amend the current planning controls for the current site located at 53-61 Rawson Street, Epping. The Proposal seeks to amend the planning controls in the Parramatta Local Environment Plan (LEP) 2023 to permit mixed-use development on land currently zoned E1 (Local Centre)[2] and increase the maximum floor space ratio and height controls that currently apply to the site.

An indicative development yield for the site comprises some 420 residential apartments set above 7,430 and 6,247 square metres of commercial and retail Gross Floor Area, respectively.

Stantec has been commissioned by Canjs Pty Ltd to undertake a transport impact assessment for the proposed development.

This report has been prepared as an update to the August 2023 report and in addition to the RFI response provided on 19 February 2024, to reflect the revised planning proposal responding to Council's RFI of December 2023 and including the additional non-residential floor space of 0.5:1.

1.2 Site Context

A key strategic merit of the development is the opportunity to promote sustainable travel given the high-density mixed-use nature of the development within a strategic centre; and within 200 metres of a rail and bus interchange that provides convenient access to local and regional residential, commuter, retail and recreational centres.

In addition, the integrated land uses provided across Epping Town Centre generally (existing, approved and future development) provide opportunities for co-location of jobs, housing and retail, providing opportunity to contain trips internally to Epping thereby minimising external traffic and continue to facilitate evenly split bi-directional trips for more equitable utilisation of public transport services and road infrastructure in and out of Epping Town Centre across the day.

The development also has the potential to make a further positive contribution to the surrounding area by providing a new retail precinct at the gateway to Epping Town Centre with a supermarket and speciality retail offerings, as well as an expanded and permeable public domain.

1.3 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing traffic and parking conditions surrounding the site
- suitability of the proposed parking in terms of supply (quantum) and layout
- service vehicle requirements
- pedestrian and bicycle requirements
- the traffic generating characteristics of the proposed development
- suitability of the proposed access arrangements for the site
- the transport impact of the development proposal on the surrounding road network.

1.4 Agency Consultation

Oakstand in conjunction with Stantec (formerly GTA Consultants) have engaged with Council on the redevelopment of the site since 2014, initially cumulating in the preparation of a joint traffic study of Epping Town Centre by Stantec and AECOM in response to a traffic study brief provided by Council. More recently, the project team has engaged with Council consistently throughout 2021 and 2022 as it relates to development planning matters for this planning proposal, with traffic being a key discussion item.

[2] Parramatta LEP 2011 classified the site as B2 – Local Centre, updated to E1 – Local Centre as part of LEP 2023

Prior to preparation of the Transport Impact Assessment, a scoping study was also provided to both Council and Transport for NSW to provide input on the proposed methodology/ assumptions. This report addresses commentary received from Transport for NSW[3], as referenced in Table 1.1.

Table 1.1 – Transport for NSW commentary addressed in report

Description	Comment	Relevant Report Section
General	• With the diversity of mix of uses proposed on the development site (including residential, commercial, and retail) the proposed development should encourage sustainable modes of transport such as walking, cycling and the use of public transport to key destinations	Section 4, 5, 7, 9
	• The Planning Proposal should include Traffic, Transport and Parking Study to investigate likely travel mode demands and investigation on systems to minimise impact to the surrounding classified and local road networks.	Section 5, 8.2
Vehicular Traffic	• Detailed assessment, including traffic survey and future modelling scenarios during peak periods of the surrounding road network to identify the suitability of required improvements to the road network to facilitate the Planning Proposal and to consider cumulative impacts from existing and planned surrounding developments.	Section 2.3, 2.4, 8
Active Transport	• Provision of end of trip facilities to encourage and support workers within the Planning Proposal in active transport options. • Identify specific walking and cycling infrastructure projects that may be delivered by developer contributions.	Section 7, 8
Loading and Servicing	• Investigate opportunities to facilitate loading and servicing facilities off-street and provide separation for private vehicles and pedestrian activity for improved safety. Details should align with relevant guidelines (eg. TfNSW Freight and Servicing Last Mile Toolkit).	Section 6.3
Parking	• Investigate opportunities for car share systems within the Planning Proposal to support businesses and residents to reduce private vehicle dependency. The study should identify the locations and provision of such services.	Section 6.2.2

Stantec have continued to engage with Transport for NSW to confirm traffic modelling assumptions. A record of correspondence with stakeholders is detailed in Table 1.2 and provided in Appendix A.

Table 1.2 – Record of stakeholder correspondence

Date of Correspondence	Author	Description	Relevant Report Section
September 2022	Stantec	Scoping Study	Appendix A.1
March 2023	Transport for NSW	Transport for NSW response to scoping study	Appendix A.2
June 2023	Stantec	Stantec response to Transport for NSW requesting concurrence on traffic generation rates and traffic growth assumptions	Appendix A.3
July 2023	Transport for NSW	Transport for NSW response to Stantec	Appendix A.4
August 2023	Stantec	Stantec response to Transport for NSW outlining approach to retail traffic generation rates and traffic growth assumptions	Appendix A.5

1.5 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Parramatta Development Control Plan 2011 (DCP), including specific reference to Section 4.1 – Town and Neighbourhood Centres
- Parramatta Local Environmental Plan (LEP) 2023
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2018
- Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2022
- traffic and car parking surveys undertaken by Geocounts and Matrix as referenced in the context of this report
- plans for the proposed development prepared by KANNFINCH

[3] Scoping paper (pre-planning proposal), mixed use development, 53-61 Rawson Street, Epping, Transport for NSW, 29 March 2023

- other documents and data as referenced in this report.

2. Existing Conditions

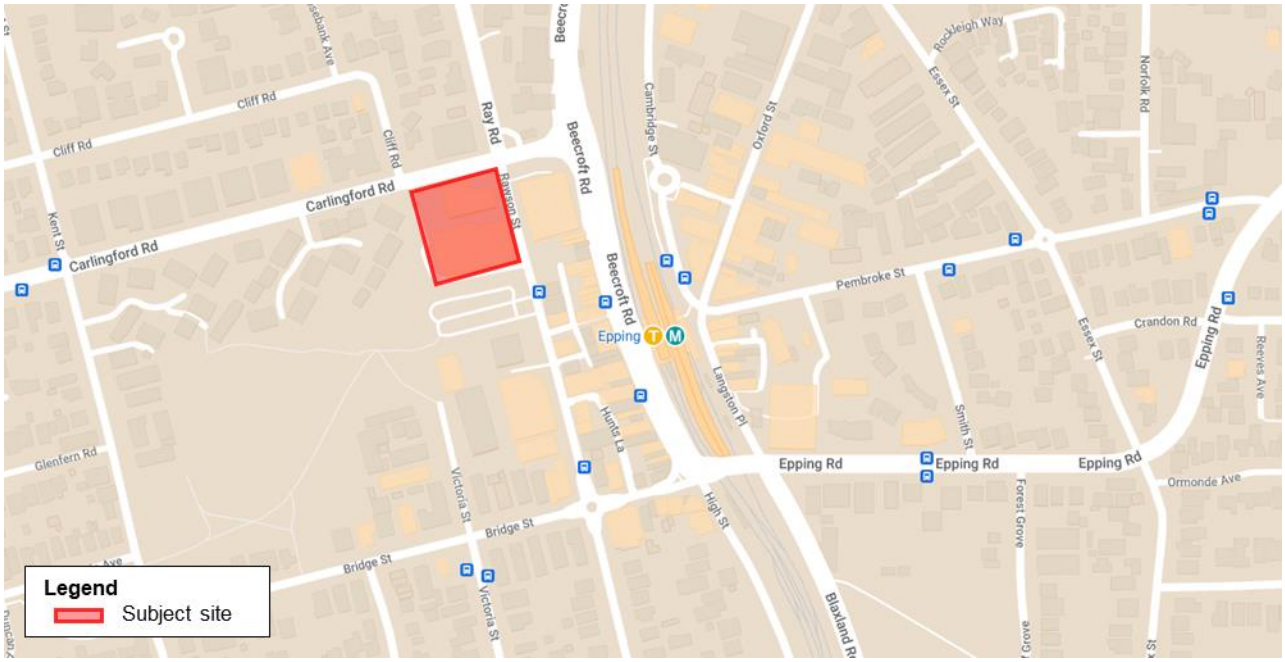
2.1 Location

The subject site is located at 53-61 Rawson Street, Epping and is Lot 7 of DP19329 and Lot 1 of DP 710711. The site of approximately 9,089 square metres has a frontage of 100 metres to Rawson Street and 95 metres to Carlingford Road.

The site currently has a land use classification as E1 – Local Centre under LEP 2023. It is occupied by a five-storey commercial building adjacent to a supermarket, each with basement or under croft parking, with at-grade parking spanning the western edge of the site allocated to the supermarket. The surrounding properties predominantly include high-density residential, retail and commercial uses.

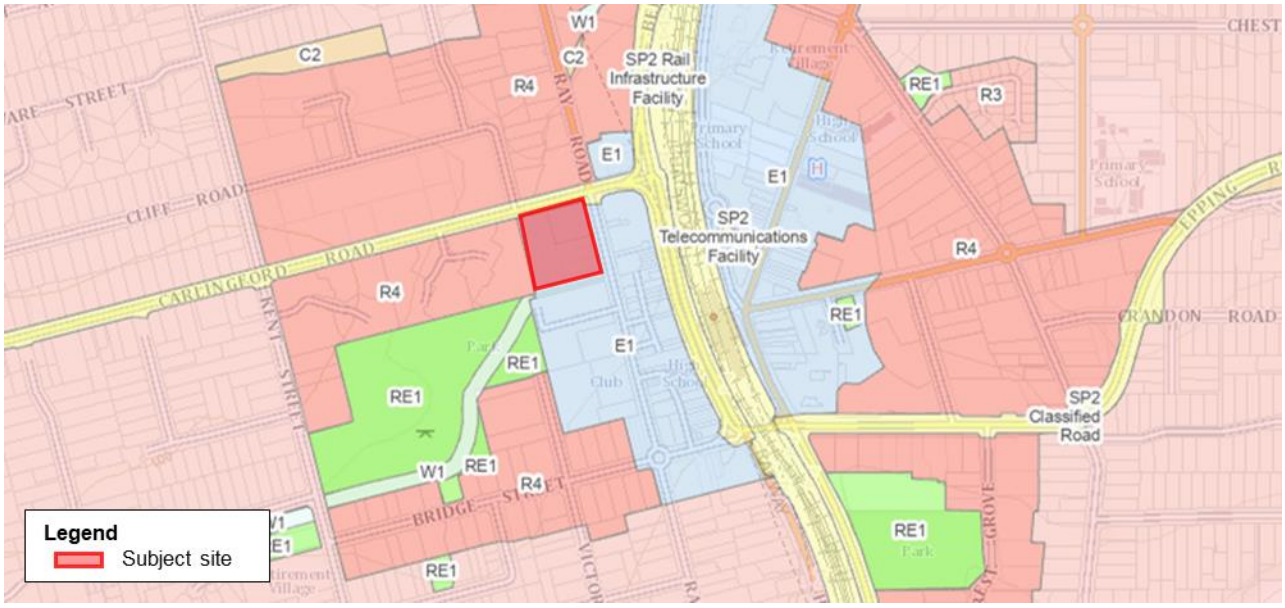
The location of the subject site and its surrounding environs is shown in Figure 2.1, while the LEP 2023 land use map is shown in Figure 2.2.

Figure 2.1: Subject site and its environs



Base image source: Google Mymaps, accessed June 2023

Figure 2.2: Land Use Map



Base image source: ePlanning Spatial Viewer, accessed June 2023

2.2 Road Network

2.2.1 Road Hierarchy

Roads are classified according to the functions they perform. The main purpose of defining a road's functional class is to provide a basis for establishing the policies which guide the management of the road according to their intended service or qualities.

In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions, and throughout the State. Transport for NSW (TfNSW) is responsible for funding, prioritising and carrying out works on State roads. State roads generally include roads classified as freeways, state highways, and main roads under the Roads Act 1993, and the regulation to manage the road system is stated in the Australian Road Rules, most recently amended on 19 March 2018.

TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

Arterial Roads – Controlled by TfNSW, typically no limit in flow and designed to carry vehicles long distance between regional centres.

Sub-Arterial Roads – Managed by either Council or TfNSW under a joint agreement. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).

Collector Roads – Provide connectivity between local sites and the sub-arterial road network, and typically carry between 2,000 and 10,000 vehicles per day.

Local Roads – Provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

2.2.2 Surrounding Road Network

A schedule of the existing road network is shown in Table 2.1, with key roads illustrated in Figure 2.3 through to Figure 2.6.

Table 2.1: Road Network

Road	Classification	Description
Beecroft Road (MR139)	Arterial Road	• North-south connection between Pennant Hills Road in the north and Epping Road in the south • Generally four lane, bidirectional road near the site, with ancillary turn lanes • 60 km/h speed zoning • Parking is generally not permitted on the road near the site
Carlingford Road (MR373)	Arterial Road	• East-west connector between Epping in the east and Carlingford in the west • Four-lane, bidirectional road • 60km/h speed zoning • Parking is not permitted on either side of the road
Rawson Street	Local Council Road	• North-south connector between Carlingford Road in the north and Bridge Street/ Chesterfield Road in the South • Two lane, bidirectional road • 50km/hr speed zoning, with local traffic calming measures • Parking is generally permitted however subject to time restrictions on both sides of the road
Ray Road	Local Council Road	• North-south connector between Kandy Avenue in the north and Carlingford Road in the south • Two-lane, bidirectional road • 50km/hr speed zoning • Parking is permitted at off-peak times on both sides of the road
Bridge Street	Local Council Road	• East-west connector between Epping Road in the east and Kent Street in the west • Two-lane, bidirectional road • 50km/h speed zoning • Parking is generally permitted however subject to time restrictions on both sides of the road
Cliff Road	Local Council Road	• Multi-directional local connector between Carlingford Road and the residential area north

Figure 2.3 – Rawson Street (looking north)

Figure 2.4 – Carlingford Road (looking east)

Figure 2.5 – Beecroft Road (looking south)

Figure 2.6 – Ray Road (looking north)

2.3 Traffic Volumes

2.3.1 Traffic Counts

On Thursday, 11 November 2022, Stantec commissioned traffic movement counts and queue length surveys at the following key intersections, as illustrated at Figure 2.7:

1. Carlingford Road and Beecroft Road
2. Carlingford Road, Rawson Street and Ray Road
3. Rawson Street and Bridge Street.

Traffic and pedestrian movement counts were also completed at the following locations along Rawson Street as illustrated in Figure 2.8:

a) Commercial building car park entry/ exit driveway, and coles exit driveway
b) Coles entry driveway
c) Rawson Street Council car park exit driveway
d) Rawson Street Council car park entry driveway
e) Pedestrian crossing along Rawson Street, proximate to Rawson Street Council car park.

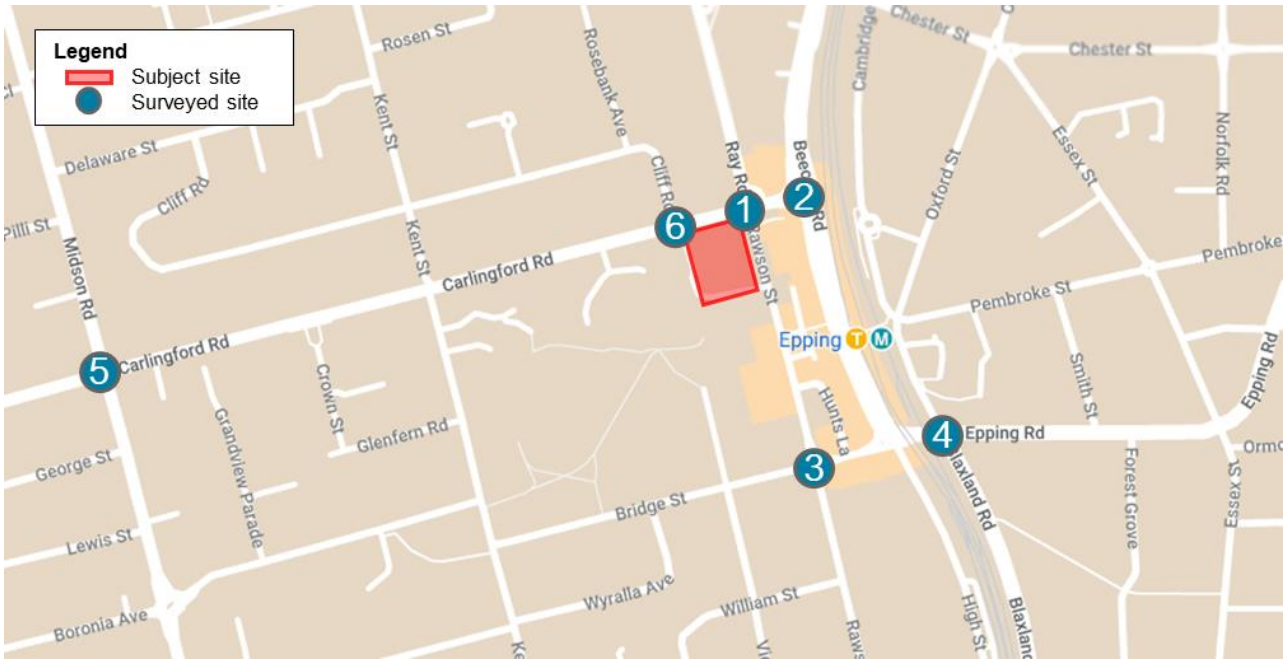
Counts were completed for the following periods:

- 6:30am to 9:30am
- 3:00pm to 7:00pm.

Following submission of the Scoping Study to Transport for NSW for comment, Transport requested traffic modelling be completed for an extended survey area. As such, Stantec commissioned traffic movement counts and queue length surveys on Thursday, 18 May 2023 at the following additional intersections, as illustrated at Figure 2.7:

4. Epping Road, Blaxland Road and Beecroft Road
5. Carlingford Road and Midson Road
6. Carlingford Road and Cliff Road.

Figure 2.7 – Traffic survey locations – intersections



Base map source: Google mymaps

Figure 2.8 – Traffic survey locations – Rawson Street driveways

Base image source: Nearmap

In order to prepare SIDRA intersection models for a consistent period, Stantec also obtained SCATS detector count data from Transport for NSW at the Carlingford Road/ Beecroft Road and Carlingford Road/ Rawson Street/ Ray Road intersections for both survey periods. The common AM and PM peak hours in 2023, based on traffic counts and SCATS detector counts at the various intersections, were found to occur from 7:30 am to 8:30 am, and 4:15 pm to 5:15 pm respectively.

The SCATS detector count data were adopted as the existing traffic volumes for the Carlingford Road/ Beecroft Road and Carlingford Road/ Rawson Street/ Ray Road intersections, with the relative split of turning vehicles at the Carlingford Road/ Rawson Street/ Ray Road determined based on the splits observed in 2022. Across both intersections, a review of the 2022 and 2023 SCATS data indicated that traffic volumes had increased by two per cent in the AM peak and reduced by one per cent in the PM peak period. A further review of traffic growth generally on the road network is discussed in Section 8.4.

The weekday AM and PM peak hour traffic flows for the key intersections are summarised at Appendix D.

2.3.2 Origin Destination Surveys

Stantec also commissioned origin destination surveys on 24 June 2021 for the right turn movement from Rawson Street onto Carlingford Road, to understand the relative percentage of traffic turning right that is generated from within the town centre (i.e. their origin commences north of Bridge Street) or from external to the town centre (i.e. their origin commences prior to Bridge Street). The surveys are provided at Appendix F.

The surveys found that during the AM period (6:30am to 9:30am) and PM period (3:00pm to 7:00pm), around 71 and 39 per cent of traffic originates from external to the town centre respectively. Further, during the specific peak hours identified in Section 2.3.1, 67 per cent and 43 per cent of traffic originates from external to the town centre.

These results indicate that Rawson Street is currently used as a rat run for vehicles external to the town centre to turn onto Carlingford Road and travel south towards Epping Road/ Blaxland Road, particularly during the AM peak period.

2.4 Intersection Operation

2.4.1 Modelling Software Package

The operation of the key intersections within the study area has been assessed using SIDRA INTERSECTION[4], a modelling software package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the RTA, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.2 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 2.2: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
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	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

2.4.2 Model Set Up, Calibration and Validation

The model comprises key intersections shown in Figure 2.7, with exception of the Carlingford Road/ Cliff Road intersection, noting these volumes were collected in order to understand any impacts of the development of a the DCP service lane (discussed in Section 3.2.2) to cliff road should it form a substantial new intersection with Carlingford Road. All intersections have been modelled as a network model.

The model also includes the Rawson Street midblock pedestrian crossing located near the Council car park as shown at Figure 2.8. The pedestrian crossing does impact the operation of Rawson Street during peak periods particularly for vehicles traveling north, with queues extending back to the Bridge Street roundabout in the PM peak period. The model excludes the second Rawson Street midblock pedestrian crossing near Hunts Lane, noting site observations indicates this crossing has negligible additional impact to the operation of the road network given it carries significantly less pedestrian volumes during peak periods, with any northbound queueing at this crossing a result of queues spilling back from the crossing near the Council car park.

While the pedestrian crossing does experience heavy foot traffic during peak periods, pedestrian volumes are observed to arrive in bunches. For pedestrians traveling from the western edge of Rawson Street towards Beecroft Road, bunching was observed to primarily result from the controlled movement of pedestrians from the Carlingford Road/ Rawson Street intersection, noting 200 to 300 pedestrians travel across the western leg of this intersection during the relevant peak hours. For pedestrians travelling from the eastern edge of Rawson Street, it is expected the bunching of pedestirans is influenced by the arrival of public transport services along Beecroft Road. Stantec reviewed video footage for the relevant peak hours and found that on average, pedestrians crossed the intersection for 12 second intervals with 12 and eight second intervals in between allowing for vehicles to travel across the intersection, respectively during the AM and PM peak hour. As such, respectively during the AM and PM peak hour, 50 and 40 per cent of the hour the crossing is clear of pedestrians allowing vehicles to travel through. To replicate this bunching and to ensure the degree of saturation remains at or under 1.0, an opposing pedestrian factor of 0.8 and 0.84 was applied respectively in the AM and PM peak periods. SIDRA results indicate a 95 percentile queue in the PM peak period of around 100 metres, which is less than the observed queue of around 170 metres (i.e. queueing extends back to the Bridge Street roundabout). To better reflect this queue and the observed operation of the intersection and bunched arrivals of pedestrians, the crossing was set up as a pedestrian operated signal with phase times based on the recorded intervals noted above. Notwithstanding, this

[4] Program used under license from Akcelik & Associates Pty Ltd.

approach yielded no improvement to the length of queue without pushing the degree of saturation over 1.0. Further discussion around the operation of this pedestrian crossing and recommended mitigation measures are outlined in Section 8.6.3.

Noting the above, given the extent of queue back from the pedestrian crossing in the network model does not reach the Bridge Street roundabout and hence impact operation of this intersection, roundabout environment factors have been included to better reflect this condition and ensure the model reflects the observed 95 percentile queues during the relevant peak hours.

Historical SCATS phasing data for each signalised intersection on Thursday, 18 May 2023 and the LX file has also been obtained from TfNSW to assist with calibrating and validating the traffic model and to understand offset and link plan details. Detailed calibration notes, included coded offsets, are presented in Appendix C. The existing condition models are consistent with recorded and observed queue lengths and SCATS phasing data.

2.4.3 Results

Table 2.3 presents a summary of the existing operation of the key intersections, with full results presented in Appendix E.

Table 2.3: Existing operating conditions

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Beecroft Rd	AM	0.98	50	197	LOS D
	PM	0.98	51	277	LOS D
Carlingford Rd/ Ray Rd/ Rawson St	AM	0.95	36	160	LOS C
	PM	0.87	25	94	LOS B
Carlingford Rd/ Midson Rd	AM	0.90	54	141	LOS D
	PM	0.95	53	155	LOS D
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	0.96	29	163	LOS C
	PM	0.98	43	250	LOS D
Rawson Street/ Bridge St	AM	0.65	18	17	LOS B
	PM	0.72	18	23	LOS B
Rawson Street pedestrian crossing (unsignalised)	AM	0.98	31	33	LOS C
	PM	0.99	39	39	LOS C

Table 2.3 indicates the surrounding arterial road network is operating close to capacity, indicated by the high degree of saturations generally ranging between 0.87 and 0.99 with exception of the Rawson Street/ Bridge Street intersection that generally operates well and with spare capacity.

2.5 Public Transport

2.5.1 Existing Services

The site is ideally located relative to public transport service. Access can be gained to a multitude of services, including the metro, train and bus, providing connectivity across Sydney and the opportunity for interchange to destinations / origins in Sydney's outer areas.

Epping railway station is approximately 200 metres (three minute walk) to the south-east, providing both train services along the Hornsby the North Shore via City line (T9), as well as metro services along the Chatswood to Tallawong Line, set to be expanded to travel from Chatswood to Sydenham and through to Bankstown in 2024 as discussed in Section 2.5.2. At peak periods, the station is serviced every three to five minutes by the metro, and every two to eight minutes by train.

A review of the main public transport services available near the site is summarised in Table 2.4 and shown indicatively in Figure 2.9 and Figure 2.10.

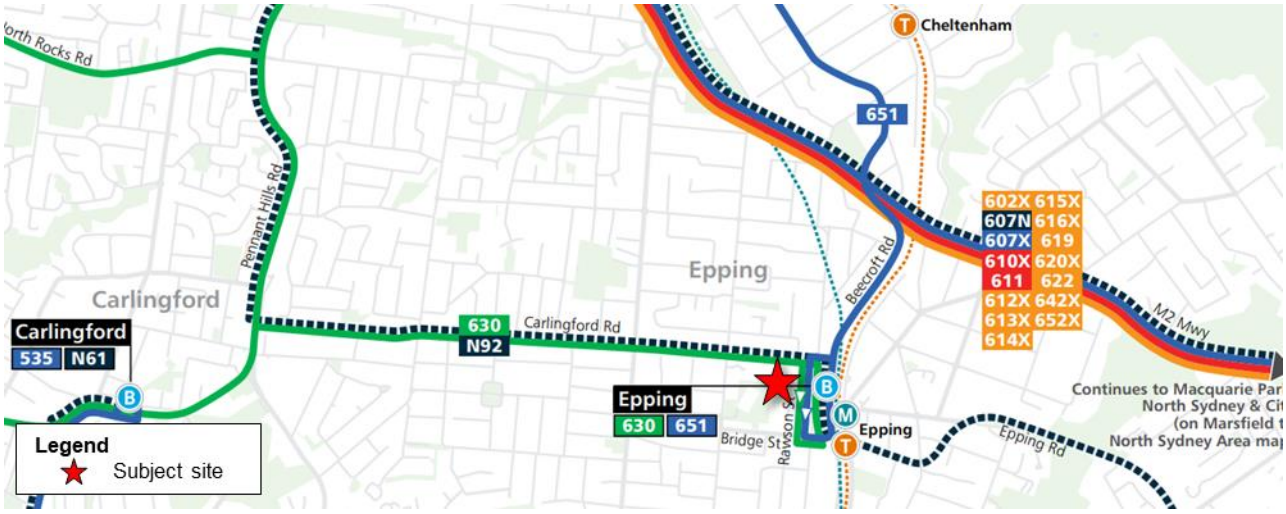
Table 2.4: Public Transport Provision

Service	Route #	Route Description	Distance to Nearest Stop	AM/ PM Peak frequency	Interpeak Frequency
Metro	M	Chatswood to Tallawong	200 metres	3-5 minutes	10 minutes
Train	T9	Hornsby to North Shore via City	200 metres	2-8 minutes	30 minutes
	CCN	Central to Newcastle	200 metres	15 minutes	15 minutes
Bus	228, 290, 291	Epping to City (amalgamated)	250 metres	10-15 minutes	10-15 minutes
	546, 549, 550	Epping to City (amalgamated)	150 metres	8-10 minutes	10-15 minutes
	541	Epping to Eastwood	100 metres	30 minutes	1 hour
	651	Rouse Hill to Epping	50 metres	30 minutes	1 hour

Figure 2.9 – Surrounding public transport network (North West bus network)

Source: North West Sydney bus network map – Effective: 12 December 2022, accessed June 2023

Figure 2.10: Surrounding public transport network (Hills District bus network)



Source: Hills District bus guide – network map weekday services as at 15 May 2023, CDC NSW, accessed June 2023

2.5.2 Future Services

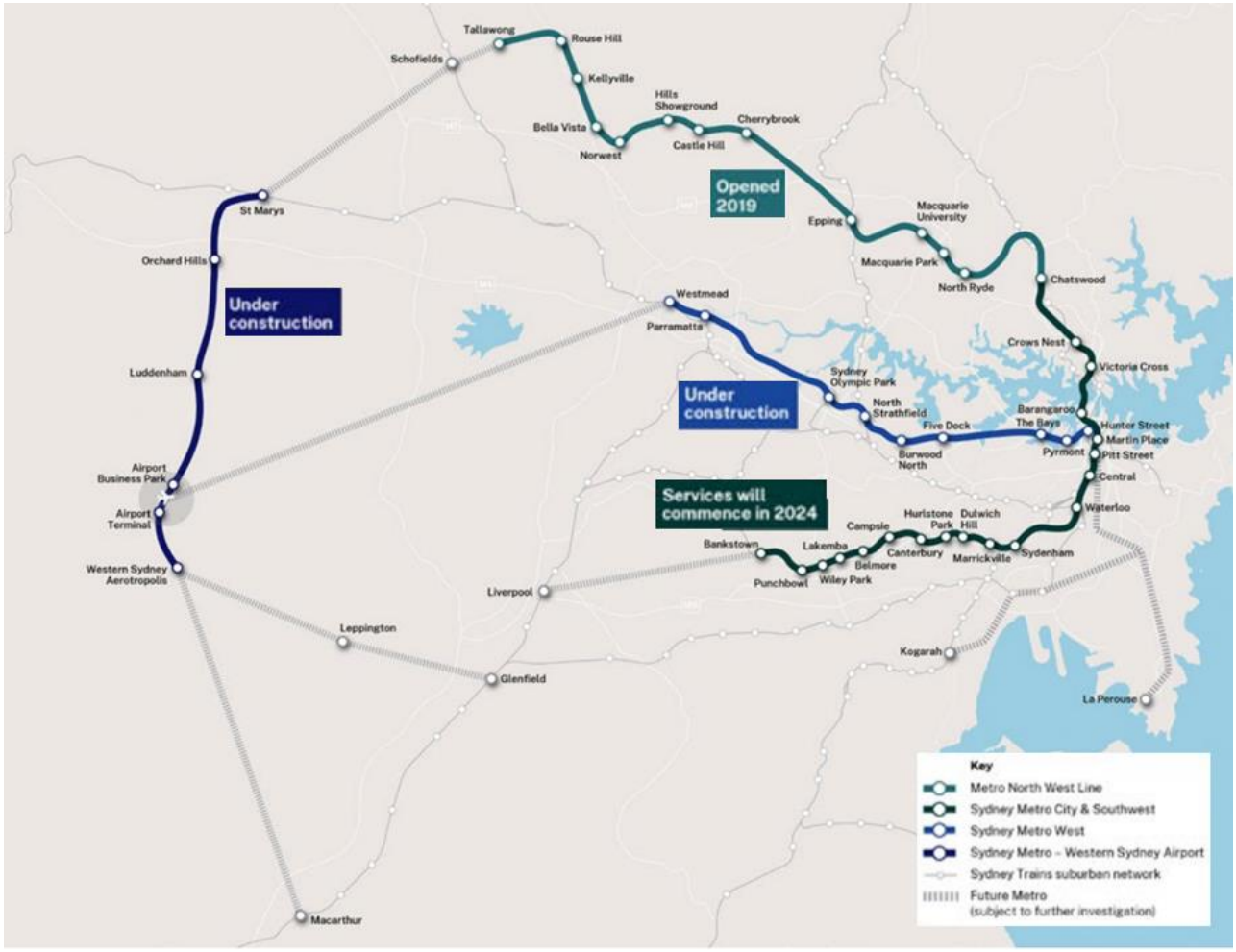
Sydney Metro north west, city and south west is currently Australia's largest public transportation project, which seeks to deliver over 65 kilometres of metro rail between Rouse Hill and Bankstown with 31 new metro stations. Stage 1 services began operating in May 2019 using automated metro trains with the expansion into the Sydney CBD and beyond to the south-west expected to be completed in 2024. Sydney Metro aims to provide a metro train every two minutes in each

direction within the Sydney CBD. Train services entering the Sydney CBD are proposed to increase from about 120 an hour to 200 services beyond 2024.

In addition, construction has commenced for the Sydney Metro West, proposed to connect Greater Parramatta with the Sydney CBD. The project intends to double rail capacity between the two CBDs and comprises seven confirmed stations including at Sydney Olympic Park. Planning is also underway for the Sydney Metro Greater West, planned between St Marys Railway Station and Western Sydney Aerotropolis.

An overview of the future Sydney Metro network is shown at Figure 2.11. As it applies to planning in relation to the subject site and broader Epping Town Centre precinct upgrades to the Sydney Metro network are planned to considerably increase rail network capacity by introducing new high-capacity rail connections from the Sydney CBD to other key economic centres in the broader Sydney area.

Figure 2.11: Existing and planned Sydney Metro route upgrades



Base image source: Figure 0-1 Sydney Metro network map, Parramatta Over and Adjacent Station Development Environmental Impact Statement, Sydney Metro and Ethos Urban, November 2022

2.6 Walking and Cycling Infrastructure

2.6.1 Walking Infrastructure

Epping Town Centre caters well for high pedestrian activity with established pedestrian networks, footpaths, through site connections and provision of ample formal crossing facilities. Pedestrian activity is generally high, especially to/ from Epping Railway Station during the weekday peak periods, particaulrly from surrounding residential precincts including high density residential developments north of Carlingford Road.

Pedestrian access from the site to Epping Railway Station is provided via two pedestrian cut throughs between Rawson Street and Beecroft Road as shown in Figure 2.12 and Figure 2.13, and a pedestrian bridge over Beecroft Road as shown in Figure 2.5.

Figure 2.12 – Pedestrian lane between Rawson Street and Beecroft Road (looking west)

Figure 2.13 –Pedestrian connection between Rawson Street and Beecroft Road through the Epping Walk Arcade (looking west)

All surrounding local roads generally provide footpaths on both sides of the roads close to site. Formalised crossing points in vicinity of the site include the following pedestrian crossings:

- All legs of the Carlingford Road/ Rawson Street/ Bay Street intersection
- West leg and slip lanes of the Beecroft Road/ Carlingford Road intersection.

A zebra crossing is also present midblock along Rawson Street just south of Council car park and proximate to the pedestrian cut throughs to Beecroft Road, providing a natural desire line to the Railway Station for pedestrians traveling to/ from the west through Boronia park, or to residential precincts located along Carlingford Road north/ north-west of the site.

Stantec commissioned pedestrian surveys at the Rawson Street pedestrian crossing proximate to the Council car park on Thursday, 17 November 2022 between 6:30am to 9:30am and 3:00pm to 7:00pm. Pedestrian volumes for each hour period are detailed in Figure 2.14, illustrating a peak volume of around 670 pedestrians between 7:45am to 8:45am and 950 pedestrians between 3:15pm to 4:15pm. Pedestrian activity experienced a distinct peak in the morning and then steadily reduced as standard work/ school hours commenced however activity remained high throughout the entire PM peak period, reflecting the continuous arrival and departure profiles of school students and commuters returning home, employees leaving and pedestrians visiting the various retail and commercial offerings within the Town Centre during the afternoon/ evening.

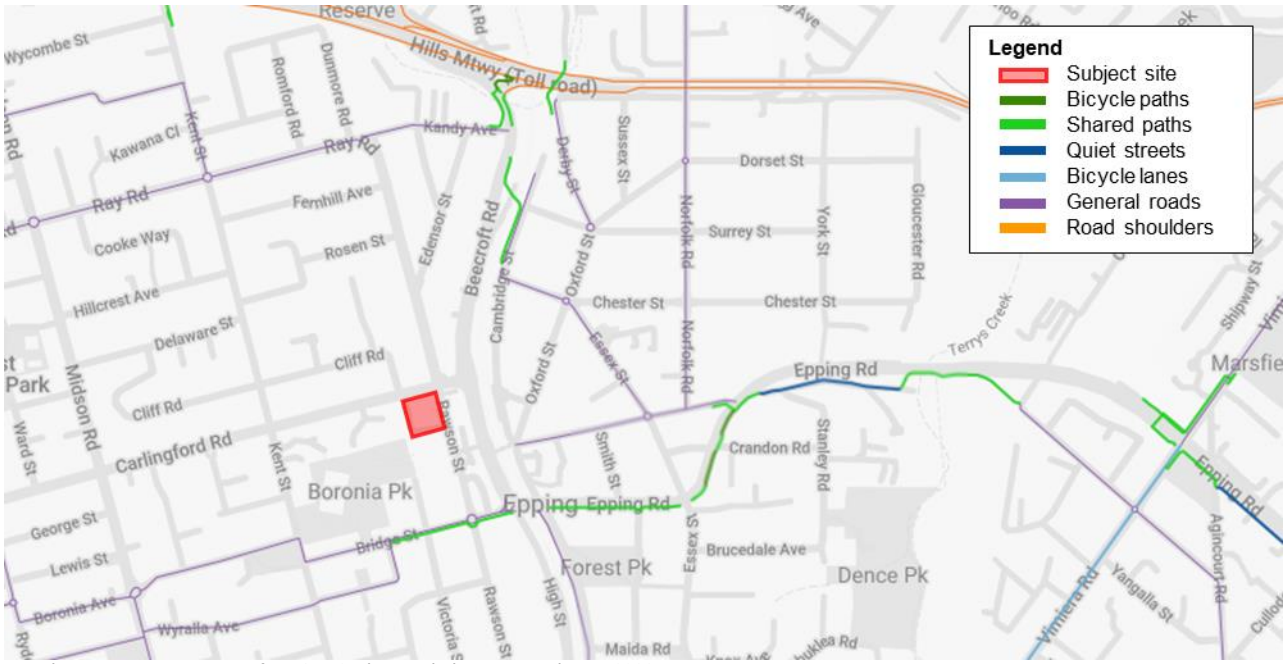
Figure 2.14: Rawson Street pedestrian crossing – hourly pedestrian volumes (Thursday, 17 November 2022)

2.6.2 Cycling Infrastructure

The site is modestly serviced by surrounding cycling infrastructure. An off-road shared path running along Bridge Street and Epping Road is located just south of the site, connecting users to Macquarie Park and through to the city via the North Shore. Furthermore, a range of on-road bike routes are provided along Ray Road and Midson Road providing routes west and south west of site.

The surrounding cycling infrastructure is shown in Figure 2.15.

Figure 2.15: Surrounding Cycling Network



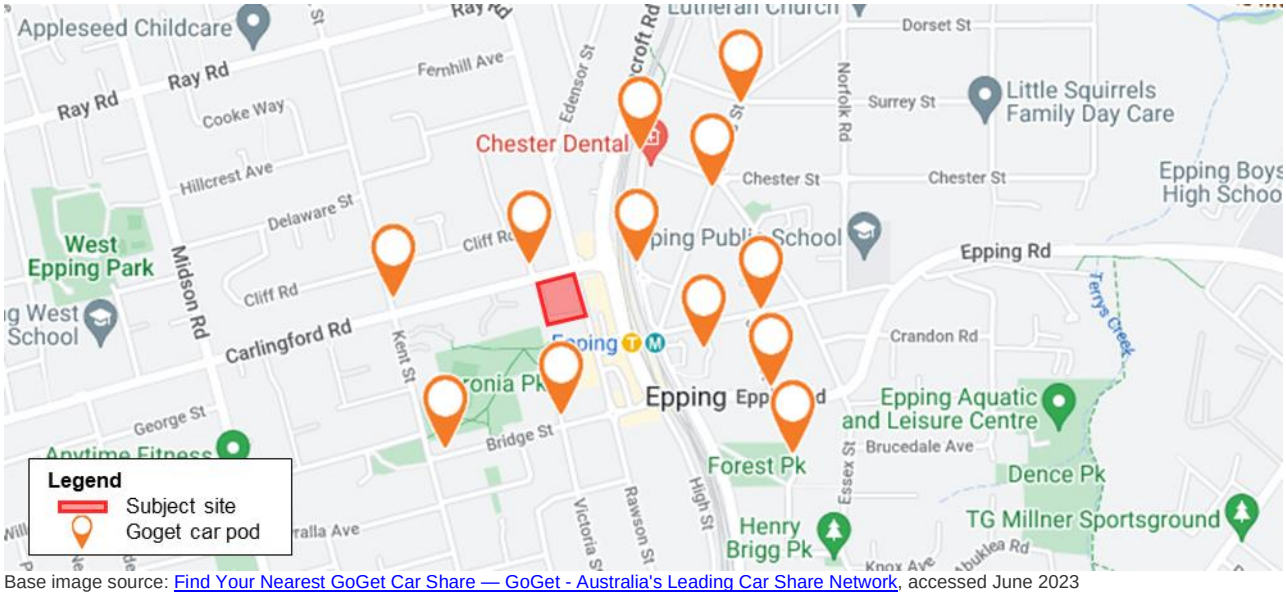
Base image source: Transport for NSW Cycleway Finder, accessed June 2023

2.7 Local Car Share Initiatives

Car share schemes have become increasingly common throughout Sydney and are now recognised as a viable transport option for drivers throughout Sydney. They offer a viable alternative to the private car for trips where distances are short and are likely to be of benefit to future residents and commercial tenants of the proposed development.

GoGet car share pods located close to the site are shown in Figure 2.16, with the closest pod located on-street along Cliff Road.

Figure 2.16: Surrounding GoGet pod locations

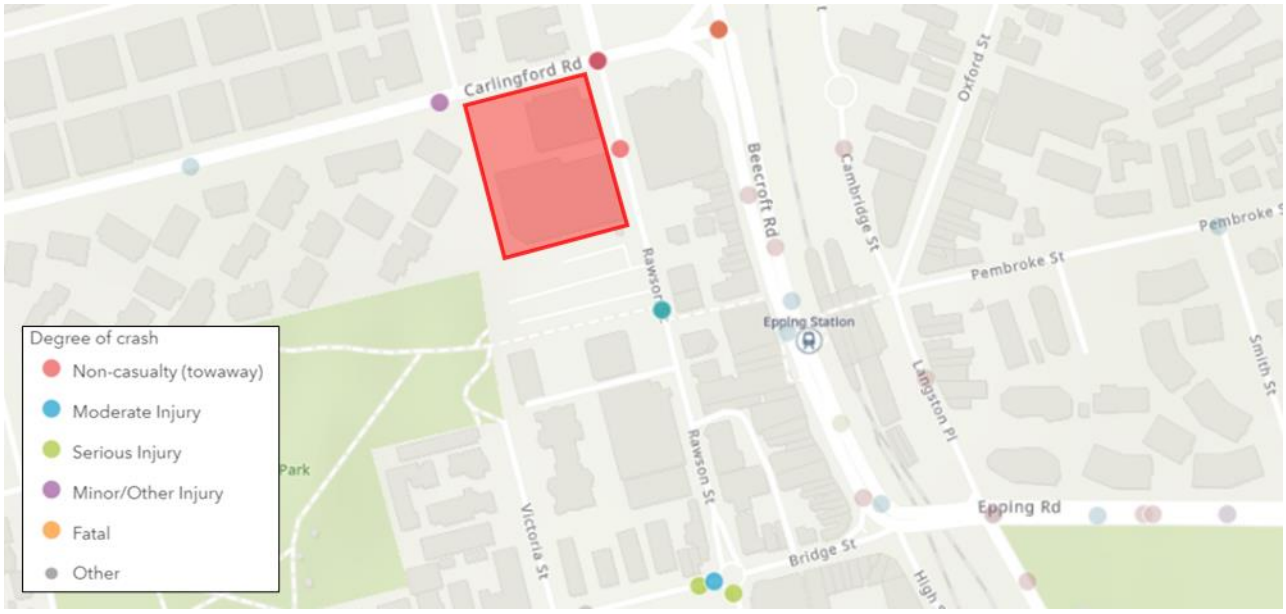


Base image source: [Find Your Nearest GoGet Car Share — GoGet - Australia's Leading Car Share Network](), accessed June 2023

2.8 Crash History

An analysis the most recent five-year period of available crash data (2017 - 2021) has been undertaken based on crash data provided by TfNSW for the roads surrounding the site. The locations and severity of the crash data for the five-year period is shown in Figure 2.17 and detailed in Table 2.5.

Figure 2.17: Crash incidences near Subject Site (2017 to 2021)



Base image source: Transport for NSW

Table 2.5: Recorded crashes

Intersection	Number of incidents	Notes
Beecroft Road/ Carlingford Road	3	• Two incidents occurred during the day • Two crashes resulted in a towaway and the other resulted in a serious injury that resulted in six injured
Carlingford Road/ Rawson Street/ Ray Road	6	• Five out of the six crashes occurred during the day • Four of the crashes resulted in a towaway, one resulted in a minor injury and the other resulted in a moderate injury
Carlingford Road/ Cliff Road	1	• Resulted in a minor injury during the day
Midblock along Rawson Street	3	• Two out of the three crashes occurred during the day • One crash resulted in a towaway, another in a moderate injury, and the other in a serious injury
Rawson Street/ Bridge Street	3	• All crashes occurred during the day • Two out of the three crashes resulted in serious injuries, with the other one resulting in a moderate injury

The following key statistics can be drawn from the crash data:

- No fatalities were recorded during the five-year period.
- Approximately 56 per cent of crashes resulted in an injury.
- Approximately 81 per cent of crashes occurred during daylight hours.

3. Strategic Transport Setting

3.1 Relevant State Strategies and Plans

3.1.1 The NSW Government Future Transport 2056 Strategy

Future Transport 2056 provides a 40-year strategy for how transport will be planned, amended and forecasted within NSW, both regional and metropolitan, for the expected 12 million residents within the state. Future Transport 2056 follows from the 2012 Long Term Transport Master Plan which listed over 700 transport projects, the majority of which are completed or in progress. It also compliments the Greater Sydney Region Plan and the subsequent district plans which support the three cities metropolis vision.

Future Transport 2056 is supported by two key documents, Greater Sydney Services and Infrastructure Plan and Regional NSW Services and Infrastructure Plan, which provide guidance and planning for these areas.

From a metropolitan view, Future Transport 2056 and associated plans include the 30-minute city where jobs and services are within 30-minutes of residents with Greater Sydney. Strategic transport corridors to move people and goods are outlined between metropolitan and strategic centres, clusters and surrounds. The Movement and Place framework is also emphasised to support liveability, productivity and sustainability.

3.1.2 The Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Commission presents a vision for three, integrated and connected cities that will rebalance Greater Sydney – placing housing, jobs, infrastructure and services within a 30-minute reach of more residents, no matter where they live.

Specifically, the following strategic plans and initiatives are relevant to the study are:

- Improving transport, walking and cycling connections across the district.
- Delivering the Sydney Metro West
- Delivering integrated land use and transport planning and a 30-minute city.

The Greater Sydney Commission's vision is to create three connected cities; a Western Parkland City west of the M7, a Central River City with Greater Parramatta at its heart and an Eastern Harbour City. By integrating land use, transport links and infrastructure across the three cities, more people will have access within 30-minutes to jobs, schools, hospitals and services.

3.1.3 Central City District Plan

The Eastern City District Plan was also produced by the State Government and complements at a more specific level the themes identified in the Region Plan. It presents a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision identified in Greater Sydney. It contains the planning priorities and actions for implementing the Metropolis of Three Cities, at a district level and is a bridge between regional and local planning.

The Plan introduces several priorities of relevance including:

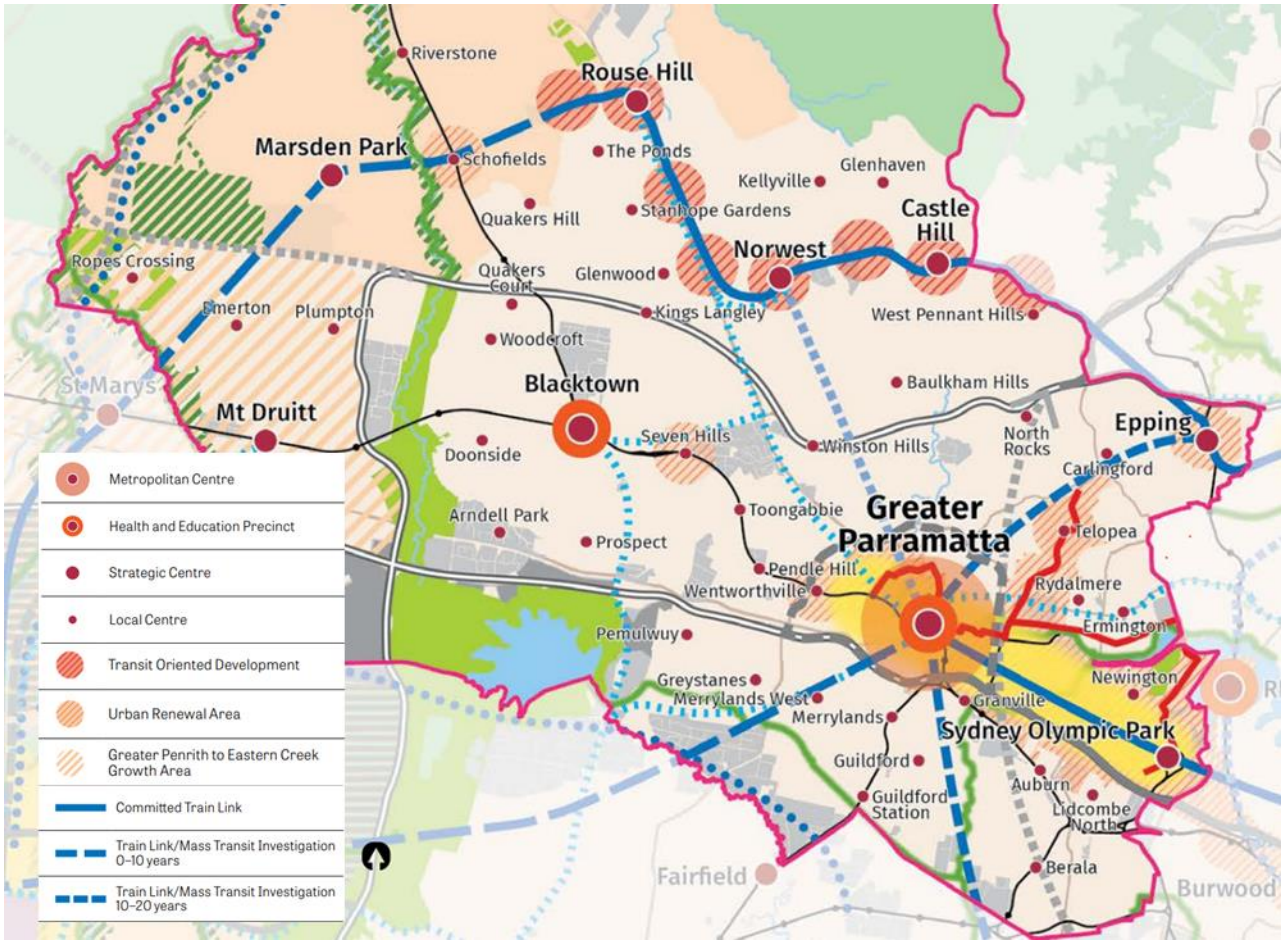
- Planning Priority C1 Planning for a city supported by infrastructure:
  - Prioritise infrastructure investments to support the vision of A Metropolis of Three Cities.
  - Sequence growth across the three cities to promote north-south and east-west connections.
  - Align forecast growth with infrastructure provision.
  - Sequence infrastructure provision using a place-based approach.
  - Maximise the utility of existing infrastructure assets and consider strategies to influence behaviour changes, to reduce the demand for new infrastructure, including supporting the development of adaptive and flexible regulations to allow decentralised utilities.
- Planning Priority C2 Working through collaboration:
  - Benefits of growth realised by collaboration of governments, community and business.
- Planning Priority C6 Creating and renewing great places and local centres, and respecting the District's heritage:
  - Using a place-based and collaborative approach throughout planning, design, development and management deliver great places by prioritising a people-friendly public realm and providing fine grain urban form, diverse land use mix, high amenity and walkability, in and within a 10-minute walk of centres.

- Planning Priority C9 Delivering integrated land use and transport planning and a 30-minute city:
  - Integrate land use and transport plans to deliver the 30-minute city.
  - Investigate, plan and protect future transport and infrastructure corridors.
  - Investigate and plan for the land use implications of potential long-term regional transport connections.
- Planning Priority C10 Growing investment, business opportunities and jobs in strategic centres:
  - Provide access to jobs, goods and services in centres by:
    - attracting significant investment and business activity in strategic centres to provide jobs growth
    - balancing the efficient movement of people and goods with supporting the liveability of places on the road network
  - Continue the review of planning controls for the Epping Town Centre in collaboration with State agencies.

Epping Town Centre represents an important Strategic Centre in the Central District Plan, with significant opportunities to create a great new place to live, work and visit.

The Central District is reproduced at Figure 3.1

Figure 3.1 – The Central District Plan



Source: The north district plan, accessed June 2023

3.2 Relevant Local Strategies and Plans

3.2.1 Local Strategic Planning Statement

The City of Parramatta Local Strategic Planning Statement (LSPS) outlines the 20-year vision for the local government area, to strategically help shape the City's future planning controls and infrastructure contributions plans. The LSPS is intended to harmonise the State Government's Greater Sydney Region Plan and Central City District Plan with the 2038 Community Strategic Plan.

The LSPS identifies Epping as both a Strategic Centre, defined as a centre that colocates a wide mix of land uses (commercial and residential) and have high levels of amenity, as well as a growth precinct.

Priority 4 of the LSPS details the intention to 'Focus housing and employment growth in the GPOP and Strategic Centres'. Notably Council policy direction and actions of this priority include:

- Focus high-rise development in Parramatta CBD and Strategic Centres (Epping and Sydney Olympic Park)
- Stage and sequence housing supply (location and yields) in Growth Precincts in line with infrastructure provision, including specific road and rail transport upgrades and provision, and not establish any new Growth Precinct
- Continue to progress Planning Proposals within Growth Precincts as per the staging plan in the City of Parramatta Local Housing Strategy (once endorsed by DPIE).

Priority 10 of the LSPS details the intention to 'Improve active walking and cycling infrastructure and access to public and shared transport'. Notably Council actions of this priority include:

- Identify typical public transport and door to door walk travel times from Planning Proposal sites to Employment Lands and Strategic Centres when assessing the merit of proposed housing densities.
- Investigate ways to implement and monitor Green Travel Plans to improve use of sustainable transport options.

Priority 11 of the LSPS details the insertion to Build the capacity of the Parramatta CBD, Strategic Centres, Local Centres and Employment Lands to be strong, competitive and productive'. Notably Council actions of this priority include:

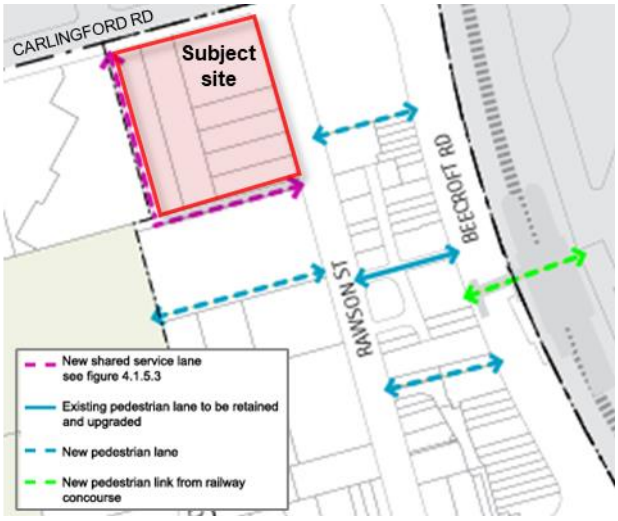
- Monitor commercial floor space in the Parramatta CBD, Sydney Olympic Park and Epping Strategic Centres and Westmead to document and understand historic trends as well as assisting in policy reviews and future forecasting
- Advocate for the recommendations of the Epping Town Centre Review (when completed) and implement the adopted recommendations.

3.2.2 Parramatta DCP 2011 – Epping Town Centre

Parramatta Council has detailed a strategy for the wider Epping Town Centre area. The area is made up of land to the west of Epping train station, bounded by Carlingford Road to the north, Kent Street to the west, Bridge Street to the south and Beecroft Road to the east. This aims to accommodate higher density commercial, retail and residential development in close proximity to the railway station.

The strategy includes guiding principles for future design and development outcomes the area. The key design item relating to development of the subject site is the requirement for a shared service lane to travel along the southern and western boundary of the site as shown in Figure 3.2 and Figure 3.3, connecting Rawson Street through to Carlingford Road.

Figure 3.2 – Epping Town Centre pedestrian connections and laneways (DCP 2011)



Source: Figure 4.1.5.3, Parramatta DCP 2011

Figure 3.3 – Epping Town Centre new vehicular laneways (DCP 2011)

Source: Figure 4.1.5.4 New vehicular laneway, Parramatta DCP 2011

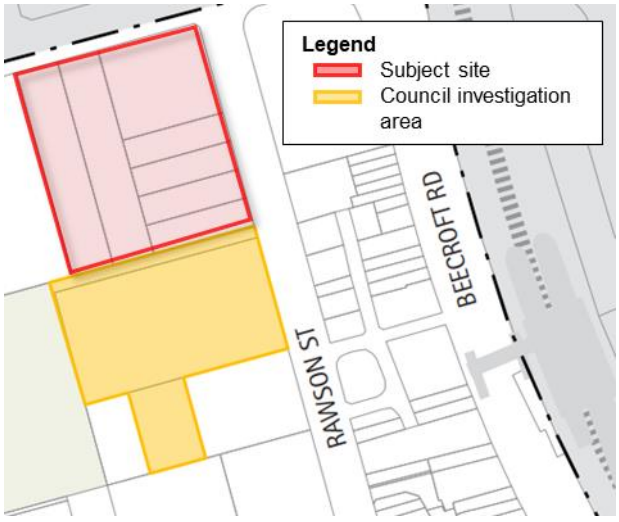
As shown, the lane on the western edge of the site is expected to be located entirely within the site with a varying road reserve of between 10 to 13 metres, whereas the lane on the southern edge of the site is expected to straddle the subject site and adjacent Council site with half of the 10 metre road reserve provided in each site. DCP 2011 indicates the laneway should be dedicated to Council.

DCP 2011 also notes:

- Shared basements are encouraged to minimise the number of vehicular crossings
- No new vehicular access points into a development site are permitted off Beecroft or Carlingford Roads. Any vehicular access required within Rawson Street should take into consideration the potential for shared basement access with adjoining sites
- Any site on the western side of Rawson Street, that has two street frontages, is not to be accessed off Rawson Street.

As it relates to broader planning within Epping Town Centre, DCP 2011 highlights Councils intention to investigate future options for the use of the Council owned car park site in Rawson Street, located along the southern boundary of the site, to determine the most appropriate future use of the site. This would be subject to a further Masterplan exercise and endorsement by City of Parramatta Council. The investigation area is shown in Figure 3.4 and Figure 3.5. Naturally any development will be required to accommodate the DCP 2011 service lane along its northern boundary as documented in Figure 3.2 and Figure 3.3.

Figure 3.4 – Council future investigation area (DCP 2011)



Source: Figure 4.1.5.2, Parramatta DCP 2011

Figure 3.5 – Council future investigation area (aerial imagery)

Base image source: Nearmap

3.3 Other Relevant Transport Studies

3.3.1 Epping Town Centre Study (Stantec, AECOM, 2014)

In November 2015, Stantec (formerly GTA Consultants) prepared a report for Oakstand documenting a review of potential future traffic conditions for the Epping Town Centre Study. At the same time, AECOM also prepared a traffic study for the redevelopment of Epping Town Centre for the Winten Lyon Group. Following receipt of separate submissions from Oakstand and the Winten Lyon Group Parramatta City Council (Council) prepared a Study Brief for a combined traffic impact study to be undertaken by Stantec and AECOM for both sites. The purpose of the joint traffic study was to provide a consistent approach on the assessment of potential future traffic conditions with different development scenarios for Epping Town Centre, including consideration of various land use and access scenarios.

Assumptions on development yields, traffic generation rates and trip reduction rates were submitted to Council and approved in July 2015. Following agreement on these matters, Stantec developed base models in LinSig for each scenario and conducted the assessment.

The assessment[5] involved a comparison of the network and intersection performance statistics of a number of land use scenarios and sub-options for the development, connectivity and road network improvements within Epping Town Centre. Key findings from the assessment include:

- The performance of the Epping Town Centre road network during peak hours is significantly influenced by the very high volumes of regional traffic passing through the Epping Road–Beecroft Road–Carlingford Road corridor. This

[5] Proposed Epping Town Centre Redevelopment, Rawson Street Epping, Traffic Study Issue A, GTA Consultants reviewed by AECOM, dated 24 November 2015

issue has been present in Epping for the last at least 20 years, with minimal traffic growth, if any, recorded during peak periods as discussed further in section 8.4.1.

- The development of Epping Town Centre under Council's DCP controls is forecast to generate approximately the same level of PM peak traffic (1,000 vehicles per hour) as currently experienced. This is because traffic generated by the proposed residential apartments would be offset by a reduction in commercial floor space.
- The overall performance of the network resulting from the various land use scenarios investigated, as indicated by average vehicle delays, fall within a relatively narrow range. This is mainly due to the situation in Epping Town Centre that the differences between the various land use scenarios become relatively minor in comparison with the very high volumes of regional traffic passing through during peak periods.

3.3.2 Epping Planning Review Traffic Analysis

Council note the following on their website:

"In March 2014, the Department of Planning and Environment introduced new planning controls for the Epping Town Centre study area completing their planned precinct process.

Since that time, a strong housing market has seen the Epping Town Centre experience unprecedented levels of redevelopment and growth. The development has raised community concern in relation to traffic congestion.

In May 2016, the council amalgamations process saw the Epping Town Centre fall entirely within the jurisdiction of the new City of Parramatta entity. This presented the opportunity to address critical issues and plan for the function of the centre for the next 20 years.

In December 2016, Council commenced the Epping Planning Review project to address these land use and traffic issues[6]."

The Epping Planning Review included undertaking technical studies to ascertain specific land use issues and traffic impacts, including commissioning the Epping Town Centre Traffic Study[7]. The study reviewed the traffic impact of a range of future land use and road network improvement scenarios through developing a series of existing and future year (2017, 2026 and 2036) mesoscopic travel demand and traffic flow/queuing models for the full study area road network. In addition to the Dynameq traffic model queuing analysis, the existing and future intersection performance and traffic delays at the six key traffic signal controlled intersections of the traffic model "core network" area were assessed in detail using the SIDRA 7 Linked Intersection model, for the existing 2017 and future year 2026 and 2036 am and pm traffic network models. The study found that the proposed land use growth scenarios will significantly impact future levels of traffic congestion on the major road network and hence further road network improvements and/ or changes to travel mode were required to accommodate the uplift in traffic.

After a review of this initial study, Transport for NSW have asked Council to undertake further work. There is no updated status on this work and given Transport for NSW commentary requested Council to modify the study, this assessment has not relied on information presented in the study.

[6] https://www.cityofparramatta.nsw.gov.au/vision/precinct-planning/epping-planning-review, accessed June 2023
[7] Epping Town Centre Traffic Study, EMM, 10 May 2018

4. Development Proposal

4.1 General Site Layout and Land Uses

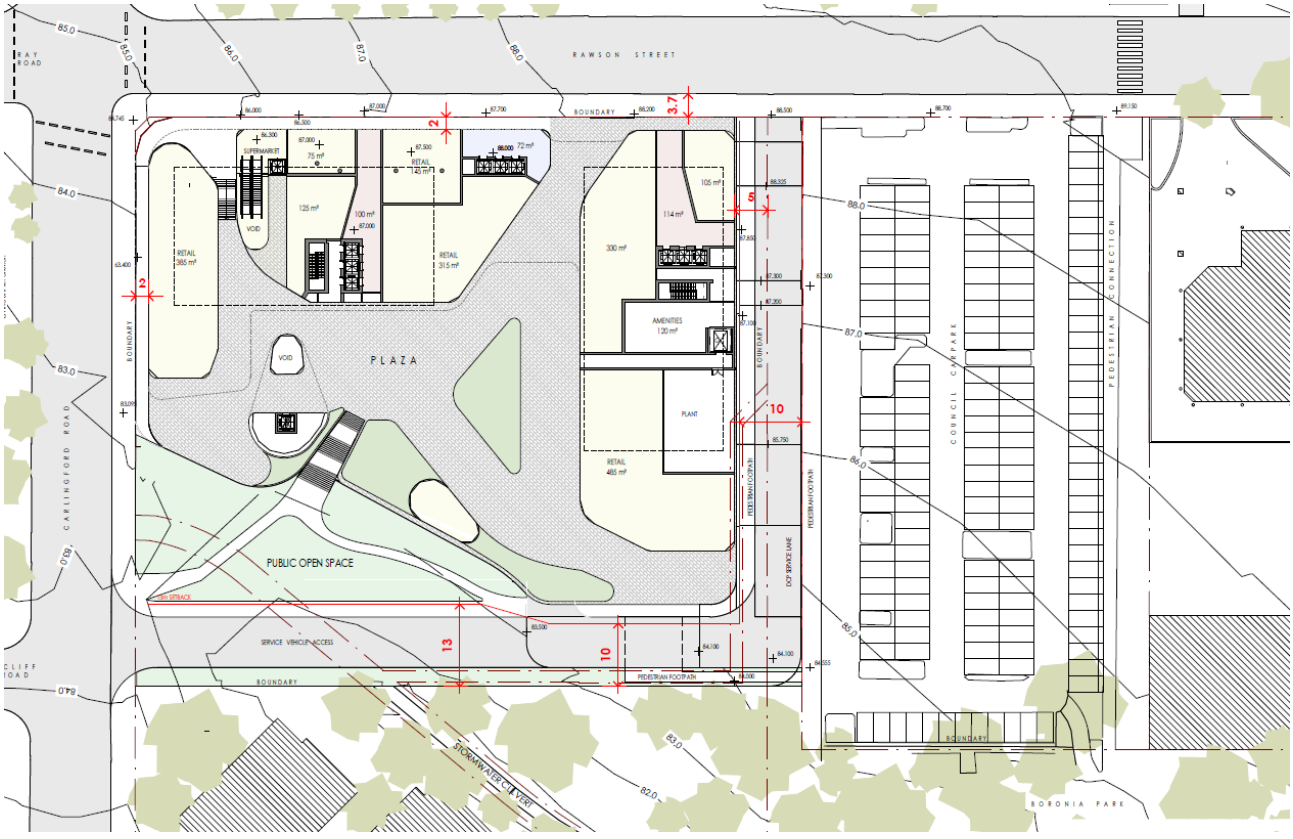
An indicative land use summary for the development proposal, which includes a range of land uses including residential, retail and commercial (office) is provided in Table 4.1.

Table 4.1: Development schedule

Land Use	Land Use Scale
Residential	420 units
Office	7,430 sqm GFA
Supermarket	3,100 sqm GLFA
Specialty Retail	3,147 sqm GLFA

The proposed layout of the development and configuration of buildings on the ground floor plane, and transport access is provided at Figure 4.1.

Figure 4.1: Proposed ground floor plan



Base image source: KANNFINCH

4.2 Transport Access and Car Parking

Rawson Street will continue to provide traffic and transport access to the subject site as part of the proposed development. A single consolidated driveway will be provided along the southern boundary of the site aligned with the DCP 2011 service lane requirement as detailed in Figure 3.2 and Figure 3.3. The driveway will form the primary vehicular access into the basement car park and loading dock.

In accordance with DCP 2011, the service lane could be extended along the western boundary of the site to Carlingford Road. As confirmed by the Flood Assessment Report prepared by GRC Hydro dated June 2023, the service lane is subject to flooding events and hence is not recommended for use by general vehicles. Notwithstanding, it is recommended the service lane is open for use by service vehicles to remove service vehicles from Rawson Street and

separate these movements from general vehicles accessing the basement car park and pedestrians travelling along Rawson Street, with controls in place to close the service lane during flooding events.

The proposal incorporates around 548 parking spaces over five basement levels. The car park will provide parking for residents, staff and visitors with access control (roller doors/ boom gates) to ensure secure access and separation of users.

The site access will be designed to accommodate the largest truck requiring access to the site; being a 12.5 metre HRV. Six bays are provided within the consolidated dock. A truck turntable in the centre of the loading dock is proposed which will provide adequate room for vehicle manoeuvres. As such, the loading dock will allow for vehicles to enter/ exit in a forward direction.

Details of bicycle parking provision have not been developed. It is recommended that a provision consistent with DCP 2011 expectations be provided, with an assessment of DCP requirements outlined in Section 7.1 of this report.

The development of the site as a whole has allowed for high-quality pedestrian experience with improved site permeability and pedestrian amenity ensured by way of expanded public domains on the ground floor, enhanced connectivity to the Rawson Street car park future development site, and strengthening desire lines to Epping Town Centre/ Railway Station.

5. Trip Generation Assessment

5.1 Existing Travel Behaviour

Journey To Work (JTW) data has been sourced from the Australian Bureau of Statistics (ABS) 2016 census[8] and provides an idea of existing travel demand characteristics for the Statistical Area containing and surrounding the subject site in Epping. Greater Sydney was subject to COVID-19 lockdowns on 2021 Census night and hence the 2021 JTW data could not be considered typical, and 2016 data has been referenced for the purpose of this assessment. It is noted that the Sydney Metro north west, nor the previous train line that was superseded by the Metro, was not active during the 2016 census and hence any resultant changes to mode share are not reflected in the results.

Figure 5.1 details the catchment of census data analysed.

Figure 5.1 – Statistical area containing and surrounding the subject site in Epping [1]

Base map source: Google Mymaps, accessed June 2023

[1] Corresponds to the ABS 2016 Statistical Area 1 12601149530, 12601149502, 12601149503 for residents and generally corresponds to destination zone 114953446 and 114953447 for commuters

Table 5.1, Figure 5.2 and Figure 5.3 provide a summary of the existing main modes of transport residents and commuters in the surrounding area respectively take to get to work.

The 2016 Census data indicates that the majority of residents travel by train (57 per cent), with 32 per cent traveling by car and six per cent by bus. Four per cent of residents walked to work, with only 0.5 per cent cycling to work. The data also indicates that the majority of commuters travel by private car (65 per cent driver, four per cent passenger), with 22 per cent traveling by train and three per cent by bus. Almost six per cent of commuters walked to work, with only 0.5 per cent cycling to work. It is noted that the Tallawong – Chatswood Metro was not active in 2016 and hence any resultant changes to mode share are not reflected in the results.

Table 5.1: Existing JTW travel mode share to/ from Epping (2016 Census)

Mode	Mode Split	
	Residents (traveling from the precinct)	Commuters (traveling to the precinct)
Car, driver	30%	65%
Car, passenger	2%	4%
Train	57%	22%
Bus	6%	3%
Walk	4%	5.5%
Cycle	0.5%	0.5%
Other	0.5%	0%

[8] Greater Sydney was subject to COVID-19 lockdowns on 2021 Census night.As such, 2021 JTW data could not be considered typical, and 2016 data has been referenced

Figure 5.2 –Existing travel mode share from Epping (residents) – 2016 Census

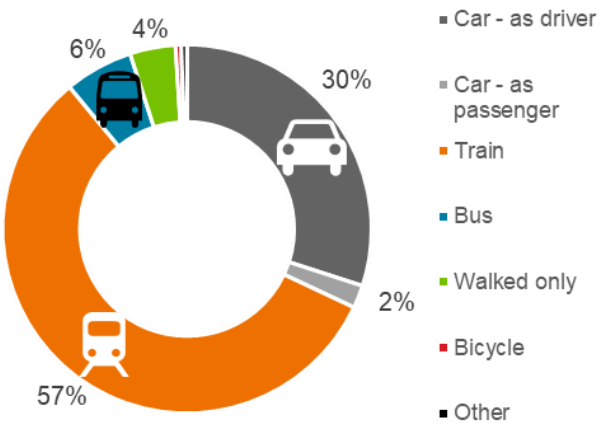


Figure 5.3 –Existing travel mode share to Epping (commuters) – 2016 Census

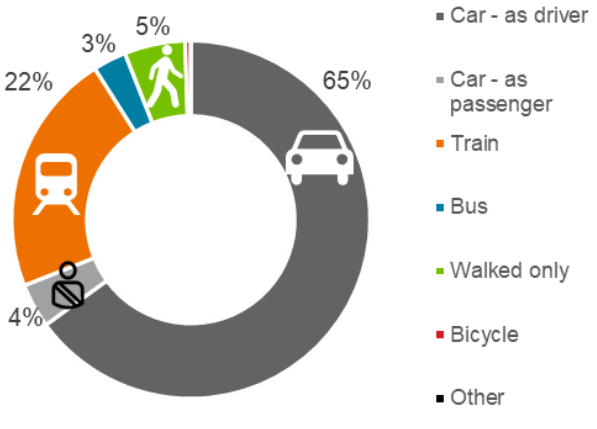


Figure 5.4 and Figure 5.5 illustrates the evolving travel behaviour change respectively for residents and commuters to/ from Epping between 2011 and 2016.

Figure 5.4 –Changing travel mode share from Epping (Residents) - 2011 to 2016 Census

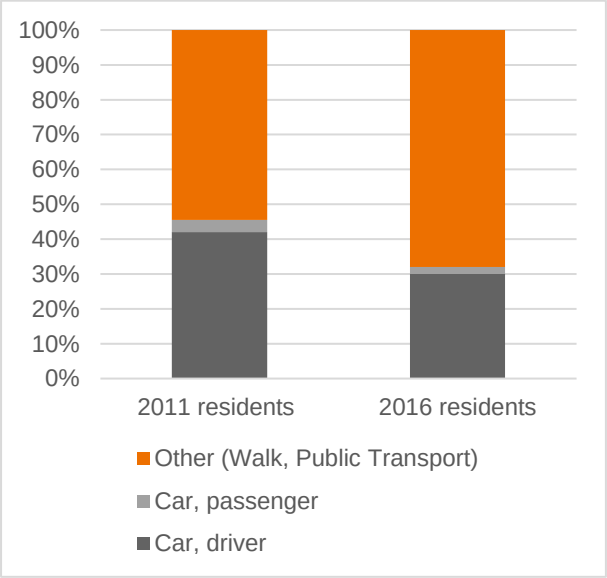


Figure 5.5 – Changing travel mode share from Epping (Commuters) - 2011 to 2016 Census

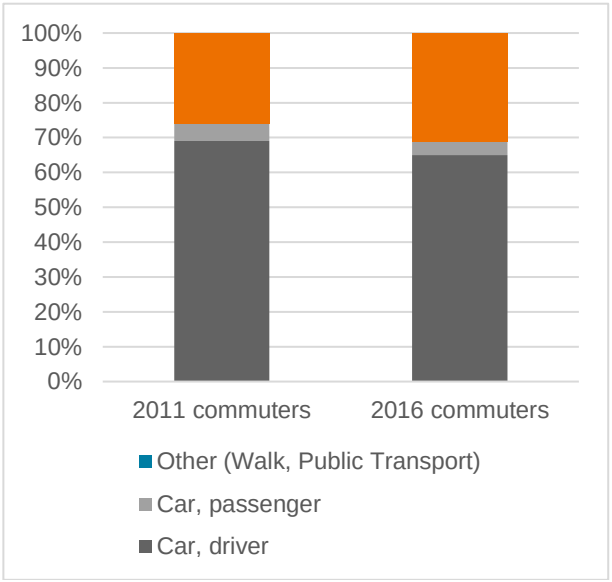


Figure 5.4 and Figure 5.5 respectively indicate private vehicle mode share (as driver or passenger) has reduced by 14 per cent for residents and five per cent for commuters over the five-year census period. Further reductions to private vehicle mode share are expected to have occurred following the opening of the Sydney Metro north west, noting the line was not active during the 2016 census[9], and further reductions are expected to occur following the extension of the metro line through the opening of the Sydney Metro city and south-west in 2024.

5.2 Travel Mode Share Targets

JTW has been used to develop mode split targets since it remains the most reliable data available. However, analysis of travel patterns from the Household Travel Survey, available only at a higher scale for Parramatta LGA, shows that peak hour car driver mode share, considering all trip purposes, could be higher than that of the JTW. Therefore, the mode split targets for residential land use when considering all trip purposes has been set based on the JTW. Naturally any Green Travel Plan prepared for the development and as discussed in Section 9, would target a reduction to car based travel for the purpose of commuter trips by residents living in the development.

[9] Greater Sydney was subject to COVID-19 lockdowns on 2021 Census night.As such, 2021 JTW data could not be considered typical, and 2016 data has been referenced

For commuters, a series of benchmark suburbs were identified to determine appropriate travel mode share targets for the site. Any Green Travel Plan prepared for the development and as discussed in Section 9, would further refine such targets, taking into consideration the changing transport environment and physical infrastructure provided on site. With this in mind, Section 6.1.1 identifies maximum parking requirements for commercial land use that would enforce a constrained parking environment for workers and therefore encourage further reductions to private vehicle mode share. As such, the mode split targets are considered suitability conservative for the assessment.

The mode split targets are summarised in Table 5.2.

Table 5.2: Future travel mode share to/ from Epping

Mode	Mode Split	
	Residents (considering all trip types)	**Commuters (traveling to the precinct for work purposes)**
Car, driver	30%	50%
Car, passenger	2%	4%
Train	57%	34%
Bus	6%	5%
Walking and Cycling	5%	7%

5.3 Trip Generation

The anticipated person trip generation associated with the development and corresponding generation by transport mode are summarised in Table 5.3. The person trip generation rates for each land use have been sourced from Roads and Maritime Services Technical Direction 2013/04a (TDT 2013/4a) for high-density residential, office and shopping centre uses.

Table 5.3: Person trip generation (network peak hours)

Land Use	Size	Person Trip Generation Rates		Person Trip Generation	
		AM Peak	**PM Peak**	**AM Peak**	**PM Peak**
Residential	420 units	0.67 trips per unit	0.56 trips per unit	281	235
Commercial	7,430 sqm GFA	2.49 trips per 100sqm	1.85 trips per 100sqm	185	137
Retail	6,247 sqm GLFA [1]	3.58 trips per 100sm GLFA	7.46 trips per 100sqm GLFA	179	373
Total				**645**	**745**

Table 5.3 indicates that the planning proposal is expected to generate approximately 645 and 745-person trips in the AM and PM peak hours respectively. Table 5.4 has been prepared to demonstrate the disaggregation of trip types across all modes of travel. For the purpose of this assessment, retail travel modes have been sourced from the Trip Generation and Parking Demand of Shopping Centres Analysis Report[10] that informs the TDT 2013/4a, using sites with similar transport settings to Epping.

[10] : Page 13, Trip Generation and Parking Demand of Shopping Centres, Analysis Report, Halcrow for the NSW Roads and Traffic Authority, September 2011

Table 5.4: Trip generation by transport mode

Travel Mode	Mode Split			Trips	
	Resident	Commuter	Retail	AM Peak	PM Peak
Vehicle, as driver	30%	65%	52%	320	402
Vehicle, as passenger	2%	4%	19%	56	99
Train	57%	22%	11%	226	216
Bus	6%	3%	7%	37	52
Walking and cycling	6%	7%	10%	51	70
Total				**690-person trips per hour**	**839-person trips per hour**

Table 5.4 indicates that trips by vehicle, as driver, would likely accounts for approximately 320 and 400 person trips in the AM and PM peak hours respectively. The assessment also indicates that some 210 to 230 trips and 35 to 50 trips will occur via train or bus respectively, with approximately 50 to 70 active travel trips.

Notwithstanding and as already discussed, further reductions to private vehicle mode share are expected within Epping Town Centre generally. The integrated land uses provided in the proposed development and across Epping Town Centre generally (existing, approved and future development) provide opportunities for co-location of jobs, housing and retail, providing opportunity to contain trips internally to Epping thereby minimising external traffic.

Any Green Travel Plan prepared for the development and as discussed in Section 9, would further refine mode share targets, taking into consideration the changing transport environment, physical infrastructure provided on site and actions to encourage behavioural change in residents, staff and visitors.

6. Parking and Loading Assessment

6.1 Car Parking Requirements

6.1.1 DCP 2011

The car parking requirements for different development types are set out in the Parramatta DCP 2011. Specific requirements for Epping Town Centre are outlined in Table 4.1.5.14.

A review of the car parking requirement rates for the proposed yields is provided in Table 6.1. It is noted that all rates are maximum rates, with exception of residential visitor which is a minimum parking rate.

Table 6.1: DCP 2011 car parking requirements

Land Use	Description	Size	Car Parking Rate	Car Parking Requirement
Residential	1 bedroom	120 units	Maximum 0.4 spaces per unit	48
	2 bedroom	240 units	Maximum 0.7 spaces per unit	168
	3 bedroom	60 units	Maximum 1.2 spaces per unit	72
			Sub-total	*288*
	Visitor	420 units	Minimum 1 space per 7 units	60
Non-Residential	Commercial	7,430sqm	Maximum 1 space per 50 sq.m GFA	149
	Retail	6,247sqm	Maximum 1 space per 30 sq.m GFA	208
Total				**705 spaces**

Based on the above, the proposed development is required to provide a minimum of 60 residential visitor spaces and a maximum of 288 residential, 208 retail and 149 commercial parking spaces, equating to a minimum of 60 residential visitor parking spaces and maximum of 645 parking spaces for the remaining land uses.

6.1.2 Adequacy of Parking Supply

The development proposes a total of 548 car parking spaces and therefore generally complies with Council's car parking requirements, with parking supply and allocation to be developed further as part of future planning applications.

As part of further planning stages, it is recommended a Resident or Green Travel Plan is prepared to minimise the reliance on single occupancy car journeys to and from the site. A Green Travel Plan is a package of measures aimed at promoting and encouraging sustainable travel and reducing reliance on the private car. This could consider features such as car share, reduced parking supply on site and end of trip bicycle facilities. An overview Green Travel Plan is provided in Section 9.

6.2 Other Parking Requirements

6.2.1 Accessible Parking

DCP 2011 requires one accessible space for every adaptable unit, and one to two per cent of non-residential parking supply to be accessible.

The accessible parking requirements would be determined as part of any future development application depending on the ultimate parking supply and provision of adaptable units.

6.2.2 Car Share Requirements

DCP 2011 requires one space to be allocated to car share for developments with 50 or more dwellings, and notes the following:

"If agreement with a car share provider is not obtained then the car share space is to be used for additional visitor parking until such time as a car share provider agreement is obtained."

As part of any future development application, a car share space would be provided within the basement car park, co-located with the residential visitor parking to ensure practical access by the public and to maintain on-site security.

6.2.3 Motorcycle Parking

The proposed development is also required to provide motorbike parking in accordance with DCP 2011, at a rate of one motorcycle parking space per 25 non-residential parking spaces.

The motorcycle parking requirements would be determined as part of any future development application depending on the ultimate parking supply.

6.3 Loading and Servicing Requirements

6.3.1 DCP 2011

DCP 2011 provides requirements for service vehicle parking for commercial land uses, and states that loading facilities for other land uses should be provided in accordance with the current Transport for NSW (former RTA) "Guide to Traffic Generating Developments 2002" (Transport for NSW Guide 2002).

Table 6.2 provides an assessment of minimum requirements as they relate to the proposal.

Table 6.2: Service vehicle parking requirements

Land Use	Size	Loading Rate	Source	Loading Requirement
Residential	420 units	4 plus one per 100 units over 200 units	Transport for NSW Guide 2002	6
Commercial	7,430 sqm	1 bay per 400m2 GFA	DCP 2011	19
Retail	6,247 sqm	5 plus 1 space per 1,000sqm GFA over 2,000sqm GFA	Transport for NSW Guide 2002	9
			Total	**34**

Table 6.2 indicates a total of 34 loading bays would be required for the development proposal. Notwithstanding, Stantec's experience with calculating loading requirements for new large-scale mixed-use developments has shown Transport for NSW Guide 2002 rates generally result in an excessive recommended loading dock provision given they have not been based on an empirical assessment of loading demands, having regard to the expected needs of the proposed land uses. An analysis has been undertaken, having regard to the frequency of existing loading events, to predict future loading requirements.

In this regard, an assessment of the loading requirements of the development is set out in the following sections.

6.3.2 TfNSW Urban Freight Forecasting Model

Stantec has analysed the TfNSW Urban Freight Forecasting Model to determine loading requirements for the proposed development. The model relies on the following inputs:

- number of floors
- commercial area
- residential area/ number of apartments
- retail area.

The proposal comprises two buildings and an average of 24 floors has been used for the purpose of the model.

The Urban Freight Forecasting Model indicates the need for eight loading spaces, broken down as follows:

- Five light vehicle spaces (cars, vans, utes)
- Two SRV spaces
- One MRV/ HRV spaces.

Six loading spaces are included in the basement comprising:

- Two residential bays accommodating light vehicles (cars, vans, utes)
- Two commercial bays accommodating vehicles up to and including 8.8m MRV's
- Two retail bays accommodating vehicles up to and including 12.5m HRV's.

TfNSW has therefore identified a deficiency in three light vehicle loading spaces (being cars, vans, utes etc.).

Notwithstanding, further review of the model indicates it is highly sensitive to retail land use. Removal of the 6,247 square metres of retail land use from the model indicates the residential/ commercial components of the development would generate a total demand for 66 daily loading events, and need to provide two loading spaces suitable to accommodate light vehicles only to service this demand.

This suggests that the retail land uses generates demand for around 200 daily loading events, and requires access to 13 loading spaces. Stantec has collated significant data on loading demands generated by supermarkets and based on a review of sites proximate to Epping[11], the supermarket, comprising more than 50 per cent of the retail area, would be expected to generate around 19 daily service events. This is naturally significantly less than suggested by the model. Further, the remaining specialty retail tenancies could not be expected to generate significant loading demands in the orders of magnitude as suggested by the Transport for NSW model.

With that in mind, a first principles assessment of loading demands has been completed in the following section.

6.3.3 Demand Assessment for Loading and Servicing Vehicles

A first principles assessment based on the expected demand has also been completed. Such an approach is routinely considered by stakeholders to be a more robust assessment and one that is better positioned to accurately reflect current (and changing) loading dock provision and efficiency.

Residential

The predominant form of ongoing deliveries to the residential apartments are likely to be in the form of supermarket and other e-commerce deliveries. It is noted that the site is well located for provision of these services in local retail and supermarket offerings. Further, each residential lobby includes a secure parcel room to accommodate such deliveries and any other delivery requirements when residents are not available. Stantec's research on the frequency of supermarket deliveries for residential apartments in CBD locations revealed no credible data sources. However, with the site located close to a number of nearby supermarkets, it is expected that on-line supermarket deliveries will be relatively infrequent, with traditional in-store and 'click and collect' purchases likely to be more convenient and thus common.

Notwithstanding, for the purposes of this assessment, Stantec has assumed that 10 per cent of residents' purchase groceries via a home delivery service each week. For 420 apartments, this equates to about 42 apartments generating one home delivery per week, representing about six home delivery services per day (on average). Assuming half of these home deliveries are either consolidated for the apartments within the site and/ or other deliveries for nearby apartments, it follows that about three additional home delivery vehicles may be generated by the residential apartments per day.

For e-commerce deliveries, Stantec has further assumed that 10 per cent of residents' generate an online delivery per day that arrive from separate providers such that packages are not consolidated (this represents an arbitrary and conservative assumption). In addition, the average residential apartment turnover rate is approximately 0.5 per cent of all apartments in any given week. Conservatively assuming a rate of 0.7 per cent to account for seasonal variations and given the proposed 420 apartments, there would be an average of three apartments moving in or out in any given week.

Overall, this assessment suggests that around up to 45 short stay loading events per day could be generated by deliveries for the residential apartments. With an additional one long stay loading event for removalist trucks, this would be by rigid trucks up to 8.8m long MRVs. As such a minimum of one loading bay is recommended, with provision for intermittent use of a second. Waste collection for the residential apartments is likely to require four garbage trucks per week.

Office

Loading docks play an important role for the function of most commercial spaces. In the case of office space, it is typically acknowledged that one loading space for every 10,000 to 15,000 square metres of GFA is appropriate. This approach is consistent with TfNSW data. Table 6.3 highlights the few examples with commercial space located in North Sydney, Sydney Olympic Park and Parramatta.

Table 6.3: TfNSW data for similar commercial buildings in Sydney

	North Sydney	Sydney Olympic Park	Parramatta	Average
Size (GFA)	31,400m2	34,131m2	27,000m2	30,844m2
Loading bays	1	7	3	3.7

[11] [11] Based on a review of loading demands collected at 11 supermarket sites including Frenches Forest, St Ives, Lane Cove, Neutral Bay, Carlingford, Macquarie, Chatswood, Northbridge, Thornleigh, Hornsby and Beecroft

	North Sydney	Sydney Olympic Park	Parramatta	Average
Loading bays pe 10,000sqm	0.03	0.21	0.11	0.12

Based on the above, with the proposed 7,430 square metres of office space, access to one loading bay would be sufficient to cater for the demands of the commercial floor space.

Further, drawing on commercial loading dock data compiled by Arup[12] from sites within Sydney CBD, the commercial use is expected to generate around one vehicle movements per 10,000 square metres of GFA in the peak hour. Assuming a peak to daily ratio of around 10 per cent, the commercial use could be expected to generate around six deliveries per day.

Retail (Speciality)

Loading requirements for retail space are typically influenced by the number of retail tenancies and their individual needs. Drawing on Stantec's database and experience with similar projects/ sites, a general rule is 1.1 deliveries per day for each general retail tenancy while mini majors generate demand for up to 3.1 deliveries per day.

With the plans indicating eight retail tenancies on the ground and one retail tenancy and mini major on the lower ground floor, the loading demands of the retail space are expected to be up to 13 vehicles per day. Conservatively applying a 50 per cent contingency this results in about 20 vehicles per day.

The specialty retail uses therefore require use of one loading bay.

Retail (Supermarket)

Drawing on Stantec's database and experience with similar projects/ sites, the supermarket is expected to generate demand for around 19 deliveries per day[13]. Provision of two loading bays provides appropriate contingency to accommodate smaller deliveries from minor suppliers at the same time as major deliveries requiring longer dwell times from distribution centres.

Summary

In summary, the following shared loading requirements are required for each of the proposed land uses:

- Residential: use of up to two loading bays for vehicles up to MRVs
- Office: use of one loading bay for vehicles up to MRVs
- Retail (speciality): use of one loading bay for vehicles up to MRVs
- Retail (supermarket): use of two loading bays for vehicles up to HRVs.

Overall, the proposal is estimated to require use of six dedicated loading bays to accommodate a demand for around 91 vehicle movements per day.

6.3.4 Adequacy of Supply

In this regard, the provision of six loading bays in the basement loading dock is considered to be sufficient for the development. A loading dock management plan will be prepared prior to Occupation and the use of the loading dock is to be administered/ monitored by the building manager to ensure capacity of the loading dock is not exceeded at any time.

Waste collection is proposed to occur within the loading dock via Council collection for the residential land uses and private contractor collection for the commercial and retail land uses.

6.4 Design Review

6.4.1 Car Park Layout

The car parking layout design would be progressed through future design stages to meet the requirements of the Australian Standard for Off Street Car Parking (AS2890.1:2020 and AS2890.6:2022), the Australian Standard for Off Street Commercial Vehicle Facilities (AS2890.2:2018) and DCP 2011 to operate satisfactorily with ramp grades, height clearances, aisle widths and car space dimensions. Design of the car parking areas would be assessed as part of any future development application.

[12] Loading docks and building servicing, an evidence-based approach, 2018 AITPM Conference Presentation, Josh Milston, ARUP
[13] Based on a review of loading demands collected at 11 supermarket sites including Frenches Forest, St Ives, Lane Cove, Neutral Bay, Carlingford, Macquarie, Chatswood, Northbridge, Thornleigh, Hornsby and Beecroft

The car parking levels would provide for resident parking, with separate security doors and/ or boom gates ensuring secure access at all times.

6.4.2 Loading Dock

The loading dock access driveway would need to be designed in accordance with Australian Standard (AS2890.2:2002) for access by service vehicles up to 8.8m medium rigid trucks, 12.5m large rigid vehicles and 10-11m long garbage trucks.

There will also be adequate manoeuvring areas, including provision of an on-site turntable within the loading dock, to allow all vehicles to enter and exit in a forward direction. Any access control points at the car park access will need to consider loading and delivery access.

It is expected that the design of the loading area and travel paths from the car park access (including height clearance) will achieve compliance with relevant Australian Standards and DCP requirements. Detailed assessments would be included as part of any future development application.

6.4.3 Vehicle Access

During early design development, the vehicle access strategy sought access from both Rawson Street and Carlingford Road via the DCP 2011 service lane as detailed in Figure 3.2 and Figure 3.3. Flood modelling completed for the project, as detailed in the Flood Assessment Report[14], indicated that the service lane along the western edge of the site near Carlingford Road is subject to flood events and hence it would not be appropriate to permit general vehicle access along this extent of the service lane.

As such, the design currently allows for a single consolidated driveway along the southern boundary of the site aligned with the DCP 2011 service lane. The driveway will form the primary vehicular access into the basement car park and loading dock, and results in the reduction of two vehicular crossovers along Rawson Street, significantly improving the pedestrian environment. All vehicles would enter and exit the site access in a forward direction under normal road conditions with good sightlines provided in either direction on approach and egress.

Notwithstanding, it is recommended the service lane is extended to Carlingford Road and developed as the primary vehicular access for service vehicles only into the loading dock. This would allow for the separation of service and private vehicle movements accessing the basement, reduce the prevalence of service vehicles traveling through Epping Town Centre along Rawson Street, and remove the interaction of service vehicles with pedestrian activity at the site access along Rawson Street. During flood events, controls could be implemented including through use of boom gates to close the Carlingford Road access, with service vehicles directed to use the Rawson Street access instead.

[14] Epping Town Centre, Flood Assessment for Planning Proposal, GRC Hydro, June 2023

7. Sustainable Transport Infrastructure

7.1 Bicycle End-of-Trip Facilities

Bicycle parking for the site should be provided in accordance with the requirements of DCP 2011, as summarised in Table 7.1.

Table 7.1: Bicycle parking requirements

Use	Size/ No.	Bicycle Parking Rate	Bicycle Parking Requirement
Residential	420 units	1 space per dwelling	420 spaces
		1 visitor space per 10 dwellings	42 visitor spaces
Commercial and retail	13,677 sqm	1 space per 200sqm GFA	68 spaces

Table 7.1 indicates that based on the indicative yield, any future development at the site should provide 420 bicycle parking spaces for residents, 42 bicycle parking spaces for residential visitors and 68 bicycle parking spaces for retail/ commercial staff and visitors. Bicycle parking provisions would be refined as part of any future Development Application.

Bicycle parking spaces, as a minimum, need to be designed in accordance with relevant Australian Standard (AS2890.3 Bicycle Parking Facilities) and DCP 2011. It is recommended that bicycle hoops/ racks be provided on the ground floor in the public domain for convenient bicycle parking adjacent to retail offerings, and to provide an alternative for visitors that does not involve navigating the basement. In accordance with DCP 2011, secure bicycle spaces for tenants can be provided individually (per tenancy) or collectively for the use of all tenants within a designated area.

DCP 2011 does not specify end of trip requirements for developments. Notwithstanding, it is recommended that at least one shower and change room facility is provided for staff per land use generating employment on-site.

7.2 Sustainable Transport

A key strategic merit of the development is the opportunity to promote sustainable travel given the high-density mixed-use nature of the development within a strategic centre; and within 200 metres of a rail and bus interchange that provides convenient access to local and regional residential, commuter, retail and recreational centres.

The development of the site as a whole has allowed for high-quality pedestrian experience with improved site permeability and pedestrian amenity ensured by way of expanded public domains on the ground floor, enhanced connectivity to the Rawson Street car park future development site, and strengthening desire lines to Epping Town Centre/ Railway Station.

In addition, the integrated land uses provided across Epping Town Centre generally (existing, approved and future development) provide opportunities for co-location of jobs, housing and retail, providing opportunity to contain trips internally to Epping thereby minimising external traffic and encouraging utilisation of public transport services in and out of Epping Town Centre across the day.

8. Traffic Impact Assessment

8.1 Overview

Intersection capacity analysis has been conducted at key intersections near the site to assess the traffic implications of the development, considering the cumulative impact of both approved and potential development in the Epping Town Centre area. The modelling scenarios are detailed in Table 8.1.

Table 8.1 – Scenario analysis for modelling traffic impacts

No.	Scenario	Description
1	Existing Condition	2023 traffic surveys
2	Post Development Condition	Scenario 1 including allowance for redevelopment
3	Future Base Condition with Epping Town Centre Background Traffic Growth	Scenario 1 including allowance for uplift of development throughout Epping Town Centre generally
4	Future Post Development Condition with Epping Town Centre Background Traffic Growth	Scenario 3 including allowance for redevelopment

8.2 Traffic Generation

8.2.1 Traffic Generation Rates

Overview

The traffic generation rates proposed to be adopted are summarised at Table 8.2, noting that the tabulated values have previously been agreed with both Transport for NSW and Council as detailed in correspondence received in Appendix A, with exception of the specialty retail rate.

Table 8.2: Agreed Trip Generation Rates

Land Use	AM Peak Traffic Rate	PM Peak Traffic Rate
Residential	0.19 per unit	0.15 per unit
Retail – supermarket	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA
Retail – specialty	1.3 per 100m2 GLFA	4.0 per 100m2 GLFA
Commercial	1.03 per 100m2 GFA	0.84 per 100m2 GFA

Retail

As detailed in Appendix A, Transport for NSW have requested the development adopts a combined traffic generation rate for the retail assets, being supermarket and specialty retail, based on rates detailed in the Small Suburban Shopping Centres Analysis report ("Analysis Report") prepared by Bitzios on behalf of Transport for NSW dated 7 November 2018.

A detailed review of the retail rates as set out in the Analysis Report is provided in Appendix B. Based on this review, Stantec found the following:

- majority of the sites are set in a different transport and land use environment when compared to the development site in Epping Town Centre, noting a key criteria for the selection of sites surveyed as part of the Small Suburban Shopping Centres Analysis was the ease in isolating the site from other developments (other businesses outside the shopping centre). This resulted in:
  - majority of the developments were located proximate to low density residential land uses
  - majority of developments were located with limited or restricted co-location of other retail / commercial developments
  - majority of developments had significantly less public transport accessibility than Epping Town Centre is afforded.
- the traffic generation rates have been derived based on the site peak hour rather than the surrounding road network peak hour. Section 3.2.2 of the Guide to Traffic Generating Developments (Transport for NSW, 2002) states that the traffic generation for the peak activity time of the adjacent road network is possibly more important period [than the peak activity time of the development itself] as it is used to assess the effect of the development on the road system.

As such, the traffic generation rates are not considered comparable to characteristics expected in Epping Town Centre during the road network peak hours and hence the assessment has adopted retail rates as documented in Table 8.2.

8.2.2 Service Vehicle Traffic Generation

Further to the above, Council has requested the assessment considers service vehicle trip generation. In estimating the anticipated loading demand of the proposed retail / commercial uses, reference has been made to outcomes in Section 6.3. Table 8.3 has been prepared to summarise the anticipated traffic generation from loading demand for each use.

Table 8.3: Service Vehicle Traffic Generation

Land Use	Land Use Scale	Daily Rate [1]	Proportion During Peak periods		Traffic Generation (vehs) [2]					
					AM Peak			PM Peak		
			AM Peak Hour	PM Peak Hour	In	Out	Total	In	Out	Total
Residential	420 units	46	7%	5%	3	3	6	2	2	4
Office	7,430 sqm GFA	6	10%	0%	1	1	2	0	0	0
Supermarket	3,100 sqm GLFA	19	10%	0%	2	2	4	0	0	0
Specialty Retail	3,147 sqm GLFA [3]	20	10%	0%	2	2	4	0	0	0
Total					**8**	**8**	**16**	**0**	**0**	**4**

[1] Discussion on source of data / rate provided in Section 6.3.
[2] Each vehicle trip represents two vehicle movements, one inbound and one outbound
[3] Specialty retail GLFA assumed to equate to 80 per cent GFA, or 2,344 sqm GLFA, in accordance with Small Suburban Shopping Centres Analysis report ("Analysis Report") prepared by Bitzios on behalf of Transport for NSW dated 7 November 2018

Table 8.3 identifies that the proposed development could be expected to generate in the order of eight and two service vehicles, or 16 and four vehicle movements, respectively in the AM and PM peak hours. It is critical to note that these will comprise a variety of vehicles including primarily cars/ vans/ utes for residential/ office uses and a mix of vans/ utes and trucks for retail uses. For the purpose of this assessment, all service vehicles are assumed to be light vehicles, with exception of two heavy vehicles for retail uses.

8.2.3 Traffic Generation Reduction Factors

A number of discount factors were adopted to reduce the traffic generation potential of the development. These comprise: trip containment and passing trade.

Trip Containment

The proposed land use mix within the development reflects a sizeable residential base that would contribute towards walk trips to/from retail and commercial developments within a 400-metre radius area.

This will be facilitated with urban design and public domain features that enhance the walking environment. These reflect opportunities for trip containment, and the total trip generation of retail and commercial developments in the town centre could be reduced.

It was agreed between Transport for NSW, Council and Stantec that discount rates of 20 per cent of peak period retail trips and 10 per cent of peak period commercial trips be applied to the traffic generation of the town centre reflect these opportunities.

Passing Trade

The Transport for NSW Guide 2002 suggests retail trip discounts of up to 25 per cent for GLFAs less than 10,000 square metres, decreasing to 15 per cent for GLFAs over 30,000 square metres, to account for the incidence of linked and multi-purpose trips. Given the land use mix proposed, it has been estimated that approximately 25 per cent of retail trips are made by vehicles already passing by on the Carlingford Road-Beecroft Road-Epping Road corridor. These trips are included in the total generation but are not "new" trips on the road network; they are simply diverted from the passing traffic into the development and back out.

The analysis for the proposed retail areas for the development would also likely reflect this. It was agreed between Transport for NSW, Council and Stantec that a 25 per cent passing trade discount be applied for traffic on the Carlingford Road-Beecroft Road-Epping Road route.

8.2.4 Directional Splits

The assignment of traffic (i.e., the ratio between the inbound and outbound traffic movements) is detailed in Table 8.4. These are considered to be consistent with typical travel behaviour in Sydney.

Table 8.4: Agreed Peak Hour Inbound/Outbound Movement Proportions

Land Use	AM peak	PM peak
Residential	20% inbound, 80% inbound	80% outbound, 20% outbound
Retail	50% inbound, 50% inbound	50% outbound, 50% outbound
Commercial	90% inbound, 10% inbound	10% outbound, 90% outbound

8.2.5 Post Development Summary

Based on the above commentary, the traffic generation for the proposed development is set out in Table 8.5.

Table 8.5: Traffic generation [1]

Land Use	Land Use Scale	Trip Containment	Type	In/ out Movement Proportion				Traffic Generation (veh movements)					
				AM Peak Hour		PM Peak Hour		AM Peak Hour			PM Peak Hour		
				In	Out	In	Out	In	Out	Total	In	Out	Total
Residential	420 units	0%	Car	20%	80%	80%	20%	16	64	**80**	50	13	63
Office	7,430 sqm GFA	10%		90%	10%	10%	90%	62	7	**69**	6	51	57
Supermarket	3,100 sqm GLFA	20%		50%	50%	50%	50%	56	56	**112**	167	167	334
Specialty Retail	3,147 sqm GLFA [2]	20%		50%	50%	50%	50%	16	16	**32**	50	50	100
Residential	420 units	0%	Service Vehicle	50%	50%	50%	50%	3	3	**6**	2	2	4
Office	7,430 sqm GFA	0%		50%	50%	50%	50%	1	1	**2**	0	0	0
Supermarket	3,100 sqm GLFA	0%		50%	50%	50%	50%	2	2	**4**	0	0	0
Specialty Retail	3,147 sqm GLFA [2]	0%		50%	50%	50%	50%	2	2	**4**	0	0	0
Total								**158**	**151**	**309**	**275**	**283**	**558**

[1] Includes trip containment discount however does not include trip passing trade discount, as this is applied in traffic distribution
[2] Specialty retail GLFA assumed to equate to 80 per cent GFA, or 2,344 sqm GLFA, in accordance with Small Suburban Shopping Centres Analysis report ("Analysis Report") prepared by Bitzios on behalf of Transport for NSW dated 7 November 2018

Table 8.5 identifies that the proposed development could be expected to generate in the order of 309 and 559 vehicle trips respectively in the AM and PM peak hours. When considering that 25 per cent of retail traffic is passing trade and hence while they are included in the total generation, they are not "new" trips on the road network, the development actually results in 273 and 450 vehicle trips respectively in the AM and PM peak hours.

8.2.6 Existing Development Summary

The site currently houses a commercial office building and supermarket that are planned to be demolished as part of this development. An assessment of existing traffic generation based on the design rate (considering GFA) and the surveyed rate has been completed.

Surveyed Rate

The survey results indicate that the commercial site currently generates approximately one and nine vehicle movements in the AM and PM peak hours, respectively, and supermarket generates approximately 37 and 115 vehicle movements. The low commercial rates are partially a result of existing occupancies and low occupancy of parking spaces, with only 24 parking spaces leased at the building.

Further, a significant proportion of existing patrons to the coles site currently park in the adjacent Rawson Street car park rather than the coles undercroft car park. As such, the existing traffic volumes observed at the site access driveways are considered to underrepresent the actual traffic generated. By way of comparison, the Rawson Street car park currently generates 133 (80 enter, 53 exit) and 394 (199 enter, 195 exit) vehicle movements in the AM and PM peak periods, respectively.

Design Rate

Table 8.6 has been prepared to summarise the anticipated traffic generation and loading demand for each existing use on site based on traffic generation rates set out in Section 8.2.1 to 8.2.5. This provides a "like for like" comparison of traffic generating characteristics of the existing site with indicative development plans.

Table 8.6: Traffic generation [1]

Land Use	Land Use Scale	Trip Containment	Type	In/ out Movement Proportion				Traffic Generation (veh movements)					
				AM Peak Hour		PM Peak Hour		AM Peak Hour			PM Peak Hour		
				In	Out	In	Out	In	Out	Total	In	Out	Total
Office	4,296sqm	10%	Car	90%	10%	10%	90%	36	4	40	3	29	32
Supermarket	3,300sqm	20%		50%	50%	50%	50%	59	59	119	178	178	356
Retail	991sqm	20%		50%	50%	50%	50%	5	5	10	16	16	32
Office	4,296sqm	0%	Service Vehicle	50%	50%	50%	50%	1	1	2	0	0	0
Supermarket	3,300sqm	0%		50%	50%	50%	50%	2	2	4	0	0	0
Retail	991sqm	0%		50%	50%	50%	50%	1	1	2	0	0	0
Total								**104**	**73**	**177**	**197**	**223**	**421**

[3] Includes trip containment discount however does not include trip passing trade discount, as this is applied in traffic distribution

Table 8.6 identifies that the existing land use on site could be expected to generate in the order of 177 and 421 vehicle trips respectively in the AM and PM peak hour, including eight and zero service vehicle movements in the AM and PM peak hours respectively.

8.2.7 Traffic Uplift

Based on the above, the net increase in traffic generation based on design rates is detailed in Table 8.7.

Table 8.7: Traffic generation – net increase based on design rates

Scenario	Type	Land Use	Traffic Generation		New Trips		Passer By Trips	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Proposed Development	Car	Residential	80	63	80	63	0	0
		Office	69	56	69	56	0	0
		Supermarket	112	335	84	251	28	84
		Retail	33	101	25	76	8	25
	Service Vehicle	All	16	4	16	4	0	0
	Total		**309**	**559**	**273**	**450**	**36**	**109**
Existing Development	Car	Office	40	32	40	32	0	0
		Supermarket	119	356	89	267	30	89
		Retail	10	32	8	24	3	8
	Service Vehicle	Supermarket	8	0	8	0	0	0
	Total		**177**	**421**	**145**	**324**	**32**	**97**
Traffic Uplift			**132**	**138**	**128**	**126**	**4**	**12**

As such, the proposed redevelopment will have a net increase in vehicle generation of around **132 and 138** vehicle trips respectively in the weekday AM and PM peak periods. When considering that 25 per cent of retail traffic is passing trade and hence while they are included in the total generation, they are not "new" trips on the road network, the development actually results in an uplift of **128 and 126** new vehicle trips respectively in the AM and PM peak hours.

Notwithstanding, for the purpose of this assessment, the uplift of traffic generated by the development is based on the following:

- the existing surveyed traffic volumes for the office land use has been removed from the background traffic, with new traffic (including loading) generated by the office superimposed

- all specialty retail and residential traffic (including loading) considered as new
- a minor uplift in traffic generated by the supermarket based on the design rate, noting the existing surveyed rate could not be established due to mix of existing traffic using both the on site and adjacent Council car park.

Based on the above, the net increase in traffic generated by the site as conservatively assessed in the SIDRA model is detailed in Table 8.8.

Table 8.8: Traffic generation – net increase based on surveyed rates as adopted in SIDRA model

Scenario	Type	Land Use	Traffic Generation		New Trips		Passer By Trips	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Proposed Development	Car	Residential	80	63	80	63	0	0
		Office	69	56	69	56	0	0
		Supermarket	112	335	84	251	28	84
		Retail	33	101	25	76	8	25
	Service Vehicle	All	16	4	16	4	0	0
	Total		**309**	**559**	**273**	**450**	**36**	**109**
Existing Development	Car	Office/ specialty retail	1	9	1	9	0	0
		Supermarket	119	356	89	267	30	89
	Service Vehicle	Supermarket	4	0	4	0	0	0
	Total		**124**	**365**	**94**	**276**	**30**	**89**
Traffic Uplift			**185**	**193**	**179**	**173**	**6**	**20**

As such, for the purpose of the traffic assessment, the proposed redevelopment has been assessed based on having a net increase in vehicle generation of around **185 and 193** vehicle trips respectively in the weekday AM and PM peak hours. 25 per cent of the retail traffic is assessed as passing trade, with the remainder assessed as “new” trips on the road network, resulting in **179 and 173** new vehicle trips respectively in the AM and PM peak hours.

8.3 Distribution and Assignment

The directional distribution and assignment of traffic generated will be influenced by a number of factors, including the:

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- surrounding employment centres, retail centres and schools in relation to the site
- likely distribution of staff residences in relation to the site
- configuration of access points to the site

Traffic associated with the development are distributed across the network by drawing on data collected from the ABS 2016 Census, including a review of where residents in Statistical Area 2 of Epping – North Epping that drive to work are commuting too at a Statistical Level 4, and where commuters working in Epping – North Epping that drive to work are commuting from at a Statistical Level 4. Key locations residents and commuters that drive to work either work or live include Ryde (34 per cent), Parramatta (19 per cent), North Sydney and Hornsby (12 per cent), Baulkham Hills (10 per cent) and Blacktown (five per cent). Further consideration has been given to the overall distribution of traffic patterns along Rawson Street, generated by the site and adjacent Council car park.

Having consideration to the above and for the purposes of estimating vehicle movements, the following directional distributions have been assumed for residents/ employees visiting the site:

- Beecroft Road South – 38 per cent
- Carlingford Road West – 29 per cent
- Beecroft Road North – 15 per cent (including a proportion that travel via Ray Road to access Beecroft Road at Kandy Avenue)
- Bridge Road South - 10 per cent
- Bridge Street west – 5 per cent
- Ray Road North – 3 per cent.

Visitors driving to the retail assets primarily including the supermarket and excluding “passing trade” trips, are typically arriving from a localised catchment. As such, distribution has been estimated based on existing travel patterns arriving/ departing Epping Town Centre generally. Further, the distribution of traffic at the site access point has been based on the existing distribution of traffic entering / exiting the site and adjacent Rawson street car park in both peak periods as follows:

- AM Peak:
  - Arrive: 68 per cent from south, 32 per cent from north
  - Depart: 36 per cent to south, 64 per cent to north
- PM Peak:
  - Arrive: 65 per cent from south, 35 per cent from north
  - Depart: 22 per cent to south, 78 per cent to north.

It is expected that a higher proportion of vehicles turn left out of the site and Council car park generally, and particularly in the PM peak, to avoid delays traveling south created by the high pedestrian volumes traveling over the midblock pedestrian crossing just south of the Council car park.

Based on the above, the estimated increase in turning movements near the subject site following development in the AM and PM peak hours are summarised at Appendix D.

8.4 Background Traffic Growth

8.4.1 Regional Traffic Growth

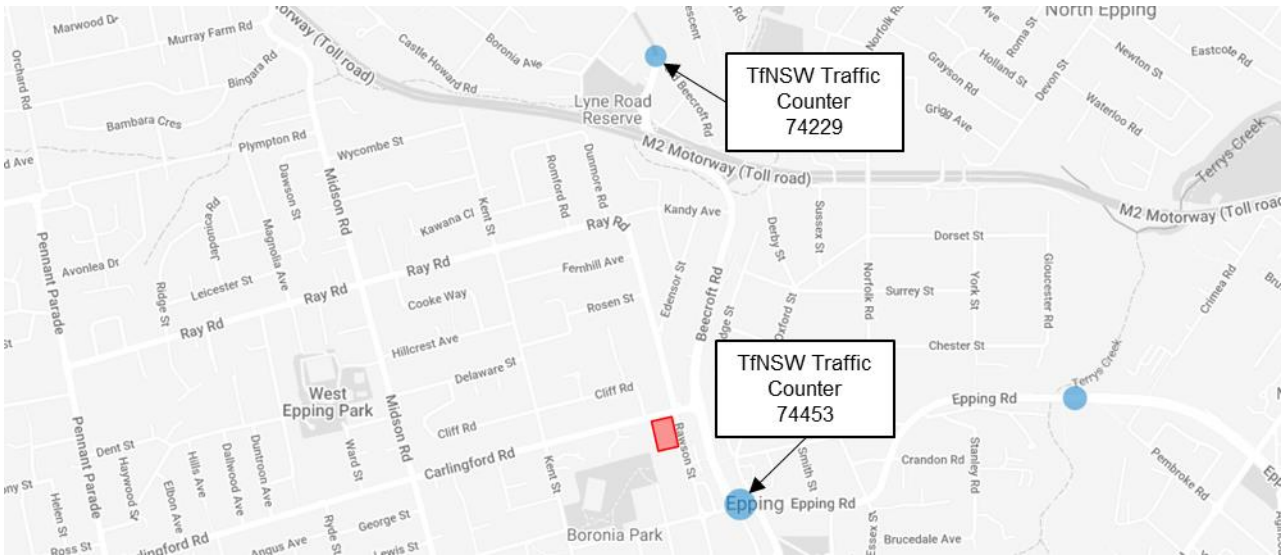
Overview

When undertaking a traffic and transport assessment of a new development proposal, it is normal to consider a future scenario that considers regional and other traffic growth and the ultimate functioning for the transport network. Stantec are proposing a departure from this approach given the capacity constraints of the Epping Town Centre road network, with relevant evidence set out in this section.

Historical Traffic Growth

Transport for NSW traffic volume viewer count stations along Beecroft Road and Epping Road shows that background traffic volumes have had no discernible growth for more than a decade. The location of each counter is illustrated in Figure 8.1, with respective AM and PM peak hour traffic volumes illustrated at Figure 8.2 and Figure 8.3 for Beecroft Road and Figure 8.4 and Figure 8.5 for Epping Road.

Figure 8.1 – Location of permanent traffic counters



Source: Transport for NSW Traffic Volume Viewer, accessed June 2023

Figure 8.2 – Beecroft Road AM Peak (Traffic Counter 74229)

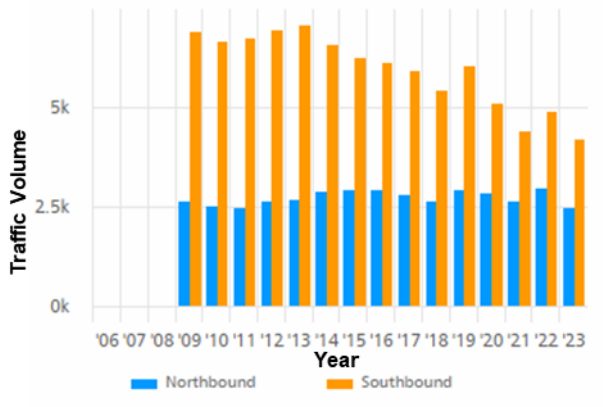


Figure 8.3 – Beecroft Road PM Peak (Traffic Counter 74229)

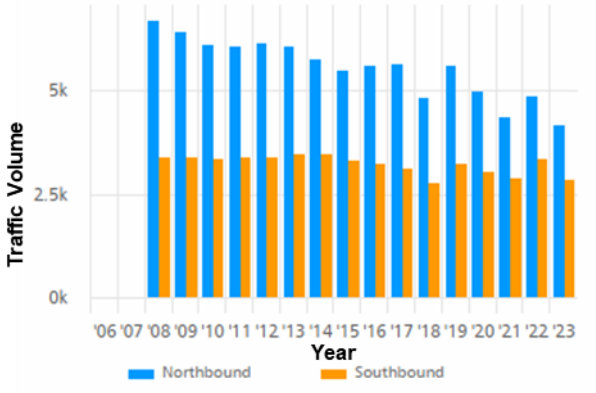


Figure 8.4 – Epping Road AM Peak (Traffic Counter 74453)

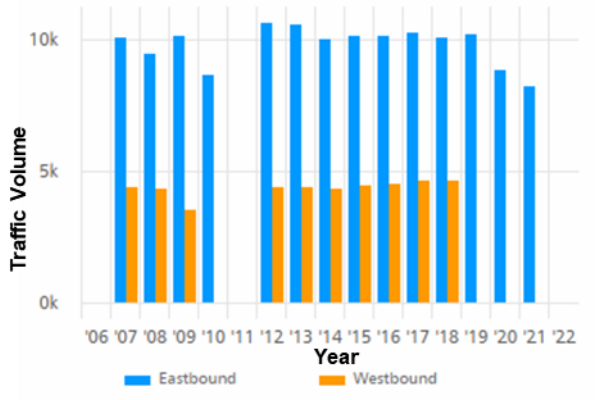


Figure 8.5 – Epping Road PM Peak (Traffic Counter 74453)

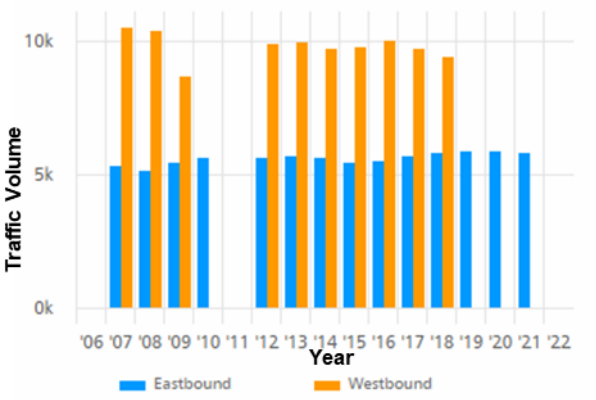


Figure 8.2 and Figure 8.3 for Beecroft Road and Figure 8.4 and Figure 8.5 for Epping Road indicates that the 10 year traffic growth has been negligible or declined.

Given Epping Town Centre has experienced a significant uplift in development over this period, it is evident that the capacity constraints of the key intersections in Epping Town Centre have displaced through traffic to other regional routes to accommodate newly generated traffic within the centre. This is not unlike other capacity restrained centre in Sydney metropolitan area such as Chatswood Town Centre and the capacity constrained Pacific Highway.

In addition and as discussed in Section 2.3, Stantec obtained SCATs traffic count data from Transport for NSW at the Carlingford Road/ Rawson Street and Carlingford Road/ Beecroft Road intersection for 11 November 2022, Thursday, 18 May 2023 and Thursday, 13 June 2019. Across both intersections, a review of the 2022 and 2023 SCATS data indicated that traffic volumes had increased by two per cent in the AM peak and reduced by one per cent in the PM peak period. This review was completed in order to adjust the 2022 traffic volumes to match 2023 conditions during the specific peak hour periods for the purpose of existing conditions modelling.

A review of the 2019 and 2023 SCATS data indicates that during the identified peak hour periods (7:30 am to 8:30 am, and 4:15 pm to 5:15 pm respectively), traffic volumes had increased by 0.5 per cent per annum in the AM peak and had reduced by 0.25 per cent per annum in the PM peak. Notwithstanding, a review of 2019 and 2023 traffic volumes across the broader AM and PM peak periods is contained in Figure 8.6 and Figure 8.7.

Figure 8.6 – Traffic growth – 2019 to 2023 AM peak period

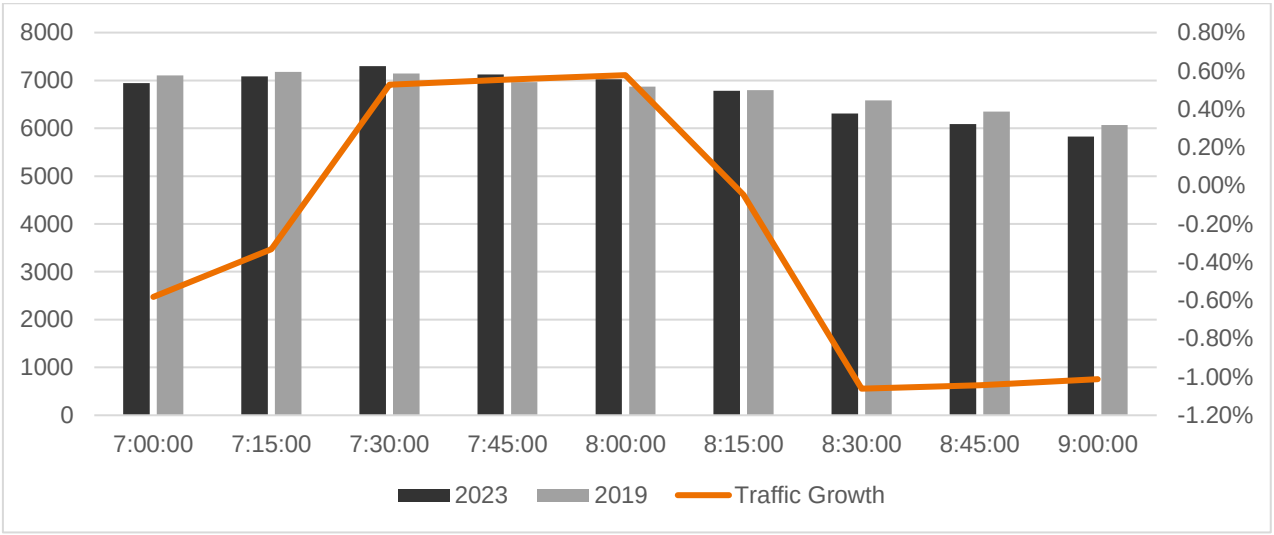
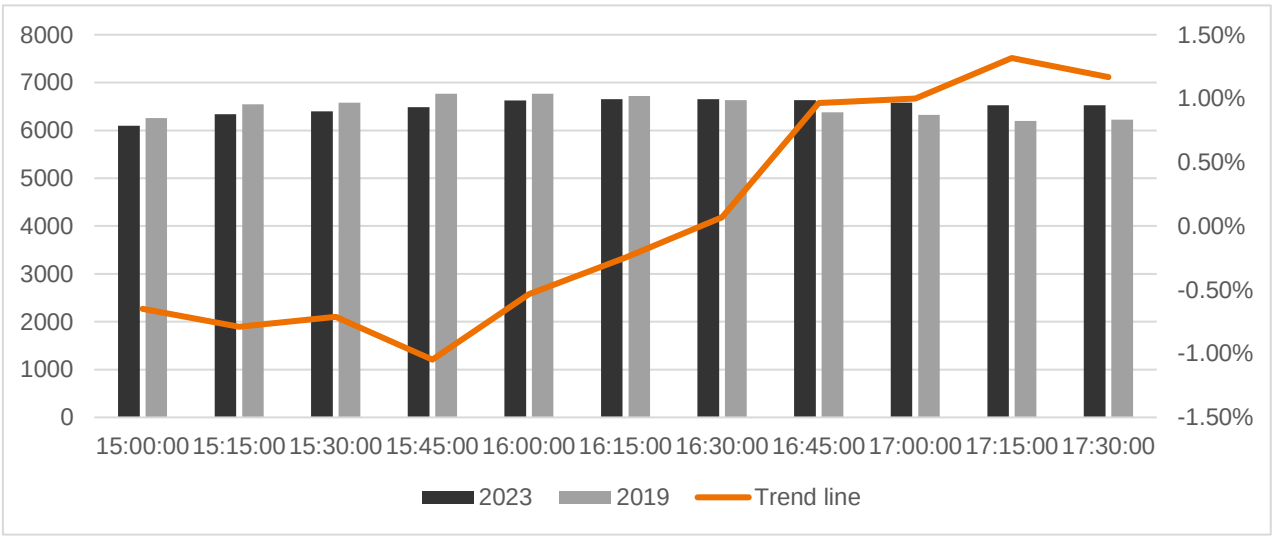


Figure 8.7 – Traffic growth – 2019 to 2023 PM peak period



As shown, the AM peak has a consistent peak period between 7:00am to 9:00am with minimal variation in total vehicles on the road network. Total traffic volumes for this period have ultimately reduced by 0.24 per cent per annum between 2019 and 2023. As such, there is ultimately no distinct pattern of traffic growth between 2019 and 2023, consistent with outcomes from the Transport for NSW traffic volume viewer.

The PM peak had a more distinct peak period in 2019 for hour periods starting at 3:45pm, 4:00pm and 4:15pm, with greater total traffic than recorded in 2023, with traffic volumes dropping off after this period, whereas the 2023 period had a smoother peak period with less variance in traffic volumes across the period. This indicates that traffic demand has smoothed out and spread across the peak period, noting total traffic volumes for this period have ultimately increased by 0.04 per cent per annum. As such, there is also no actual discernible growth in traffic, consistent with outcomes from the Transport for NSW traffic volume viewer.

Epping Road/ Langston Place/ Blaxland Road / Beecroft Road intersection upgrade

In April 2023, Transport for NSW awarded Mott MacDonald Australia the contract to develop the concept design, prepare the Review of Environmental Factors, manage early investigation work, and provide technical advice for the proposed upgrade.

Notwithstanding, while the proposed upgrades have been discussed for 20 to 30 years, they have never eventuated. It is understood that the potential adverse effect to patronage on M2 is a key issue from owners and operators of the motorway, with this issue continuing to be unresolved and hence impacting the practicality of this project proceeding.

Further, even with the upgrades, there remains further pinch points on the road network that will limit uplift in regional traffic growth. As it relates to Epping Town Centre, the pinch point will merely shift from the Epping Road/ Langston Place/ Blaxland Road / Beecroft Road intersection to the Beecroft Road/ Carlingford Road intersection.

Further assurance that this project will proceed, and indicative timelines, would be required to incorporate any impacts into traffic modelling for the proposed development.

Summary

With regards to the above, any additional traffic from developments along Rawson Street will simply continue to displace regional through traffic as it has done in the past. A conservative approach would be to consider additional traffic generation additive to the current situation.

Based on this, no regional background traffic growth rate has been adopted for this assessment as this would be contrary to the historical trend. Notwithstanding, traffic growth resulting from an uplift in development within Epping Town Centre has been considered as discussed below.

8.4.2 Traffic Growth in Epping Town Centre

242-244 Beecroft Road, Epping (SSD-8784, SSD-8784-Mod-1, SSD-31576972)

A concept development application under SSD 8784 was approval for a mixed use development comprising:

- maximum of 37,700 square metres residential gross floor area, which could provide up to 432 residential units
- maximum of 1,000 square metres non-residential gross floor area
- basement car parking.

At time of preparation of the Transport Impact Assessment, a detailed development application under SSD-31576972 was under assessment for a mixed use development comprising:

- 374 residential units
- 927 square metres commercial floor area
- basement car parking, motorcycle parking, bicycle parking and service vehicle spaces[15].

Vehicle access is proposed via both Ray Road and Beecroft Road (left in, left out only) in both the approved concept and proposed development.

The development application (SSD-8784-Mod-1, SSD-31576972) has since been approved on 19 September 2023.

Given SSD-31576972 was under assessment during preparation of the Transport Impact Assessment, the approved concept development has been considered in this assessment although noting this is a conservative approach as the traffic generation has naturally only reduced between applications given the reduction in residential units and commercial floor area. For the purpose of this assessment, traffic generation has been estimated based on rates agreed with stakeholders as detailed above. This equates to 91 to 73 vehicle trips in each peak hour, respectively.

245-250 Beecroft Road, Epping (DA/653/2022, PPSCC-387)

A proposed mixed use development under DA/653/2022 and PPSCC-387 at 245-250 Beecroft Road, Epping is currently under assessment. The proposal includes 103 residential apartments over three levels comprising 246 and 3,056 square metres retail and medical floor area, respectively.

The site is currently occupied by a service station. Given the current use, the development is expected to result in the reduction of 73 and 52 vehicle movements in the AM and PM peak periods, respectively[16]. As the development is under assessment, the expected reduction to trips have not been removed from the road network for the purpose of this assessment.

37-41 Oxford Street, Epping (DA/314/2017, DA/314/2017/A, DA/1/2022)

A concept development application under DA/314/2017 was approved for a mixed use development comprising:

- 257 residential units
- 438 square metres commercial floor area
- 591 square metres retail floor area.
- Basement car parking.

At time of preparation of the Transport Impact Assessment, a modified concept application under MOD314/2017/A and detailed application under DA/1/2022 were under assessment, noting both applications were initially refused in August and September 2022 however were under appeal. The proposed development under both applications comprises:

[15] Submissions Report, SSD 3156972 – 242 -244 Beecroft Road, Epping, Think Planners, May 2023
[16] Statement of Environmental Effects, 246-250 Beecroft Road, Epping, Urbis, 14 July 2022

- 204 residential units
- Childcare centre with 60 children
- 785 square metres commercial floor area
- 101 square metres retail floor area
- Basement car parking.

Each application proposes vehicle access from Oxford Street.

The development application (MOD314/2017/A and DA/1/2022) have since been approved (NSWLEC 1509) with decision date on 6 September 2023.

Given MOD314/2017/A and DA/1/2022 were under assessment during preparation of the Transport Impact Assessment, consistent with the approach for 242-244 Beecroft Road, the approved concept development has been considered in this assessment. For the purpose of this assessment, traffic generation has been estimated based on rates agreed with stakeholders as detailed above. This equates to 58 and 54 vehicle trips in each peak hour, respectively.

59 Beecroft Road, Epping (DA/944/2021, PPSSCC-292, [2022] NSWLEC 1705)

A development application under DA/944//2021 was refused, for a mixed use development comprising:

- 117 residential units
- 1,847 square metres commercial floor area
- 3,262 square metres retail floor area.
- Basement car parking.

Vehicle access was proposed via Rawson Street, north of the Council car park.

Notwithstanding the refusal, the site is clearly intended to be developed and as such, the refused scheme has been incorporated as potential traffic growth within Epping Town Centre. For the purpose of this assessment, traffic generation has been estimated based on rates agreed with stakeholders as detailed in Section 8.2. This equates to 66 and 116 vehicles trips in each peak hour, respectively.

48 - 54 Rawson Street, Epping (DA/61/2018/A, PPSSCC-365)

A Section 4.55 application under DA/61/2018/A was approved for a mixed use development comprising:

- 123 residential units
- 1,370 square metres retail floor area.
- Basement car parking.

Vehicle access is proposed via a minor laneway connecting to Rawson Street north of Hunts Lane.

For the purpose of this assessment, traffic generation has been estimated based on rates agreed with stakeholders as detailed in Section 8.2. This equates to 34 and 53 vehicles trips in each peak hour, respectively.

Summary

Table 8.9 has been prepared to summarise the anticipated traffic generation for each proposed, approved or potential development within Epping Town Centre.

Table 8.9: Traffic generation –Epping Town Centre development uplift

Site	Land Use	Land Use Scale	Traffic Rate		Trip Containment	Traffic Generation (vehs)	
			AM Peak	PM Peak		AM Peak	PM Peak
242-244 Beecroft Road, Epping	Residential	432 units	0.19 per unit	0.15 per unit	0%	82	65
	Commercial	1,000 sqm GFA	1.03 per 100m2 GFA	0.84 per 100m2 GFA	10%	9	8
	SubTotal					**91**	**73**
37-41 Oxford Street, Epping	Residential	257 units	0.19 per unit	0.15 per unit	0%	49	39
	Commercial	591 sqm GFA	1.03 per 100m2 GFA	0.84 per 100m2 GFA	10%	5	4
	Retail	438 sqm GFA (350 sqm GLFA [1])	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA	20%	4	11
	SubTotal					**58**	**54**
59 Beecroft Road, Epping	Residential	117 units	0.19 per unit	0.15 per unit	0%	22	18
	Commercial	1,847 sqm GFA	1.03 per 100m2 GFA	0.84 per 100m2 GFA	10%	17	14
	Retail	3,262 sqm GFA (2,610 sqm GLFA [1])	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA	20%	27	84
	SubTotal					**66**	**116**
48 - 54 Rawson Street,Epping	Residential	123 units	0.19 per unit	0.15 per unit	0%	23	18
	Retail	1,370 sqm GFA (1,096 sqm GLFA [1])	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA	20%	11	35
	SubTotal					**34**	**53**
Total						**249**	**296**
245-250 Beecroft Road	*Development expected to reduce traffic compared to existing site, hence excluded from assessment*						

[1] Specialty retail GLFA assumed to equate to 80 per cent GFA, in accordance with Small Suburban Shopping Centres Analysis report ("Analysis Report") prepared by Bitzios on behalf of Transport for NSW dated 7 November 2018

Table 8.9 indicates the approved, proposed and potential background developments throughout Epping Town Centre could result in 249 and 296 vehicle trips in the AM and PM peak hours, respectively. When considering that 25 per cent of retail traffic is passing trade and hence while they are included in the total generation, they are not "new" trips on the road network, the background developments could actually result in an uplift of 240 and 263 new vehicle trips respectively in the AM and PM peak hours.

The directional distribution and assignment of traffic generated has been adopted based on assumptions outlined in Section 8.3.

Based on the above, the estimated increase in turning movements near the site following development of approved, proposed and potential background developments throughout Epping Town Centre in the AM and PM peak hours are summarised at Appendix D.

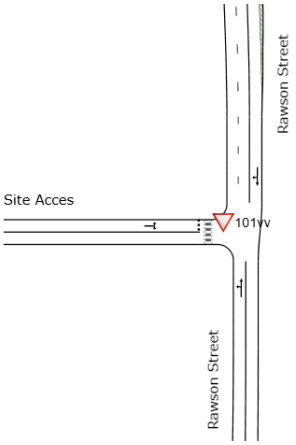
8.5 Rawson Street Arrangement

8.5.1 Site Vehicle Access

As discussed in Section 4.2, a single consolidated driveway will be provided along the southern boundary of the site to form the primary vehicular access into the basement car park and loading dock.

For the purpose of this assessment, the indicative site access layout is provided at Figure 8.8.

Figure 8.8 – Potential site access layout – priority controlled



Pedestrian volumes across the western leg of the intersection of 650 and 770 have been adopted for the assessment respectively in the AM and PM peak hours. This includes consideration for existing pedestrian volumes, the transfer of some vehicles from parking within the adjacent Council car park to parking on site to visit the supermarket asset, and an additional 245 and 250 pedestrians generated by the proposed development based on outcomes from the trip generation assessment outlined in Section 5.

8.5.2 Proposed Mitigation – Pedestrian Operated Signals

The existing pedestrian crossing along Rawson Street results in notable peak period queueing, particularly in the PM peak period, and operates close to practical capacity as detailed in Section 2.4.3. This pedestrian crossing presents a key challenge in accommodating an uplift in traffic along Rawson Street and hence the development proposes to deliver pedestrian operated signals at this location. This would provide a significant improvement to the operation of Rawson Street, improving access to both existing and potential developments within the Town Centre.

The design of the signals could be developed as part of future development applications, however would naturally require suitable kerb build outs to provide adequate pedestrian queueing area. For the purpose of this assessment, the signals have been coded as practical cycle time, with a maximum cycle time of 60 seconds.

It is noted that site observations indicate that less vehicles turn right out of the Council car park (and hence the future site access) during peak periods to avoid localised congestion at this midblock crossing, increasing reliance on the Rawson Street/ Carlingford Road intersection and reducing incentives for vehicles to take advantage of the local collector road networks as avenues to feed back onto the arterial road network. To ensure a conservative assessment, the potential redistribution of traffic away from the Rawson Street/ Carlingford Road intersection has not been considered.

8.6 Traffic Impact

8.6.1 Overview

A detailed summary of anticipated future operation of key intersections in the network in the AM and PM peak periods for each modelling scenario, without and with mitigation measures, are presented respectively in Section 8.6.2 and 8.6.3, with a summary of all modelling results presented in Section 0.

8.6.2 Detailed Modelling Results

Table 8.10 presents a summary of the operation of the key intersections post development, with full results presented in Appendix E.

Table 8.10: Scenario 2 operation – post development operating conditions

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Beecroft Rd	AM	0.98	52	207	LOS D
	PM	1.00	54	277	LOS D
Carlingford Rd/ Ray Rd/ Rawson St	AM	1.55	53	157	LOS D
	PM	0.83	33	114	LOS C
Carlingford Rd/ Midson Rd	AM	0.92	56	143	LOS D
	PM	0.97	57	171	LOS E
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	0.96	29	170	LOS C
	PM	0.99	50	289	LOS D
Rawson Street/ Bridge St	AM	0.74	22	24	LOS B
	PM	0.74	19	27	LOS D=B
Rawson Street Site Access	AM	0.24	14	4	LOS A
	PM	0.51	17	10	LOS B
Rawson Street pedestrian crossing (signalised)	AM	0.61	10	34	LOS A
	PM	0.52	10	27	LOS A

Table 8.10 indicates that most intersections are expected to operate similar to the existing condition, with overall average delays increasing by up to four seconds at any intersection, with exception of the Rawson Street/ Carlingford Road/ Ray Road intersection during each peak and Epping Road/ Blaxalnd Road/ Beecroft Road/ Langston Place intersection in the PM peak period. Given the right turn from Rawson Street is already operating close to capacity in each peak period, and noting the limited storage available on the western edge of Carlingford Road / Beecroft Road intersection to accommodate additional vehicles, any uplift in demands places pressure on the performance of the intersection. This is seen with the degree of saturation increasing from 0.95 to 1.55 in the AM peak period, and with the overall intersection delays expected to increase by around 16 and seven seconds in the AM and PM peak periods, respectively. Similarly, the Epping Road/ Blaxalnd Road/ Beecroft Road/ Langston Place intersection operates close to capacity particularly during the PM peak period, as shown with degree of saturation of 0.99, and hence any incremental increase in traffic results in additional delays, with overall intersection delays increasing by seven seconds.

Table 8.12 presents a summary of the operation of the key intersections following further development uplift within Epping Town Centre, without the development, with full results presented in Appendix E. As already discussed, the Rawson Street pedestrian crossing operates close or at capacity during both peak hours. With this in mind, and as shown in Table 8.12, any uplift of development along Rawson Street results in the crossing operating over capacity. When this occurs in a network model, vehicles that cannot pass through the crossing are considered as “unreleased demand” in the network and can result in upstream intersections appearing to operate better due to the reduced demand on an approach. As such, the pedestrian crossing has been removed from the network model to ensure this effect does not impact the actual performance of key intersections, including Carlingford Road/ Rawson Street/ Ray Road.

Table 8.11: Scenario 3 operation – development uplift in Epping Town Centre generally, without development conditions

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Beecroft Rd	AM	1.00	50	216	LOS D
	PM	1.01	60	321	LOS E
Carlingford Rd/ Ray Rd/ Rawson St	AM	1.25	47	181	LOS D
	PM	0.82	31	114	LOS C
Carlingford Rd/ Midson Rd	AM	0.91	57	147	LOS E
	PM	0.96	55	158	LOS D
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	0.98	31	176	LOS C
	PM	1.03	69	388	LOS E
Rawson Street/ Bridge St	AM	0.69	18	20	LOS B
	PM	0.39	8	6	LOS A
Rawson Street pedestrian crossing (unsignalised)	AM	1.05	66	70	LOS E
	PM	1.20	195	191	LOS F

Table 8.11 indicates that following uplift of development within Epping Town Centre, and without the development, the Carlingford Road/ Beecroft Road intersection during both peak periods and Epping Road/ Blaxland Road/ Beecroft Road intersection doing the PM peak hour will operate near or at capacity with LOS D or E and with a degree of saturation of just over 1.00. This is a result of the intersections already operating with high degree of saturations of 0.96 to 0.98.

Similar to scenario 2, the Rawson Street/ Carlingford Road intersection operates well in the PM peak hour and at capacity in the PM peak hour, however the right turn operates with a degree of saturation at 1.25.

Table 8.12 presents a summary of the operation of the key intersections post development and following further development uplift within Epping Town Centre, with full results presented in Appendix E.

Table 8.12: Scenario 4 operation – development uplift in Epping Town Centre generally and post development conditions

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Beecroft Rd	AM	1.01	55	227	LOS D
	PM	1.02	59	299	LOS E
Carlingford Rd/ Ray Rd/ Rawson St	AM	1.90	74	181	LOS F
	PM	0.89	40	140	LOS C
Carlingford Rd/ Midson Rd	AM	0.92	59	147	LOS E
	PM	1.00	62	186	LOS E
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	0.97	31	186	LOS C
	PM	1.02	67	385	LOS E
Rawson Street/ Bridge St	AM	0.80	27	29	LOS B
	PM	0.85	28	41	LOS B
Rawson Street Site Access	AM	0.40	16	4	LOS B
	PM	0.58	20	11	LOS B
Rawson Street pedestrian crossing (signalised)	AM	0.64	10	37	LOS A
	PM	0.57	9	31	LOS A

Table 8.12 indicates that with both the proposed development and uplift of background traffic within Epping Town Centre, the intersections are expected to operate in a similar condition to scenario 3.

8.6.3 Mitigation Measures

Three additional scenarios have been explored with various mitigation measures employed, exploring potential impacts of these measures on scenario 4 which has previously been documented. These scenarios are:

- 40 right turning vehicles redistributed to turn right at the Carlingford Road/ Midson Road intersection during the AM peak hour.
- Removing the pedestrian crossing on the eastern approach to the Carlingford Road/ Rawson Street/ Ray Road intersection.
- Triple Right Turn from Carlingford Road to Beecroft Road at the Carlingford Road/ Beecroft Road intersection.

Traffic Re-distribution

In Section 2.3.2, it is noted *"around 70 per cent of traffic turning right from Rawson Street onto Carlingford Road in the AM peak hour currently originate from areas outside of the town centre. As such, in reality the increased traffic generated from within the town centre will likely reduce the appeal of this route as an existing rat run and existing vehicles will likely re-route to access Carlingford Road via other available intersections, including Midson Road. Such an event is clearly evident in congested town centres such as Chatswood that have continued to develop without any significant increase in road network capacity, with the co-location of the railway / metro / bus interchange ensuring any new residents / workers and visitors have viable access to alternative modes of transport and therefore ensuring continued equitable access to travel without necessitating the need for road network upgrades throughout development."*

The assessment was prepared to ensure conservative results and has not allowed for any redistribution of existing background traffic. Notwithstanding, given Council's commentary and approval for this methodology and following commentary contained in the Transport Assessment, a scenario contemplating the redistribution of traffic from turning right at Rawson Street to turning right at an alternate location (Kent Street or Midson Road) has been completed. Currently, around 62 vehicles turn right from Rawson Street in the AM peak period, with up to 44 of those originating from out of the town centre.

With that in mind, the redistribution of right turning traffic has been explored in the mitigation modelling scenarios summarised in this section.

Removal of Pedestrian Crossing at Carlingford Road/ Rawson Street/ Ray Road Intersection

Following recommendations from Council in a letter dated 22 December 2023 (reference RZ/3/2023), a scenario considering the removal of the pedestrian crossing on the eastern approach to the Carlingford Road/ Rawson Street/ Ray Road intersection has been explored. Given the availability of two pedestrian crossing opportunities along Carlingford Road within 50 metres of this location, this is considered a suitable option.

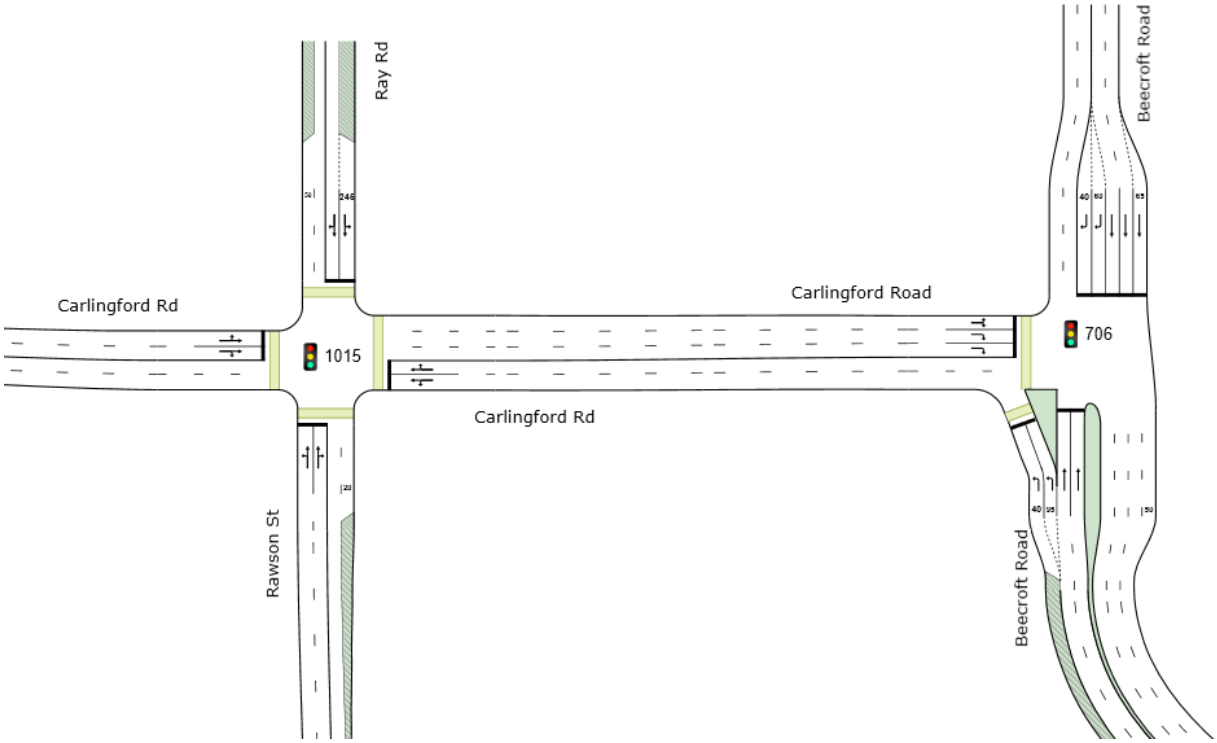
Triple Right Turn from Carlingford Road to Beecroft Road

Following Council direction set out in a letter dated 22 December 2023 (reference RZ/3/2023), a scenario involving lengthening the existing left turn slip lane from Carlingford Road onto Beecroft Road to provide a full length lane between Rawson Street and Beecroft Road, and conversion of the lane to allow both right and left turn movements from Carlingford Road onto Beecroft Road has been explored.

Due to the geometry of the Carlingford Road/ Beecroft Road intersection, it is expected that the inside radius of the centre lane cannot be altered (i.e. reduced) without impacting the ability for larger vehicles to turn right from this lane. As such, the kerb line along Beecroft Road its eastern edge/ south departure would need to be extended further east to accommodate a lane for vehicles to turn right from the new eastbound lane along Carlingford Road. Based on current land boundaries, it appears a minor allowance for a short departure lane on the southern approach has been catered for, such that on departure there are three full length lanes as per existing and one new short departure lane. For the purpose of this modelling, the additional short lane is expected to be 50 metres in length. Based on this arrangement, the new short lane would have no impact on the performance of Beecroft Road north approach and would only impact the performance of Carlingford Road.

An indicative layout is shown in Figure 8.9.

Figure 8.9 – Carlingford Road/ Beecroft Road indicative intersection geometry



Results have exclusively been provided for the operation of select key intersections, including Rawson Street/ Carlingford Road / Ray Road, Carlingford Road/ Beecroft Road and Carlingford Road/ Midson Road, given the mitigations generally do not impact performance at the other surrounding intersections.

Modelling results for the various scenarios above documented as follows:

- Traffic re-distribution only is shown in Table 8.13 (mitigation A).
- Traffic re-distribution and removal of pedestrian crossing is shown in Table 8.14 (mitigation B).
- Traffic re-distribution and triple right turn at Carlingford Road/ Beecroft Road is shown in Table 8.15 (mitigation C).
- Traffic re-distribution, removal of pedestrian crossing and triple right turn at Carlingford Road/ Beecroft Road is shown in Table 8.16 (mitigation D).

Detailed SIDRA results are included in Appendix E.

Table 8.13: Scenario 4 operation – redistribution of background traffic (Mitigation A)

Intersection	Peak Hour	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Ray Rd/ Rawson St	AM	South	1.38	127	70	LOS F
		East	0.50	22	50	LOS B
		North	0.91	61	89	LOS E
		West	0.92	53	199	LOS D
		Overall	**1.38**	**53**	**199**	**LOS D**
Carlingford Rd/ Beecroft Rd	AM	South	1.00	48	227	LOS D
		North	1.00	38	86	LOS C
		West	1.00	72	50	LOS F
		Overall	**1.01**	**52**	**227**	**LOS D**
Carlingford Rd/ Midson Rd	AM	South	0.89	59	105	LOS E
		East	0.92	60	146	LOS E
		North	0.92	67	81	LOS E

Intersection	Peak Hour	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
		West	0.91	58	147	LOS E
		Overall	**0.92**	**60**	**147**	**LOS E**

As shown in Table 8.13, redistribution of background traffic results in a significant uplift in the performance of the Carlingford Rd/ Ray Rd/ Rawson St intersection, improving from Level of Service F to D, with minimal impact to the operation of the Carlingford Rd/ Midson Rd intersection. It is noted that should Council proceed with updating the Carlingford Road/ Kent Street intersection, the traffic would likely redistribute to spread across both the Midson Road and Kent Street intersection, further minimising any associated impacts.

As such, the following results focus on mitigation measures assuming the redistribution of background traffic in the AM peak hour.

Table 8.14: Scenario 4 operation – redistribution of background traffic and removal of pedestrian crossing (Mitigation B)

Intersection	Peak Hour	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Ray Rd/ Rawson St	AM	South	0.98	53	53	LOS D
		East	0.56	28	55	LOS B
		North	0.72	39	71	LOS C
		West	1.01	106	274	LOS F
		Overall	**1.01**	**63**	**274**	**LOS E**
Carlingford Rd/ Beecroft Rd	AM	South	1.03	55	239	LOS D
		North	1.00	39	86	LOS C
		West	1.00	62	55	LOS E
		Overall	**1.03**	**52**	**239**	**LOS D**

Table 8.14 indicates that in both peak hours, the removal of the pedestrian crossing has limited benefit to the operation of the key intersections as an isolated mitigation measure.

During the AM peak hour, to better balance delays at the intersection, SIDRA redistributes phase time away from Carlingford Road and to Rawson Street/ Ray Road and while this significantly improves the operation of Rawson Street, with degree of saturations returning to near 1.00, the operation of Carlingford west approach degrades. Further, the degree of saturation and average delay at the Carlingford Road/ Beecroft Road intersection slightly increases. This is primarily a result of the model no longer having “unreleased demand” at the Carlingford Road/ Rawson Street/ Ray Road intersection, as indicated by the Degree of Saturations settling around 1.00.

Table 8.15: Scenario 4 operation – redistribution of background traffic and three lanes along Carlingford Road (Mitigation C)

Intersection	Peak Hour	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Ray Rd/ Rawson St	AM	South	1.00	63	48	LOS E
		East	0.54	26	50	LOS B
		North	0.80	52	72	LOS D
		West	0.98	86	250	LOS F
		Overall	**1.00**	**58**	**250**	**LOS E**
Carlingford Rd/ Beecroft Rd	AM	South	0.98	45	216	LOS D
		North	0.89	31	83	LOS C
		West	0.93	48	50	LOS D
		Overall	**0.98**	**42**	**216**	**LOS C**

Table 8.15 indicates that during both peak periods, the provision of three lanes along Carlingford Road results greater improvement to the operation of key intersections than the removal of pedestrian crossing on the eastern edge of the intersection.

Table 8.16: Scenario 4 operation – redistribution of background traffic, removal of pedestrian crossing and three lanes along Carlingford Road (Mitigation D)

Intersection	Peak Hour	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
Carlingford Rd/ Ray Rd/ Rawson St	AM	South	0.97	57	48	LOS E
		East	0.55	27	55	LOS B
		North	0.68	44	60	LOS D
		West	0.99	91	257	LOS F
		Overall	**0.99**	**58**	**257**	**LOS E**
Carlingford Rd/ Beecroft Rd	AM	South	0.98	45	216	LOS D
		North	0.89	31	83	LOS C
		West	0.93	43	55	LOS D
		Overall	**0.87**	**40**	**216**	**LOS C**

Table 8.16 indicates that the combination of both mitigations, being the provision of three lanes along Carlingford Road between Rawson Street and Beecroft Road and removal of the pedestrian crossing on the eastern approach to the Carlingford Road/ Rawson Street/ Ray Road intersection, results in the best overall performance of key intersections.

It is expected this is due to the following:

- The removal of the pedestrian crossing results in greater “effective green time” for left turning vehicles from Ray Road and right turning vehicles from Rawson Street. However, Ray Road still has priority over Rawson Street and therefore given the uplift in vehicles expected on this movement, they are occupying the storage capacity along Carlingford Road
- The provision of three lanes therefore provides greater opportunity for vehicles from Rawson Street to turn onto Carlingford Road, as vehicles from Ray Road would preference turning into the two kerb side lanes, and vehicles from Rawson Street would preference turning into the two centre lanes.

As already noted, SIDRA has attempted to balance delays at the Carlingford Rd/ Ray Rd/ Rawson St intersection through redistributing phase time away from Carlingford Road and towards Rawson Street/ Ray Road. A scenario locking the phase times against the original Scenario 4 phase times indicates that the key intersections with mitigations will operate better than the without mitigation scenarios, with Rawson Street/ Ray Road/ Carlingford Road operating with a Degree of Saturation 1.23, average delay of 45 seconds and Level of Service D.

8.6.4 Traffic Impact Summary

Table 8.17 provides a summary of the overall Level of Service (LOS) estimated at each modelled intersection on the network. Table 8.17 provides a summary of the overall Level of Service (LOS) estimated at each modelled intersection on the network, based on the four mitigation measures applied to scenario 4 respectively as detailed previously.

Table 8.17: Summary of network results – AM and PM peak period level of service estimates

Intersection	Peak	Level of Service			
		Existing	Scenario 2	Scenario 3	Scenario 4
Carlingford Rd/ Beecroft Rd	AM	D	D	D	D
	PM	D	D	E	E
Carlingford Rd/ Ray Rd/ Rawson St	AM	C	D	D	F
	PM	B	C	C	C
Carlingford Rd/ Midson Rd	AM	D	D	E	E
	PM	D	E	D	E
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	C	C	C	C
	PM	D	D	E	E
Rawson Street/ Bridge St	AM	B	B	B	B
	PM	B	B	A	B
Rawson Street pedestrian crossing (signalised)	AM	C [1]	A [2]	E [1]	A [2]
	PM	C [1]	A [2]	F [1]	A [2]
Rawson Street Site Access	AM	N/a	A	N/a	B
	PM	N/a	B	N/a	B

[1] Unsignalised pedestrian crossing, as per existing condition
[2] Signalised pedestrian crossing

Table 8.18: Summary of network results – AM and PM peak period level of service estimates (continued)

Intersection	Peak	Level of Service			
		Scenario 4 Mitigation A	Scenario 4 Mitigation B	Scenario 4 Mitigation C	Scenario 4 Mitigation D
Carlingford Rd/ Beecroft Rd	AM	D	D	C	C
Carlingford Rd/ Ray Rd/ Rawson St	AM	D	E	E	E
Carlingford Rd/ Midson Rd	AM	E	E	E	E
Epping Rd/ Blaxland Rd/ Beecroft Rd	AM	C	E	C	C
Rawson Street/ Bridge St	AM	B	B	B	B
Rawson Street pedestrian crossing (signalised)	AM	A	A	A	A
Rawson Street Site Access	AM	N/a	N/a	N/a	N/a

Figure 8.10 through to Figure 8.17 illustrate the level of service estimates for the various intersections. The intersections are labelled as per the following:

1. Carlingford Rd/ Beecroft Rd
2. Carlingford Rd/ Ray Rd/ Rawson St
3. Carlingford Rd/ Midson Rd
4. Epping Rd/ Blaxland Rd/ Beecroft Rd
5. Rawson Street/ Bridge St
6. Rawson Street pedestrian crossing (signalised)
7. Rawson Street Site Access.

Figure 8.10 – Existing level of service estimates

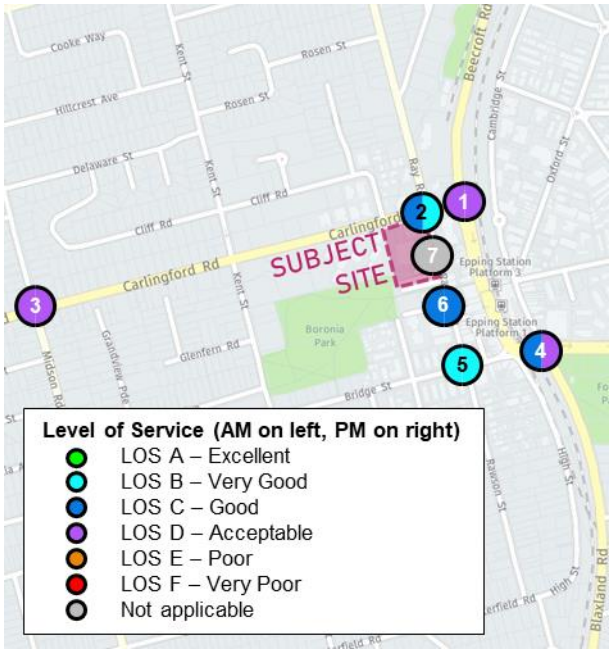


Figure 8.11 – Scenario 2 level of service estimates

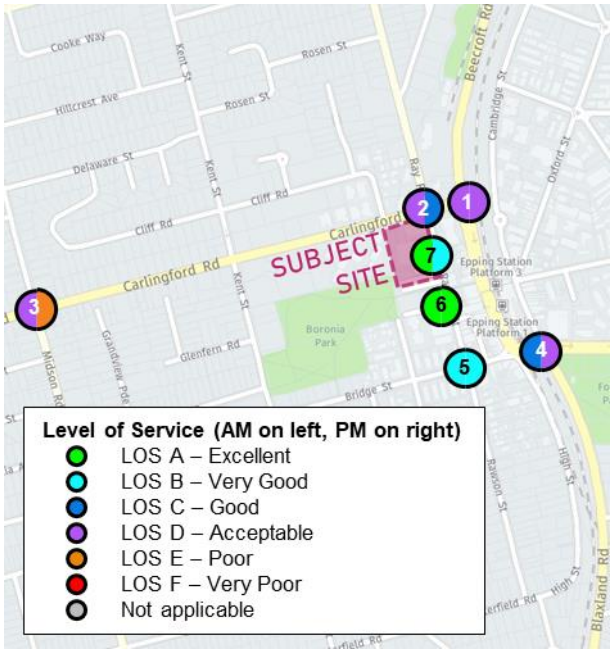


Figure 8.12 – Scenario 3 level of service estimates

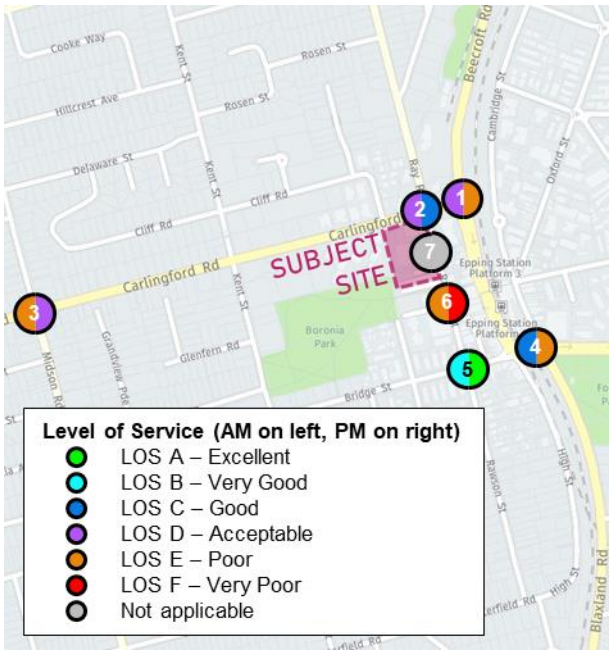


Figure 8.13 – Scenario 4 level of service estimates

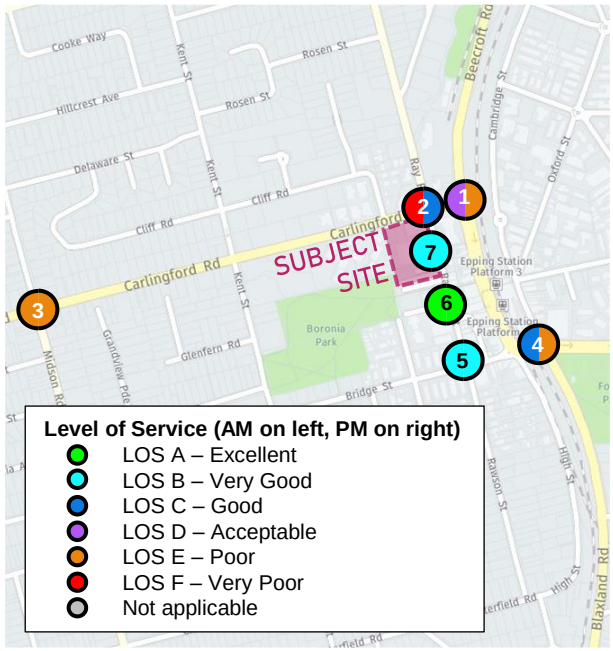


Figure 8.14 – Scenario 4 Mitigation A level of service estimates

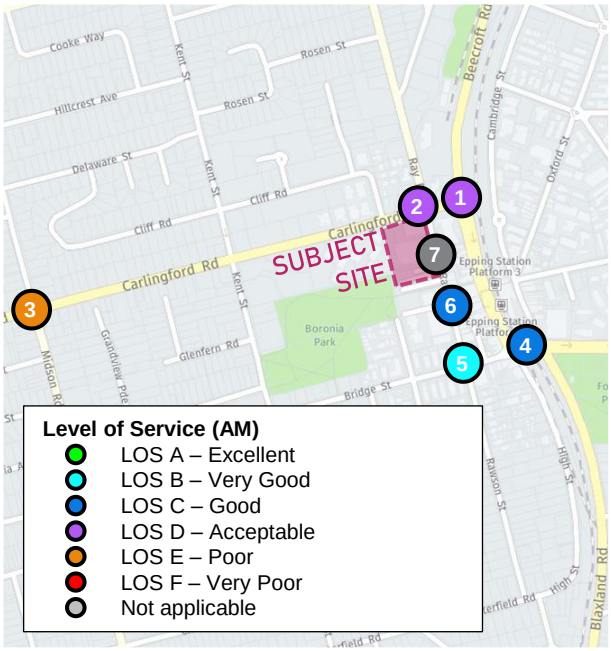


Figure 8.15 – Scenario 4 Mitigation B level of service estimates

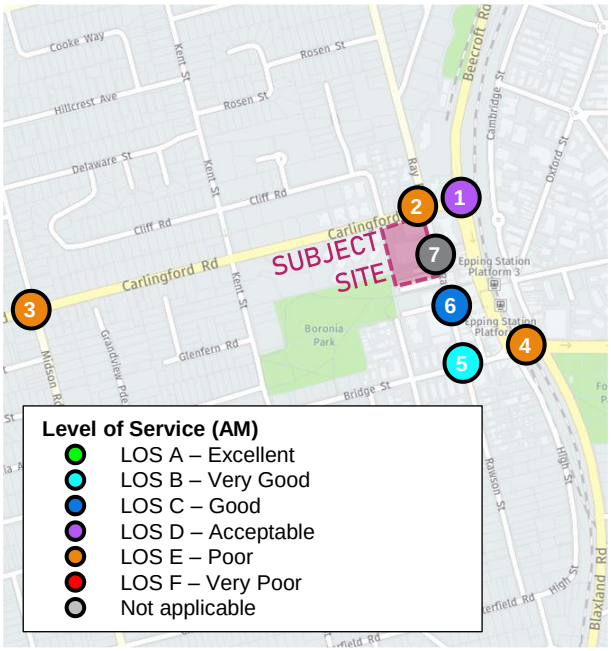


Figure 8.16 – Scenario 4 Mitigation C level of service estimates

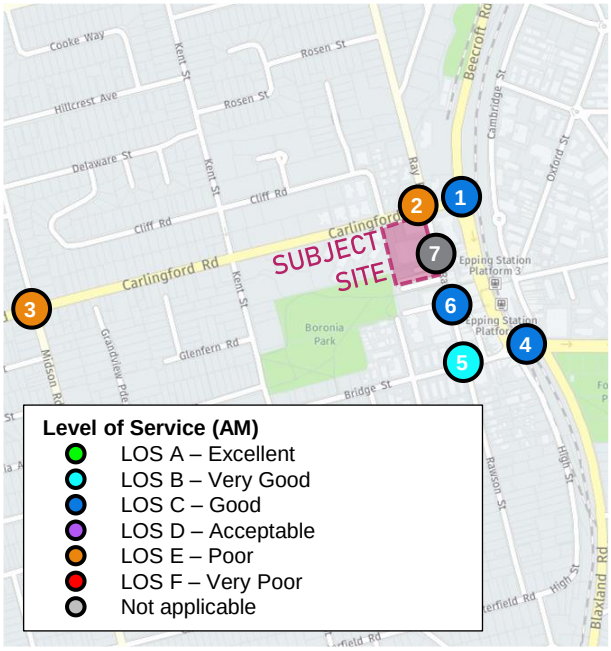
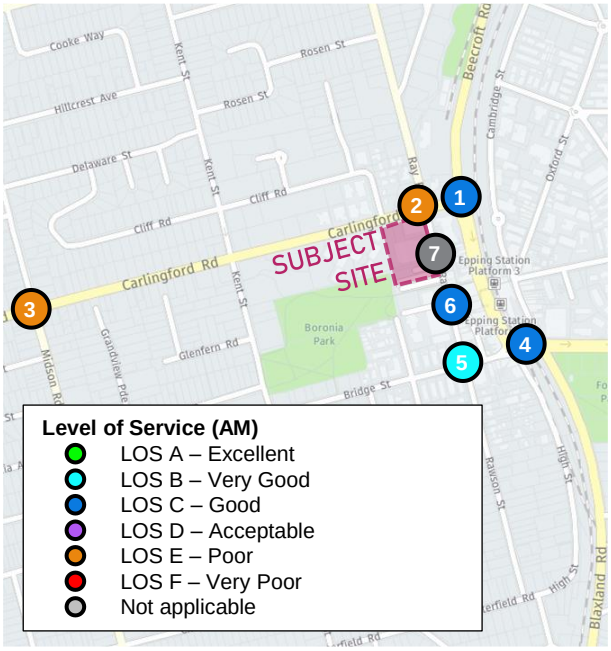


Figure 8.17 – Scenario 4 Mitigation D level of service estimates



Traffic analysis presented in this report and as summarised above indicates it is clear the development has a relatively minor impact on the operation of surrounding intersections, with or without background traffic growth from developments within the town centre, with exception of the Carlingford Road/ Rawson Street/ Ray Road intersection during the AM peak hour specifically due to the limited capacity of the right turn from Rawson Street to Carlingford Road to accommodate an uplift in traffic. Notwithstanding, the provision of a third eastbound lane along Carlingford Road between Rawson Street and Beecroft Road would result in increased capacity for vehicles exiting Rawson Street and allow for similar performance of the intersection under scenario two, however may not deliver enough capacity to accommodate all potential development within the town centre under scenario four.

As discussed in Section 2.3.2, around 70 per cent of traffic turning right from Rawson Street onto Carlingford Road in the AM peak hour currently originate from areas outside of the town centre. As such, in reality the increased traffic generated from within the town centre will likely reduce the appeal of this route as an existing rat run and existing vehicles will likely re-route to access Carlingford Road via other available intersections, including Midson Road. Such an event is clearly evident in congested town centres such as Chatswood that have continued to develop without any significant increase in

road network capacity, with the co-location of the railway / metro / bus interchange ensuring any new residents / workers and visitors have viable access to alternative modes of transport and therefore ensuring continued equitable access to travel without necessitating the need for road network upgrades throughout development.

It is also noted that this assessment is conservative, allowing for greater uplift in development at sites within Epping Town Centre including 59 Beecroft road, noting the recent refusal of this development, 245 to 250 Beecroft Road which is expected to result in a reduction to traffic generated by this site, and 242 to 244 Beecroft road whose detailed development application results in less residential units (60 units) and commercial floor area (70 square metres) compared to the approved concept application.

Further, additional traffic expected to turn right from Rawson Street onto Carlingford Road would also likely reduce given the performance of this approach, with vehicles intending to travel north using routes such as Ray Road and Kandy Avenue, as well as less (if any) retail traffic traveling to and from the east given availability of other retail assets that may result in lower travel times for users and therefore hold more appeal.

In the context of the broader aspirations surrounding development within Epping Town Centre, as well as aspirations surrounding development that promotes sustainable travel given proximity to a rail and bus interchange and integrated land uses that co-locates jobs, housing and retail, thereby containing trips internally to Epping, the impacts of the Planning Proposal can, on this assessment be satisfactorily managed.

8.6.5 Site Access Operation

The operation of the site access, including all relevant approaches, is presented in Table 8.19 for scenario 2 and 4. Results are consistent in with and without mitigation at Carlingford Road with full results presented in Appendix E.

Table 8.19: Post development – site access operating conditions

Scenario	Peak Period	Approach	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
2 (With development and without background traffic growth)	AM	South	0.35	6	5	LOS A
		North	0.24	14	4	LOS A
		West	0.36	14	4	LOS A
	PM	South	0.39	8	7	LOS A
		North	0.29	16	6	LOS B
		West	0.51	17	8	LOS B
4 (With development and background traffic growth)	AM	South	0.32	8	3	LOS A
		North	0.31	15	4	LOS B
		West	0.40	16	4	LOS B
	PM	South	0.43	10	8	LOS A
		North	0.35	19	9	LOS B
		West	0.58	20	11	LOS B

Table 8.19 indicates the site access is expected to operate well and with significant spare capacity in all scenarios. Results are based on the worst performing movements on each approach, and hence represent the right turn from north, right turn from west and left turn from south. As shown, these turning movements are expected to operate with low average queues of up to 11 metres. As such, the intersection could not be expected to impact the operation of the adjacent Rawson Street/ Carlingford Road/ Ray Road intersection.

8.7 Proportional Increase in Traffic Volumes

Overall, the proposed modification traffic anticipated to travel through the key surrounding intersections is expected to be minor.

A summary of the proportional increase in traffic through the study intersections is detailed in Table 8.20.

Table 8.20: Summary of estimated traffic volumes

Intersection	AM Peak Hour			PM Peak Hour		
	Existing Traffic	Uplift in Development Traffic	% change from existing	Existing Traffic	Uplift in Development Traffic	% change from existing
Rawson St/ Carlingford Rd/ Ray Rd	2,641	83	**3%**	2,485	73	**3%**
Carlingford Rd/ Midson Rd	2,826	38	**1%**	2,901	20	**1%**
Carlingford Rd/ Beecroft Rd	4,655	46	**1%**	4,166	30	**1%**
Epping Rd/ Blaxland Rd/ Langston Pl	4,879	48	**1%**	4,512	41	**1%**

This indicates that the proposal would likely contribute to an uplift of one per cent traffic for all relevant signlaised intersections, with exception of the Rawson Street/ Carlingford Road/ Ray Road intersection where it would likely contribute to an uplift of three per cent traffic compared to existing traffic volumes.

9. Overview Green Travel Plan

9.1 Introduction

9.1.1 Travel Plan Framework

Transport is a necessary part of life which has effects that can be managed. The transport sector is one of the fastest growing emissions sectors in Australia and therefore a travel plan provides an opportunity for reducing greenhouse gases, and for managing traffic congestion (which has adverse economic, health and social outcomes). As well as delivering better environmental outcomes, providing a range of travel choices with a focus on walking, cycling and public transport will have major public health benefits and will ensure strong and prosperous communities.

The physical infrastructure being provided as part of any development is only part of the solution. A green travel plan (GTP) will ensure that the transport infrastructure, services, and policies both within and external to the site are tailored to the users and co-ordinated to achieve the most sustainable outcome possible.

9.1.2 What is a Green Travel Plan

A GTP is a package of actions and strategies aimed at encouraging sustainable modes of transport such as walking, cycling, public transport and higher-occupancy car use for travel. They aim to mitigate (as far as possible) private car commuting to allow people to carry out their daily business in a more sustainable manner using the following:

- measures which encourage reduced car use (disincentives or 'sticks')
- measures which encourage or support sustainable travel (such as active transport, public transport, and multi-occupant vehicle use)
- measures to reduce the need to travel or make travelling more efficient (incentives or 'carrots').

A GTP seeks to:

- advise residents, staff and visitors on the wider travel choices available to them and encourage use of sustainable travel modes
- aim to reduce congestion on the surrounding road network by causing mode shift from private vehicles, or at the very least encourage higher vehicle occupancy to reduce private vehicle trips.

9.1.3 Key Objectives

The aim of the GTP is to bring about better transport arrangements for living and working at the site. The key objectives of the plan are:

- to encourage walking
- to encourage cycling
- to encourage the use of public transport
- to reduce the use of the car, in particular single car occupancy
- where it is necessary to use the car, encourage more efficient use.

It is the intention therefore that the travel plan would deliver the following benefits:

- enable higher public and active travel mode share targets to be achieved
- contribute to greenhouse gas emission reductions and carbon footprint minimisation
- contribute to healthy living for all
- contribute to social equity and reduction in social exclusion
- improve knowledge and contribute to learning.

9.1.4 Site Specific Measures

Implementation of a GTP would benefit from the established pedestrian network surrounding the site, as well as the high frequency of bus and train services that run near it. A GTP would put in place measures to raise awareness and further influence the travel patterns of people living, working or visiting the site with a view to encouraging modal shift away from cars.

The following potential measures and initiatives could be implemented to encourage more sustainable travel modes:

- Limiting on-site parking provision.

- Open up shortcuts for pedestrian access through the site.
- Providing a car sharing pod(s) on-site and promoting the availability of car sharing pods for trips that require the use of private vehicles.
- Providing bicycle facilities including secure bicycle parking for staff, bicycle racks/ rails for visitors and shower and change room facilities.
- Ensure bicycle parking is clearly visible or provide signage to direct people to cycle bays.
- Provide a Travel Access Guide (TAG) which would be provided to all residents and staff and publicly available to all visitors. The document would be based on facilities available at the site and include detail on the surrounding public transport services and active transport initiatives. The TAG would be updated as the surrounding transport environment changes.
- Providing public transport information boards/ apps to inform residents, staff and visitors of alternative transport options (the format of such information boards would be based upon the TAG).
- Encouraging staff that drive to work and park on surrounding roads to carpool through creation of a carpooling club or registry/ forum.
- Regularly promoting ride/ walk to workdays.
- Providing a regular newsletter to all residents and staff members bringing the latest news on sustainable travel initiatives in the area.

9.1.5 Travel Access Guide

A TAG provides information to residents, staff and visitors on how to travel to the site using sustainable transport modes such as walking and public transport. The information is presented visually in the format of a map (or app) showing the site location and nearby transport modes highlighting available pedestrian and cycle routes. The information is usually presented as a brochure (or app) to be included in a welcome pack or on the back of company stationery and business cards.

9.1.6 Information and Communication

Several opportunities exist to provide residents, staff and visitors with information about nearby transport options. Connecting residents, staff and visitors with information would help to facilitate journey planning and increase their awareness of convenient and inexpensive transport options which support change in travel behaviour. These include:

- Transport NSW provides bus, train and ferry routes, timetables and journey planning through their Transport Info website: http://www.transportnsw.info.
- Council provides a number of services and a range of information and events to encourage people of all levels of experience to travel by bicycle.
- In addition, connecting residents, staff and visitors via social media may provide a platform to informally pilot new programs or create travel-buddy networks and communication.

9.1.7 Monitoring of the GTP

There is no standard methodology for monitoring the GTP, but it is suggested that it be monitored to ensure that it is achieving the desired benefits and modify it if required. It will not be possible at this stage to state what additional modifications might be made as this will be dependent on the particular circumstances prevailing at that time.

The GTP should be monitored on a regular basis, e.g., yearly, by carrying out travel surveys. Travel surveys will allow the most effective initiatives of the GTP to be identified, and conversely less effective initiatives can be modified or replaced to ensure the best outcomes are achieved. It will clearly be important to understand people's reasons for travelling the way they do: - any barriers to changing their behaviour, and their propensity to change.

To ensure the successful implementation of the GTP, a Travel Plan Coordinator (TPC) should be appointed to ensure the successful implementation of the GTP. This could be the building manager or a member of the body corporate.

10. Conclusion

The following conclusions are made based on the analysis and discussions presented within this report:

- It is proposed to amend the planning controls in the Parramatta Local Environment Plan (LEP) 2023 to permit mixed-use development on land currently zoned E1 (Local Centre) and increase the maximum floor space ratio and height controls that currently apply to the site.
- A key strategic merit of the development is the opportunity to promote sustainable travel given the high-density mixed-use nature of the development within a strategic centre; and within 200 metres of a rail interchange that provides convenient access to local and regional residential, commuter, retail and recreational centres.
- The development also has the potential to make a positive contribution to the surrounding area by providing a new retail precinct at the gateway to Epping Town Centre with a supermarket and speciality retail offerings, as well as an expanded and permeable public domain.
- The indicative development yield is around 420 apartments and around 13,677 square metres of non-residential uses.
- It is recommended that car parking for the future land uses be provided in accordance with the requirements of the Parramatta DCP 2011.
- It is recommended that bicycle parking for the future land uses be provided in accordance with the requirements of the Parramatta DCP 2011.
- The site loading strategy, including a basement loading dock with six loading bays, is expected to have capacity for the anticipated loading demands of the development.
- The design currently allows for a single consolidated driveway along the southern boundary of the site at Rawson Street aligned with the DCP 2011 service lane. It is recommended the service lane is extended to Carlingford Road and developed as the primary vehicular access for service vehicles only into the loading dock. During flood events, controls could be implemented including through use of boom gates to close the Carlingford Road access, with service vehicles directed to use the Rawson Street access instead.
- The proposed parking layout and loading areas will be progressed as part of future staged development applications to be consistent with the dimensional requirements as set out in DCP 2011 and Australian/New Zealand Standard for Off Street Car Parking (AS/NZS2890.1:2020, AS/NZS2890.2:2018 and AS/NZS2890.6:2022).
- The proposed development could be expected to generate in the order of 309 and 559 vehicle trips respectively in the AM and PM peak hours (including service vehicle trips). When considering that 25 per cent of retail traffic is passing trade and hence while they are included in the total generation, they are not “new” trips on the road network, the development results in 273 and 450 “new” vehicle trips respectively in the AM and PM peak hours.
- The proposed site will have a net increase in vehicle generation of around 132 and 138 new vehicle trips respectively in the AM and PM peak hours compared to existing land uses on site.
- For existing road infrastructure - any potential adverse effects from land use development proposals on road safety and operational efficiency are identified. The project team would work with Transport for NSW and Council to agree operational and physical improvements to the Rawson Street/ Carlingford Road/ Ray Road intersection. Potential measures have been identified which can be accommodated within the existing road configuration, subject to some minor encroachment on the property at 246 Beecroft Road. With these mitigation measures, the key intersections surrounding the site are expected to operate satisfactorily in the weekday peak periods in the scenario without uplift in background traffic growth. In the scenario with uplift in background traffic growth, the right turn from Rawson Street onto Carlingford Road would continue to operate over capacity. Notwithstanding, noting that 70 per cent of existing traffic turning right at this intersection originate from outside the town centre, it is expected that further development of the town centre will merely reduce the appeal of this route as a “rat run” and external vehicles will re-route, ensuring the right turn continues to operate at or near capacity.
- The Rawson Street access is expected to operate well and with spare capacity in both peak periods.
- The proposed traffic anticipated to travel through the key surrounding intersections is expected to be minor, contributing up to three per cent additional traffic compared to existing traffic volumes.
- As part of further planning stages, it is recommended a Resident or Green Travel Plan is prepared to minimise the reliance on single occupancy car journeys to and from the site. Mode share targets should reflect the observed changing behaviour in travel for those living or working within the Epping Town Centre precinct. The development has many of the characteristics required to continue that emerging trend. These characteristics together with commitments to green travel under the guidance of a suitable Green Travel plan should perpetuate growth towards more sustainable forms of travel and achieve identified targets.

- From a transport perspective, the proposed development does not raise specific issues with respect to impacts on the area or transport network nor unnecessarily affect existing land uses. It realises a definitive need for mixed-use developments within Epping Town Centre and encourages a decrease in car dependency and uptake of sustainable transport.

Appendix A. Stakeholder Consultation

A.1 Original Scoping Study

Memo

To:	Justin Micallef Oakstand	From:	Chris Wilson Stantec Australia Pty Ltd
Project/File:	301400281/ N210130	CC.:	Ingrid Bissaker Stantec Australia Pty Ltd
Page 1 of:	8	Date:	27 September 2022

Reference: EPPING TOWN CENTRE – TRANSPORT IMPACT REVIEW METHODOLOGY

A key component of development planning in association with land located at 53-61 Rawson Street, Epping, is the traffic and transport impact of the proposal on the local environs and surrounding transport system. Oakstand on behalf of Canjs engaged Stantec to assess the likely transport impacts of the proposed development on the surrounding transport network, as well as understand impacts of other nearby developments within Epping Town Centre, primarily along Rawson Street.

Stantec has carried out on going works and investigations as it relates to understanding the transport issues and opportunities which exist in the Epping Town Centre area. This includes the collation of traffic data recorded between 2019 and 2021, preparation of SIDRA intersection models for existing and future growth year scenarios (2031), site inspections and the completion of a series of virtual consultation meetings with stakeholders (Council and Transport for NSW). Outcomes of works complete to date have been relied upon to inform the depth and breadth of the proposed methodology to evaluate the transport impact of the proposal.

To assist agency evaluation of the re-development proposal, this letter sets out our proposed transport impact assessment methodology including the proposed process, procedures, inputs and selected analytic modelling tools. Stantec is seeking agency support for the assumptions, inputs, process and methodology proposed and described in this letter before proceeding with preparing a detailed Transport Impact Assessment report for submission with the Planning Proposal.

This letter sets out the following:

- Subject site location
- Other relevant Transport Studies
- Development proposal
- Transport modelling methodology, including the process, procedures, inputs and selected analytic modelling tools
- Design development methodology.

Reference: EPPING TOWN CENTRE – TRANSPORT MODELLING

1 Subject Site Location

The location of the subject site and immediate surrounds is provided as context at Figure 1.

Figure 1: Site context

Source: Nearmap, accessed August 2022

2 Other Relevant Transport Studies

In November 2014, Stantec (formerly GTA Consultants) prepared a report for Oakstand documenting a review of potential future traffic conditions for the Epping Town Centre Study. At the same time, AECOM also prepared a traffic study for the redevelopment of Epping Town Centre for the Winten Lyon Group. Following receipt of separate submissions from Oakstand and the Winten Lyon Group Parramatta City Council (Council) prepared a Study Brief for a combined traffic impact study to be undertaken by Stantec and AECOM for both sites. The purpose of the joint traffic study was to provide a consistent approach on the assessment of potential future traffic conditions with different development scenarios for Epping Town Centre, including consideration of various land use and access scenarios.

Assumptions on development yields, traffic generation rates and trip reduction rates were submitted to Council and approved in July 2015. Following agreement on these matters, Stantec developed base models in LinSig for each scenario and conducted the assessment.

The assessment[1] involved a comparison of the network and intersection performance statistics of a number of land use scenarios and sub-options for the development, connectivity and road network improvements within Epping Town Centre. Key findings from the assessment include:

- The performance of the Epping Town Centre road network during peak hours is significantly influenced by the very high volumes of regional traffic passing through the Epping Road–Beecroft Road–Carlingford Road corridor.

[1] Proposed Epping Town Centre Redevelopment, Rawson Street Epping, Traffic Study Issue A, GTA Consultants reviewed by AECOM, dated 24 November 2015

- Presently the intersections of Carlingford Road/Beecroft Road and Rawson Street/Carlingford Road operate beyond capacity. The Epping Town Centre relies on Rawson Street as its principal access and accordingly the situation is becoming untenable with the high levels of traffic congestion restricting proper access.
- The development of Epping Town Centre under Council's DCP controls is forecast to generate approximately the same level of PM peak traffic (1,000 vehicles per hour) as currently experienced. This is because traffic generated by the proposed residential apartments would be offset by a reduction in commercial floor space.
- The overall performance of the network resulting from the various land use scenarios investigated, as indicated by average vehicle delays, fall within a relatively narrow range. This is mainly due to the situation in Epping Town Centre that the differences between the various land use scenarios become relatively minor in comparison with the very high volumes of regional traffic passing through during peak periods.

3 Development Overview

The proposed redevelopment will comprise a mixed use development including residential, retail and commercial land uses. The proposed land uses are summarised in Table 1.

Table 1: Development scheme

Land Use	Land Use Scale
Residential	420 units
Office	1600 sqm GFA
Supermarket	3200 sqm GFA
Specialty Retail	4340 sqm GFA

Key transport elements of the development will include:

- basement car park and loading dock, with vehicular access provided from Rawson Street
- high-quality pedestrian experience with improved site permeability and pedestrian amenity ensured by way of expanded public domains, enhanced connectivity to the Rawson Street car park future development site, and strengthening desire lines to Epping Town Centre/ Railway Station.

A key strategic merit of the development is the opportunity to promote sustainable travel given the high-density mixed-use nature of the development within a strategic centre; and within 200 metres of a rail interchange that provides convenient access to local and regional residential, commuter, retail and recreational centres.

In addition, the integrated land uses provided across Epping Town Centre generally (existing, approved and future development) provide opportunities for co-location of jobs, housing and retail, providing opportunity to contain trips internally to Epping thereby minimising external traffic and continue to facilitate evenly split bi-directional trips for more equitable utilisation of public transport services and road infrastructure in and out of Epping Town Centre across the day.

4 Transport Modelling Methodology

Traffic Data Collection and Study Area

To date, weekday AM and PM peak hour traffic turning movement surveys have been commissioned at intersections within the vicinity of the subject site, including:

1. Carlingford Rd & Beecroft Rd
2. Carlingford Rd & Rawson St & Ray Rd
3. Carlingford Rd & Cliff Rd
4. Carlingford Rd & Bridge St.

Queue length surveys and Origin Destination surveys of the right turn at the Carlingford Road/ Rawson Street/ Ray Road intersection were also commissioned.

All data was collected on Thursday, 24 June 2021. Sydney was at this time, on the brink of returning into a partial and then full lock down due to COVID 19. SCATS traffic volume data was therefore procured at the above intersection location 1 and 2 for Wednesday 16 and Thursday 17 June 2021 and Thursday, 13 June 2019. This data has been compared to the surveys and it was found traffic volumes on 24 June 2021 were generally lower than volumes recorded on 16, 17 June 2021 and 13 June 2019. Further, there was only one per cent variance in peak period traffic volumes recorded on 16, 17 June 2021 and 13 June 2019. As such, for SIDRA modelling completed to date, the existing condition has adopted traffic volumes based on the Wednesday 16 June 2021 SCATS traffic volume data, with the relative split of each turning movement determined based on the recent survey data where required.

To understand changes to traffic patterns throughout Epping Town Centre between 2019 to 2022, additional traffic surveys are proposed to be undertaken at the abovementioned intersections.

To assist in preparing traffic generation and distribution assumptions, traffic surveys are proposed to be undertaken at the following additional site access points along Rawson Street:

1. 53-61 Rawson Street
2. Rawson Street Car Park.

We will require direction from agencies on whether to use current counts (2022) or pre covid counts (2019) as the basis of our existing conditions SIDRA assessment.

Historical SCATS phasing data has also been obtained from TfNSW for the relevant periods to assist with calibrating the model.

Traffic Generation Rates

The traffic generation rates proposed to be adopted for the retail and commercial uses are summarised at Table 2, noting that the tabulated values have previously been agreed with Council during preparation of the Joint Traffic Study (Stantec, AECOM, 2015).

Table 2: Trip Generation Rates - Agreed with Council

Land Use	AM Peak Traffic Rate	PM Peak Traffic Rate
Retail – supermarket	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA
Retail – specialty	1.3 per 100m2 GLFA	4.0 per 100m2 GLFA
Commercial	1.1 per 100m2 GFA (1.467 per 100m2 GLFA)	0.5 per 100m2 GFA (0.667 per 100m2 GLFA)

Residential traffic generation rates similar to those that have been surveyed in high density centres around public transport nodes such as Parramatta, Chatswood and St Leonards will be adopted.

Trip Generation Reduction Factors

Traffic generation reduction factors proposed to be adopted for the development are summarised at Table 3, noting that the tabulated values have previously been agreed with Council during preparation of the Joint Traffic Study (Stantec, AECOM, 2015).

Table 3: Trip Generation Reduction Factors – Agreed with Council

Land Use	Discount Rate	Description
Trip Containment	20% retail trips 10% commercial trips	The proposed land use mix within the Epping Town Centre development reflects a sizeable resitdentail base that would contribute towards walk trips to/ from retail and commercial developments within a 400 metre radius area. This will be facilitated with urban design and public domain features that enhance the walking environment. These reflect opportunities for trip containment and total trip generation of retail and commercial developments in town centres could be reduced.
Passing Trade	25% of retail trips on Carlingford Road – Beecroft Road – Epping Road	The Guide to Traffic Generating Developments (RTA, 2002) suggests retail trip discounts of up to 25% for GLFAs less than 10,000 square metres, decreasing to 15% for GLFAs over 30,000 square metres, to account for the incidence of linked and multi-purpose trips. Given the likely land use mix proposed for Epping Town Centre, approximately 25% of retail trips are made by vehicles already passing by on Carlingford Road-Beecroft Road-Epping Road. These trips are included in the total generation but are not "new" trips on the road network; they are simply diverted from the passing traffic into the development and back out. The analysis for the proposed retail areas for the town centre would also likely reflect this. It is thus proposed that a 25% passing trade discount be applied for traffic on the Carlingford Road-Beecroft Road-Epping Road route
Increased public transport availability (2026)	77.8%	The Epping Town Centre Study (Halcrow, 2011) suggests that car trips are reduced by applying a factor of 0.778. This has been derived by dividing the current mode share of public transport use (35%) by the target future public transport mode share (45%) ie. 35/45 = 0.778. The Halcrow 2011 study has been the subject of multiple discussions and sign-offs from Parramatta Council, Transport for NSW and the Department of Planning. In the longer term, an overall discount of 0.778 has been applied to reflect incentives to reduce car usage.

Traffic Assignment and Distribution

A summary of the traffic assignment (in/out) splits proposed to be adopted for the traffic analysis are provided at Table 4. These are considered to be consistent with typical travel behaviour in Sydney.

Table 4: Proposed Assignments by Land Use

Land Use	AM Peak	PM Peak
Retail	50% inbound 50% outbound	50% inbound 50% outbound
Commercial	90% inbound 10% outbound	10% inbound 90% outbound
Residential	20% inbound 80% outbound	80% inbound 20% outbound

Further to estimated assignments, traffic associated with the development will be distributed across the network by drawing on the following data:

- Traffic survey volumes proposed to be collected at the existing site access to Rawson Street
- Traffic survey volumes proposed to be collected collected at the Rawson Street car park access
- Origin Destination survey data collected along Rawson Street in 2021
- STFM Select Link Analysis data proposed to be collected from Transport for NSW
- Journey to Work data collected from the Australian Bureau of Statistics.

Selected Intersection Modelling Software

The study review will rely on the use of SIDRA 9.0 intersection modelling software. This software will be used to assess the performance of individual intersections on the assessed transport network for a range of operable scenarios and periods. Modifications to any default operating parameters will be set out in the broader technical document proposed to accompany the application. Using this software, each intersection will be coded as a network.

Background Traffic Growth

Transport for NSW traffic volume viewer count stations along Beecroft Road and Epping Road shows that background traffic volumes have had no discernible growth. The location of each counter is illustrated in Figure 2, with respective AM and PM peak hour traffic volumes illustrated at Figure 3 and Figure 4 for Beecroft Road and Figure 5 and Figure 6 for Epping Road.

Figure 2: Location of Permanent Traffic Counters

Source: Transport for NSW Traffic Volume Viewer, accessed August 2022

Figure 3: Beecroft Road AM Peak (Traffic Counter 74229)

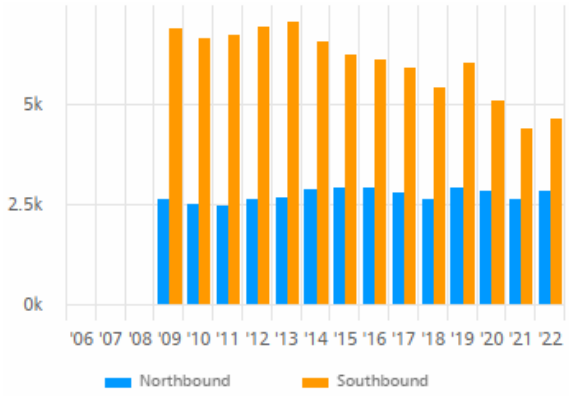


Figure 4: Beecroft Road PM Peak (Traffic Counter 74229)

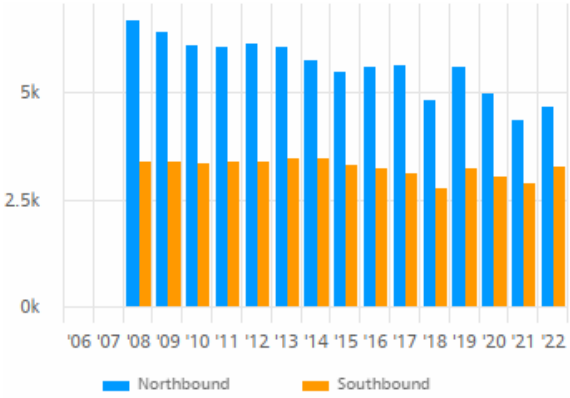


Figure 5: Epping Road AM Peak (Traffic Counter 74453)

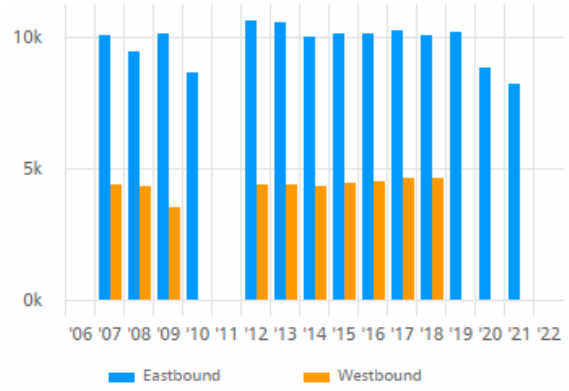
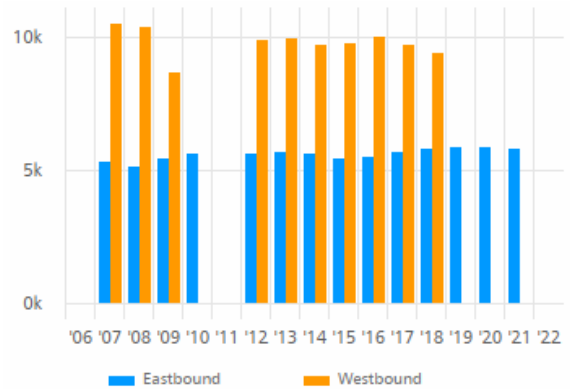


Figure 6: Epping Road PM Peak (Traffic Counter 74453)



While Epping Town Centre has experienced an uplift in development over this period, traffic volumes on key arterial roads surrounding the centre have either experienced no discernible growth or else reduced. This indicates that through traffic has been squeezed out from the centre to travel on alternate routes, such as the M2.

The centre is the most appropriate place to develop given opportunity to promote sustainable travel due to proximity to a major public transport mode and to facilitate trip containment through co-location of jobs, housing and retail. The diversion of through traffic to more appropriate routes through increased development within Epping Town Centre and associated traffic loading on the local road network, is entirely appropriate given its role as a strategic centre and encourages more equitable utilisation of public transport services and road infrastructure in and out of Epping Town Centre.

The additional traffic turning movement surveys proposed to be undertaken will be used to assess traffic patterns throughout Epping Town Centre and understand any such growth (or otherwise) of traffic volumes. This analysis will inform the background traffic growth assumptions to be adopted.

Transport Modelling Scenarios

Following confirmation of background traffic growth assumptions, the following modelling scenarios are proposed to be completed in association with the any analysis.

Table 5: Scenario analysis for modelling traffic impacts

No.	Scenario	Description
1	Existing Condition	Agencies to confirm data to use for base year (2019 or 2022)
2	Project Case or Post Development Condition	Scenario 1 including allowance for redevelopment
3	Epping Town Centre Development Uplift Condition	Scenario 2 including allowance for uplift of development throughout Epping Town Centre generally

It is observable that the Epping Road railway overbridge is processing high levels of regional traffic during peak periods with limited opportunity to provide road network improvements. Given the development will contribute minimal additional traffic when compared to the existing high levels of regional traffic demand, it is not expected to exacerbate operating conditions at this location. This is demonstrated through reference to historic traffic counts that show no discernible growth in traffic over the years despite substantial development in Epping.

5 Development Methodology

Transportation access and precinct integration principles for the project will be established on all transport modes including vehicles, pedestrian and cyclists, ensuring alignment with strategic plans and collated background information for the area over the last 10 years.

The study will examine appropriate vehicular access arrangements, having regard to the service lane as set out in the Parramatta Development Control Plan 2011, requirements for service vehicles, integration with surrounding developments, while also ensuring a high level of pedestrian domain space with distinct permeability and pedestrian amenity along Rawson Street.

The development will adopt car parking rates that ensure a balanced and equitable supply, having regard to rates as set out in Parramatta Development Control Plan 2011. Bicycle parking and end of trip facilities will be designed such that they are easy and convenient to access, to encourage use and promote sustainable travel objectives.

The study will assess the uplift in person trips generated by the development and review transport data available for the precinct which sets out historic patterns in transport travel for residents and employees to estimate uplift in trips expected for each mode of travel. The study will consider the broader qualitative transport implications associated with the proposed development on the public transport network surrounding site.

A Green Travel Plan (GTP) is a tool that the development could use to manage the transport mode choices of their staff, residents and visitors. The study will provide an overview Green Travel Plan to demonstrate how the development could promote and encourage sustainable travel and reduce reliance on private vehicle.

A.2 Transport for NSW Reply to Scoping Study (March 2023)

Transport for NSW

29 March 2023

TfNSW Reference: SYD23/00169/01

Ms Gail Connolly
Chief Executive Officer
City of Parramatta
Po Box 32
Parramatta NSW 2124

Attention: Belinda Borg

SCOPING PAPER (PRE-PLANNING PROPOSAL)
MIXED USE DEVELOPMENT
53-61 RAWSON STREET, EPPING

Dear Ms Connelly

Reference is made to Paramatta City Council's correspondence of 13 February 2023 seeking comment from Transport for NSW (TfNSW) on the scoping paper for pre-Planning Proposal for a mixed-use development at 53-61 Rawson Street, Epping.

TfNSW has reviewed the submitted documentation and recommends Council, as the relevant Planning Authority, should consider the need for a 'Transport Study' to better understand the cumulative traffic and transport impacts associated with the potential increase in development yields beyond current land use forecasts of the Epping Town Centre. The 'Transport Study' should consider and identify required transport infrastructure and travel demand management to support the increased growth as well as an implementation strategy, including timing, land components, costings, delivery responsibilities, and funding mechanisms.

Further details regarding the need to consider a cumulative traffic and transport study is outlined in TfNSW's previous correspondence to Council dated 17 August 2022.

In addition to the above, TfNSW provides detailed comments on the scoping study in **TAB A**, which should be considered as part of any transport study undertaken for the proposed development.

Should you have any questions or further enquiries in relation to this matter, please don't hesitate to contact Senior Land Use Planner, Andrew Popoff, via phone on 0413 459 225 or by email: andrew.popoff@transport.nsw.gov.au.

Yours sincerely

Brendan Pegg
A/Director Land Use
Planning and Programs, Greater Sydney Division

27-31 Argyle Street Parramatta NSW 2150
PO Box 973 Parramatta CBD NSW 2124
W transport.nsw.gov.au

TAB A – Detailed TfNSW comments on scoping study

Traffic data collection and study area

- The following intersections should be modelled below as a network model (SIDRA 9):

    - Carlingford Road / Beecroft Road (TCS)
    - Carlingford Road / Rawson Street / Ray Road (TCS)
    - Carlingford Road / Cliff Road
    - Carlingford Road / Midson Road (TCS)
    - Rawson Street / Bridge Street
    - Epping Road / Blaxland Road / Beecroft Road (TCS)

- Traffic counts and other related data (i.e., queue length surveys, etc) to facilitate a calibrated and validated base model should be based off the latest 2023 count information. TfNSW is willing to assist in the provision of the latest SCATS data for the abovementioned signal sites. The proponent's Transport Consultant should obtain SCATS data via scats.traffic.signal.data@transport.nsw.gov.au.

Traffic generation rates

- TfNSW has previously conducted Trip Generation Surveys for small suburban shopping centres (i.e. < 10,000m2 GLFA). The report can be found on the OpenGov website via the following link below:https://www.opengov.nsw.gov.au/searches?query=*Trip+Generation&titleOnly=on&agencyId=28237&typeId=+&fromDate=&toDate=&size=&page.The same Traffic Generation Rates should be used for both the Retail-Supermarket and the Retail-Specialty.

  TfNSW raise no objections to the suggested memo rates for Retail as follows:

    - AM Peak = 4.5 trips per 100m2 GLFA
    - PM Peak = 13.5 trips per 100m2 GLFA

- Based off Census 2016 mode share data for the suburb of Epping, the high-density residential traffic generation rates to be used should be the Sydney average rates from the TfNSW Technical Direction (TDT 2013/04a) which is:

    - AM Peak = 0.19 trips per unit
    - PM Peak = 0.15 trips per unit

- The Sydney average commercial traffic generation rates used from the TfNSW Technical Direction (TDT 2013/04a) equate to the following:

    - AM Peak = 1.6 trips per 100m2 GFA
    - PM Peak = 1.2 trips per 100m2 GFA

- These rates above are based off a 63% car driver mode share. However, noting that the 2016 Census data for the suburb of Epping had a car driver mode share of around 44%, the commercial Rates to be used should be benchmarked against the Chatswood Commercial Survey Site which has a similar car Driver Mode Share as follows:

    - AM Peak = 1.03 trips per 100m2 GFA
    - PM Peak = 0.84 trips per 100m2 GFA

Trip generation reduction factors

- TfNSW has no issues in the usage of the trip containment and passing trade discount rates suggested within Table 2 of the Stantec memo. However, TfNSW does not support the multiplying factor of 0.778 to be applied to car trips (i.e., > 20% reduction in car trips) as the above traffic generation rates already factor high level of public transport accessibility.

STFM plot data

- TfNSW has no issues with providing such data on request for the purposes of modelling. However, please be advised that the proponent's transport consultant may be required to pay for such information and will also be required to fill out and sign an EMME data access agreement form.

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Scenario analysis

- Further discussions will be required later to resolve details and / or assumptions associated with the scenario No 3 (Epping Town Centre Development Uplift).

General transport study comments

- With the diversity of mix of uses proposed on the development site (including residential, commercial, and retail) the proposed development should encourage sustainable modes of transport such as walking, cycling and the use of public transport to key destinations.

  The Planning Proposal should include Traffic, Transport and Parking Study to investigate likely travel mode demands and investigation on systems to minimise impact to the surrounding classified and local road networks.

  TfNSW recommends that the key items of investigation for the Traffic, Transport and Parking Study are to include, but not be limited to:

  - Vehicular Traffic
    - Detailed assessment, including traffic survey and future modelling scenarios during peak periods of the surrounding road network to identify the suitability of required improvements to the road network to facilitate the Planning Proposal and to consider cumulative impacts from existing and planned surrounding developments.
  - Active Transport
    - Provision of end of trip facilities to encourage and support workers within the Planning Proposal in active transport options.
    - Identify specific walking and cycling infrastructure projects that may be delivered by developer contributions.
  - Loading and Servicing
    - Investigate opportunities to facilitate loading and servicing facilities off-street and provide separation for private vehicles and pedestrian activity for improved safety. Details should align with relevant guidelines (eg. TfNSW Freight and Servicing Last Mile Toolkit).
  - Parking
    - Investigate opportunities for car share systems within the Planning Proposal to support businesses and residents to reduce private vehicle dependency. The study should identify the locations and provision of such services.

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W transport.nsw.gov.au

A.3 Stantec Response to Transport for NSW (June 2023)

Stantec

Memorandum

Project:	**53-61 Rawson Street, Epping**	**Office:**	Sydney, St Leonards
Project №:	301400281/ N210130	**Status:**	Final
Client:	Canjs c/o Oakstand	**Prepared by:**	Ingrid Bissaker
Date:	15 June 2023	**Approved by:**	Chris Wilson
Subject:	**Transport Impact Review Methodology - Response to Transport for NSW Advice**		

The following memorandum has been prepared in response to Transport for NSW's (TfNSW) detailed comments on the proposed transport impact assessment methodology for a mixed-use development at 53-61 Rawson Street, Epping. The memorandum specifically seeks concurrence from Transport for NSW on the proposed speciality retail traffic generation rates, and proposed traffic growth assumptions.

For reference, the proposed transport impact assessment methodology and TfNSW detailed comments/ response are respectively provided in Appendix A and B of this memorandum.

The memorandum is set out as follows:

- Traffic generation rates
- Trip generation reduction factors
- Background traffic growth.

Traffic Generation Rates

The traffic generation rates agreed with TfNSW for adoption in the assessment are summarised at Table 1.

Table 1 – Traffic generation rates agreed with TfNSW

Land Use	AM Peak Traffic Rate	PM Peak Traffic Rate
Residential	0.19 trips per unit	0.15 trips per unit
Retail – supermarket	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA
Commercial	1.03 per 100m2 GFA	0.84 per 100m2 GFA

In addition to uses outlined in Table 1, Stantec note the development also proposes a minor allowance for specialty retail shops. The proposed traffic generation rates for speciality retail use are reproduced in Table 2.

Table 2 – Proposed traffic generation rates not specifically addressed by TfNSW

Land Use	AM Peak Traffic Rate	PM Peak Traffic Rate
Retail – specialty	1.3 per 100m2 GLFA	4.0 per 100m2 GLFA

Stantec seek Transport for NSW concurrence on proposed traffic generation rates for speciality retail use.

Trip Generation Reduction Factors

The trip generation reduction factors agreed with TfNSW are outlined in Table 3.

Table 3 –Trip generation reduction factors – agreed with TfNSW

Land Use	Discount Rate	Description
Trip Containment	20% retail trips 10% commercial trips	Agreed with Transport for NSW
Passing Trade	25% of retail trips on Carlingford Road – Beecroft Road – Epping Road	Agreed with Transport for NSW
Increased public transport availability (2026)	None	Discount rate removed following Transport for NSW correspondence

Background Traffic Growth

When undertaking a traffic and transport assessment of a new development proposal, it is normal to consider a future scenario that considers regional and other traffic growth and the ultimate functioning for the transport network.

Stantec are proposing a departure from this approach given the capacity constraints of the Epping Town Centre road network. Agreement in principle to this departure is sought from TfNSW for adopting zero growth in regional traffic through the Epping Town Centre.

Supporting evidence for a zero regional growth scenario will be fully documented in the Traffic and Transport assessment however a summary of the evidence is herewith presented.

TfNSW traffic volume viewer count stations along Beecroft Road and Epping Road shows that background traffic volumes have had no discernible growth for more than a decade. The location of each counter is illustrated in Figure 1, with respective AM and PM peak hour traffic volumes illustrated at Figure 2 and Figure 3 for Beecroft Road and Figure 4 and Figure 5 for Epping Road.

Figure 1 – Location of permanent traffic counters

Source: [Transport for NSW Traffic Volume Viewer](), accessed August 2022

Figure 2 – Beecroft Road AM Peak (Traffic Counter 74229)

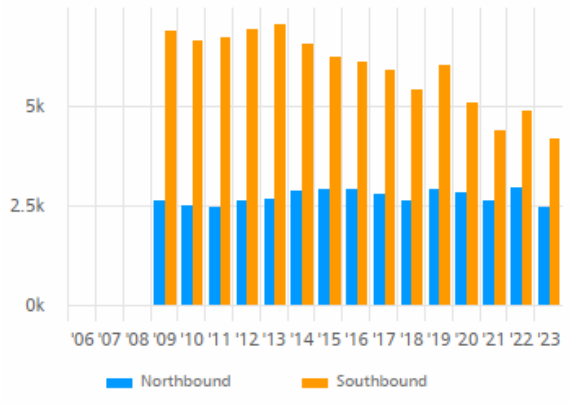

Figure 3 – Beecroft Road PM Peak (Traffic Counter 74229)

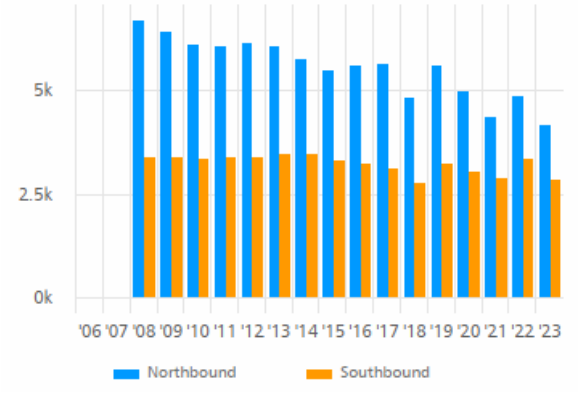

Figure 4 – Epping Road AM Peak (Traffic Counter 74453)

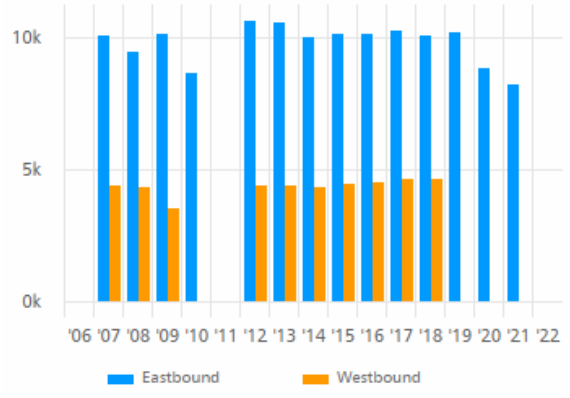

Figure 5 – Epping Road PM Peak (Traffic Counter 74453)

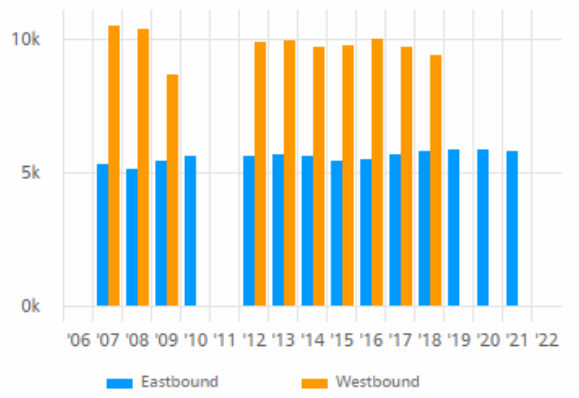

Figure 2 and Figure 3 for Beecroft Road and Figure 4 and Figure 5 for Epping Road indicates that the 10 year traffic growth has been negligible or declined.

Given Epping Town Centre has experienced a significant uplift in development over this period, it is evident that the capacity constraints of the key intersections in Epping Town Centre have displaced through traffic to other regional routes to accommodate newly generated within the centre. This is not unlike other capacity restrained centre in Sydney metropolitan area such as Chatswood Town Centre and the capacity constrained Pacific Highway.

Further review of traffic data collated along Carlingford Road between 2019 and 2023 indicates there has been no change in traffic volumes and further, that COVID 19 has had no impact. Supporting data will be provided in our traffic report when submitting with the planning proposal.

Any additional traffic from developments along Rawson Street will simply continue to displace regional through traffic as it has done. Stantec is therefore seeking TfNSW to agree to this and that modelling a future scenario with background traffic growth is not reality.

A conservate approach would be to consider additional traffic generation additive to the current situation.

With this in mind, the three scenarios proposed to be assessed are outlined in Table 4.

Table 4 – Scenario analysis for modelling traffic impacts

No.	Scenario	Description
1	Existing Condition	
2	Project Case or Post Development Condition	Scenario 1 including allowance for redevelopment additive to current conditions. No allowance for background traffic growth.
3	Epping Town Centre Development Uplift Condition	Scenario 2 including allowance for uplift of development throughout Epping Town Centre generally, additive to current conditions. No allowance for further background traffic growth.

A.4 Transport for NSW Response to Stantec (July 2023)

Transport for NSW

23 July 2023

TfNSW Reference: SYD23/00169/02

Mr Chris Wilson
Director
Stantec
Level 9, 203 Pacific Highway
St Leonards NSW 2065

Attention: Ingrid Bissaker

PRE-PLANNING PROPOSAL – SCOPING PAPER
MIXED USE DEVELOPMENT
53-61 RAWSON STREET, EPPING

Dear Mr Wilson

Reference is made to Stantec's correspondence of 15 June 2023 seeking additional comment from Transport for NSW (TfNSW) regarding the agency's previous correspondence to Council dated 29 March 2023 (Reference: SYD23/00169/01) on the scoping paper for a Pre-Planning Proposal for mixed-use development at 53-61 Rawson Street, Epping.

TfNSW has reviewed the submitted documentation that covers the following matters:

- Proposed specialty retail traffic generation rates.
- Proposed future year regional background traffic growth assumptions.

TfNSW provides detailed comments on the documentation within **TAB A**, which should be considered as part of any transport study undertaken for the proposed development.

Should you have any questions or further enquiries in relation to this matter, please don't hesitate to contact Senior Land Use Planner, Andrew Popoff via phone on 0413 459 225 or email: Andrew.Popoff@transport.nsw.gov.au.

Yours sincerely

Brendan Pegg
Acting Director Land Use
Planning and Programs, Greater Sydney Division

Cc: Belinda Borg – City of Parramatta Council

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TAB A – Detailed TfNSW comments

Traffic Generation Rates

TfNSW notes that the proposed Retail – Specialty rates within the Stantec Memo seem to be based off the Thursday PM Peak multiple regression equation within Section 3.6.1 – Shopping Centres of the Guide to Traffic Generating Developments. TfNSW does not support the use of this multiple regression equation where all the other parts of this equation are set to zero (except the specific part seeking a trip generation rate). As such, TfNSW does not support the use of the following Retail – Specialty rates of:

- AM Peak = 1.3 trips per 100m2 GLFA
- PM Peak = 4.0 trips per 100m2 GLFA

Whilst TfNSW acknowledge that our previous correspondence raised no objections to the following Retail – Supermarket rates as follows:

- AM Peak = 4.5 trips per 100m2 GLFA
- PM Peak = 13.5 trips per 100m2 GLFA

TfNSW previous correspondence stated that the agency had conducted Trip Generation Surveys for Small Suburban Shopping Centres (i.e., < 10,000m2 GLFA) and that the same traffic generation rates should be used for both the Retail – Supermarket and the Retail - Specialty. This report can be found on the OpenGov website via the following link below:
https://www.opengov.nsw.gov.au/searches?query=*Trip+Generation&titleOnly=on&agencyId=28237&typeId=+&fromDate=&toDate=&size=&page
Therefore, TfNSW advises that the Traffic Generation Rates adopted should be for the total GLFA of the (Supermarket + Specialty Retail) uses within this site and be based off the rates provided within the abovementioned Small Suburban Shopping Centres Analysis report – consider Section 4.3.1.

Future Year Regional Background Traffic Growth

The count station on Beecroft Road (74229) is north of the M2 interchange and is too far away to confirm whether there has been traffic growth on the arterial road system through the Epping Town Centre.
Whilst a stronger case can be made for the use of the Epping Road count station (74453), the count data for 2020 and 2021 is questionable due to the COVID-19 Pandemic. Another factor which would be limiting historical traffic growth at this count station is the fact that the intersection of Epping Road / Langston Place / Blaxland Road / Beecroft Road has been and still is a known network pinch point to access the Epping Town Centre, particularly during the AM / PM peak periods.
As provided on the websites linked below, the road bridge over the rail line will be widened in the short-term future to provide additional capacity at this pinch point. Once this upgrade is completed, that there would be some future traffic growth here (i.e., due to capacity increase of this pinch point).

- https://minister.infrastructure.gov.au/c-king/media-release/epping-bridge-project-concept-design-and-early-work-tender-awarded

- https://caportal.com.au/tfnsw/tiip/pipeline

As such TfNSW would not be supportive of Stantec's request to assume zero regional background traffic growth for their modelling of future years. The agency advises that TPZ2022 within the Sydney Strategic Transport Model (STM) has recently been released and includes post covid travel behaviours, such as flexible working arrangements and working from home a few days per week for white collar professionals. While TPZ2022 provides an increase in background traffic demand it is less than the previous projections identified in TPZ2019 that was based on pre-Covid travel behaviours. Such regional background traffic growth information to inform Stantec's future year modelling should be obtained from TfNSW's Sydney Traffic Forecasting Models (STFM).

Please be advised that Stantec will be required to sign an EMME Data Access Agreement Form.

A.5 Stantec Response to Transport for NSW (August 2023)

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23 August 2023

Enquiries: Chris Wilson
Project No: 301400281

Transport for NSW
27-31 Argyle Street
PARRAMATTA NSW 2150

Attention: Andrew Popoff (Senior Land Use Planner)

Dear Andrew

RE: 53-61 Rawson Street, Epping
Transport Impact Review Methodology - Response to Transport for NSW Advice

Thank you for taking my call last week and appreciate the time you gave to discuss aspects of the letter received from Transport for NSW's (TfNSW) letter dated 23 July 2023[1]. As foreshadowed, I formally respond to two directions that TfNSW set out in its letter that we, Stantec, are not in total agreement with.

While appreciating that TfNSW directions are normal protocol for assessing traffic and transport impacts of urban developments, we do however contend that the locational circumstances of this site have not been fully appreciated.

Accordingly, this letter provides key responses to Transport for NSW stated position on retail traffic generation rates and traffic growth assumptions. Our Transport Impact Assessment Report to be lodged by our client with Parramatta City Council this coming week will expand on these matters together with providing supporting information.

The letter is set out as follows:

- Retail traffic generation rates
- Background traffic growth.

For reference, the proposed retail traffic generation rates and traffic growth assumptions proposed by Stantec and TfNSW detailed response on these items are provided in Appendix A of this letter.

1. Retail Traffic Generation Rates

TNSW have requested the development adopts a combined traffic generation rate for the retail assets, being supermarket and specialty retail, based on rates detailed in the Small Suburban Shopping Centres Analysis report ("Analysis Report") prepared by Bitzios on behalf of Transport for NSW dated 7 November 2018.

A detailed review of the retail rates as set out in the Analysis Report will be provided in the Transport Impact Assessment supporting the Planning Proposal. In summary, based on this review Stantec highlight the following:

- majority of the sites are set in a different transport and land use environment when compared to the development site in Epping Town Centre, noting a key criterion for the selection of sites surveyed as part of the Small Suburban Shopping Centres Analysis was the ease in isolating the site from other developments (other businesses outside the shopping centre). This resulted in:
  - majority of the developments were located proximate to low density residential land uses
  - majority of developments were located with limited or restricted co-location of other retail / commercial developments
  - majority of developments had significantly less public transport accessibility than Epping Town Centre which is located on a major transport interchange node.
- the traffic generation rates have been derived based on the site peak hour rather than the surrounding road network peak hour. Section 3.2.2 of the Guide to Traffic Generating Developments (Transport for NSW, 2002) states that

[1] Pre-Planning Proposal – Scoping Paper, Mixed Use Development, 53-61 Rawson Street, Epping, TfNSW Reference SYD23/00169/02, letter from Brendan Pegg to Christopher Wilson, dated 23 July 2023

> the traffic generation for the peak activity time of the adjacent road network is possibly more important period [than the peak activity time of the development itself] as it is used to assess the effect of the development on the road system.

As such, the traffic generation rates are not considered comparable to characteristics expected in Epping Town Centre during the road network peak hours and the sites close proximity to public transport interchange (bus/metro/rail) and hence the assessment has adopted alternate retail rates agreed with Council as documented to date and summarised at Table 1.

Table 1 – Traffic generation rates agreed with Council

Land Use	AM Peak Traffic Rate	PM Peak Traffic Rate
Retail – supermarket	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA
Retail – specialty	1.3 per 100m2 GLFA	4.0 per 100m2 GLFA

Application of these rates to the indicative development scheme results in the site generating 183 and 552 vehicle trips in each peak period. Assuming 20 per cent trip containment for retail uses as agreed with Transport for NSW, the site generates 146 and 441 vehicle trips in each peak period.

When benchmarking the site traffic generation against surveyed traffic generating characteristics for the Coles and adjacent Council car parks of 170 and 509 vehicle trips in each peak hour, it is clear the adopted traffic generation rates are appropriate.

2. Traffic Growth

As already discussed in our previous correspondence with TfNSW, Stantec are proposing a departure from this approach given the capacity constraints of the Epping Town Centre road network and decade of flat traffic growth. Notwithstanding, the proposal does include an allowance for uplift of development throughout Epping Town Centre generally, additive to current conditions. The developments considered in the assessment include:

- 242-244 Beecroft Road, Epping (SSD-8784, SSD-8784-Mod-1, SSD-31576972)
- 245-250 Beecroft Road, Epping (DA/653/2022, PPSCC-387)
- 37-41 Oxford Street, Epping (DA/314/2017, DA/314/2017/A, DA/1/2022)
- 59 Beecroft Road, Epping (DA/944/2021, PPSSCC-292, [2022] NSWLEC 1705)
- 48 - 54 Beecroft Road, Epping (DA/61/2018/A, PPSSCC-365).

Transport for NSW have requested the development adopts regional traffic growth in accordance with Sydney Transport Forecasting Model (STFM), noting the following reasons:

- Epping Road / Langston Place / Blaxland Road / Beecroft Road intersection upgrade will increase capacity on the road network
- The traffic count station along Beecroft Road is too far from Epping Town Centre, and count station along Epping Road short term (2020 and 2021) results are not reliable due to COVID-19
- Sydney Transport Model (STM) has been revised to account for post-covid travel behaviours.

Stantec provide the following responses to these items.

Epping Road/ Langston Place/ Blaxland Road / Beecroft Road intersection upgrade

In April 2023, Transport for NSW awarded Mott MacDonald Australia the contract to develop the concept design, prepare the Review of Environmental Factors, manage early investigation work, and provide technical advice for the proposed upgrade.

Notwithstanding, while the proposed upgrades have been discussed for more than 30 years, they have never eventuated. It is understood that the potential material adverse effect to patronage on M2 Motorway is a key issue for owners and operators of the motorway, and with this issue continuing to be unresolved and hence impacting the practicality of this project proceeding.

Further, even with the upgrades, there remains further pinch points on the road network that will limit uplift in regional traffic growth. As it relates to Epping Town Centre, the pinch point will merely shift from the Epping Road/ Langston Place/ Blaxland Road / Beecroft Road intersection to the Beecroft Road/ Carlingford Road intersection which currently operates at its full capacity during peak periods.

Further assurance that this project will proceed, and indicative timelines, would be required to incorporate any impacts into traffic modelling for the proposed development.

Transport for NSW Traffic Volume Viewer

The benefit of using the Traffic Volume Viewer is that it presents results from a significantly larger sample size over a longer time scale, compared to reviewing point in time traffic count data, and therefore presents a true understanding of traffic growth.

Notwithstanding, Stantec has also previously obtained SCATs traffic count data from Transport for NSW at the Carlingford Road/ Rawson Street and Carlingford Road/ Beecroft Road intersection for Thursday, 13 June 2019 and Thursday, 18 May 2023.

A review of the 2019 and 2023 SCATS data indicates that during the identified peak hour periods (7:30 am to 8:30 am, and 4:15 pm to 5:15 pm respectively), traffic volumes had increased by 0.53 per cent per annum in the AM peak hour and had reduced by 0.25 per cent per annum in the PM peak hour. Notwithstanding, a review of 2019 and 2023 traffic volumes across the broader AM and PM peak periods is contained in Figure 1 and Figure 2.

Figure 1 – Traffic growth – 2019 to 2023 AM peak period

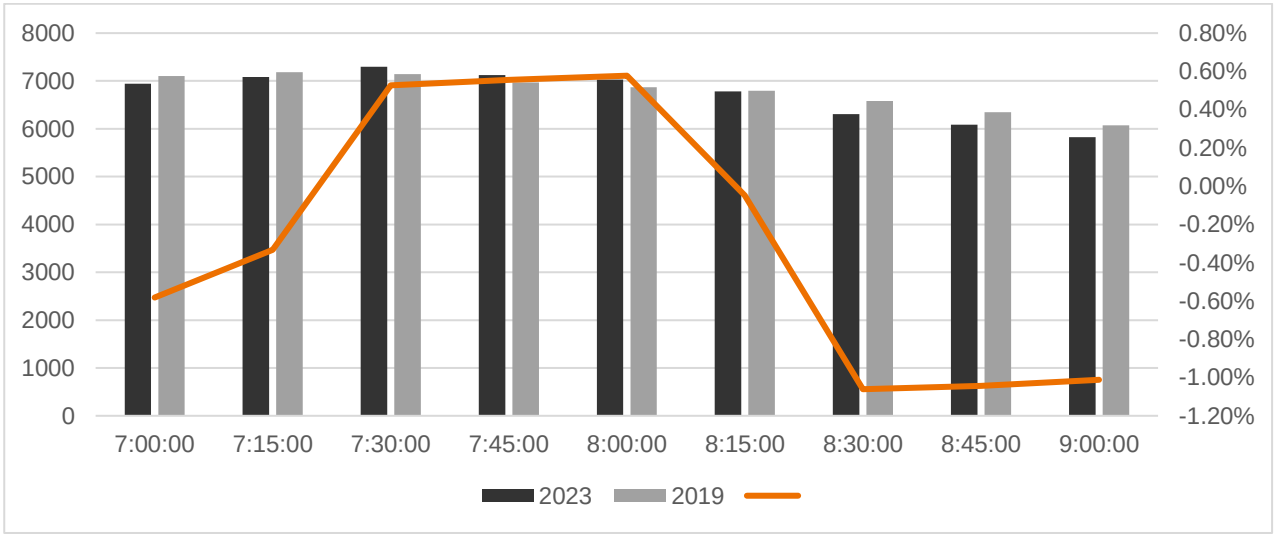
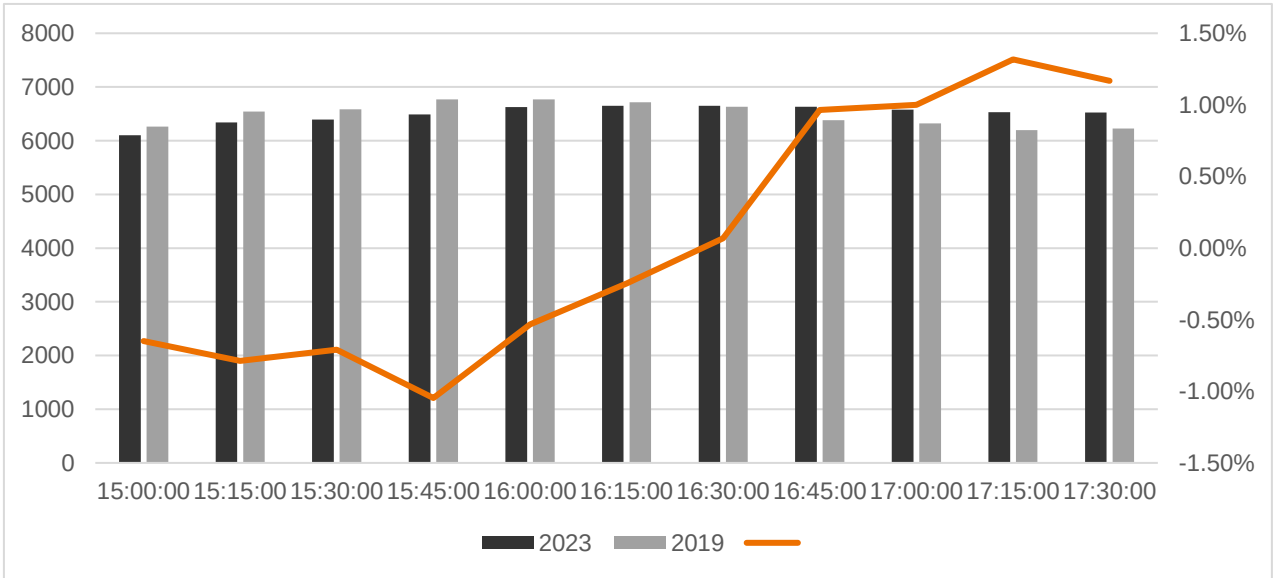


Figure 2 – Traffic growth – 2019 to 2023 PM peak period



As shown, the AM peak has a consistent peak period between 7:00am to 9:00am with minimal variation in total vehicles on the road network. Total traffic volumes for this period have reduced by a negligible 0.01 per cent per annum between 2019 and 2023. As such, there is ultimately no distinct pattern of traffic growth between 2019 and 2023, consistent with outcomes from the Transport for NSW traffic volume viewer.

The PM peak had a more distinct peak period in 2019 for hour periods starting at 3:45pm, 4:00pm and 4:15pm, with greater total traffic than recorded in 2023, with traffic volumes dropping off after this period, whereas the 2023 period had a smoother peak period with less variance in traffic volumes across the period. This indicates that traffic demand has smoothed out and spread across the peak period, with no actual discernible growth in traffic, consistent with outcomes from the Transport for NSW traffic volume viewer.

With this in mind, any additional traffic from developments along Rawson Street will simply continue to displace regional through traffic as it has done in the past. A conservative approach would be to consider additional traffic generation additive to the current situation.

Based on this, no background traffic growth rate has been adopted for this assessment as this would be contrary to the historical trend.

STFM

The trip demands in the STFM assigns traffic such that all traffic is forced through the network along applicable routes, regardless of whether such an uplift in traffic would create unrealistic delays along routes such as Carlingford Road and Epping Road. Traffic models do have problems in forecasting flows under high levels of congestion.

From personal experience in the use of the STFM and its previous incarnates in modelling the Sydney Motorway Network (and more recently the WestConnex Project), exogenous adjustments need to be made across major traffic movement Screenline to balance demand with available capacity. The Screenline across M2, Epping Road, Victoria Road, and M4 is one such anomaly in the STFM.

While the STFM is typically relied on to provide an understanding on potential uplift in traffic volumes in non congested networks, noting commentary provided throughout this section, application of the outputs would create an unrealistic scenario particularly given there's been no growth along Carlingford Road.

I trust this is satisfactory; should you have any questions, please do not hesitate to contact me directly.

Yours sincerely

Stantec Australia Pty Ltd

Chris Wilson
Senior Principal Transport Advisory

Encl

Appendix A – Transport for NSW Response

Appendix B. Retail Traffic Generation Rate Review

As detailed in Appendix A, Transport for NSW have requested the development adopts traffic generation rates based on rates detailed in the Small Suburban Shopping Centres Analysis report ("Analysis Report") prepared by Bitzios on behalf of Transport for NSW dated 7 November 2018. For reference, the site data summary sheet provided in page 73 of the Analysis Report has been extracted in Figure 10.1.This contains key details from the Analysis Report including sites selected, size, surrounding land uses, vehicle trips and traffic generation rates during various peak hours.

Figure 10.1 – Site Data Summary Sheet -

Site No.	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Site 17	Site 18	Site 19	Site 20
Centre Name	Casula	Aldi Wyoming	Northlakes	Lakeside	Aldi Fletcher	Fletcher Village	Lighthouse Plaza	Vincentia	Aldi Albion Park	IGA Woonona
Area	Sydney	Central Coast	Central Coast	Central Coast	Newcastle	Newcastle	Regional NSW	Regional NSW	Wollongong	Wollongong
Location	607 Hume Hwy, Casula NSW 2170	489 Pacific Highway, Wyoming NSW 2250	17-21 Old Pacific Highway, Charmhaven NSW 2263	Cnr The Entrance Road & Dening Street, The Entrance NSW 2261	Britannia Blvd & Minmi Road, Fletcher NSW 2287	Cnr Minmi Road & Churnwood Drive, Fletcher NSW 2287	100 Ocean Drive, Port Macquarie NSW 2444	8 Moona Creek Road, Vincentia NSW 2540	10 Ash Ave, Albion Park Rail NSW 2527	4-10 Russell St, Woonona NSW 2517
Dates of survey	7th-9th June	3rd-6th May	3rd-5th May	3rd-5th May	9th-13th May	10th-12th May	5th-7th April	5th-7th April	3rd-4th/26th-27th May	24th-26th May
Duration of surveys	3	4	3	3	4	3	3	3	4	3
Area Characteristics:										
Surrounding land use	Low density residential, near arterial road and school	Medium density residential, on arterial road	Low density residential, on arterial road	Low denisty residential, near beach	Low density residentail, near Flecther Village	Low density residentail, near Aldi Fletcher	Low density residential	Low density residential	Low density residential, near train station and sports fields	Low density residential
Nearby on-street parking regime	NO	YES - Restricted	YES - Restricted	YES - Restricted	NO	YES - Restricted	YES - Restricted	YES - Restricted	YES - Restricted	YES - Restricted
Principal adjacent road - AM Peak Period (weekday)										
Wednesday / Thursday	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM	10:45 AM - 11:45 AM	11:15 AM - 12:15 PM	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM	11:45 AM - 12:45 PM	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM
Friday	11:45 AM - 12:45 PM	08:30 AM - 09:30 AM	11:15 AM - 12:15 PM	11:00 AM - 12:00 PM	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM	11:45 AM - 12:45 PM	08:30 AM - 09:30 AM	08:30 AM - 09:30 AM
Principal adjacent road - PM Peak Period (weekday)										
Wednesday / Thursday	04:00 PM - 05:00 PM	04:15 PM - 05:15 PM	04:30 PM - 05:30 PM	02:45 PM - 03:45 PM	04:45 PM - 05:45 PM	04:45 PM - 05:45 PM	03:15 PM - 04:15 PM	04:15 PM - 05:15 PM	04:30 PM - 05:30 PM	03:15 PM - 04:15 PM
Friday	03:30 PM - 04:30 PM	04:30 PM - 05:30 PM	03:00 PM - 04:00 PM	01:45 PM - 02:45 PM	04:45 PM - 05:45 PM	04:30 PM - 05:30 PM	12:00 PM - 01:00 PM	03:15 PM - 04:15 PM	03:00 PM - 04:00 PM	04:30 PM - 05:30 PM
Principal adjacent road - Daily Peak (weekend)										
Saturday	02:45 PM - 03:45 PM	11:30 AM - 12:30 PM	11:00 AM - 12:00 PM	11:45 AM - 12:45 PM	10:45 AM - 11:45 AM	10:45 AM - 11:45 AM	10:00 AM - 11:00 AM	12:30 PM - 01:30 PM	02:15 PM - 03:15 PM	09:00 AM - 10:00 AM
Sunday	03:45 PM - 04:45 PM	12:45 PM - 01:45 PM			11:30 AM - 12:30 PM				02:15 PM - 03:15 PM	
Building Characteristics:										
Year built	0	0	2008	1979	2014	2013	1997	2015	0	Pre 2007
Major Tenant	Woolworths	Aldi	Coles	coles	ALDI	Coles	coles	Woolowrths	ALDI	IGA
Gross Leasable Floor Area (GLFA) (m2)	4027	991	4831	5028	991	4933	5000	9505	1411	660
Major Tenant GLFA (m2)	3847	991	3500	3084	991	3633	3013	5743	1199	660
Specialty Store GLFA (m2) (other tenants)	180	0	1331	1944	0	1300	1987	3762	212	0
Vehicle Trips:										
Peak 1-hour vehicle-trips										
Wednesday / Thursday AM Peak	353	189	445	311	100	451	296	740	233	162
Friday AM Peak	376	178	476	324	98	489	385	775	259	205
Wednesday / Thursday PM Peak	510	234	565	293	150	739	459	711	309	208
Friday PM Peak	600	242	594	329	161	811	490	744	350	198
Saturday	588	278	564	289	160	750	480	809	344	181
Sunday	579	281			149				360	
Peak time of 1-hour vehicle-trips										
Wednesday / Thursday AM Peak	12:00:00 PM	10:30:00 AM	11:45:00 AM	10:30:00 AM	10:30:00 AM	10:45:00 AM	11:30:00 AM	9:45:00 AM	11:15:00 AM	10:00:00 AM
Friday AM Peak	11:15:00 AM	12:00:00 PM	10:45:00 AM	9:45:00 AM	12:00:00 PM	11:30:00 AM	11:00:00 AM	11:00:00 AM	11:00:00 AM	10:00:00 AM
Wednesday / Thursday PM Peak	5:45:00 PM	1:15:00 PM	4:15:00 PM	12:30:00 PM	3:30:00 PM	4:30:00 PM	5:00:00 PM	12:00:00 PM	4:45:00 PM	4:00:00 PM
Friday PM Peak	5:00:00 PM	4:15:00 PM	3:30:00 PM	3:00:00 PM	4:30:00 PM	4:45:00 PM	4:15:00 PM	12:15:00 PM	4:45:00 PM	3:45:00 PM
Saturday	2:00:00 PM	3:30:00 PM	11:00:00 AM	11:30:00 AM	11:30:00 AM	11:15:00 AM	10:30:00 AM	9:15:00 AM	11:15:00 AM	12:15:00 PM
Sunday	11:45:00 AM	2:00:00 PM			11:45:00 AM				11:15:00 AM	
Peak vehicle-trips per 100m2 GLFA										
Wednesday / Thursday AM Peak	8.77	19.07	9.21	6.19	10.09	9.14	5.92	7.79	16.51	19.06
Friday AM Peak	9.34	17.96	9.85	6.44	9.89	9.91	7.70	8.15	18.36	24.12
Wednesday / Thursday PM Peak	12.66	23.61	11.70	5.83	15.14	14.98	9.18	7.48	21.90	24.47
Friday PM Peak	14.90	24.42	12.30	6.54	16.25	16.44	9.80	7.83	24.81	23.29
Saturday	14.60	28.05	11.67	5.75	16.15	15.20	9.60	8.51	24.38	21.29
Sunday	14.38	28.36			15.04				25.51	
Peak vehicle-trips per parking space										
Wednesday / Thursday AM Peak	2.04	2.12	1.97	1.57	1.37	2.08	2.26	1.50	2.51	0.93
Friday AM Peak	2.17	2.00	2.11	1.64	1.34	2.25	2.94	1.57	2.78	1.18
Wednesday / Thursday PM Peak	2.95	2.63	2.50	1.48	2.05	3.41	3.50	1.44	3.32	1.20
Friday PM Peak	3.47	2.72	2.63	1.66	2.21	3.74	3.74	1.51	3.76	1.14
Saturday Peak	3.40	3.12	2.50	1.46	2.19	3.46	3.66	1.64	3.70	1.04
Sunday Peak	3.35	3.16			2.04				3.87	
Total daily vehicle trips										
Wednesday / Thursday	4786	1873	5045	2844	1076	5332	3633	7202	2409	1605
Friday	3978	1685	4369	2906	985	4607	3580	6626	2482	1557
Saturday	4224	1776	4006	2288	1149	5194	3762	6313	2461	1231
Sunday	4004	1701			997				2607	
Total daily vehicle-trips per 100m2 GLFA										
Wednesday / Thursday	118.85	189.00	104.43	56.56	108.58	108.09	72.66	75.77	170.73	188.82
Friday	98.78	170.03	90.44	57.80	99.39	93.39	71.60	69.71	175.90	183.18
Saturday	104.89	179.21	82.92	45.51	115.94	105.29	75.24	66.42	174.42	144.82
Sunday	99.43	171.64			100.61				184.76	
Total daily vehicle-trips per parking space										
Wednesday / Thursday	27.66	21.04	22.32	14.36	14.74	24.57	27.73	14.61	25.90	9.22
Friday	22.99	18.93	19.33	14.68	13.49	21.23	27.33	13.44	26.69	8.95
Saturday	24.42	19.96	17.73	11.56	15.74	23.94	28.72	12.81	26.46	7.07
Sunday	23.14	19.11			13.66				28.03	
Vehicle-trips during adjacent road AM weekday peak										
Wednesday / Thursday	295	119	368	316	98	370	213	708	172	113
Friday	364	99	450	410	71	NA	279	750	153	108
Vehicle-trips during adjacent road PM weekday peak										
Wednesday / Thursday	295	119	368	316	98	370	213	708	172	113
Friday	534	225	535	392	NA	769	314	726	303	138
Vehicle-trips during adjacent road weekend peak										
Saturday	556	220	564	356	140	717	448	698	298	133
Sunday	440	197			138				340	

Source: Page 73, Small Suburban Shopping Centres Analysis report, prepared by Bitzios on behalf of Transport for NSW, 7 November 2018

A review around the suitability of using these rates is provided below.

Suitability of Surveyed Sites

A key criteria for the selection of sites surveyed as part of the Small Suburban Shopping Centres Analysis was the ease in isolating the site from other developments (other businesses outside the shopping centre). Bitzios notes in the Analysis Report that this was one of the key challenges and describes their interpretation of this selection criteria as identifying sites that were isolated from nearby commercial development.

As a result, majority of the sites are set in a different transport and land use environment when compared to the development site in Epping Town Centre. This includes:

- majority of the developments were located proximate to low density residential land uses
- majority of developments were located with limited or restricted co-location of other retail / commercial developments
- majority of developments had significantly less public transport accessibility than Epping Town Centre is afforded, and therefore benefits less from pedestrian traffic.

As such, the travel characteristics of visitors to the selected shopping centres are generally not comparable to characteristics expected in Epping Town Centre, given the increased public transport availability, co-location with a range of retail, commercial and educational land uses, as well as proximity to high density residential development resulting in the retail uses generally being less reliant on customers driving to and from site.

Key sites that could be considered the most similar to Epping Town Centre include Cantebury (site 5), Manly Vale (site 10), Wentworthville (site 7) and Greenacre (site 8), however both Cantebury and Manly Vale are less than 1,500 square metres GLFA and as such, are not relevant noting the Analysis Report acknowledges sites less than 2,000 square metres GLFA have different traffic generation profiles to those greater than 2,000 square metres GLFA. Both Wentworthville and Greenacre recorded traffic generation rates are 20 to 30 per cent lower than the average of all sites greater than 2,000 square metres GLFA, although these sites are still not considered to be comparable to travel characteristics within Epping Town Centre.

Suitability of Traffic Generation Rates – Peak Period Review

It is also noted that the traffic generation rates have been derived based on the site peak hour rather than the surrounding road network peak hour. Section 4.3.1 of the Analysis Report notes *"compared to the frontage road peak periods, the site peak periods were typically 1-2 hours later"*. Section 7.1 of the Analysis Report also states *"Shopping Centre site peak hours typically differ from road network peak hours and accordingly the site peak hours have been used for determination of "design" trip generation rates".*

Section 3.2.2 of the Guide to Traffic Generating Developments (Transport for NSW, 2002) states the following:

"Two periods of traffic generation need to be considered:

- *the peak activity time of the development itself.*
- *the peak activity time of the adjacent road network.*

The first of these is generally used as a basis for reviewing access to the site and driveway design requirements. The second and possibly more important period is used to assess the effect of the development on the road system. Such an assessment should identify whether any road improvements or traffic management measures are required to accommodate the increased traffic on the system."

For the purpose of understanding the traffic impact of the development on the external road network, it would therefore not be appropriate to adopt traffic generation rates based on the site peak hour rather than the road network peak hour.

With this in mind, Stantec have reviewed the site data summary sheet extracted in Figure 10.1. This sheet details the traffic generated by each site both during the site peak hours, as well as the road network peak hours, and hence could be used to understand the sites traffic generation rates based on the road network peak period. Notwithstanding, the vehicle trips during adjacent road AM and PM weekday peak hours are equivalent and hence it is expected that the data sheet has an error and the data cannot be used for this purpose.

Suitability of Traffic Generation Rates – Comparison to Existing Site

A further review of the traffic generation rates provided in Analysis Report and comparison to traffic generated by the existing site is provided below.

Section 4.3.1 of the Analysis Report suggests a traffic generation rate of 7.76 and 10.41 tripes per 100 square metres GLFA is applicable to sites with greater than 2,000 square metres GLFA. Section 10 of the report also provides recommended trip generation rates as reproduced in Figure 10.2. Both rates are based on the site peak hours, rather than the road network peak hours.

Figure 10.2 – Smaller Suburban Shopping Centres Trip Generation Recommendations

Day	Period	Recommended Models		
		0 – 1,000m square GLFA	1,000 – 6,000m square GLFA	6,000 – 10,000m square GLFA
Vehicle Trips				
Wednesday /Thursday	AM Peak	0.192*A	0.066*A + 126	0.076*MT + 0.075*OT
	PM Peak	0.259*A	0.089*A + 170	0.216*A – 591
	Daily	2.022*A	0.695*A + 1327	1.684*A – 4608

Source: Table 10.1, Small Suburban Shopping Centres Analysis report, prepared by Bitzios on behalf of Transport for NSW, 7 November 2018

The indicative development scheme proposes to provide around 5,736 square metres retail GLFA comprising 3,392 and 2,344 square metres supermarket and specialty retail GLFA. Application of the rates outlined in Section 4.3.1 of the report results in the development generating 445 and 597 vehicle trips in the AM and PM peak hours, respectively. Application of the rates outlined in Section 10 results in the development generating 505 and 680 vehicle movements in the AM and PM peak hours, respectively. Assuming 20 per cent trip containment for retail uses as agreed with Transport for NSW, traffic generation ranges from 356 to 400 and 478 to 544 trips respectively in the AM and PM peak hours.

On Thursday, 11 November 2022, Stantec commissioned traffic movement counts at the following locations along Rawson Street:

- Commercial building car park entry/ exit driveway
- Coles entry and exit driveways
- Rawson Street Council car park entry and exit driveways.

The Coles car park site cannot be considered in isolation to gauge traffic generation rates for the supermarket given a proportion of customers currently park within the adjacent Council car park.

The Council car park is currently used for a range of trip purposes within the town centre, including providing short to medium term parking for visitors to retail / commercial developments, as well as acting as a popular parking area for vehicles picking up and dropping off passengers visiting the town centre or walking to the train, metro and bus interchange. Most notably, it is the primary car parking facility that services a multitude of specialty retail offerings along Rawson Street and Beecroft Road, including 991 square metres GLFA on the ground floor of the existing commercial office building on site, as well as servicing a proportion of parking demand for the existing Coles supermarket. While some on-street parking is available along Rawson Street to assist in these purposes, there are no other public car parks servicing retail offerings along Rawson Street and Beecroft Road, with exception of the Coles car park.

Currently the Council and Coles car park generate a total of around 170 and 509 vehicle movements in the AM and PM peak hours, with around 78 and 22 per cent of traffic generated by the Council and Coles car park respectively.

Clearly the indicative development scheme which effectively provides the equivalent supermarket offering to existing, as well as an uplift of around 1,400 square metres GLFA of specialty retail uses, will not generate traffic that exceeds the existing traffic generated by the site and adjacent Council car park. It is more appropriate to assume the site will generate traffic volumes lower than the existing Coles car park and adjacent Council car park.

Summary

Based on a review of the above, it is clear that traffic generation rates based on the Small Suburban Shopping Centres Analysis report are not suitable for Epping Town Centre.

The alternative traffic generation rates used in the assessment to date are summarised at Figure 10.3.

Figure 10.3 – Traffic generation rates agreed with Council

Land Use	AM Peak Traffic Rate	PM Peak Traffic Rate
Retail – supermarket	4.5 per 100m2 GLFA	13.5 per 100m2 GLFA
Retail – specialty	1.3 per 100m2 GLFA	4.0 per 100m2 GLFA

Application of these rates to the indicative development scheme results in the site generating 183 and 552 vehicle trips in each peak period. Assuming 20 per cent trip containment for retail uses as agreed with Transport for NSW, the site generates 146 and 441 vehicle trips in each peak period.

When benchmarking the site traffic generation against existing traffic generating characteristics for the Coles and Council car parks of 170 and 509 vehicle trips in each peak periods, it is clear the adopted traffic generation rates are appropriate.

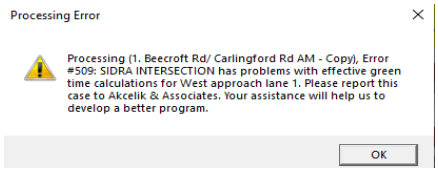
Appendix C. Detailed Calibration Notes

Model Calibration Notes

Site Information	Name	Epping/ Blaxland Road/ Langston Place	
	TCS Number	216	
	Peak Hour	AM (7:30am to 8:30am)	PM (4:15pm to 5:15pm)
Lane Geometry	Lane Utilisation	Nth Lane 1 = 75% (default 100%)	
	Geometry	Free Queue - West Slip Ln, Left = 6m, Thr = 6m	
	Capacity Adjustment		
	Basic Saturation Flow		
Lane Movements	Flow Proportions		
	Blockage Calibration		
Pedestrians	Pedestrian Minimum Time		
	Pedestrian Maximum Time		
	Pedestrian Actuation		
Volumes	Peak Flow Factor	West RT, Thr = 98%, West LT = 97%, South LT = 99%, East Thr - 99%	East Thr = 99%, West LT = 97%, Thr = 98%, RT = 98%
	Volume adjustment		
Priorities	Priorities		
Gap Acceptance	Opposing Peds (Signals)	West LT = 10 sec, North LT = 9 sec	West LT = 10 sec, North LT = 9 sec
	Minimum Departures		
Vehicle Movement Data	Queue Space		
	Signal Coordination	Phase D commences 39 seconds before start of Phase B at site 706	Phase A commences 19 seconds before start of Phase B at site 706
	Start Loss		
	End Loss		
	Minimum Green	West RT = 15 sec, East Through = 50 sec	East Thr = 63 sec
	Maximum Green		
	Phase Actuation		
	Late Start		
Phasing & Timing	Phase Sequence	A, B, C, D	A, B, C, D
	Reference Phase	D	A
	Variable Phase		
	Yellow Time	5 seconds, all phases	5 seconds, all phases
	All-Red Time	2 seconds, all phases	2 seconds, all phases
	Dummy Phases		
	Filter Option		
Intersection	Area Factor	West = 1.15	South = 0.76, west = 1.1
	Extra Bunching		

Model Calibration Notes

Site Information	Name	Beecroft/ Carlingford	
	TCS Number	706	
	Peak Hour	AM (7:30am to 8:30am)	PM (4:15pm to 5:15pm)
Lane Geometry	Lane Utilisation		
	Geometry	West Slip Ln Free Queue - 16m Thr, 25m Left	West Slip Ln Free Queue - 16m Thr, 25m Left
	Capacity Adjustment		
	Basic Saturation Flow		
Lane Movements	Flow Proportions	West RT, Lane 1 = 100% Lane 1. West RT, Lane 2 = 80% lane 2, 20% Lane 1	West RT, Lane 1 = 100% Lane 1. West RT, Lane 2 = 90% lane 2, 10% Lane 1
	Blockage Calibration		
Pedestrians	Pedestrian Minimum Time		
	Pedestrian Maximum Time		
	Pedestrian Actuation		
	Unsignalised Crossing	West approach slip lane, remove crossing as SIDRA error excerpted below with effective green time calculations for lane 1. Note only 7 pedestirans recorded in AM peak hour.	West approach slip lane, remove crossing as SIDRA error excerpted below with effective green time calculations for lane 1. Note only 7 pedestirans recorded in PM peak hour.
Volumes	Peak Flow Factor	Nth Thr - 96%, West RT - 99%, Sth LT = 99%, Sth Thr - 97%	Sth Thr - 96%, Nth Thr - 99%, Nth RT - 96%, West RT - 96%
	Volume adjustment		
Priorities	Priorities		
Gap Acceptance	Opposing Peds (Signals)		
	Minimum Departures		
Vehicle Movement Data	Queue Space		
	Signal Coordination	Phase B commences 39 seconds after start of phase D at site 216 Phase B commences 7 seconds after start of phase B at site 1015	Phase B commences 19 seconds after start of phase A at site 216 Phase B commences 7 seconds after start of phase B at site 1015
	Start Loss		
	End Loss		
	Minimum Green		West RT = 44 sec, Sth Thr = 49 sec
	Maximum Green		
	Phase Actuation		
	Late Start		
Phasing & Timing	Phase Sequence	A, C, B	A, C, B
	Reference Phase		
	Variable Phase		
	Yellow Time		
	All-Red Time		
	Dummy Phases		
	Filter Option		
Intersection	Area Factor	South = 1.05	South = 1.1, North = 1.2
	Extra Bunching		



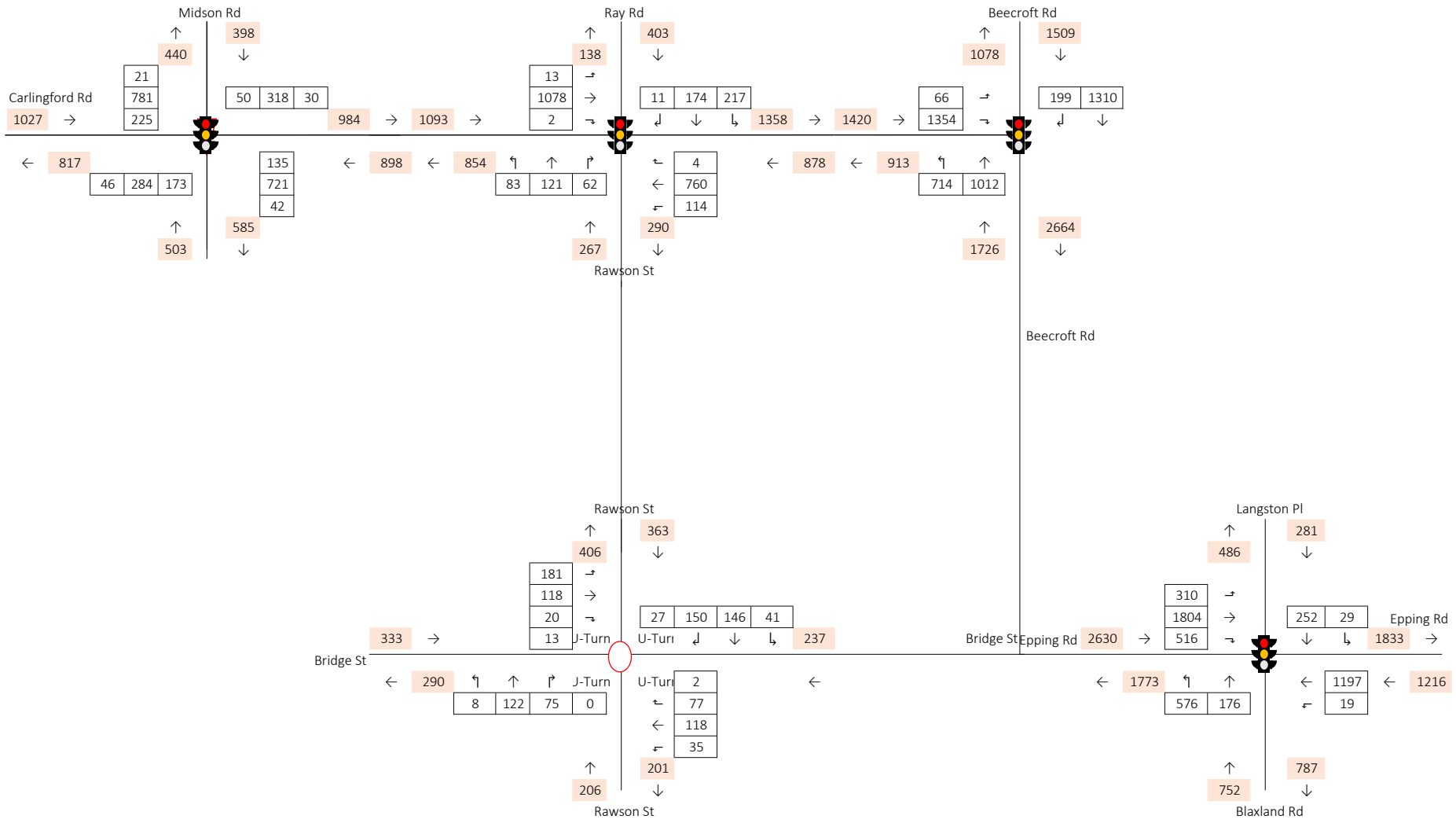
Model Calibration Notes

Site Information	Name	Carlingford/ Midson	
	TCS Number	1068	
	Peak Hour	AM (7:30am to 8:30am)	PM (4:15pm to 5:15pm)
Lane Geometry	Lane Utilisation	Sth Ln 1 - 50% (program assumes 20%) Nth Ln 1 - 50% (program assumes 25%)	Sth Ln 1 - 60% (program assumes 20%) Nth Ln 1 - 60% (program assumes 25%)
	Geometry		
	Capacity Adjustment		
Lane Movements	Flow Proportions	Sth RT - 40% lane 1, 60% lane 2	Sth RT - 40% lane 1, 60% lane 2
	Blockage Calibration		
Pedestrians	Pedestrian Minimum Time		
	Pedestrian Maximum Time		
	Pedestrian Actuation	50% (actual is 25%)	
Volumes	Peak Flow Factor		
	Volume adjustment		
Priorities	Priorities		
Gap Acceptance	Opposing Peds (Signals)		
	Minimum Departures		
Vehicle Movement Data	Queue Space		
	Signal Coordination	None, different subsystem and no link plans	None, different subsystem and no link plans
	Start Loss		
	End Loss		
	Minimum Green	Sth Thr = 27 sec	
	Maximum Green		
	Phase Actuation		
	Late Start		
Phasing & Timing	Phase Sequence	A, B, C, D, E, F, F1, F2	A, B, C, D, E, F, F1, F2
	Reference Phase	A	A
	Variable Phase	B, C, F1, F2	B, C, F1, F2
	Yellow Time	4	4
	All-Red Time	2	2
	Dummy Phases		
	Filter Option		
Intersection	Area Factor		
	Extra Bunching		

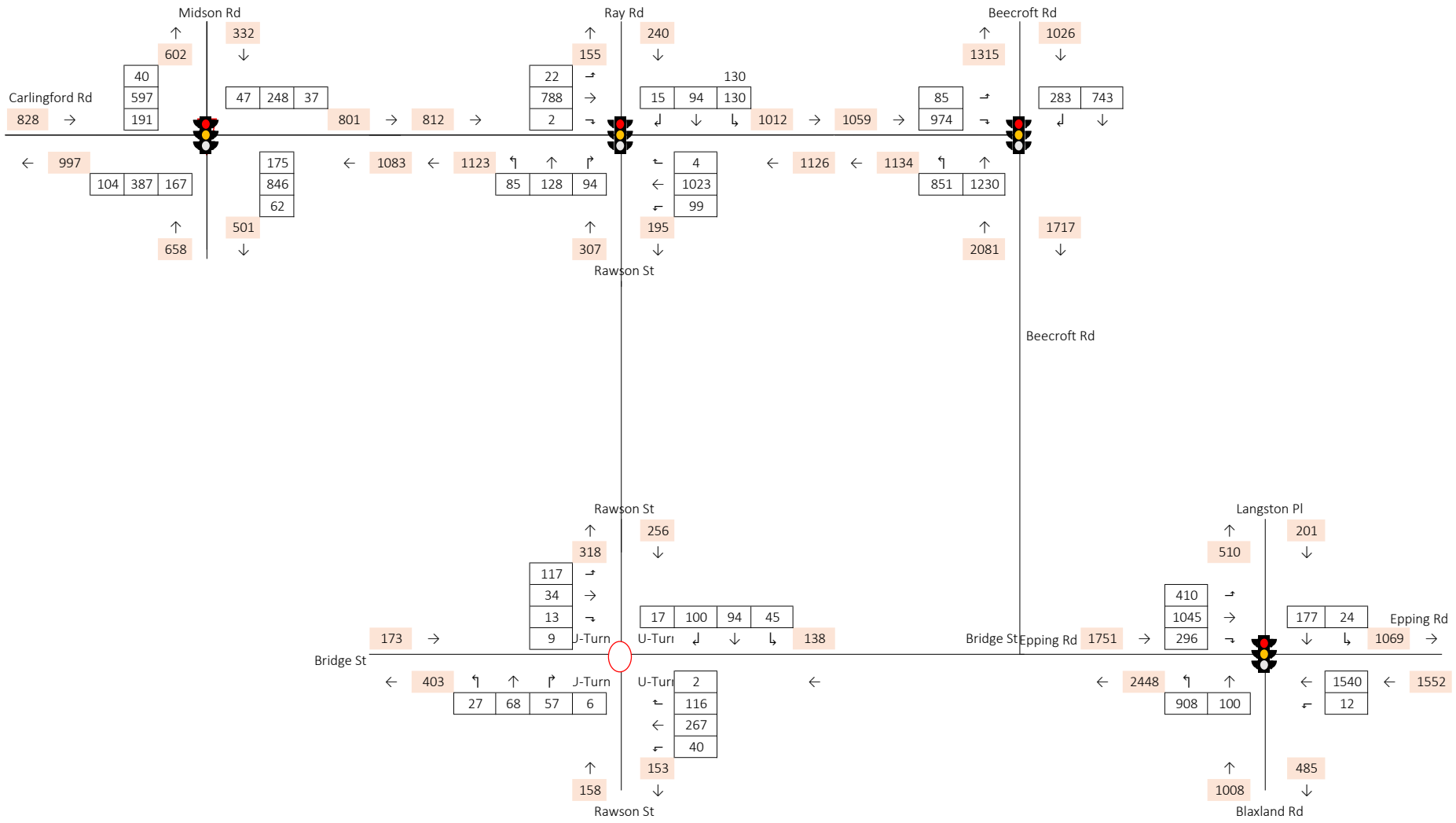
Model Calibration Notes

Site Information	Name	Carlingford/ Rawson/ Ray	
	TCS Number	1015	
	Peak Hour	AM (7:30am to 8:30am)	PM (4:15pm to 5:15pm)
Lane Geometry	Lane Utilisation		Sth Lane 1 = 45% (SIDRA calculates 32%)
	Geometry		
	Capacity Adjustment		
Lane Movements	Flow Proportions		
	Blockage Calibration		
Pedestrians	Pedestrian Minimum Time		
	Pedestrian Maximum Time		
	Pedestrian Actuation		
Volumes	Peak Flow Factor	West Thr & LT - 98%, East Thr = 97%	West Thr - 97%
	Volume adjustment		
Priorities	Priorities		
Gap Acceptance	Opposing Peds (Signals)	Sth & Nth Approach = 4 seconds for all movements including through. East & West LT = 4 seconds	Sth & Nth Approach = 4 seconds for all movements including through. East & West LT = 4 seconds
	Minimum Departures		
Vehicle Movement Data	Queue Space		
	Signal Coordination	Phase B commences seven seconds before start of phase B at site 706	Phase B commences seven seconds before start of phase B at site 706
	Start Loss		
	End Loss		
	Minimum Green	West Thr = 75 sec	West Thr = 80 sec
	Maximum Green		
	Phase Actuation		
	Late Start		
Phasing & Timing	Phase Sequence	A, B	A, B
	Reference Phase		
	Variable Phase		
	Yellow Time		
	All-Red Time		
	Dummy Phases		
	Filter Option		
Intersection	Area Factor	West = 1.2, South = 1.1	
	Extra Bunching		

Appendix D. Turning Movement Diagrams



Sc 1 2023 Existing AM



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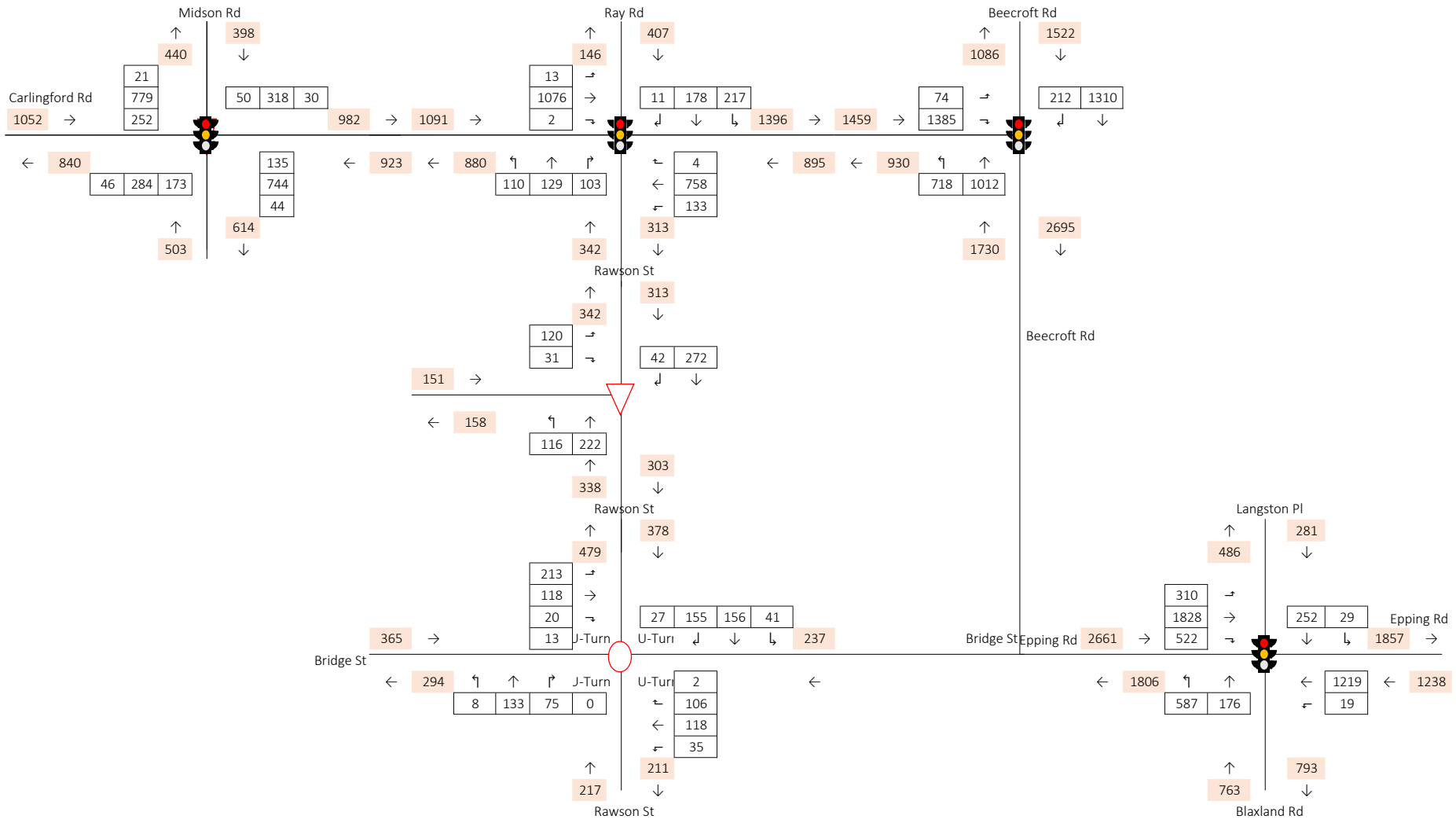

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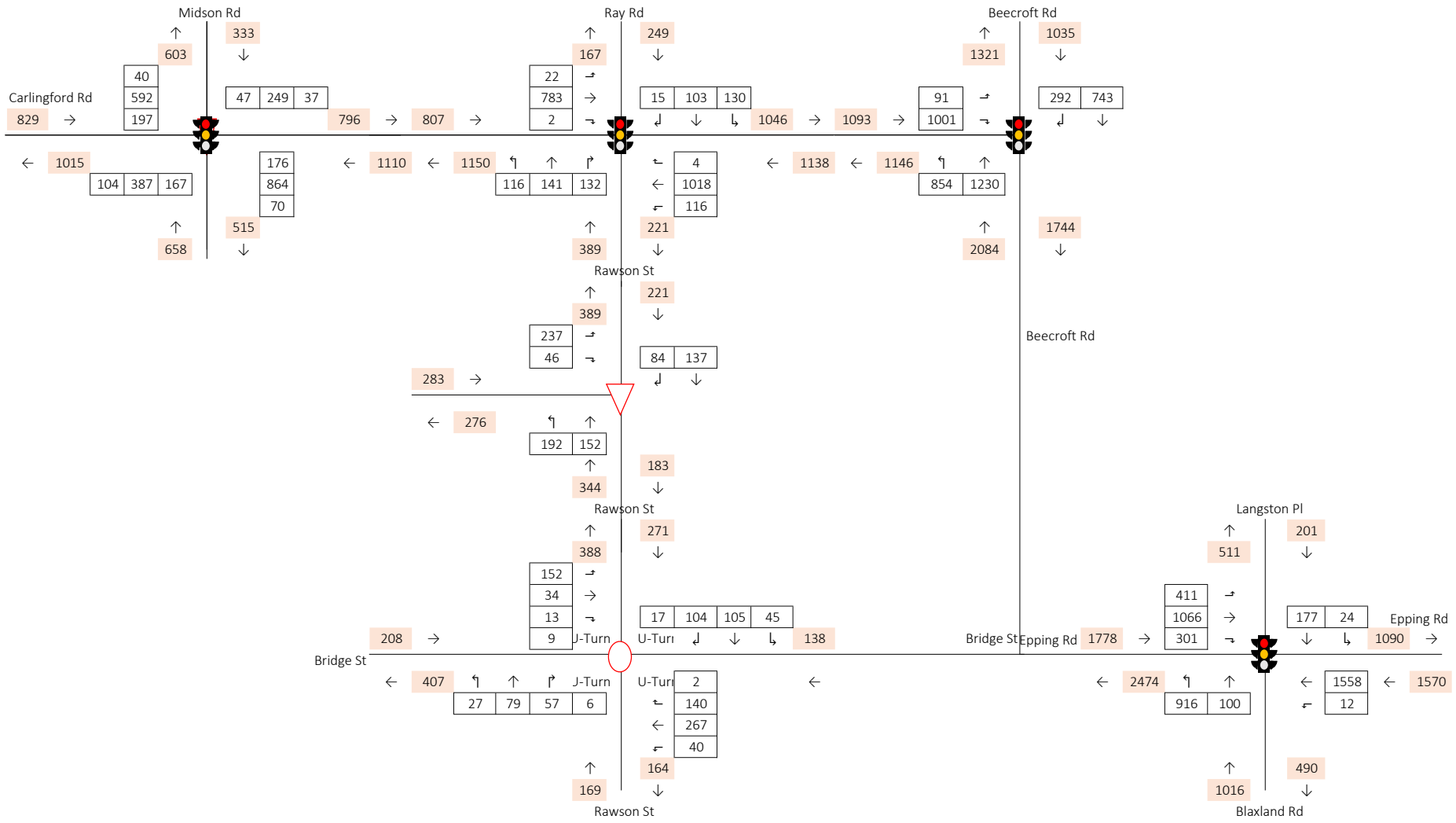

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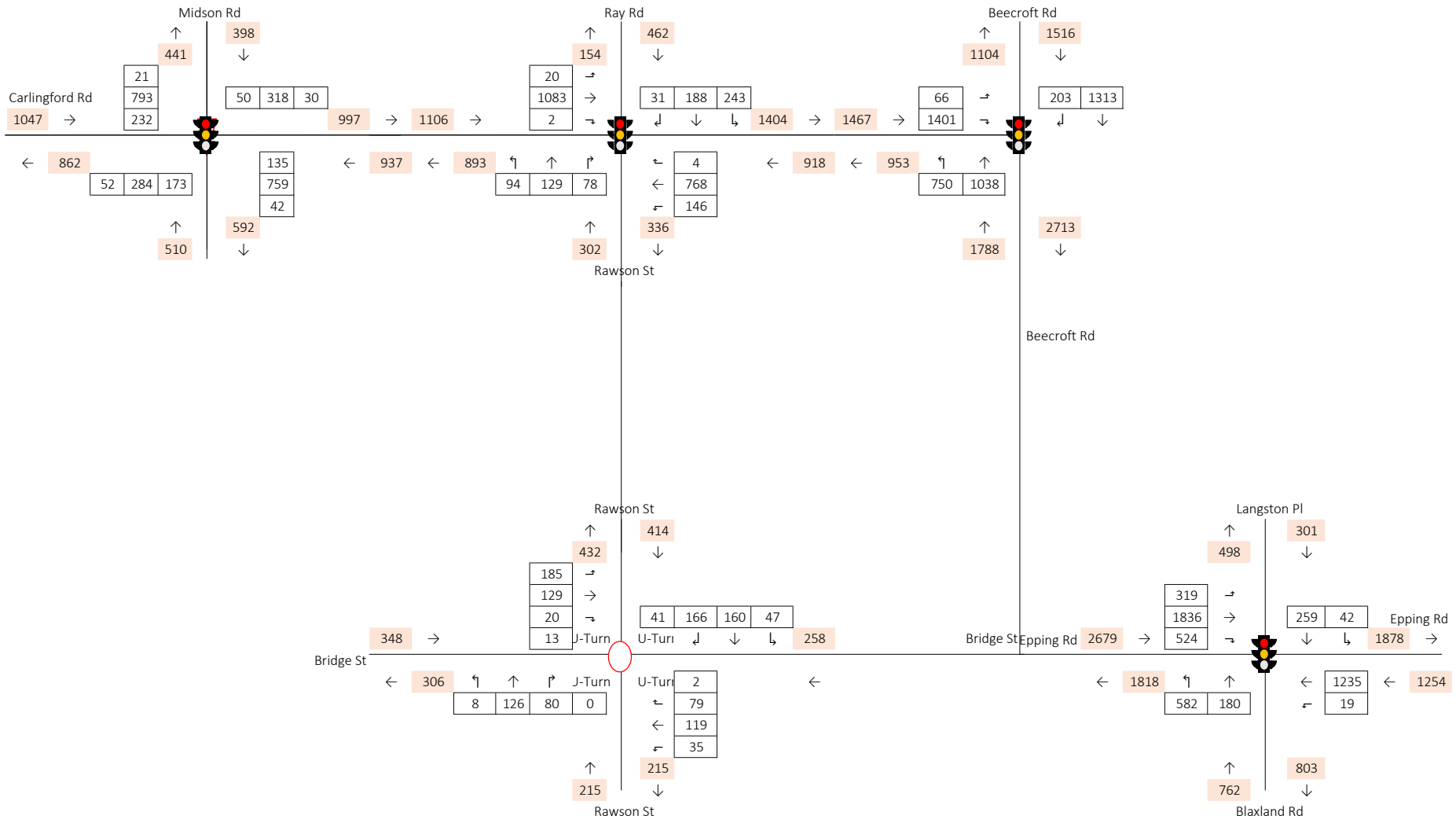

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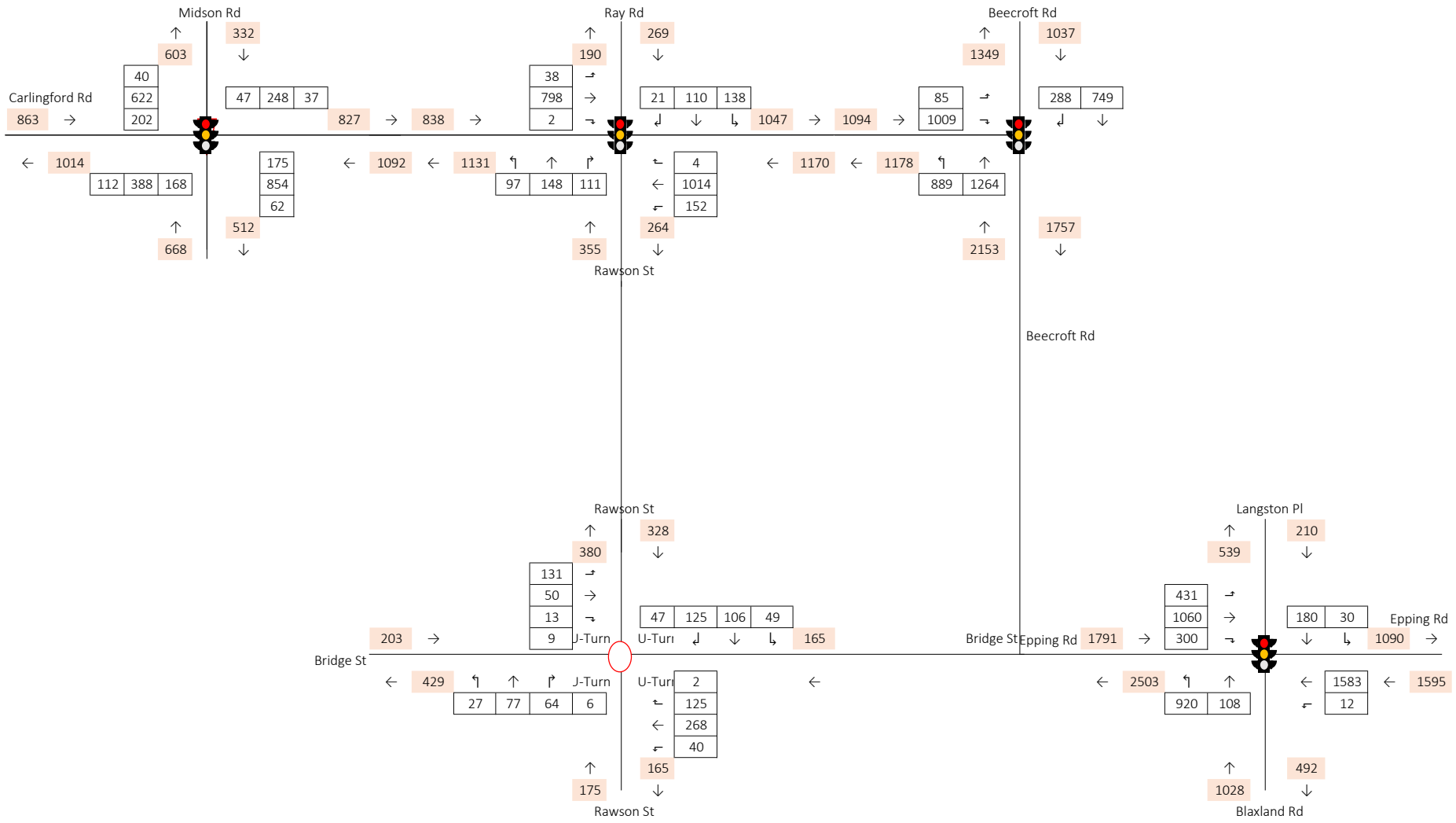
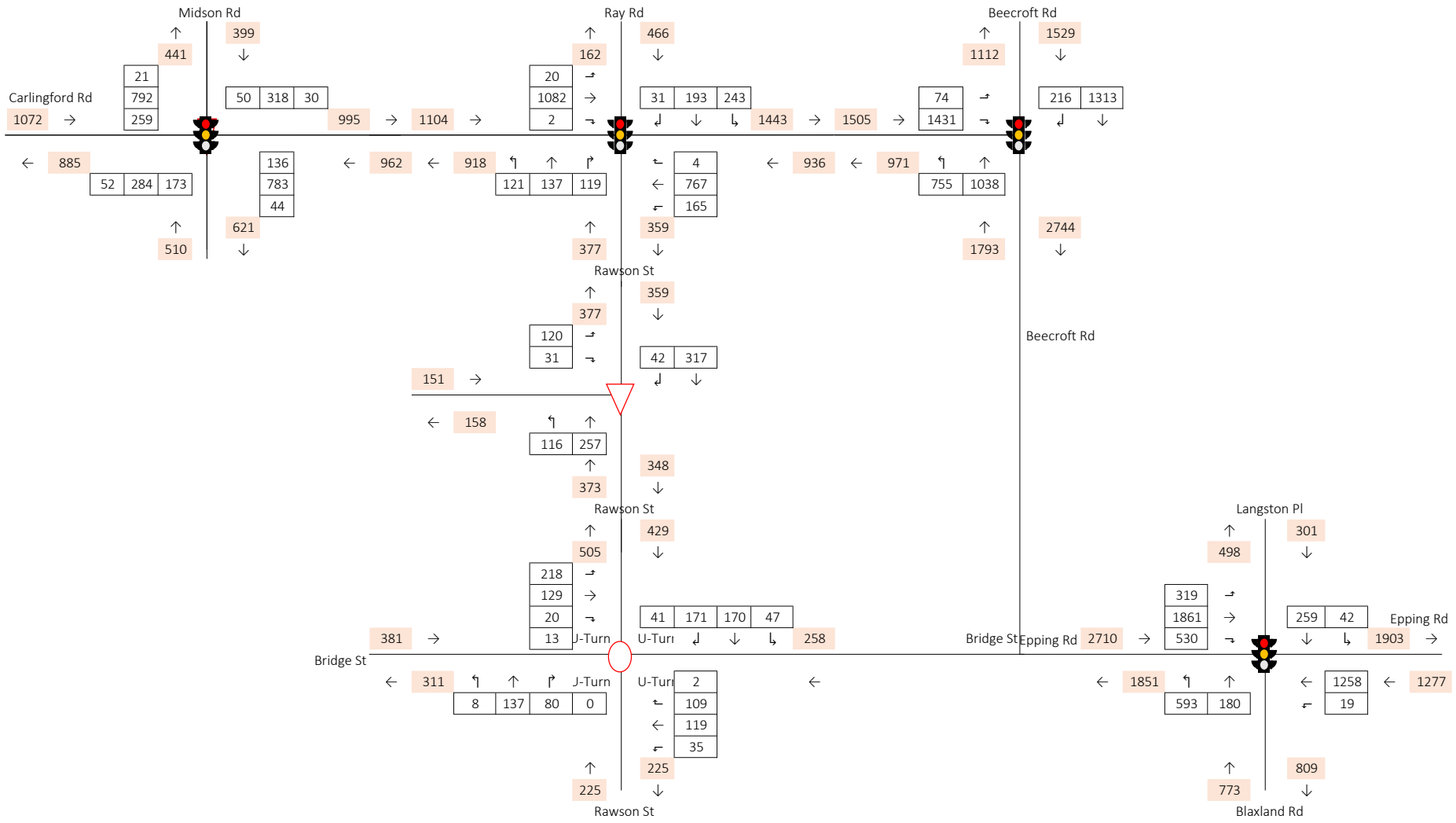


Sc 3 BG no Dev PM



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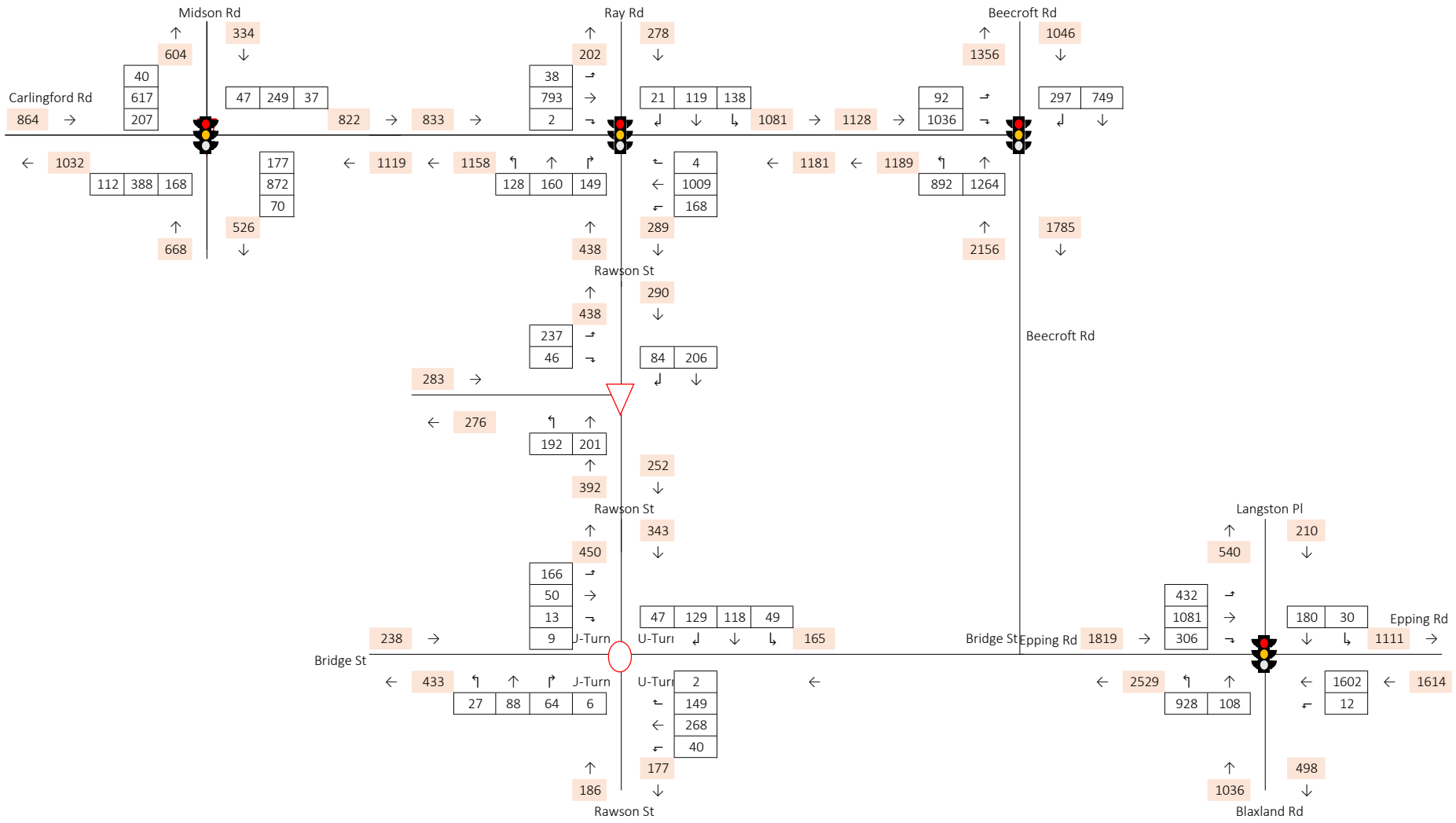
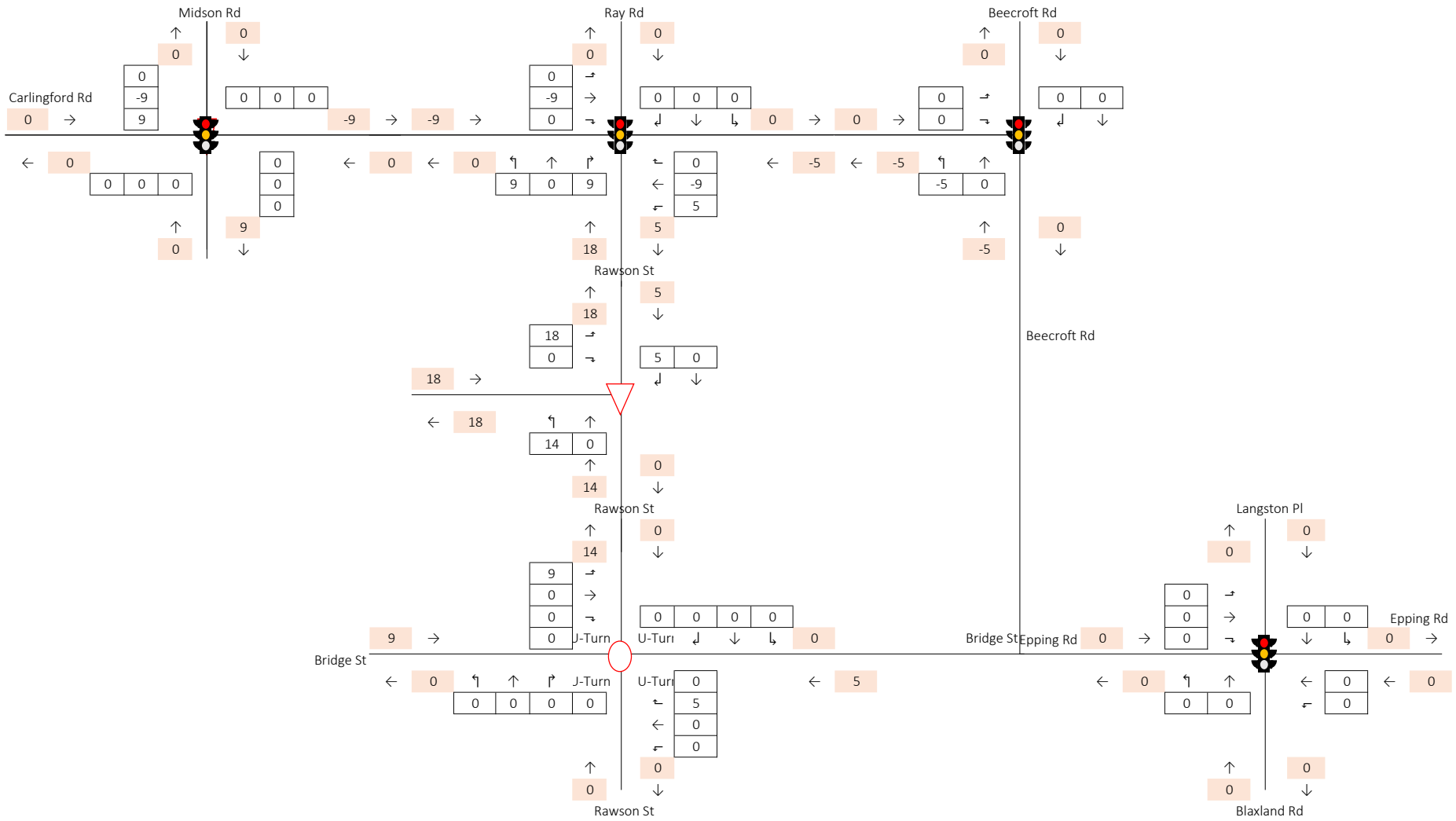
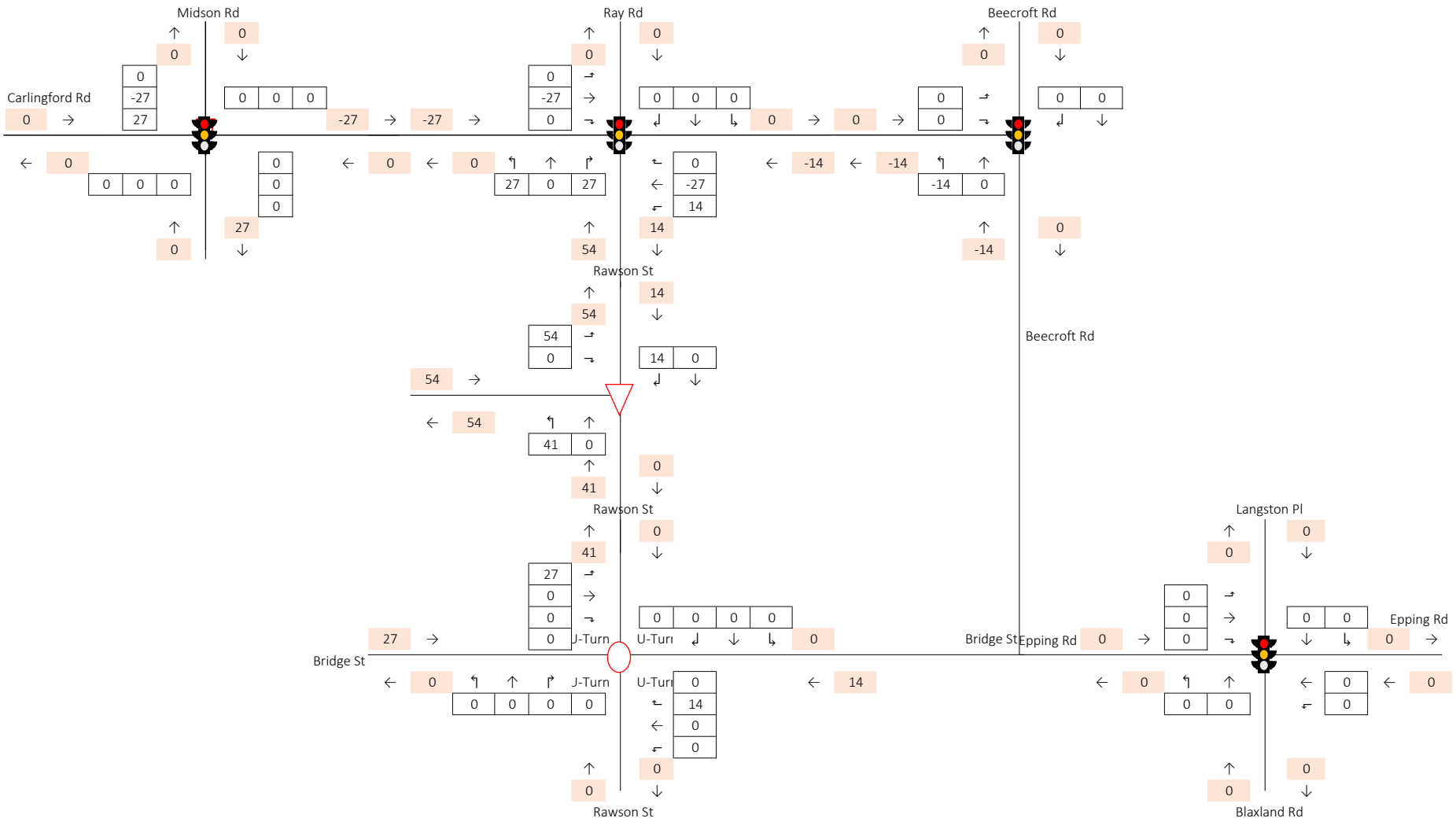


Sc 4 BG w Dev PM



Dev (Retail) Pass By Trips AM



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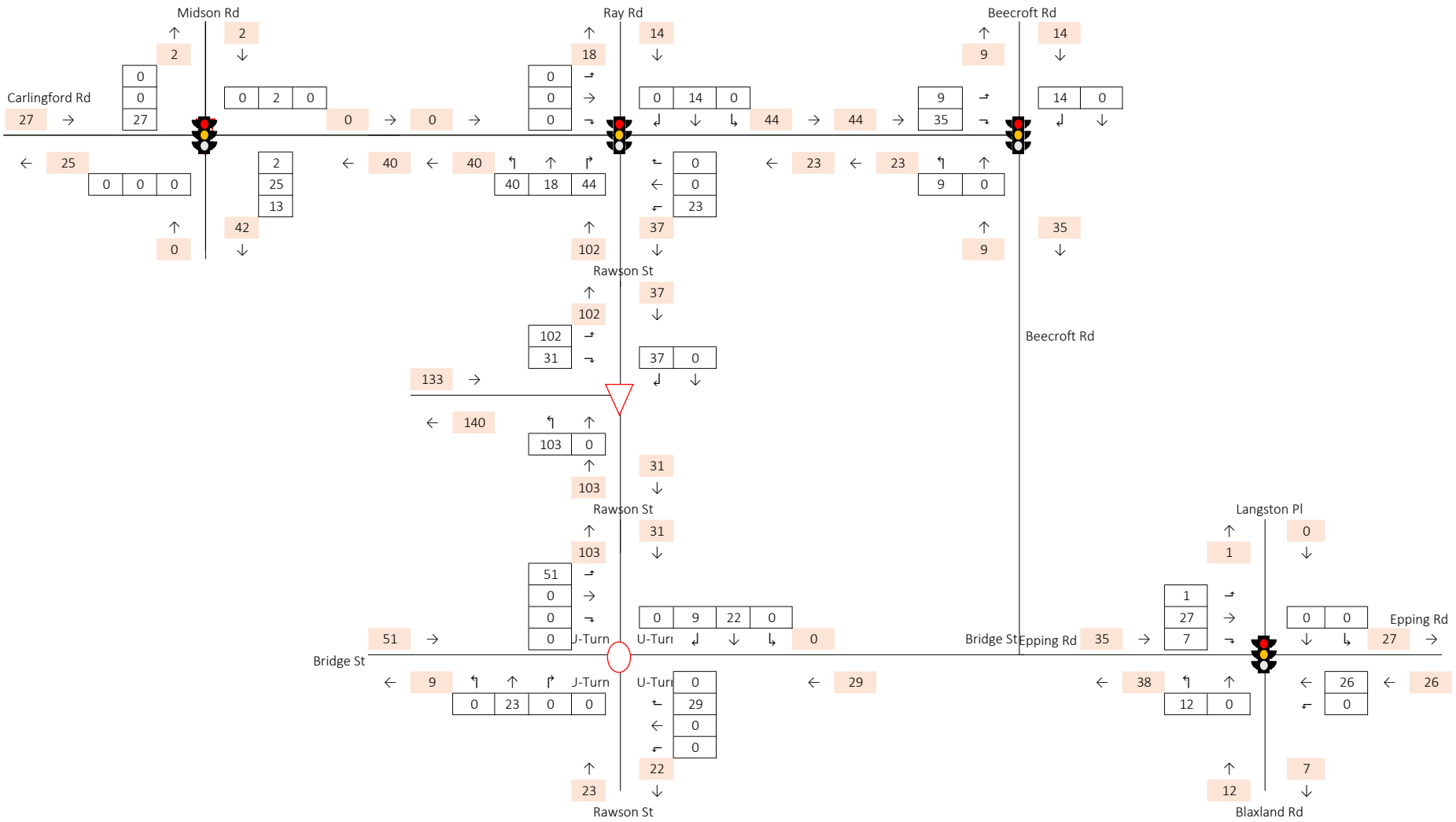
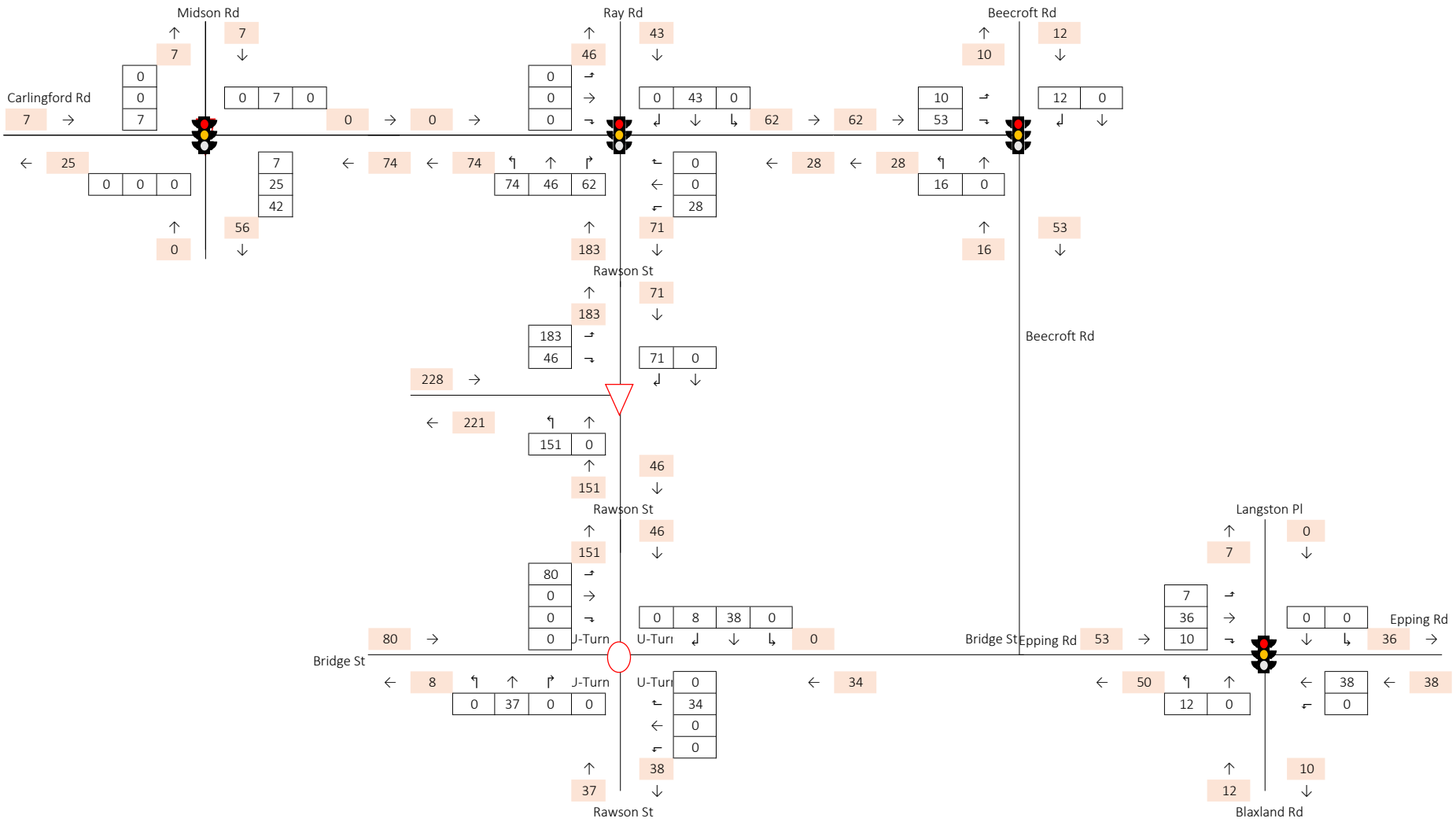


Dev (All Uses) New Trips AM



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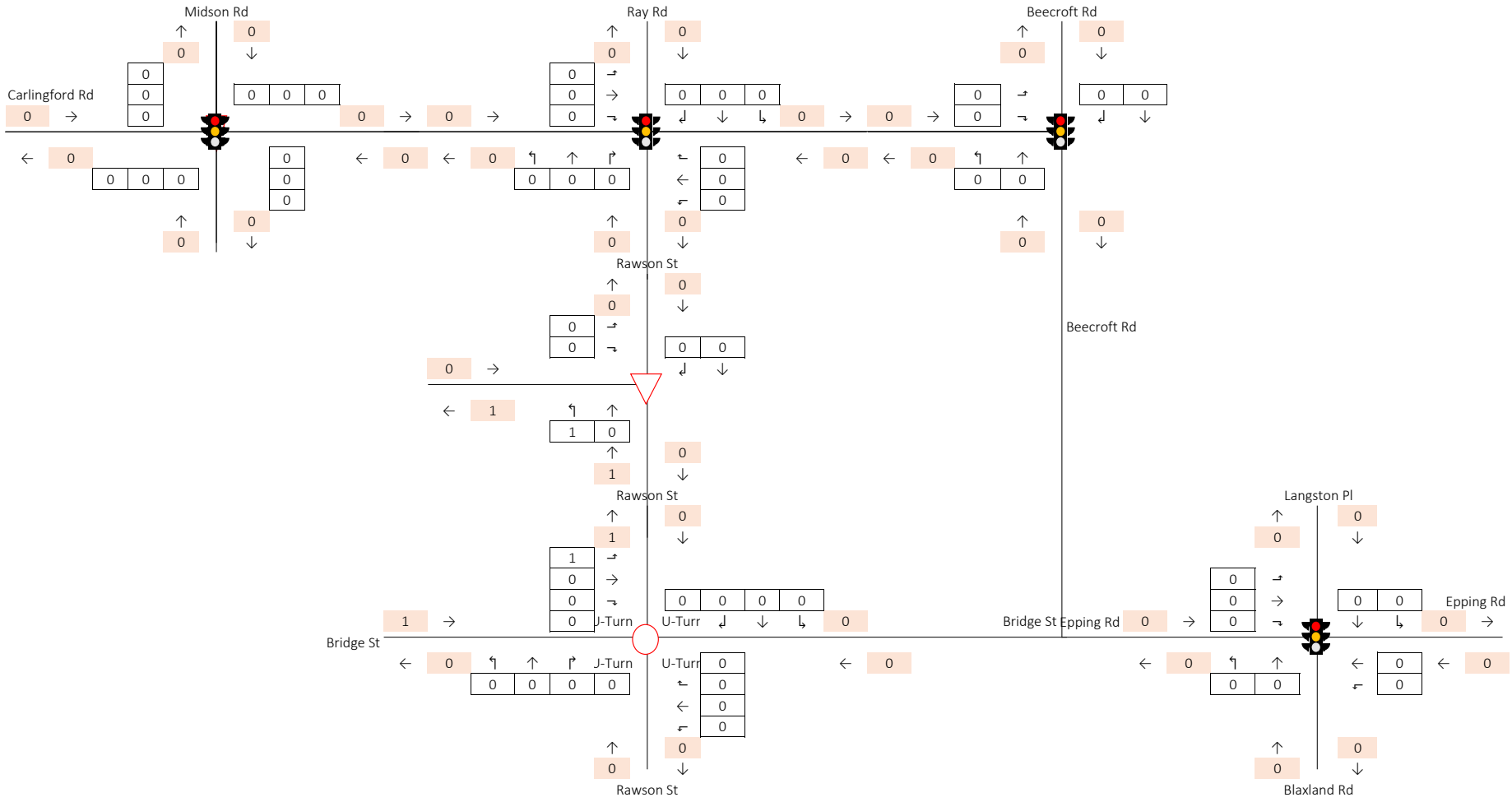
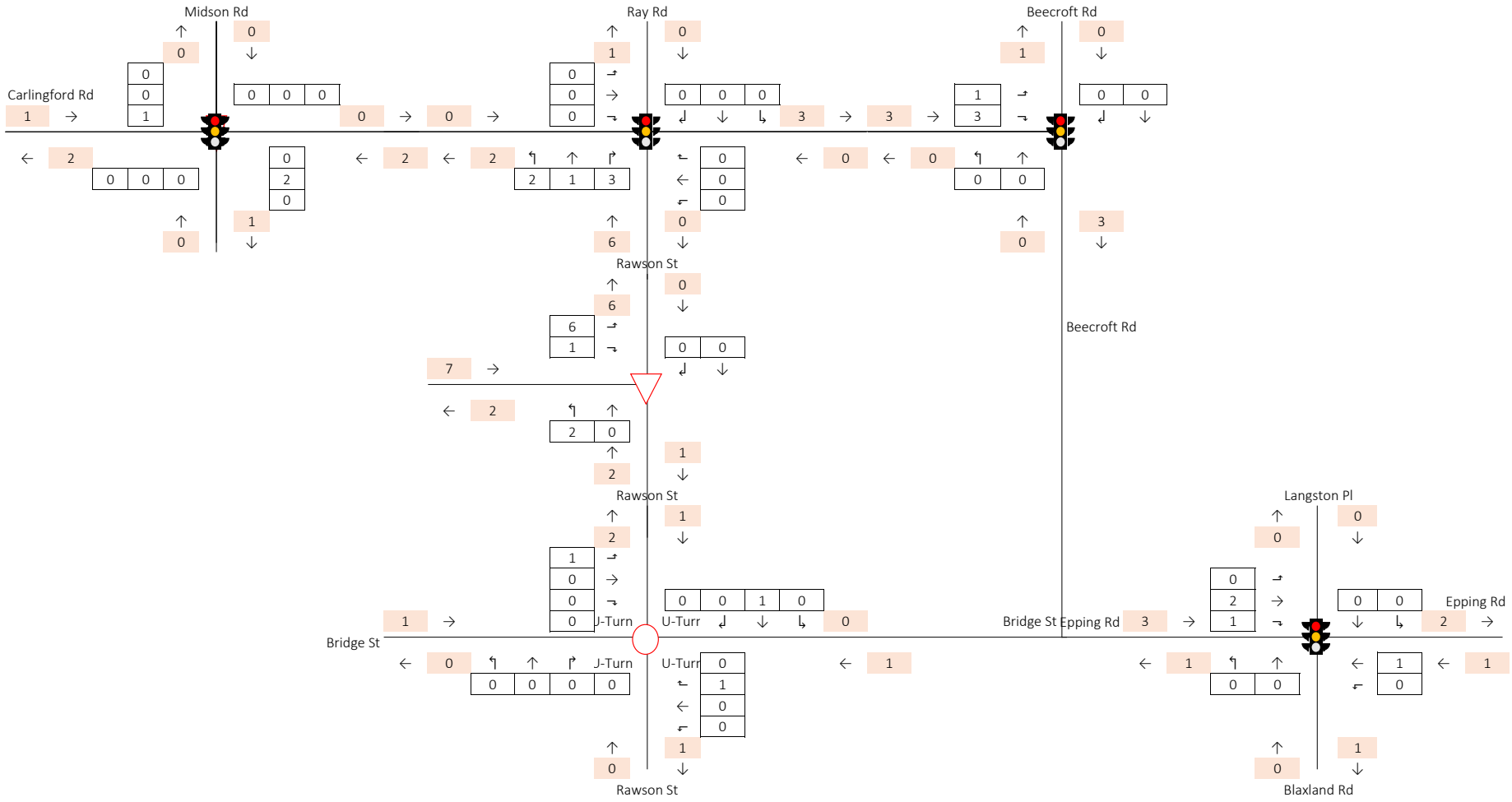
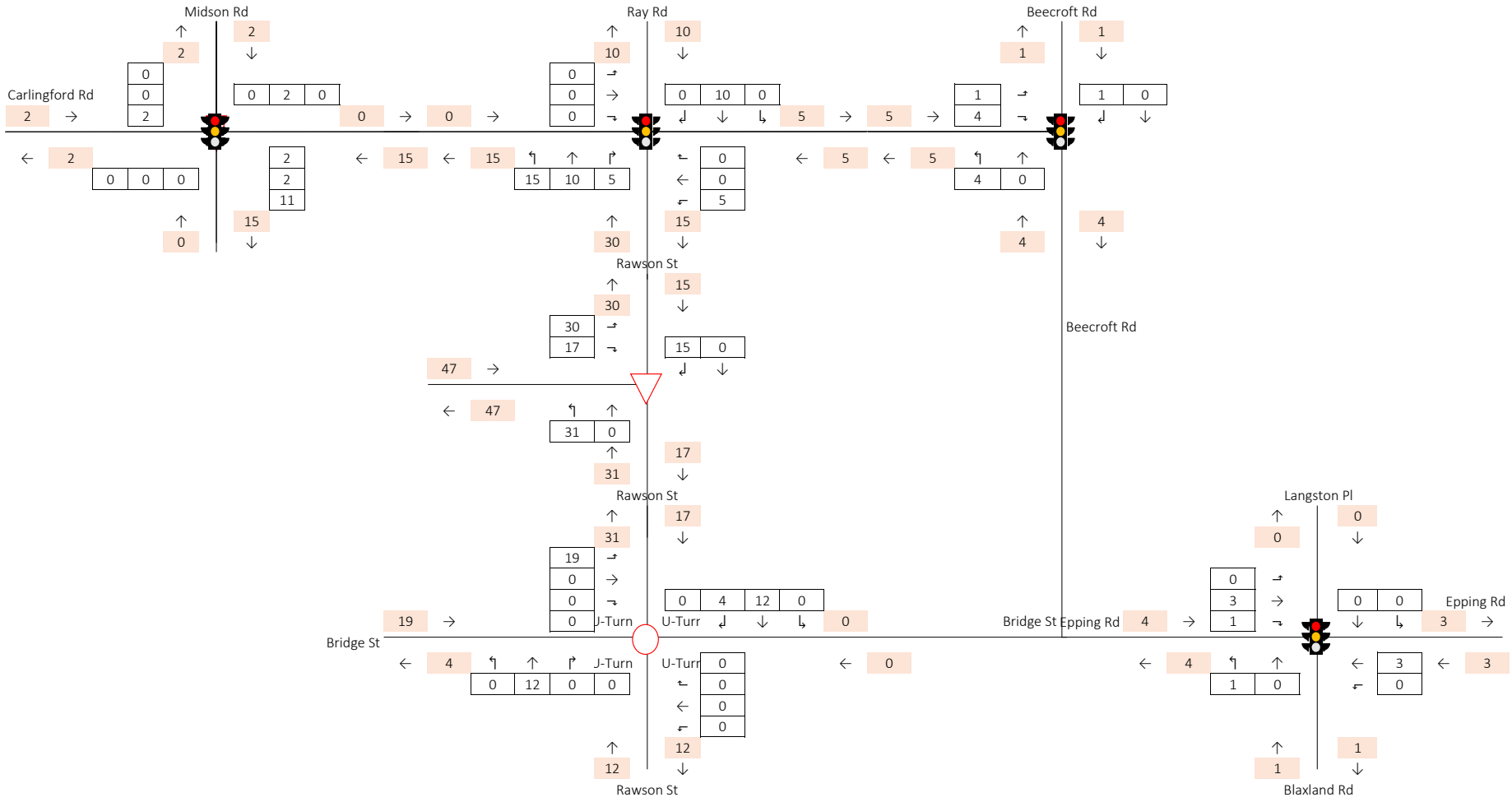


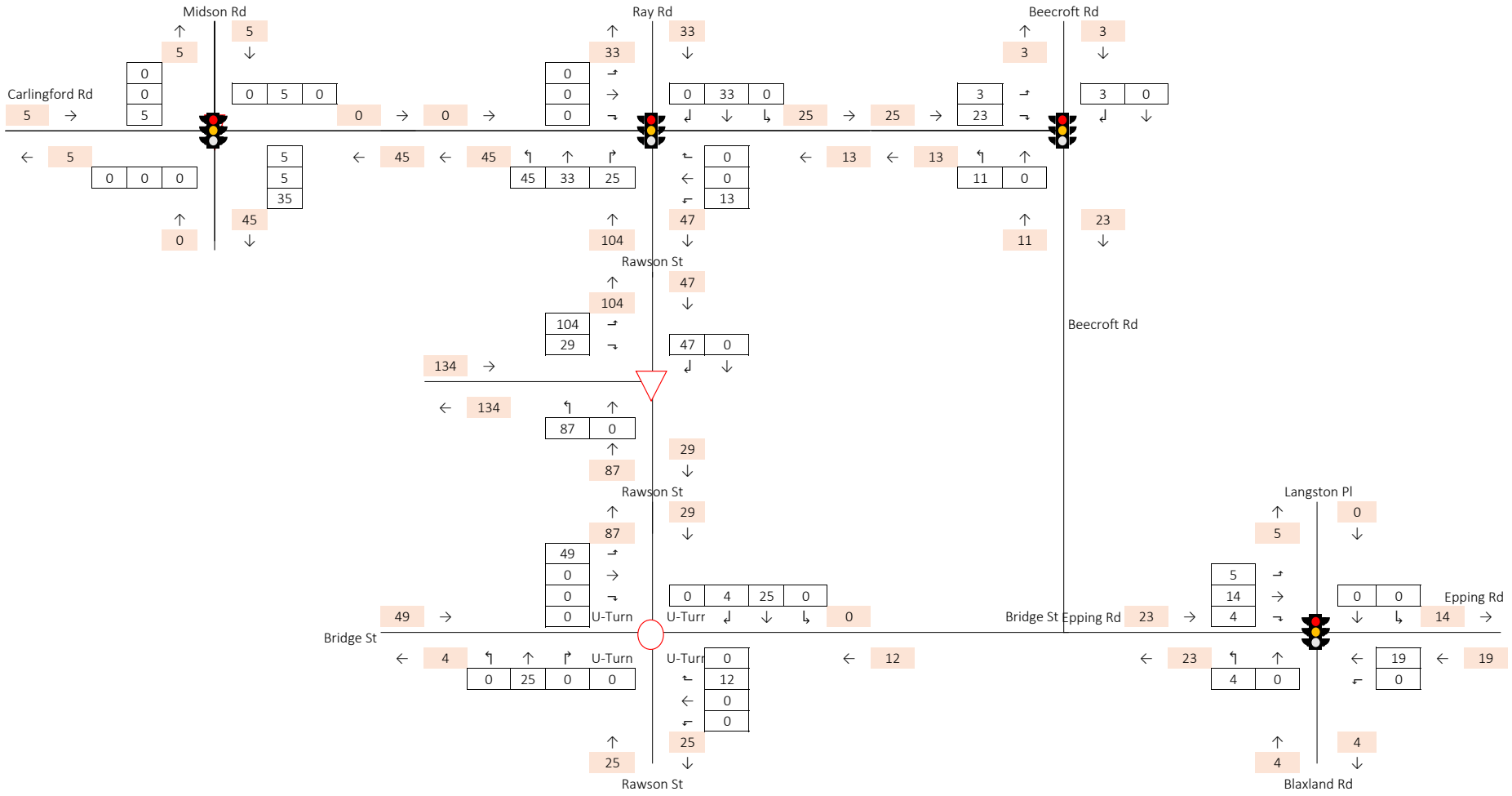
Existing Site (Office) AM



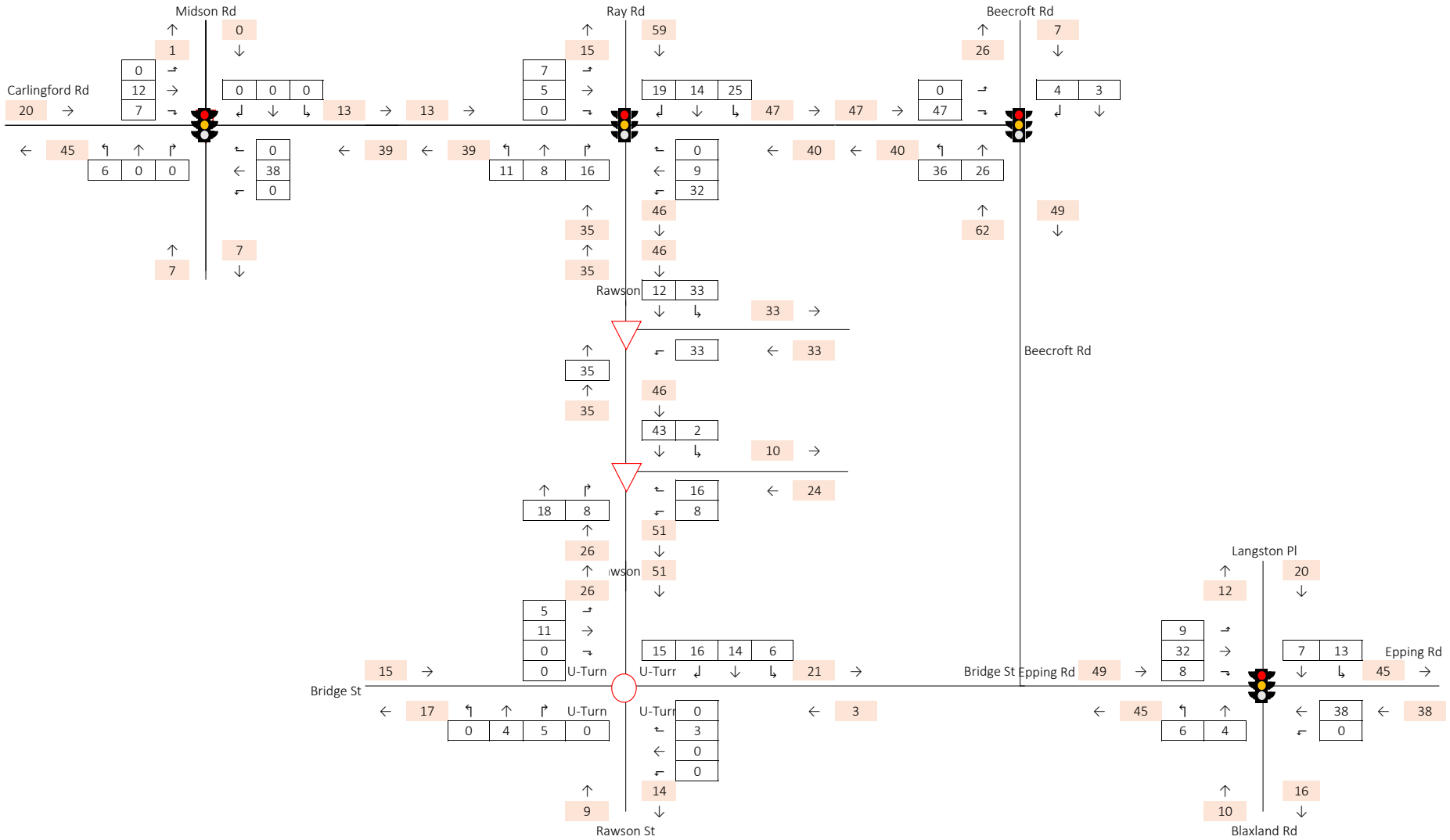
Existing Site (Office) PM



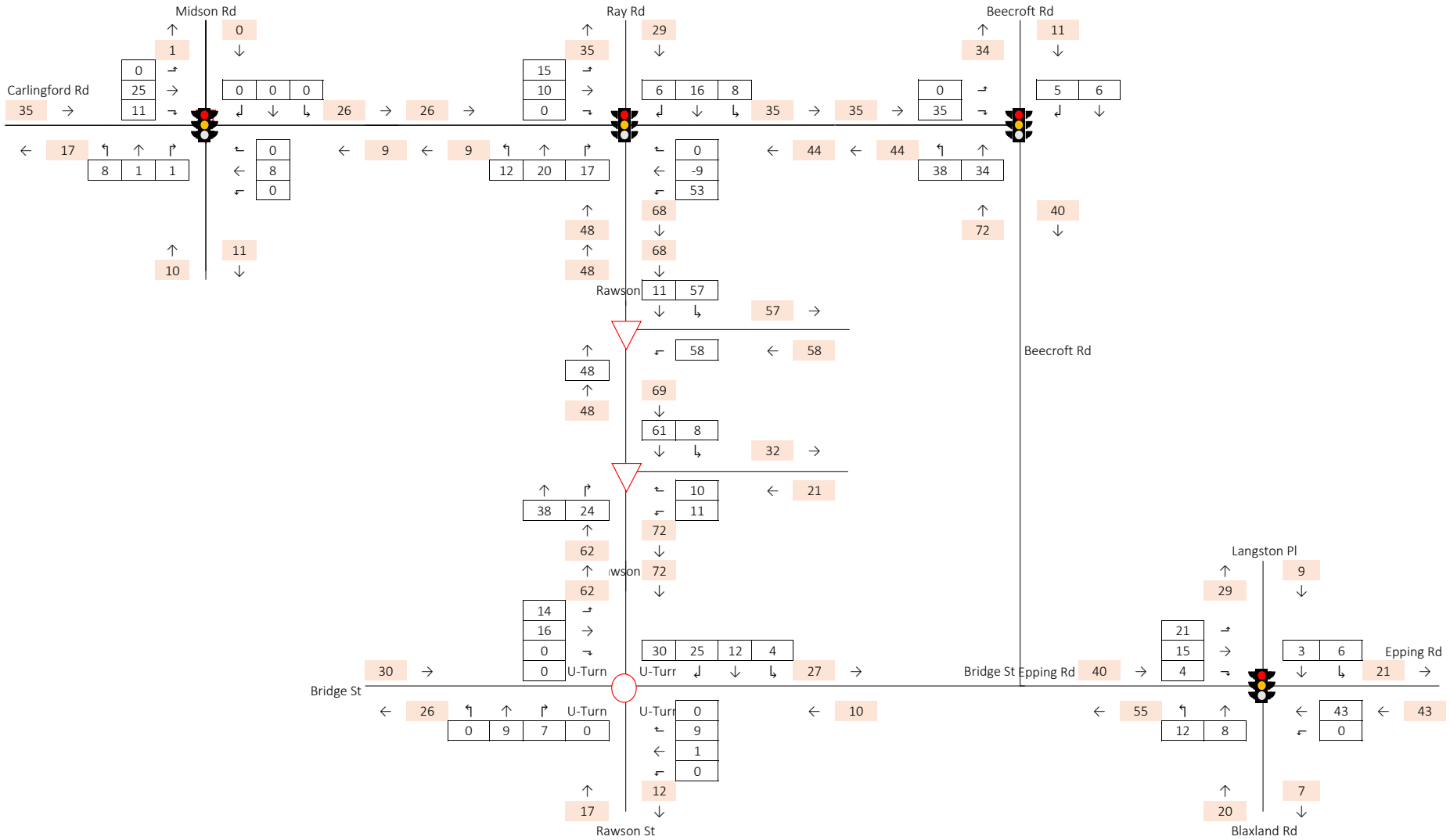
Existing Site (retail) AM



Existing Site (retail) PM



Other Developments AM



Other Developments PM

Appendix E. SIDRA Intersection Results

MOVEMENT SUMMARY

Site: 101 [X. Rawson St AM (Site Folder: 1 - Existing)]

Network: N101 [Existing AM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Pedestrian Crossing (Unsignalised)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	427	1.2	427	1.2	0.982	30.7	LOS C	4.6	32.7	0.48	2.50	3.11	12.4
Approach		427	1.2	427	1.2	0.982	30.7	LOS C	4.6	32.7	0.48	2.50	3.11	12.4
North: Rawson Street														
8	T1	382	6.1	382	6.1	0.915	13.1	LOS A	1.9	14.2	0.37	1.23	1.40	17.8
Approach		382	6.1	382	6.1	0.915	13.1	LOS A	1.9	14.2	0.37	1.23	1.40	17.8
All Vehicles		809	3.5	809	3.5	0.982	22.4	NA	4.6	32.7	0.43	1.90	2.30	14.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: 1 - Existing)]

Network: N101 [Existing AM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	721	4.8	721	4.8	0.495	11.0	LOS A	5.0	36.2	0.38	0.68	0.38	41.7
2	T1	1043	2.8	1043	2.8	* 0.953	64.1	LOS E	27.4	196.5	0.94	1.06	1.23	27.5
Approach		1765	3.6	1765	3.6	0.953	42.4	LOS C	27.4	196.5	0.71	0.91	0.88	30.0
North: Beecroft Road														
8	T1	1351	0.9	1351	0.9	0.631	24.0	LOS B	12.0	84.8	0.73	0.64	0.73	33.8
9	R2	209	6.5	209	6.5	* 0.979	113.4	LOS F	5.8	43.0	1.00	1.13	1.80	12.9
Approach		1560	1.7	1560	1.7	0.979	36.0	LOS C	12.0	84.8	0.76	0.71	0.87	27.7
West: Carlingford Road														
10	L2	69	12.1	69	12.1	0.963	77.0	LOS F	6.9	50.0	1.00	1.11	1.27	18.3
12	R2	1368	3.2	1368	3.2	* 0.963	72.6	LOS F	6.9	50.0	1.00	1.07	1.27	3.3
Approach		1437	3.7	1437	3.7	0.963	72.8	LOS F	6.9	50.0	1.00	1.07	1.27	4.4
All Vehicles		4762	3.0	4762	3.0	0.979	49.5	LOS D	27.4	196.5	0.82	0.89	1.00	21.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: 1 - Existing)]

Network: N101 [Existing AM (Network Folder: Scenario 1 Existing Conditions)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	87	1.2	87	1.2	0.307	42.0	LOS C	5.7	40.4	0.82	0.72	0.82	11.6
2	T1	127	0.8	127	0.8	* 0.945	47.4	LOS D	5.7	40.4	0.85	0.79	0.97	24.5
3	R2	65	6.5	65	6.5	0.945	99.7	LOS F	4.5	32.7	1.00	1.12	1.71	5.4
Approach		280	2.3	280	2.3	0.945	57.9	LOS E	5.7	40.4	0.87	0.85	1.10	16.4
East: Carlingford Rd														
4	L2	120	14.0	120	14.0	0.458	21.3	LOS B	6.8	50.0	0.67	0.64	0.67	10.6
5	T1	800	3.4	800	3.4	0.458	19.7	LOS B	6.9	50.0	0.71	0.65	0.71	9.8
6	R2	4	100.0	4	100.0	0.458	25.5	LOS B	6.9	50.0	0.74	0.66	0.74	32.0
Approach		924	5.2	924	5.2	0.458	20.0	LOS B	6.9	50.0	0.70	0.65	0.70	10.2
North: Ray Rd														
7	L2	228	1.4	228	1.4	0.836	63.5	LOS E	9.8	69.3	1.00	0.98	1.23	18.5
8	T1	183	3.4	183	3.4	0.436	44.7	LOS D	6.4	46.3	0.89	0.75	0.89	22.6
9	R2	12	9.1	12	9.1	0.436	49.3	LOS D	6.4	46.3	0.89	0.75	0.89	22.6
Approach		423	2.5	423	2.5	0.836	55.0	LOS D	9.8	69.3	0.95	0.87	1.07	20.2
West: Carlingford Rd														
10	L2	13	0.0	13	0.0	0.865	42.5	LOS D	22.2	160.0	0.92	0.94	1.04	39.2
11	T1	1099	3.4	1099	3.4	* 0.865	37.5	LOS C	22.2	160.0	0.92	0.94	1.04	35.0
12	R2	2	100.0	2	100.0	0.865	44.4	LOS D	21.8	157.7	0.91	0.95	1.05	34.8
Approach		1114	3.6	1114	3.6	0.865	37.6	LOS C	22.2	160.0	0.92	0.94	1.04	35.0
All Vehicles		2742	3.8	2742	3.8	0.945	36.4	LOS C	22.2	160.0	0.84	0.82	0.94	26.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	88.6	34.8	0.39

North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	589	59.7	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: 1 - Existing)] Network: N101 [Existing AM (Network Folder: Scenario 1 Existing Conditions)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.441	10.5	LOS A	1.1	7.8	0.74	0.89	0.81	42.8
2	T1	128	0.8	128	0.8	0.441	10.4	LOS A	1.1	7.8	0.74	0.89	0.81	38.1
3	R2	79	0.0	79	0.0	0.441	14.2	LOS A	1.1	7.8	0.74	0.89	0.81	38.3
Approach		216	0.5	216	0.5	0.441	11.8	LOS A	1.1	7.8	0.74	0.89	0.81	38.5
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.497	10.9	LOS A	1.4	9.9	0.77	0.92	0.88	38.7
5	T1	124	2.5	124	2.5	0.497	10.9	LOS A	1.4	9.9	0.77	0.92	0.88	39.7
6	R2	81	1.3	81	1.3	0.497	14.5	LOS A	1.4	9.9	0.77	0.92	0.88	20.3
6u	U	2	0.0	2	0.0	0.497	16.0	LOS B	1.4	9.9	0.77	0.92	0.88	12.3
Approach		244	1.7	244	1.7	0.497	12.1	LOS A	1.4	9.9	0.77	0.92	0.88	36.2
North: Rawson Street														
7	L2	43	31.7	43	31.7	0.639	11.7	LOS A	2.4	17.7	0.78	0.88	0.92	29.8
8	T1	154	0.7	154	0.7	0.639	10.3	LOS A	2.4	17.7	0.78	0.88	0.92	40.5
9	R2	158	5.3	158	5.3	0.639	14.1	LOS A	2.4	17.7	0.78	0.88	0.92	40.6
9u	U	28	0.0	28	0.0	0.639	15.4	LOS B	2.4	17.7	0.78	0.88	0.92	26.8
Approach		383	6.0	383	6.0	0.639	12.4	LOS A	2.4	17.7	0.78	0.88	0.92	39.3
West: Bridge Street														
10	L2	191	1.7	191	1.7	0.645	12.6	LOS A	2.4	17.1	0.83	0.98	1.05	37.0
11	T1	124	4.2	124	4.2	0.645	12.9	LOS A	2.4	17.1	0.83	0.98	1.05	38.9
12	R2	21	0.0	21	0.0	0.645	16.3	LOS B	2.4	17.1	0.83	0.98	1.05	42.7
12u	U	14	0.0	14	0.0	0.645	17.9	LOS B	2.4	17.1	0.83	0.98	1.05	43.2
Approach		349	2.4	349	2.4	0.645	13.2	LOS A	2.4	17.1	0.83	0.98	1.05	38.6
All Vehicles		1193	3.1	1193	3.1	0.645	12.5	LOS A	2.4	17.7	0.78	0.92	0.93	38.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: 1 - Existing)]

Network: N101 [Existing AM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	582	4.3	582	4.3	0.321	24.5	LOS B	6.6	48.1	0.63	0.75	0.63	33.4
22	T1	185	3.4	185	3.4	0.681	59.7	LOS E	7.1	50.8	1.00	0.84	1.03	28.8
Approach		767	4.1	767	4.1	0.681	33.0	LOS C	7.1	50.8	0.72	0.77	0.73	31.5
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1209	3.3	1209	3.3	* 0.837	43.0	LOS D	22.6	161.8	0.98	0.93	1.04	25.1
Approach		1229	3.4	1229	3.4	0.837	42.9	LOS D	22.6	162.6	0.97	0.92	1.03	25.3
NorthWest: Langston Pl														
27a	L1	31	13.8	31	13.8	0.524	64.7	LOS E	3.9	28.3	0.99	0.78	0.99	27.8
28	T1	265	1.6	265	1.6	* 0.698	59.5	LOS E	7.4	52.7	1.00	0.83	1.03	28.9
Approach		296	2.8	296	2.8	0.698	60.1	LOS E	7.4	52.7	1.00	0.83	1.03	28.8
West: Epping Rd														
10b	L3	320	3.9	320	3.9	0.801	13.2	LOS A	13.1	93.6	0.46	0.59	0.46	47.9
11	T1	1841	1.8	1841	1.8	0.801	6.6	LOS A	21.9	155.3	0.48	0.50	0.48	52.9
12a	R1	527	1.6	527	1.6	* 0.964	60.3	LOS E	18.1	128.1	1.00	1.08	1.32	28.4
Approach		2687	2.0	2687	2.0	0.964	17.9	LOS B	21.9	155.3	0.58	0.62	0.64	44.7
All Vehicles		4979	2.7	4979	2.7	0.964	28.9	LOS C	22.6	162.6	0.72	0.73	0.77	36.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											
P7	Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians		526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: 1 - Existing)]

Network: N101 [Existing AM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	48	2.2	48	2.2	0.488	50.4	LOS D	6.8	47.9	0.92	0.78	0.92	31.6
2	T1	299	0.4	299	0.4	* 0.813	50.2	LOS D	12.3	88.1	0.96	0.85	1.02	29.2
3	R2	182	4.0	182	4.0	0.813	59.9	LOS E	12.3	88.1	1.00	0.93	1.12	19.6
Approach		529	1.8	529	1.8	0.813	53.6	LOS D	12.3	88.1	0.97	0.87	1.05	26.7
East: Carlingford Rd														
4	L2	44	4.8	44	4.8	0.846	58.5	LOS E	16.3	118.5	1.00	0.98	1.14	34.7
5	T1	759	4.2	759	4.2	0.846	52.5	LOS D	16.3	118.5	0.99	0.97	1.14	36.6
6	R2	142	2.2	142	2.2	0.427	32.6	LOS C	3.1	22.0	0.92	0.79	0.92	40.6
Approach		945	3.9	945	3.9	0.846	49.8	LOS D	16.3	118.5	0.98	0.94	1.10	37.1
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.523	57.4	LOS E	5.2	36.4	0.96	0.83	0.96	20.5
8	T1	335	0.0	335	0.0	* 0.871	60.7	LOS E	10.8	75.7	0.99	0.95	1.15	27.2
9	R2	53	0.0	53	0.0	0.871	69.9	LOS E	10.8	75.7	1.00	1.03	1.26	27.1
Approach		419	0.0	419	0.0	0.871	61.6	LOS E	10.8	75.7	0.99	0.95	1.15	26.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	* 0.895	65.2	LOS E	19.4	140.5	1.00	1.05	1.22	28.7
11	T1	822	4.1	822	4.1	0.895	59.4	LOS E	19.4	140.5	0.98	1.04	1.23	20.6
12	R2	237	1.8	237	1.8	* 0.673	33.8	LOS C	5.5	39.0	0.98	0.83	0.99	36.0
Approach		1081	3.5	1081	3.5	0.895	53.9	LOS D	19.4	140.5	0.98	0.99	1.17	24.4
All Vehicles		2975	2.8	2975	2.8	0.895	53.6	LOS D	19.4	140.5	0.98	0.95	1.13	29.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
North: Midson Rd											
P3	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96

All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [X. Rawson St PM (Site Folder: 1 - Existing)]

Network: N101 [Existing PM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Pedestrian Crossing (Unsignalised)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
2	T1	335	0.0	335	0.0	0.993	39.0	LOS C	3.9	38.6	0.53	3.32	4.04	10.7
Approach		335	0.0	335	0.0	0.993	39.0	LOS C	3.9	38.6	0.53	3.32	4.04	10.7
North: Rawson St														
8	T1	269	5.9	269	5.9	0.847	10.4	LOS A	0.9	6.7	0.44	1.03	1.16	19.5
Approach		269	5.9	269	5.9	0.847	10.4	LOS A	0.9	6.7	0.44	1.03	1.16	19.5
All Vehicles		604	2.6	604	2.6	0.993	26.2	NA	3.9	38.6	0.49	2.30	2.76	13.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd PM (Site Folder: 1 - Existing)]

Network: N101 [Existing PM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	896	4.5	896	4.5	0.604	13.0	LOS A	7.7	56.1	0.48	0.72	0.48	39.4
2	T1	1281	1.5	1281	1.5	* 0.983	75.6	LOS F	39.0	276.7	0.94	1.12	1.29	25.1
Approach		2177	2.7	2177	2.7	0.983	49.8	LOS D	39.0	276.7	0.75	0.96	0.96	27.5
North: Beecroft Road														
8	T1	751	1.6	751	1.6	0.195	14.2	LOS A	4.6	32.5	0.52	0.44	0.52	41.1
9	R2	295	5.7	295	5.7	* 0.961	102.5	LOS F	7.8	57.1	1.00	1.09	1.65	13.9
Approach		1045	2.8	1045	2.8	0.961	39.1	LOS C	7.8	57.1	0.65	0.62	0.84	26.5
West: Carlingford Road														
10	L2	89	4.7	89	4.7	0.898	66.5	LOS E	7.0	50.0	1.00	1.07	1.15	20.2
12	R2	1015	1.4	1015	1.4	* 0.898	64.9	LOS E	7.1	50.0	1.00	1.02	1.17	3.7
Approach		1104	1.7	1104	1.7	0.898	65.0	LOS E	7.1	50.0	1.00	1.02	1.17	5.6
All Vehicles		4327	2.5	4327	2.5	0.983	51.1	LOS D	39.0	276.7	0.79	0.89	0.98	22.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St PM (Site Folder: 1 - Existing)]

Network: N101 [Existing PM (Network Folder: Scenario 1 Existing Conditions)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	87	1.2	87	1.2	0.390	47.0	LOS D	6.2	43.7	0.87	0.76	0.87	10.6
2	T1	131	0.0	131	0.0	* 0.866	48.1	LOS D	6.2	43.7	0.89	0.81	0.97	24.4
3	R2	96	0.0	96	0.0	0.866	79.8	LOS F	5.5	38.5	1.00	1.05	1.43	6.5
Approach		313	0.3	313	0.3	0.866	57.5	LOS E	6.2	43.7	0.92	0.87	1.08	16.0
East: Carlingford Rd														
4	L2	104	10.1	104	10.1	0.532	19.5	LOS B	6.9	50.0	0.63	0.60	0.63	11.7
5	T1	1077	3.9	1077	3.9	0.532	16.2	LOS B	6.9	50.0	0.64	0.59	0.64	11.6
6	R2	4	100.0	4	100.0	0.532	20.5	LOS B	6.9	50.0	0.64	0.58	0.64	34.6
Approach		1185	4.8	1185	4.8	0.532	16.5	LOS B	6.9	50.0	0.63	0.59	0.63	11.8
North: Ray Rd														
7	L2	137	0.8	137	0.8	0.572	50.9	LOS D	4.8	33.6	0.92	0.81	0.92	21.1
8	T1	96	4.4	96	4.4	0.271	43.5	LOS D	3.5	25.8	0.86	0.70	0.86	22.9
9	R2	16	6.7	16	6.7	0.271	48.1	LOS D	3.5	25.8	0.86	0.70	0.86	22.9
Approach		249	2.5	249	2.5	0.572	47.9	LOS D	4.8	33.6	0.89	0.76	0.89	21.8
West: Carlingford Rd														
10	L2	23	0.0	23	0.0	0.727	24.3	LOS B	13.2	94.4	0.75	0.69	0.75	45.7
11	T1	813	2.2	813	2.2	* 0.727	18.8	LOS B	13.2	94.4	0.75	0.69	0.75	44.1
12	R2	2	100.0	2	100.0	0.727	25.1	LOS B	12.2	87.4	0.75	0.69	0.75	44.1
Approach		838	2.4	838	2.4	0.727	19.0	LOS B	13.2	94.4	0.75	0.69	0.75	44.1
All Vehicles		2585	3.2	2585	3.2	0.866	25.3	LOS B	13.2	94.4	0.73	0.67	0.75	29.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											
P2	Full	105	59.4	LOS E	0.4	0.4	0.96	0.96	88.4	34.8	0.39

North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	211	59.7	LOS E	0.7	0.7	0.96	0.96	88.7	34.8	0.39
All Pedestrians	421	59.5	LOS E	0.7	0.7	0.96	0.96	88.3	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St PM (Site Folder: 1 - Existing)] Network: N101 [Existing PM (Network Folder: Scenario 1 Existing Conditions)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	28	0.0	28	0.0	0.411	12.3	LOS A	1.0	6.9	0.79	0.94	0.88	41.9
2	T1	72	0.0	72	0.0	0.411	12.2	LOS A	1.0	6.9	0.79	0.94	0.88	36.8
3	R2	60	0.0	60	0.0	0.411	16.0	LOS B	1.0	6.9	0.79	0.94	0.88	27.2
3u	U	6	0.0	6	0.0	0.411	19.0	LOS B	1.0	6.9	0.79	0.94	0.88	45.4
Approach		166	0.0	166	0.0	0.411	13.9	LOS A	1.0	6.9	0.79	0.94	0.88	34.2
East: Bridge Street														
4	L2	42	0.0	42	0.0	0.718	12.5	LOS A	3.2	22.6	0.85	0.95	1.08	37.8
5	T1	281	0.4	281	0.4	0.718	12.4	LOS A	3.2	22.6	0.85	0.95	1.08	38.8
6	R2	122	0.0	122	0.0	0.718	16.0	LOS B	3.2	22.6	0.85	0.95	1.08	19.1
6u	U	2	0.0	2	0.0	0.718	17.6	LOS B	3.2	22.6	0.85	0.95	1.08	12.1
Approach		447	0.2	447	0.2	0.718	13.4	LOS A	3.2	22.6	0.85	0.95	1.08	36.0
North: Rawson Street														
7	L2	47	17.8	47	17.8	0.366	5.9	LOS A	0.9	6.9	0.47	0.61	0.47	35.4
8	T1	99	1.1	99	1.1	0.366	5.3	LOS A	0.9	6.9	0.47	0.61	0.47	44.2
9	R2	105	6.0	105	6.0	0.366	9.0	LOS A	0.9	6.9	0.47	0.61	0.47	44.2
9u	U	18	0.0	18	0.0	0.366	10.4	LOS A	0.9	6.9	0.47	0.61	0.47	33.1
Approach		269	5.9	269	5.9	0.366	7.2	LOS A	0.9	6.9	0.47	0.61	0.47	43.0
West: Bridge Street														
10	L2	123	0.0	123	0.0	0.314	7.1	LOS A	0.7	4.9	0.60	0.71	0.60	41.4
11	T1	36	2.9	36	2.9	0.314	7.4	LOS A	0.7	4.9	0.60	0.71	0.60	43.0
12	R2	14	0.0	14	0.0	0.314	10.9	LOS A	0.7	4.9	0.60	0.71	0.60	45.5
12u	U	9	0.0	9	0.0	0.314	12.5	LOS A	0.7	4.9	0.60	0.71	0.60	46.1
Approach		182	0.6	182	0.6	0.314	7.7	LOS A	0.7	4.9	0.60	0.71	0.60	42.6
All Vehicles		1065	1.7	1065	1.7	0.718	10.9	LOS A	3.2	22.6	0.70	0.82	0.81	38.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - PM (Site Folder: 1 - Existing)]

Network: N101 [Existing PM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	956	0.9	956	0.9	* 0.949	78.5	LOS F	27.6	194.3	0.99	1.06	1.36	16.9
22	T1	105	3.0	105	3.0	0.508	58.1	LOS E	3.9	28.0	0.97	0.78	0.97	29.2
Approach		1061	1.1	1061	1.1	0.949	76.5	LOS F	27.6	194.3	0.99	1.04	1.32	18.2
East: Epping Rd														
4b	L3	13	0.0	13	0.0	0.019	30.6	LOS C	0.3	2.0	0.62	0.68	0.62	39.5
5	T1	1556	2.5	1556	2.5	* 0.911	47.8	LOS D	34.8	250.1	1.00	1.04	1.15	23.5
Approach		1568	2.5	1568	2.5	0.911	47.7	LOS D	34.8	250.1	1.00	1.04	1.15	23.7
NorthWest: Langston Pl														
27a	L1	25	4.2	25	4.2	0.446	64.0	LOS E	3.3	24.0	0.98	0.77	0.98	28.0
28	T1	186	2.8	186	2.8	0.446	57.2	LOS E	4.5	31.8	0.97	0.77	0.97	29.5
Approach		212	3.0	212	3.0	0.446	58.0	LOS E	4.5	31.8	0.97	0.77	0.97	29.3
West: Epping Rd														
10b	L3	423	1.2	423	1.2	0.523	8.7	LOS A	2.9	20.7	0.18	0.51	0.18	49.9
11	T1	1066	2.0	1066	2.0	0.523	2.7	LOS A	5.4	38.0	0.19	0.25	0.19	56.2
12a	R1	312	0.7	312	0.7	0.978	76.6	LOS F	11.6	81.4	1.00	1.14	1.45	24.9
Approach		1801	1.6	1801	1.6	0.978	16.9	LOS B	11.6	81.4	0.32	0.47	0.40	45.0
All Vehicles		4641	1.9	4641	1.9	0.978	42.8	LOS D	34.8	250.1	0.73	0.80	0.89	29.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	227.6	218.4	0.96
NorthWest: Langston Pl											
P7	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.7	212.5	0.95
All Pedestrians		274	59.4	LOS E	0.6	0.6	0.96	0.96	226.4	217.1	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - PM (Site Folder: 1 - Existing)]

Network: N101 [Existing PM (Network Folder: Scenario 1 Existing Conditions)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	109	2.9	109	2.9	0.565	42.7	LOS D	7.9	56.1	0.92	0.80	0.92	33.6
2	T1	407	0.3	407	0.3	* 0.942	55.4	LOS D	17.4	123.5	0.97	1.01	1.22	28.1
3	R2	176	4.2	176	4.2	0.942	72.1	LOS F	17.4	123.5	1.00	1.15	1.42	17.5
Approach		693	1.7	693	1.7	0.942	57.7	LOS E	17.4	123.5	0.97	1.01	1.22	26.5
East: Carlingford Rd														
4	L2	65	1.6	65	1.6	0.945	72.0	LOS F	21.4	154.6	1.00	1.18	1.40	31.7
5	T1	891	4.4	891	4.4	* 0.945	66.2	LOS E	21.4	154.6	1.00	1.18	1.41	33.2
6	R2	184	0.0	184	0.0	* 0.536	28.7	LOS C	3.8	26.7	0.89	0.80	0.89	41.9
Approach		1140	3.5	1140	3.5	0.945	60.5	LOS E	21.4	154.6	0.98	1.12	1.33	34.3
North: Midson Rd														
7	L2	39	2.7	39	2.7	0.556	50.8	LOS D	3.7	26.3	0.99	0.83	0.99	21.9
8	T1	261	1.6	261	1.6	* 0.926	61.1	LOS E	8.8	62.0	0.99	1.02	1.31	27.0
9	R2	49	0.0	49	0.0	0.926	73.5	LOS F	8.8	62.0	1.00	1.13	1.49	26.3
Approach		349	1.5	349	1.5	0.926	61.7	LOS E	8.8	62.0	0.99	1.02	1.30	26.6
West: Carlingford Rd														
10	L2	42	0.0	42	0.0	0.600	41.1	LOS C	9.4	66.9	0.91	0.79	0.91	35.2
11	T1	628	2.5	628	2.5	0.600	35.5	LOS C	9.5	68.2	0.91	0.79	0.91	27.8
12	R2	201	0.5	201	0.5	0.754	36.1	LOS C	4.5	31.4	1.00	0.85	1.12	35.2
Approach		872	1.9	872	1.9	0.754	36.0	LOS C	9.5	68.2	0.93	0.80	0.96	30.6
All Vehicles		3054	2.4	3054	2.4	0.945	53.0	LOS D	21.4	154.6	0.97	0.99	1.20	30.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
East: Carlingford Rd											
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
North: Midson Rd											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	212.2	211.8	1.00

All Pedestrians	158	49.3	LOS E	0.2	0.2	0.95	0.95	214.6	214.9	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St AM - Pedestrian Operated Signals (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	504	1.0	504	1.0	* 0.606	9.9	LOS A	4.8	34.2	0.83	0.72	0.83	28.3
Approach		504	1.0	504	1.0	0.606	9.9	LOS A	4.8	34.2	0.83	0.72	0.83	28.3
North: Rawson Street														
8	T1	398	5.8	398	5.8	0.493	9.3	LOS A	3.6	26.3	0.77	0.66	0.77	14.9
Approach		398	5.8	398	5.8	0.493	9.3	LOS A	3.6	26.3	0.77	0.66	0.77	14.9
All Vehicles		902	3.2	902	3.2	0.606	9.7	LOS A	4.8	34.2	0.80	0.69	0.80	24.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19
All Pedestrians		858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	725	4.7	725	4.7	0.503	11.4	LOS A	5.2	37.8	0.40	0.69	0.40	41.2
2	T1	1043	2.8	1043	2.8	* 0.971	71.9	LOS F	28.8	206.5	0.95	1.11	1.30	25.8
Approach		1769	3.6	1769	3.6	0.971	47.1	LOS D	28.8	206.5	0.72	0.94	0.93	28.4
North: Beecroft Road														
8	T1	1351	0.9	1351	0.9	0.636	24.0	LOS B	12.1	85.3	0.73	0.64	0.73	33.8
9	R2	223	6.1	223	6.1	* 0.979	113.2	LOS F	6.2	45.7	1.00	1.13	1.78	12.9
Approach		1574	1.7	1574	1.7	0.979	36.7	LOS C	12.1	85.3	0.77	0.71	0.88	27.5
West: Carlingford Road														
10	L2	78	10.8	76	10.7	0.963	77.5	LOS F	6.9	50.0	1.00	1.11	1.27	18.2
12	R2	1399	3.2	1365	3.2	* 0.963	73.4	LOS F	7.0	50.0	1.00	1.07	1.27	3.3
Approach		1477	3.6	1441 N1	3.6	0.963	73.6	LOS F	7.0	50.0	1.00	1.07	1.27	4.4
All Vehicles		4819	3.0	4783 N1	3.0	0.979	51.7	LOS D	28.8	206.5	0.82	0.90	1.01	20.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	116	0.9	116	0.9	0.411	44.1	LOS D	7.8	55.1	0.85	0.76	0.85	7.7
2	T1	136	0.8	136	0.8	0.411	39.5	LOS C	7.8	55.1	0.85	0.76	0.85	25.6
3	R2	108	3.9	108	3.9	1.545	555.8	LOS F	12.4	90.0	1.00	1.92	3.75	0.6
Approach		360	1.8	360	1.8	1.545	196.5	LOS F	12.4	90.0	0.90	1.11	1.73	4.7
East: Carlingford Rd														
4	L2	140	12.0	140	12.0	0.460	20.7	LOS B	6.8	50.0	0.62	0.62	0.62	10.9
5	T1	798	3.4	798	3.4	0.460	18.8	LOS B	6.9	50.0	0.67	0.63	0.67	10.2
6	R2	4	100.0	4	100.0	0.460	24.2	LOS B	6.9	50.0	0.72	0.64	0.72	32.6
Approach		942	5.1	942	5.1	0.460	19.1	LOS B	6.9	50.0	0.67	0.63	0.67	10.5
North: Ray Rd														
7	L2	228	1.4	228	1.4	* 0.858	67.7	LOS E	10.1	71.9	1.00	1.00	1.28	17.7
8	T1	187	3.4	187	3.4	0.391	40.3	LOS C	6.2	44.9	0.85	0.72	0.85	23.9
9	R2	12	9.1	12	9.1	0.391	44.8	LOS D	6.2	44.9	0.85	0.72	0.85	23.9
Approach		427	2.5	427	2.5	0.858	55.0	LOS D	10.1	71.9	0.93	0.87	1.08	20.1
West: Carlingford Rd														
10	L2	13	0.0	13	0.0	* 0.853	39.4	LOS C	21.7	156.3	0.90	0.91	1.00	40.2
11	T1	1098	3.4	1098	3.4	0.853	34.4	LOS C	21.7	157.0	0.90	0.91	1.01	36.2
12	R2	2	100.0	2	100.0	0.853	41.2	LOS C	21.7	157.0	0.90	0.92	1.01	36.0
Approach		1113	3.6	1113	3.6	0.853	34.5	LOS C	21.7	157.0	0.90	0.91	1.01	36.3
All Vehicles		2843	3.7	2843	3.7	1.545	53.0	LOS D	21.7	157.0	0.83	0.84	1.00	20.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	88.6	34.8	0.39

North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	589	59.7	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.476	11.6	LOS A	1.3	9.1	0.77	0.93	0.89	42.3
2	T1	140	0.8	140	0.8	0.476	11.6	LOS A	1.3	9.1	0.77	0.93	0.89	37.3
3	R2	79	0.0	79	0.0	0.476	15.3	LOS B	1.3	9.1	0.77	0.93	0.89	37.6
Approach		227	0.5	227	0.5	0.476	12.9	LOS A	1.3	9.1	0.77	0.93	0.89	37.7
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.537	11.7	LOS A	1.7	12.1	0.80	0.92	0.93	38.0
5	T1	124	2.5	124	2.5	0.537	11.7	LOS A	1.7	12.1	0.80	0.92	0.93	38.9
6	R2	112	0.9	112	0.9	0.537	15.2	LOS B	1.7	12.1	0.80	0.92	0.93	19.4
6u	U	2	0.0	2	0.0	0.537	16.8	LOS B	1.7	12.1	0.80	0.92	0.93	12.2
Approach		275	1.5	275	1.5	0.537	13.2	LOS A	1.7	12.1	0.80	0.92	0.93	34.5
North: Rawson Street														
7	L2	43	31.7	43	31.7	0.663	11.7	LOS A	2.2	16.4	0.61	0.82	0.73	30.0
8	T1	164	0.6	164	0.6	0.663	10.2	LOS A	2.2	16.4	0.61	0.82	0.73	40.6
9	R2	163	5.2	163	5.2	0.663	14.0	LOS A	2.2	16.4	0.61	0.82	0.73	40.7
9u	U	28	0.0	28	0.0	0.663	15.3	LOS B	2.2	16.4	0.61	0.82	0.73	27.0
Approach		399	5.8	399	5.8	0.663	12.3	LOS A	2.2	16.4	0.61	0.82	0.73	39.5
West: Bridge Street														
10	L2	224	1.4	224	1.4	0.742	17.2	LOS B	3.3	23.8	0.92	1.14	1.33	33.9
11	T1	124	4.2	124	4.2	0.742	17.5	LOS B	3.3	23.8	0.92	1.14	1.33	36.0
12	R2	21	0.0	21	0.0	0.742	20.8	LOS B	3.3	23.8	0.92	1.14	1.33	40.5
12u	U	14	0.0	14	0.0	0.742	22.4	LOS B	3.3	23.8	0.92	1.14	1.33	41.0
Approach		383	2.2	383	2.2	0.742	17.7	LOS B	3.3	23.8	0.92	1.14	1.33	35.5
All Vehicles		1284	2.9	1284	2.9	0.742	14.2	LOS A	3.3	23.8	0.77	0.96	0.98	37.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	593	4.3	593	4.3	0.327	24.5	LOS B	6.8	49.2	0.63	0.75	0.63	33.3
22	T1	185	3.4	185	3.4	0.681	59.7	LOS E	7.1	50.8	1.00	0.84	1.03	28.8
Approach		778	4.1	778	4.1	0.681	32.9	LOS C	7.1	50.8	0.72	0.77	0.73	31.5
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1231	3.3	1231	3.3	* 0.852	44.8	LOS D	23.7	169.2	0.99	0.95	1.07	24.5
Approach		1251	3.3	1251	3.3	0.852	44.7	LOS D	23.7	170.0	0.98	0.95	1.06	24.7
NorthWest: Langston Pl														
27a	L1	31	13.8	31	13.8	0.524	64.7	LOS E	3.9	28.3	0.99	0.78	0.99	27.8
28	T1	265	1.6	265	1.6	* 0.698	59.5	LOS E	7.4	52.7	1.00	0.83	1.03	28.9
Approach		296	2.8	296	2.8	0.698	60.1	LOS E	7.4	52.7	1.00	0.83	1.03	28.8
West: Epping Rd														
10b	L3	320	3.9	316	3.9	0.801	13.3	LOS A	13.1	94.2	0.46	0.59	0.46	47.8
11	T1	1865	1.8	1843	1.8	0.801	6.7	LOS A	21.9	155.4	0.48	0.50	0.48	52.8
12a	R1	533	1.5	526	1.5	* 0.963	59.9	LOS E	18.0	127.6	1.00	1.08	1.31	28.5
Approach		2718	2.0	2684 N1	2.0	0.963	17.9	LOS B	21.9	155.4	0.58	0.62	0.64	44.8
All Vehicles		5043	2.7	5010 N1	2.7	0.963	29.4	LOS C	23.7	170.0	0.73	0.74	0.78	36.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											
P7	Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians		526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	48	2.2	48	2.2	0.488	50.4	LOS D	6.8	47.9	0.92	0.78	0.92	31.6
2	T1	299	0.4	299	0.4	* 0.813	50.2	LOS D	12.3	88.1	0.96	0.85	1.02	29.2
3	R2	182	4.0	182	4.0	0.813	59.9	LOS E	12.3	88.1	1.00	0.93	1.12	19.6
Approach		529	1.8	529	1.8	0.813	53.6	LOS D	12.3	88.1	0.97	0.87	1.05	26.7
East: Carlingford Rd														
4	L2	46	4.5	46	4.5	0.876	62.6	LOS E	17.7	128.6	1.00	1.02	1.19	33.7
5	T1	783	4.0	783	4.0	0.876	56.6	LOS E	17.7	128.6	0.99	1.02	1.19	35.5
6	R2	142	2.2	142	2.2	0.411	32.0	LOS C	3.0	21.6	0.92	0.78	0.92	40.8
Approach		972	3.8	972	3.8	0.876	53.3	LOS D	17.7	128.6	0.98	0.98	1.15	36.1
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.550	58.4	LOS E	5.3	36.8	0.97	0.83	0.97	20.2
8	T1	335	0.0	335	0.0	* 0.917	65.9	LOS E	11.5	80.7	0.99	1.00	1.23	26.2
9	R2	53	0.0	53	0.0	0.917	77.6	LOS F	11.5	80.7	1.00	1.10	1.38	25.6
Approach		419	0.0	419	0.0	0.917	66.8	LOS E	11.5	80.7	0.99	1.00	1.23	25.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.900	66.1	LOS E	19.7	142.6	1.00	1.06	1.23	28.5
11	T1	820	4.1	820	4.1	* 0.900	60.4	LOS E	19.7	142.6	0.98	1.05	1.24	20.3
12	R2	265	1.6	265	1.6	* 0.735	39.4	LOS C	6.9	49.0	0.99	0.87	1.05	34.1
Approach		1107	3.4	1107	3.4	0.900	55.5	LOS D	19.7	142.6	0.99	1.00	1.19	24.2
All Vehicles		3027	2.8	3027	2.8	0.917	56.0	LOS D	19.7	142.6	0.98	0.97	1.16	29.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
North: Midson Rd											
P3	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96

All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access AM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 AM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	122	0.9	122	0.9	0.349	8.0	LOS A	0.7	4.6	0.46	0.27	0.54	37.5
2	T1	234	2.7	234	2.7	0.349	2.9	LOS A	0.7	4.6	0.46	0.27	0.54	23.3
Approach		356	2.1	356	2.1	0.349	4.7	NA	0.7	4.6	0.46	0.27	0.54	34.1
North: Rawson Street														
8	T1	286	8.5	286	8.5	0.239	3.2	LOS A	0.5	3.6	0.38	0.10	0.40	30.5
9	R2	44	2.4	44	2.4	0.239	13.5	LOS A	0.5	3.6	0.38	0.10	0.40	37.9
Approach		331	7.6	331	7.6	0.239	4.6	NA	0.5	3.6	0.38	0.10	0.40	33.6
West: Site Acces														
10	L2	126	1.7	126	1.7	0.357	9.7	LOS A	0.5	3.8	0.67	0.90	0.85	32.5
12	R2	33	0.0	33	0.0	0.357	14.2	LOS A	0.5	3.8	0.67	0.90	0.85	32.5
Approach		159	1.3	159	1.3	0.357	10.6	LOS A	0.5	3.8	0.67	0.90	0.85	32.5
All Vehicles		845	4.1	845	4.1	0.357	5.8	NA	0.7	4.6	0.47	0.32	0.55	33.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St PM - Pedestrian Operated Signals (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	408	0.0	408	0.0	* 0.518	10.1	LOS A	3.8	26.8	0.80	0.69	0.80	28.1
Approach		408	0.0	408	0.0	0.518	10.1	LOS A	3.8	26.8	0.80	0.69	0.80	28.1
North: Rawson Street														
8	T1	285	5.5	285	5.5	0.375	9.4	LOS A	2.5	18.3	0.75	0.63	0.75	14.8
Approach		285	5.5	285	5.5	0.375	9.4	LOS A	2.5	18.3	0.75	0.63	0.75	14.8
All Vehicles		694	2.3	694	2.3	0.518	9.8	LOS A	3.8	26.8	0.78	0.66	0.78	24.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	1047	15.1	LOS B	1.1	1.1	0.89	0.89	175.9	209.0	1.19
All Pedestrians		1047	15.1	LOS B	1.1	1.1	0.89	0.89	175.9	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd PM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	899	4.4	899	4.4	0.606	13.1	LOS A	7.9	57.2	0.48	0.73	0.48	39.4
2	T1	1281	1.5	1281	1.5	* 0.983	75.9	LOS F	39.1	277.1	0.94	1.12	1.29	25.0
Approach		2180	2.7	2180	2.7	0.983	50.0	LOS D	39.1	277.1	0.75	0.96	0.96	27.5
North: Beecroft Road														
8	T1	751	1.6	751	1.6	0.195	14.2	LOS A	4.6	32.5	0.52	0.44	0.52	41.1
9	R2	304	5.5	304	5.5	* 0.996	118.2	LOS F	8.7	63.7	1.00	1.14	1.77	12.4
Approach		1055	2.7	1055	2.7	0.996	44.2	LOS D	8.7	63.7	0.66	0.64	0.88	24.7
West: Carlingford Road														
10	L2	96	4.4	96	4.4	0.924	74.1	LOS F	7.0	50.0	1.00	1.11	1.24	18.8
12	R2	1043	1.4	1043	1.4	* 0.924	68.8	LOS E	7.1	50.0	1.00	1.04	1.22	3.5
Approach		1139	1.7	1139	1.7	0.924	69.3	LOS E	7.1	50.0	1.00	1.05	1.22	5.3
All Vehicles		4374	2.4	4374	2.4	0.996	53.6	LOS D	39.1	277.1	0.79	0.91	1.01	21.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St PM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	118	0.9	118	0.9	0.374	39.3	LOS C	7.1	49.6	0.81	0.73	0.81	8.5
2	T1	144	0.0	144	0.0	* 0.832	39.0	LOS C	7.1	49.6	0.83	0.77	0.88	25.6
3	R2	135	0.0	135	0.0	0.832	68.9	LOS E	6.9	48.1	1.00	1.00	1.30	5.0
Approach		397	0.3	397	0.3	0.832	49.2	LOS D	7.1	49.6	0.88	0.84	1.00	14.8
East: Carlingford Rd														
4	L2	122	8.6	122	8.6	0.619	27.0	LOS B	6.9	50.0	0.80	0.74	0.80	8.5
5	T1	1072	3.9	1072	3.9	0.619	24.4	LOS B	6.9	50.0	0.81	0.74	0.81	8.2
6	R2	4	100.0	4	100.0	0.619	29.5	LOS C	6.9	50.0	0.83	0.75	0.83	30.0
Approach		1198	4.7	1198	4.7	0.619	24.7	LOS B	6.9	50.0	0.81	0.74	0.81	8.4
North: Ray Rd														
7	L2	137	0.8	137	0.8	0.442	41.3	LOS C	4.8	33.7	0.83	0.79	0.83	23.7
8	T1	105	4.0	105	4.0	0.220	34.3	LOS C	3.4	24.7	0.77	0.64	0.77	25.8
9	R2	16	6.7	16	6.7	0.220	38.9	LOS C	3.4	24.7	0.77	0.64	0.77	25.8
Approach		258	2.4	258	2.4	0.442	38.3	LOS C	4.8	33.7	0.80	0.72	0.80	24.6
West: Carlingford Rd														
10	L2	23	0.0	23	0.0	* 0.825	41.2	LOS C	16.0	114.1	0.90	0.90	1.00	39.6
11	T1	807	2.2	807	2.2	0.825	36.5	LOS C	16.0	114.1	0.90	0.91	1.01	35.3
12	R2	2	100.0	2	100.0	0.825	43.6	LOS D	15.0	107.5	0.90	0.91	1.02	35.1
Approach		833	2.4	833	2.4	0.825	36.6	LOS C	16.0	114.1	0.90	0.91	1.01	35.5
All Vehicles		2685	3.1	2685	3.1	0.832	33.3	LOS C	16.0	114.1	0.85	0.81	0.90	24.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											
P2	Full	105	59.4	LOS E	0.4	0.4	0.96	0.96	88.4	34.8	0.39

North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	211	59.7	LOS E	0.7	0.7	0.96	0.96	88.7	34.8	0.39
All Pedestrians	421	59.5	LOS E	0.7	0.7	0.96	0.96	88.3	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St PM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	28	0.0	28	0.0	0.448	13.5	LOS A	1.2	8.3	0.82	0.97	0.95	41.4
2	T1	83	0.0	83	0.0	0.448	13.3	LOS A	1.2	8.3	0.82	0.97	0.95	36.0
3	R2	60	0.0	60	0.0	0.448	17.2	LOS B	1.2	8.3	0.82	0.97	0.95	26.9
3u	U	6	0.0	6	0.0	0.448	20.1	LOS B	1.2	8.3	0.82	0.97	0.95	44.8
Approach		178	0.0	178	0.0	0.448	14.9	LOS B	1.2	8.3	0.82	0.97	0.95	33.8
East: Bridge Street														
4	L2	42	0.0	42	0.0	0.740	13.6	LOS A	3.9	27.0	0.89	0.94	1.13	37.1
5	T1	281	0.4	281	0.4	0.740	13.4	LOS A	3.9	27.0	0.89	0.94	1.13	38.0
6	R2	147	0.0	147	0.0	0.740	17.0	LOS B	3.9	27.0	0.89	0.94	1.13	18.2
6u	U	2	0.0	2	0.0	0.740	18.6	LOS B	3.9	27.0	0.89	0.94	1.13	11.9
Approach		473	0.2	473	0.2	0.740	14.6	LOS B	3.9	27.0	0.89	0.94	1.13	34.8
North: Rawson Street														
7	L2	47	17.8	47	17.8	0.384	5.9	LOS A	0.9	6.3	0.37	0.59	0.37	35.7
8	T1	111	1.0	111	1.0	0.384	5.3	LOS A	0.9	6.3	0.37	0.59	0.37	44.3
9	R2	109	5.8	109	5.8	0.384	9.0	LOS A	0.9	6.3	0.37	0.59	0.37	44.4
9u	U	18	0.0	18	0.0	0.384	10.4	LOS A	0.9	6.3	0.37	0.59	0.37	33.5
Approach		285	5.5	285	5.5	0.384	7.2	LOS A	0.9	6.3	0.37	0.59	0.37	43.2
West: Bridge Street														
10	L2	160	0.0	160	0.0	0.395	7.9	LOS A	0.9	6.5	0.67	0.76	0.67	40.8
11	T1	36	2.9	36	2.9	0.395	8.2	LOS A	0.9	6.5	0.67	0.76	0.67	42.4
12	R2	14	0.0	14	0.0	0.395	11.7	LOS A	0.9	6.5	0.67	0.76	0.67	45.1
12u	U	9	0.0	9	0.0	0.395	13.3	LOS A	0.9	6.5	0.67	0.76	0.67	45.7
Approach		219	0.5	219	0.5	0.395	8.4	LOS A	0.9	6.5	0.67	0.76	0.67	41.8
All Vehicles		1155	1.5	1155	1.5	0.740	11.6	LOS A	3.9	27.0	0.71	0.82	0.82	37.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - PM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	964	0.9	964	0.9	* 0.976	92.1	LOS F	30.8	217.0	1.00	1.11	1.47	15.0
22	T1	105	3.0	105	3.0	0.508	58.1	LOS E	3.9	28.0	0.97	0.78	0.97	29.2
Approach		1069	1.1	1069	1.1	0.976	88.7	LOS F	30.8	217.0	0.99	1.08	1.42	16.4
East: Epping Rd														
4b	L3	13	0.0	13	0.0	0.019	30.6	LOS C	0.3	2.0	0.62	0.68	0.62	39.5
5	T1	1574	2.5	1574	2.5	* 0.945	59.7	LOS E	40.3	289.0	1.00	1.11	1.24	20.4
Approach		1586	2.5	1586	2.5	0.945	59.4	LOS E	40.3	289.0	1.00	1.11	1.24	20.6
NorthWest: Langston Pl														
27a	L1	25	4.2	25	4.2	0.446	64.0	LOS E	3.3	24.0	0.98	0.77	0.98	28.0
28	T1	186	2.8	186	2.8	0.446	57.2	LOS E	4.5	31.8	0.97	0.77	0.97	29.5
Approach		212	3.0	212	3.0	0.446	58.0	LOS E	4.5	31.8	0.97	0.77	0.97	29.3
West: Epping Rd														
10b	L3	424	1.2	424	1.2	0.532	8.5	LOS A	2.6	18.6	0.15	0.50	0.15	50.1
11	T1	1088	2.0	1088	2.0	0.532	2.6	LOS A	5.4	38.1	0.18	0.25	0.18	56.3
12a	R1	317	0.7	317	0.7	0.994	84.4	LOS F	12.4	87.2	1.00	1.18	1.51	23.5
Approach		1828	1.6	1828	1.6	0.994	18.2	LOS B	12.4	87.2	0.32	0.47	0.40	44.3
All Vehicles		4696	1.8	4696	1.8	0.994	50.0	LOS D	40.3	289.0	0.73	0.84	0.94	27.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	227.6	218.4	0.96
NorthWest: Langston Pl											
P7	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.7	212.5	0.95
All Pedestrians		274	59.4	LOS E	0.6	0.6	0.96	0.96	226.4	217.1	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - PM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	109	2.9	109	2.9	0.565	42.7	LOS D	7.9	56.2	0.92	0.80	0.92	33.6
2	T1	407	0.3	407	0.3	* 0.942	55.5	LOS D	17.4	123.6	0.97	1.01	1.22	28.1
3	R2	176	4.2	176	4.2	0.942	72.3	LOS F	17.4	123.6	1.00	1.15	1.42	17.5
Approach		693	1.7	693	1.7	0.942	57.7	LOS E	17.4	123.6	0.97	1.01	1.22	26.5
East: Carlingford Rd														
4	L2	74	1.4	74	1.4	0.972	82.5	LOS F	23.7	171.2	1.00	1.25	1.50	29.7
5	T1	909	4.3	909	4.3	* 0.972	76.7	LOS F	23.7	171.2	1.00	1.25	1.51	31.0
6	R2	185	0.0	185	0.0	* 0.537	28.7	LOS C	3.8	26.9	0.89	0.80	0.89	41.9
Approach		1168	3.4	1168	3.4	0.972	69.5	LOS E	23.7	171.2	0.98	1.18	1.41	32.3
North: Midson Rd														
7	L2	39	2.7	39	2.7	0.557	50.9	LOS D	3.7	26.4	0.99	0.83	0.99	21.9
8	T1	262	1.6	262	1.6	* 0.929	61.5	LOS E	8.8	62.5	1.00	1.03	1.32	27.0
9	R2	49	0.0	49	0.0	0.929	74.1	LOS F	8.8	62.5	1.00	1.13	1.50	26.2
Approach		351	1.5	351	1.5	0.929	62.1	LOS E	8.8	62.5	0.99	1.02	1.31	26.5
West: Carlingford Rd														
10	L2	42	0.0	42	0.0	0.596	41.0	LOS C	9.3	66.2	0.91	0.79	0.91	35.2
11	T1	623	2.5	623	2.5	0.596	35.5	LOS C	9.5	67.6	0.91	0.78	0.91	27.9
12	R2	207	0.5	207	0.5	0.791	39.9	LOS C	5.0	35.0	1.00	0.88	1.17	34.0
Approach		873	1.9	873	1.9	0.791	36.8	LOS C	9.5	67.6	0.93	0.81	0.97	30.3
All Vehicles		3084	2.4	3084	2.4	0.972	56.8	LOS E	23.7	171.2	0.97	1.02	1.23	29.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
East: Carlingford Rd											
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
North: Midson Rd											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	212.2	211.8	1.00

All Pedestrians	158	49.3	LOS E	0.2	0.2	0.95	0.95	214.6	214.9	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access PM (Site Folder: 2 - Post Development)]

Network: N101 [Sc. 2 PM - with POS mitigation (Network Folder: Scenario 2 Pdev)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	202	0.0	202	0.0	0.387	9.4	LOS A	1.0	6.9	0.66	0.51	0.82	35.6
2	T1	160	3.9	160	3.9	0.387	5.2	LOS A	1.0	6.9	0.66	0.51	0.82	17.8
Approach		362	1.7	362	1.7	0.387	7.6	NA	1.0	6.9	0.66	0.51	0.82	33.1
North: Rawson Street														
8	T1	144	17.5	144	17.5	0.286	9.5	LOS A	0.8	6.2	0.78	0.40	0.90	18.7
9	R2	88	0.0	88	0.0	0.286	16.1	LOS B	0.8	6.2	0.78	0.40	0.90	33.5
Approach		233	10.9	233	10.9	0.286	12.0	NA	0.8	6.2	0.78	0.40	0.90	28.6
West: Site Acces														
10	L2	249	0.0	249	0.0	0.513	12.8	LOS A	1.4	9.5	0.77	1.08	1.24	31.0
12	R2	48	0.0	48	0.0	0.513	16.6	LOS B	1.4	9.5	0.77	1.08	1.24	31.0
Approach		298	0.0	298	0.0	0.513	13.4	LOS A	1.4	9.5	0.77	1.08	1.24	31.0
All Vehicles		893	3.5	893	3.5	0.513	10.7	NA	1.4	9.5	0.73	0.67	0.98	31.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 AM BG wo dev (Network Folder: Scenario 3 Background Growth)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	55	1.9	55	1.9	0.493	50.4	LOS D	6.9	48.6	0.92	0.78	0.92	31.5
2	T1	299	0.4	299	0.4	* 0.822	50.7	LOS D	12.6	89.8	0.96	0.86	1.03	29.1
3	R2	182	4.0	182	4.0	0.822	60.6	LOS E	12.6	89.8	1.00	0.94	1.14	19.5
Approach		536	1.8	536	1.8	0.822	54.0	LOS D	12.6	89.8	0.97	0.88	1.05	26.6
East: Carlingford Rd														
4	L2	44	4.8	44	4.8	0.890	64.9	LOS E	18.5	133.9	1.00	1.04	1.22	33.2
5	T1	799	4.0	799	4.0	0.890	58.9	LOS E	18.5	133.9	0.99	1.04	1.22	35.0
6	R2	142	2.2	142	2.2	0.430	32.7	LOS C	3.1	22.0	0.93	0.79	0.93	40.5
Approach		985	3.7	985	3.7	0.890	55.4	LOS D	18.5	133.9	0.98	1.00	1.18	35.6
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.523	57.4	LOS E	5.2	36.4	0.96	0.83	0.96	20.5
8	T1	335	0.0	335	0.0	* 0.871	60.7	LOS E	10.8	75.7	0.99	0.95	1.15	27.2
9	R2	53	0.0	53	0.0	0.871	69.9	LOS E	10.8	75.7	1.00	1.03	1.26	27.1
Approach		419	0.0	419	0.0	0.871	61.6	LOS E	10.8	75.7	0.99	0.95	1.15	26.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.909	68.0	LOS E	20.3	146.7	1.00	1.07	1.25	28.1
11	T1	835	4.0	835	4.0	* 0.909	62.4	LOS E	20.3	146.7	0.99	1.07	1.26	19.9
12	R2	244	1.7	244	1.7	* 0.711	38.2	LOS C	6.2	43.8	0.99	0.86	1.03	34.5
Approach		1101	3.4	1101	3.4	0.909	57.1	LOS E	20.3	146.7	0.99	1.02	1.21	23.7
All Vehicles		3041	2.8	3041	2.8	0.909	56.6	LOS E	20.3	146.7	0.98	0.98	1.16	29.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
North: Midson Rd											

P3 Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96
All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 AM BG wo dev (Network Folder: Scenario 3 Background Growth)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	758	4.5	758	4.5	0.519	10.8	LOS A	5.5	40.2	0.37	0.68	0.37	42.0
2	T1	1070	2.7	1070	2.7	* 0.994	65.7	LOS E	30.2	216.1	0.94	1.10	1.29	27.2
Approach		1828	3.5	1828	3.5	0.994	43.0	LOS D	30.2	216.1	0.70	0.93	0.91	29.7
North: Beecroft Road														
8	T1	1354	0.9	1354	0.9	0.647	24.8	LOS B	12.2	86.0	0.74	0.65	0.74	33.3
9	R2	214	6.4	214	6.4	* 0.998	122.6	LOS F	6.2	45.7	1.00	1.16	1.86	12.1
Approach		1567	1.7	1567	1.7	0.998	38.1	LOS C	12.2	86.0	0.77	0.72	0.89	26.9
West: Carlingford Road														
10	L2	69	12.1	69	12.1	0.977	76.7	LOS F	6.9	50.0	1.00	1.13	1.31	18.3
12	R2	1415	3.1	1415	3.1	* 0.977	72.5	LOS F	7.0	50.0	1.00	1.09	1.31	3.3
Approach		1485	3.6	1485	3.6	0.977	72.7	LOS F	7.0	50.0	1.00	1.09	1.31	4.3
All Vehicles		4880	2.9	4880	2.9	0.998	50.4	LOS D	30.2	216.1	0.82	0.91	1.02	21.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 AM BG wo dev (Network Folder: Scenario 3 Background Growth)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	99	1.1	99	1.1	0.355	41.1	LOS C	7.0	49.1	0.82	0.73	0.82	11.8
2	T1	136	0.8	136	0.8	0.355	36.6	LOS C	7.0	49.1	0.82	0.73	0.82	27.7
3	R2	82	5.1	82	5.1	1.251	305.1	LOS F	8.0	58.8	1.00	1.53	2.88	1.8
Approach		317	2.0	317	2.0	1.251	107.6	LOS F	8.0	58.8	0.87	0.94	1.35	9.9
East: Carlingford Rd														
4	L2	154	11.0	154	11.0	0.493	22.9	LOS B	6.8	50.0	0.70	0.68	0.70	21.8
5	T1	808	3.4	808	3.4	0.493	21.9	LOS B	6.9	50.0	0.75	0.69	0.75	9.0
6	R2	4	100.0	4	100.0	0.493	28.0	LOS B	6.9	50.0	0.78	0.70	0.78	30.8
Approach		966	5.0	966	5.0	0.493	22.1	LOS B	6.9	50.0	0.74	0.69	0.74	11.8
North: Ray Rd														
7	L2	256	1.2	256	1.2	* 0.890	72.6	LOS F	12.0	84.9	1.00	1.03	1.34	16.9
8	T1	198	3.2	198	3.2	0.444	39.6	LOS C	7.2	52.0	0.86	0.74	0.86	27.2
9	R2	33	3.2	33	3.2	0.444	44.1	LOS D	7.2	52.0	0.86	0.74	0.86	24.0
Approach		486	2.2	486	2.2	0.890	57.2	LOS E	12.0	84.9	0.93	0.89	1.11	21.0
West: Carlingford Rd														
10	L2	20	0.0	20	0.0	0.898	52.1	LOS D	25.2	181.3	0.96	1.03	1.15	36.4
11	T1	1105	3.4	1105	3.4	* 0.898	47.2	LOS D	25.2	181.3	0.96	1.04	1.16	31.6
12	R2	2	100.0	2	100.0	0.898	54.3	LOS D	23.9	173.0	0.96	1.04	1.16	32.3
Approach		1128	3.5	1128	3.5	0.898	47.3	LOS D	25.2	181.3	0.96	1.04	1.16	31.7
All Vehicles		2897	3.6	2897	3.6	1.251	47.2	LOS D	25.2	181.3	0.87	0.88	1.03	23.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											

P2 Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	88.6	34.8	0.39
North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	589	59.7	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 AM BG wo dev (Network Folder: Scenario 3 Background Growth)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	588	4.3	588	4.3	0.324	24.5	LOS B	6.7	48.7	0.63	0.75	0.63	33.4
22	T1	189	3.3	189	3.3	0.697	60.1	LOS E	7.3	52.3	1.00	0.85	1.05	28.8
Approach		777	4.1	777	4.1	0.697	33.2	LOS C	7.3	52.3	0.72	0.77	0.73	31.4
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1247	3.2	1247	3.2	* 0.863	46.3	LOS D	24.5	174.9	0.99	0.97	1.09	24.0
Approach		1267	3.3	1267	3.3	0.863	46.2	LOS D	24.5	175.8	0.99	0.96	1.08	24.2
NorthWest: Langston Pl														
27a	L1	44	9.5	44	9.5	0.581	66.3	LOS E	3.9	28.7	1.00	0.79	1.00	27.4
28	T1	273	1.5	273	1.5	* 0.775	61.9	LOS E	8.5	60.6	1.00	0.88	1.09	28.4
Approach		317	2.7	317	2.7	0.775	62.5	LOS E	8.5	60.6	1.00	0.87	1.08	28.3
West: Epping Rd														
10b	L3	329	3.8	329	3.8	0.815	13.3	LOS A	13.9	99.7	0.48	0.61	0.48	47.8
11	T1	1873	1.8	1873	1.8	0.815	6.8	LOS A	23.2	164.4	0.50	0.52	0.50	52.7
12a	R1	535	1.5	535	1.5	* 0.978	70.2	LOS E	18.9	134.3	1.00	1.15	1.36	26.2
Approach		2737	2.0	2737	2.0	0.978	20.0	LOS B	23.2	164.4	0.59	0.65	0.66	43.5
All Vehicles		5099	2.7	5099	2.7	0.978	31.1	LOS C	24.5	175.8	0.74	0.76	0.80	35.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											
P7	Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians		526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - PM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 PM BG wo dev (Network Folder: Scenario 3 Background Growth)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	118	2.7	118	2.7	0.577	42.8	LOS D	8.1	57.6	0.92	0.80	0.92	33.5
2	T1	408	0.3	408	0.3	* 0.961	59.6	LOS E	18.4	130.9	0.97	1.04	1.26	27.2
3	R2	177	4.2	177	4.2	0.961	78.8	LOS F	18.4	130.9	1.00	1.20	1.49	16.5
Approach		703	1.6	703	1.6	0.961	61.6	LOS E	18.4	130.9	0.97	1.04	1.26	25.7
East: Carlingford Rd														
4	L2	65	1.6	65	1.6	0.950	73.7	LOS F	21.8	157.6	1.00	1.19	1.41	31.3
5	T1	899	4.3	896	4.3	* 0.950	68.0	LOS E	21.8	157.6	1.00	1.19	1.43	32.8
6	R2	184	0.0	184	0.0	0.547	29.0	LOS C	3.8	26.6	0.90	0.80	0.90	41.8
Approach		1148	3.5	1145 N1	3.5	0.950	62.0	LOS E	21.8	157.6	0.98	1.13	1.34	33.9
North: Midson Rd														
7	L2	39	2.7	39	2.7	0.556	50.8	LOS D	3.7	26.3	0.99	0.83	0.99	21.9
8	T1	261	1.6	261	1.6	* 0.926	61.1	LOS E	8.8	62.0	0.99	1.02	1.31	27.0
9	R2	49	0.0	49	0.0	0.926	73.5	LOS F	8.8	62.0	1.00	1.13	1.49	26.3
Approach		349	1.5	349	1.5	0.926	61.7	LOS E	8.8	62.0	0.99	1.02	1.30	26.6
West: Carlingford Rd														
10	L2	42	0.0	42	0.0	0.623	41.4	LOS C	9.8	70.1	0.92	0.80	0.92	35.1
11	T1	655	2.4	655	2.4	0.623	35.9	LOS C	10.0	71.5	0.92	0.79	0.92	27.7
12	R2	213	0.5	213	0.5	* 0.800	39.6	LOS C	5.1	35.8	1.00	0.89	1.18	34.1
Approach		909	1.9	909	1.9	0.800	37.0	LOS C	10.0	71.5	0.94	0.82	0.98	30.2
All Vehicles		3111	2.4	3107 N1	2.4	0.961	54.6	LOS D	21.8	157.6	0.97	1.00	1.21	30.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
East: Carlingford Rd											
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00

North: Midson Rd										
P3 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	212.2	211.8	1.00
All Pedestrians	158	49.3	LOS E	0.2	0.2	0.95	0.95	214.6	214.9	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd PM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 PM BG wo dev (Network Folder: Scenario 3 Background Growth)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	936	4.3	933	4.3	0.628	13.3	LOS A	8.3	60.5	0.50	0.73	0.50	39.2
2	T1	1317	1.4	1313	1.4	* 1.008	99.1	LOS F	45.3	320.7	1.00	1.30	1.52	21.2
Approach		2253	2.6	2245 N1	2.6	1.008	63.5	LOS E	45.3	320.7	0.79	1.07	1.09	23.9
North: Beecroft Road														
8	T1	757	1.6	757	1.6	0.196	14.2	LOS A	4.6	32.8	0.52	0.44	0.52	41.1
9	R2	300	5.6	300	5.6	* 0.978	109.3	LOS F	8.2	60.2	1.00	1.11	1.71	13.2
Approach		1057	2.7	1057	2.7	0.978	41.2	LOS C	8.2	60.2	0.65	0.63	0.86	25.7
West: Carlingford Road														
10	L2	89	4.7	89	4.7	0.928	76.1	LOS F	7.0	50.0	1.00	1.12	1.25	18.5
12	R2	1051	1.4	1051	1.4	* 0.928	69.8	LOS E	7.1	50.0	1.00	1.05	1.23	3.4
Approach		1141	1.7	1141	1.7	0.928	70.3	LOS E	7.1	50.0	1.00	1.05	1.23	5.1
All Vehicles		4450	2.4	4443 N1	2.4	1.008	59.9	LOS E	45.3	320.7	0.81	0.96	1.07	20.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St PM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 PM BG wo dev (Network Folder: Scenario 3 Background Growth)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	99	1.0	99	1.0	0.368	41.4	LOS C	6.6	46.6	0.82	0.73	0.82	11.8
2	T1	151	0.0	151	0.0	* 0.817	42.0	LOS C	6.6	46.6	0.86	0.78	0.91	26.0
3	R2	113	0.0	113	0.0	0.817	68.9	LOS E	6.2	43.1	1.00	0.99	1.28	7.4
Approach		363	0.3	363	0.3	0.817	50.2	LOS D	6.6	46.6	0.89	0.84	1.00	17.4
East: Carlingford Rd														
4	L2	160	6.6	159	6.6	0.609	24.6	LOS B	6.9	50.0	0.73	0.70	0.73	20.6
5	T1	1067	3.9	1062	3.9	0.609	21.8	LOS B	6.9	50.0	0.76	0.71	0.76	9.0
6	R2	4	100.0	4	100.0	0.609	26.6	LOS B	6.9	50.0	0.79	0.71	0.79	31.3
Approach		1232	4.6	1226 N1	4.6	0.609	22.2	LOS B	6.9	50.0	0.76	0.70	0.76	11.2
North: Ray Rd														
7	L2	145	0.7	145	0.7	0.504	44.5	LOS D	5.2	36.4	0.86	0.80	0.86	22.7
8	T1	112	3.7	112	3.7	0.277	38.8	LOS C	4.1	29.3	0.82	0.69	0.82	27.4
9	R2	22	4.8	22	4.8	0.277	43.4	LOS D	4.1	29.3	0.82	0.69	0.82	24.2
Approach		280	2.3	280	2.3	0.504	42.1	LOS C	5.2	36.4	0.84	0.75	0.84	24.8
West: Carlingford Rd														
10	L2	40	0.0	40	0.0	* 0.816	37.5	LOS C	16.0	114.0	0.87	0.87	0.96	40.7
11	T1	823	2.2	823	2.2	0.816	32.9	LOS C	16.0	114.0	0.88	0.87	0.97	36.8
12	R2	2	100.0	2	100.0	0.816	40.1	LOS C	14.9	106.4	0.88	0.88	0.98	37.1
Approach		865	2.3	865	2.3	0.816	33.1	LOS C	16.0	114.0	0.88	0.87	0.97	37.0
All Vehicles		2740	3.1	2734 N1	3.1	0.817	31.4	LOS C	16.0	114.0	0.82	0.78	0.87	26.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39

East: Carlingford Rd										
P2 Full	105	59.4	LOS E	0.4	0.4	0.96	0.96	88.4	34.8	0.39
North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	211	59.7	LOS E	0.7	0.7	0.96	0.96	88.7	34.8	0.39
All Pedestrians	421	59.5	LOS E	0.7	0.7	0.96	0.96	88.3	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - PM (Site Folder: 3 - Background Growth without Development)]

Network: N101 [Sc. 3 PM BG wo dev (Network Folder: Scenario 3 Background Growth)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	968	0.9	968	0.9	* 1.026	122.7	LOS F	37.2	262.0	1.00	1.21	1.67	11.9
22	T1	114	2.8	114	2.8	0.548	58.5	LOS E	4.2	30.4	0.98	0.79	0.98	29.1
Approach		1082	1.1	1082	1.1	1.026	115.9	LOS F	37.2	262.0	1.00	1.16	1.60	13.4
East: Epping Rd														
4b	L3	13	0.0	13	0.0	0.019	30.6	LOS C	0.3	2.0	0.62	0.68	0.62	39.5
5	T1	1599	2.5	1599	2.5	* 1.011	96.4	LOS F	54.1	387.7	1.00	1.32	1.50	14.5
Approach		1612	2.4	1612	2.4	1.011	95.9	LOS F	54.1	387.7	1.00	1.31	1.49	14.6
NorthWest: Langston Pl														
27a	L1	32	3.3	32	3.3	0.477	64.4	LOS E	3.4	24.4	0.98	0.77	0.98	27.9
28	T1	189	2.8	189	2.8	0.477	57.4	LOS E	4.8	34.2	0.97	0.77	0.97	29.4
Approach		221	2.9	221	2.9	0.477	58.4	LOS E	4.8	34.2	0.97	0.77	0.97	29.2
West: Epping Rd														
10b	L3	444	1.2	444	1.2	0.533	8.6	LOS A	2.8	20.1	0.17	0.51	0.17	49.9
11	T1	1082	2.0	1082	2.0	0.533	2.7	LOS A	5.5	38.6	0.18	0.25	0.18	56.2
12a	R1	316	0.7	316	0.7	0.991	82.7	LOS F	12.2	86.0	1.00	1.17	1.50	23.8
Approach		1842	1.6	1842	1.6	0.991	17.9	LOS B	12.2	86.0	0.32	0.47	0.40	44.5
All Vehicles		4757	1.8	4757	1.8	1.026	68.5	LOS E	54.1	387.7	0.73	0.93	1.07	22.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	227.6	218.4	0.96
NorthWest: Langston Pl											
P7	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.7	212.5	0.95
All Pedestrians		274	59.4	LOS E	0.6	0.6	0.96	0.96	226.4	217.1	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St AM - Pedestrian Operated Signals (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	532	1.0	532	1.0	* 0.639	10.3	LOS A	5.2	37.0	0.84	0.74	0.85	27.9
Approach		532	1.0	532	1.0	0.639	10.3	LOS A	5.2	37.0	0.84	0.74	0.85	27.9
North: Rawson Street														
8	T1	452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
Approach		452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
All Vehicles		983	2.9	983	2.9	0.639	10.0	LOS A	5.2	37.0	0.82	0.72	0.83	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19
All Pedestrians		858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	763	4.5	763	4.5	0.528	11.6	LOS A	5.6	41.0	0.41	0.70	0.41	41.0
2	T1	1070	2.7	1070	2.7	* 1.006	79.1	LOS F	31.7	227.1	0.99	1.18	1.39	24.4
Approach		1833	3.5	1833	3.5	1.006	51.0	LOS D	31.7	227.1	0.75	0.98	0.98	27.1
North: Beecroft Road														
8	T1	1354	0.9	1354	0.9	0.639	24.1	LOS B	12.1	85.5	0.73	0.64	0.73	33.8
9	R2	227	6.0	227	6.0	* 0.997	122.0	LOS F	6.6	48.5	1.00	1.16	1.85	12.1
Approach		1581	1.6	1581	1.6	0.997	38.1	LOS C	12.1	85.5	0.77	0.72	0.89	26.9
West: Carlingford Road														
10	L2	78	10.8	75	10.7	0.980	83.4	LOS F	6.9	50.0	1.00	1.14	1.32	17.3
12	R2	1445	3.1	1391	3.1	* 0.980	78.8	LOS F	7.0	50.0	1.00	1.10	1.32	3.1
Approach		1523	3.5	1466 N1	3.5	0.980	79.0	LOS F	7.0	50.0	1.00	1.10	1.32	4.1
All Vehicles		4937	2.9	4879 N1	2.9	1.006	55.2	LOS D	31.7	227.1	0.83	0.93	1.05	20.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	127	0.8	127	0.8	0.411	41.9	LOS C	8.2	58.0	0.84	0.75	0.84	8.1
2	T1	144	0.7	144	0.7	0.411	37.3	LOS C	8.2	58.0	0.84	0.75	0.84	26.2
3	R2	125	3.4	125	3.4	1.895	862.0	LOS F	12.5	90.0	1.00	2.18	4.50	0.4
Approach		397	1.6	397	1.6	1.895	299.1	LOS F	12.5	90.0	0.89	1.20	1.99	3.1
East: Carlingford Rd														
4	L2	174	9.7	174	9.7	0.503	22.9	LOS B	6.8	50.0	0.67	0.66	0.67	9.8
5	T1	807	3.4	807	3.4	0.503	21.8	LOS B	6.9	50.0	0.73	0.68	0.73	9.0
6	R2	4	100.0	4	100.0	0.503	27.7	LOS B	6.9	50.0	0.78	0.69	0.78	30.9
Approach		985	4.9	985	4.9	0.503	22.0	LOS B	6.9	50.0	0.72	0.68	0.72	9.3
North: Ray Rd														
7	L2	256	1.2	256	1.2	* 0.890	72.6	LOS F	12.0	84.9	1.00	1.03	1.34	16.9
8	T1	203	3.1	203	3.1	0.466	39.9	LOS C	7.5	53.6	0.87	0.74	0.87	23.9
9	R2	33	3.2	33	3.2	0.466	44.5	LOS D	7.5	53.6	0.87	0.74	0.87	23.9
Approach		492	2.1	492	2.1	0.890	57.2	LOS E	12.0	84.9	0.94	0.89	1.11	19.7
West: Carlingford Rd														
10	L2	20	0.0	20	0.0	* 0.897	52.0	LOS D	25.1	180.9	0.96	1.03	1.15	36.5
11	T1	1104	3.4	1104	3.4	0.897	47.1	LOS D	25.1	180.9	0.96	1.04	1.15	31.6
12	R2	2	100.0	2	100.0	0.897	54.1	LOS D	23.9	172.6	0.96	1.04	1.16	31.4
Approach		1127	3.5	1127	3.5	0.897	47.2	LOS D	25.1	180.9	0.96	1.04	1.15	31.7
All Vehicles		3000	3.5	3000	3.5	1.895	73.9	LOS F	25.1	180.9	0.87	0.92	1.12	16.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	88.6	34.8	0.39

North: Ray Rd										
P3	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4	Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians		589	59.7	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.517	13.3	LOS A	1.5	10.6	0.81	0.98	0.98	41.5
2	T1	144	0.7	144	0.7	0.517	13.2	LOS A	1.5	10.6	0.81	0.98	0.98	36.2
3	R2	84	0.0	84	0.0	0.517	17.0	LOS B	1.5	10.6	0.81	0.98	0.98	36.6
Approach		237	0.4	237	0.4	0.517	14.5	LOS B	1.5	10.6	0.81	0.98	0.98	36.6
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.582	13.8	LOS A	2.0	14.1	0.85	1.01	1.06	36.6
5	T1	125	2.5	125	2.5	0.582	13.9	LOS A	2.0	14.1	0.85	1.01	1.06	37.5
6	R2	115	0.9	115	0.9	0.582	17.4	LOS B	2.0	14.1	0.85	1.01	1.06	17.6
6u	U	2	0.0	2	0.0	0.582	18.9	LOS B	2.0	14.1	0.85	1.01	1.06	11.8
Approach		279	1.5	279	1.5	0.582	15.4	LOS B	2.0	14.1	0.85	1.01	1.06	32.7
North: Rawson Street														
7	L2	49	27.7	49	27.7	0.762	14.8	LOS B	3.2	23.6	0.68	0.92	0.92	27.6
8	T1	179	0.6	179	0.6	0.762	13.1	LOS A	3.2	23.6	0.68	0.92	0.92	38.7
9	R2	180	4.7	180	4.7	0.762	16.9	LOS B	3.2	23.6	0.68	0.92	0.92	38.7
9u	U	43	0.0	43	0.0	0.762	18.2	LOS B	3.2	23.6	0.68	0.92	0.92	24.2
Approach		452	5.1	452	5.1	0.762	15.3	LOS B	3.2	23.6	0.68	0.92	0.92	37.3
West: Bridge Street														
10	L2	229	1.4	229	1.4	0.801	21.4	LOS B	4.1	29.4	0.97	1.25	1.56	31.5
11	T1	136	3.9	136	3.9	0.801	21.7	LOS B	4.1	29.4	0.97	1.25	1.56	33.6
12	R2	21	0.0	21	0.0	0.801	25.1	LOS B	4.1	29.4	0.97	1.25	1.56	38.7
12u	U	14	0.0	14	0.0	0.801	26.7	LOS B	4.1	29.4	0.97	1.25	1.56	39.2
Approach		400	2.1	400	2.1	0.801	21.9	LOS B	4.1	29.4	0.97	1.25	1.56	33.2
All Vehicles		1367	2.7	1367	2.7	0.801	17.1	LOS B	4.1	29.4	0.82	1.04	1.14	35.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	599	4.2	599	4.2	0.331	24.6	LOS B	6.9	49.9	0.63	0.75	0.63	33.3
22	T1	189	3.3	189	3.3	0.697	60.1	LOS E	7.3	52.3	1.00	0.85	1.05	28.8
Approach		788	4.0	788	4.0	0.697	33.1	LOS C	7.3	52.3	0.72	0.77	0.73	31.4
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1271	3.2	1271	3.2	* 0.880	49.0	LOS D	25.8	184.3	1.00	1.00	1.12	23.2
Approach		1291	3.2	1291	3.2	0.880	48.9	LOS D	25.8	185.7	1.00	0.99	1.12	23.4
NorthWest: Langston Pl														
27a	L1	44	9.5	44	9.5	0.581	66.3	LOS E	3.9	28.7	1.00	0.79	1.00	27.4
28	T1	273	1.5	273	1.5	* 0.775	61.9	LOS E	8.5	60.6	1.00	0.88	1.09	28.4
Approach		317	2.7	317	2.7	0.775	62.5	LOS E	8.5	60.6	1.00	0.87	1.08	28.3
West: Epping Rd														
10b	L3	329	3.8	322	3.7	0.811	13.7	LOS A	13.9	99.7	0.48	0.61	0.48	47.6
11	T1	1899	1.8	1862	1.8	0.811	7.0	LOS A	23.2	164.7	0.50	0.52	0.50	52.5
12a	R1	541	1.5	530	1.5	* 0.970	62.9	LOS E	18.6	131.8	1.00	1.09	1.34	27.8
Approach		2769	2.0	2715 N1	1.9	0.970	18.7	LOS B	23.2	164.7	0.60	0.64	0.66	44.3
All Vehicles		5165	2.6	5111 N1	2.7	0.970	31.3	LOS C	25.8	185.7	0.74	0.77	0.81	35.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											
P7	Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians		526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	55	1.9	55	1.9	0.493	50.4	LOS D	6.9	48.6	0.92	0.78	0.92	31.5
2	T1	299	0.4	299	0.4	* 0.822	50.7	LOS D	12.6	89.8	0.96	0.86	1.03	29.1
3	R2	182	4.0	182	4.0	0.822	60.6	LOS E	12.6	89.8	1.00	0.94	1.14	19.5
Approach		536	1.8	536	1.8	0.822	54.0	LOS D	12.6	89.8	0.97	0.88	1.05	26.6
East: Carlingford Rd														
4	L2	46	4.5	46	4.5	0.917	70.7	LOS F	20.1	145.7	1.00	1.09	1.28	32.0
5	T1	824	3.8	824	3.8	* 0.917	64.8	LOS E	20.1	145.7	1.00	1.09	1.29	33.6
6	R2	143	2.2	143	2.2	0.416	32.0	LOS C	3.1	21.8	0.92	0.79	0.92	40.8
Approach		1014	3.6	1014	3.6	0.917	60.4	LOS E	20.1	145.7	0.99	1.05	1.24	34.3
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.550	58.4	LOS E	5.3	36.8	0.97	0.83	0.97	20.2
8	T1	335	0.0	335	0.0	* 0.917	65.9	LOS E	11.5	80.7	0.99	1.00	1.23	26.2
9	R2	53	0.0	53	0.0	0.917	77.6	LOS F	11.5	80.7	1.00	1.10	1.38	25.6
Approach		419	0.0	419	0.0	0.917	66.8	LOS E	11.5	80.7	0.99	1.00	1.23	25.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.910	68.2	LOS E	20.3	147.2	1.00	1.08	1.26	28.0
11	T1	834	4.0	834	4.0	0.910	62.6	LOS E	20.3	147.2	0.99	1.07	1.26	19.9
12	R2	273	1.5	273	1.5	* 0.771	44.2	LOS D	7.7	54.8	1.00	0.90	1.09	32.7
Approach		1128	3.4	1128	3.4	0.910	58.3	LOS E	20.3	147.2	0.99	1.03	1.22	23.6
All Vehicles		3097	2.7	3097	2.7	0.917	59.4	LOS E	20.3	147.2	0.99	1.00	1.20	28.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
North: Midson Rd											
P3	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96

All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access AM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	122	0.9	122	0.9	0.320	8.0	LOS A	0.4	3.1	0.45	0.24	0.51	37.7
2	T1	271	1.9	271	1.9	0.320	2.7	LOS A	0.4	3.1	0.45	0.24	0.51	24.2
Approach		393	1.6	393	1.6	0.320	4.4	NA	0.4	3.1	0.45	0.24	0.51	34.2
North: Rawson Street														
8	T1	334	7.3	334	7.3	0.308	3.5	LOS A	0.6	4.4	0.36	0.09	0.43	30.0
9	R2	44	2.4	44	2.4	0.308	14.7	LOS B	0.6	4.4	0.36	0.09	0.43	37.8
Approach		378	6.7	378	6.7	0.308	4.8	NA	0.6	4.4	0.36	0.09	0.43	33.0
West: Site Acces														
10	L2	126	1.7	126	1.7	0.395	10.5	LOS A	0.6	4.2	0.69	0.93	0.91	32.0
12	R2	33	0.0	33	0.0	0.395	16.0	LOS B	0.6	4.2	0.69	0.93	0.91	32.0
Approach		159	1.3	159	1.3	0.395	11.7	LOS A	0.6	4.2	0.69	0.93	0.91	32.0
All Vehicles		929	3.6	929	3.6	0.395	5.8	NA	0.6	4.4	0.45	0.30	0.55	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St AM - Pedestrian Operated Signals (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	489	1.1	489	1.1	* 0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
Approach		489	1.1	489	1.1	0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
North: Rawson Street														
8	T1	452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
Approach		452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
All Vehicles		941	3.0	941	3.0	0.589	9.8	LOS A	4.6	32.8	0.81	0.70	0.81	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19
All Pedestrians		858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	763	4.5	763	4.5	0.528	11.2	LOS A	5.3	38.9	0.39	0.69	0.39	41.4
2	T1	1070	2.7	1070	2.7	* 1.006	73.9	LOS F	31.7	226.8	0.98	1.17	1.37	25.4
Approach		1833	3.5	1833	3.5	1.006	47.8	LOS D	31.7	226.8	0.73	0.97	0.96	28.1
North: Beecroft Road														
8	T1	1354	0.9	1354	0.9	0.637	24.1	LOS B	12.1	85.6	0.73	0.64	0.73	33.8
9	R2	227	6.0	227	6.0	* 0.997	122.0	LOS F	6.6	48.5	1.00	1.16	1.85	12.1
Approach		1581	1.6	1581	1.6	0.997	38.1	LOS C	12.1	85.6	0.77	0.72	0.89	26.9
West: Carlingford Road														
10	L2	78	10.8	77	10.7	1.004	56.6	LOS E	6.9	50.0	1.00	1.02	1.41	15.4
12	R2	1445	3.1	1426	3.1	* 1.004	72.7	LOS F	7.0	50.0	1.00	1.06	1.42	2.6
Approach		1523	3.5	1502 N1	3.4	1.004	71.9	LOS F	7.0	50.0	1.00	1.06	1.42	3.5
All Vehicles		4937	2.9	4916 N1	2.9	1.006	52.1	LOS D	31.7	226.8	0.83	0.92	1.08	19.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	127	0.8	127	0.8	0.421	42.8	LOS D	8.3	58.7	0.85	0.76	0.85	7.9
2	T1	144	0.7	144	0.7	0.421	38.2	LOS C	8.3	58.7	0.85	0.76	0.85	26.0
3	R2	83	5.1	83	5.1	1.379	411.4	LOS F	9.6	70.0	1.00	1.66	3.30	0.9
Approach		355	1.8	355	1.8	1.379	127.3	LOS F	9.6	70.0	0.88	0.97	1.42	7.2
East: Carlingford Rd														
4	L2	174	9.7	174	9.7	0.499	22.3	LOS B	6.8	50.0	0.66	0.65	0.66	10.0
5	T1	807	3.4	807	3.4	0.499	21.4	LOS B	6.9	50.0	0.72	0.67	0.72	9.1
6	R2	4	100.0	4	100.0	0.499	27.5	LOS B	6.9	50.0	0.77	0.69	0.77	31.0
Approach		985	4.9	985	4.9	0.499	21.6	LOS B	6.9	50.0	0.71	0.67	0.71	9.5
North: Ray Rd														
7	L2	256	1.2	256	1.2	* 0.912	79.2	LOS F	12.6	89.0	1.00	1.06	1.40	16.0
8	T1	203	3.1	203	3.1	0.478	40.8	LOS C	7.6	54.3	0.87	0.75	0.87	23.6
9	R2	33	3.2	33	3.2	0.478	45.4	LOS D	7.6	54.3	0.87	0.75	0.87	23.6
Approach		492	2.1	492	2.1	0.912	61.1	LOS E	12.6	89.0	0.94	0.91	1.15	18.9
West: Carlingford Rd														
10	L2	20	0.0	20	0.0	0.917	57.5	LOS E	27.7	198.9	0.98	1.08	1.21	35.0
11	T1	1145	3.3	1145	3.3	* 0.917	52.9	LOS D	27.7	198.9	0.98	1.09	1.22	29.9
12	R2	2	100.0	2	100.0	0.917	60.1	LOS E	27.4	198.0	0.98	1.10	1.23	29.6
Approach		1167	3.4	1167	3.4	0.917	53.0	LOS D	27.7	198.9	0.98	1.09	1.22	30.0
All Vehicles		2999	3.5	2999	3.5	1.379	52.8	LOS D	27.7	198.9	0.87	0.91	1.06	20.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											

P2 Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	88.6	34.8	0.39
North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	589	59.7	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.480	12.5	LOS A	1.3	9.3	0.79	0.95	0.92	41.8
2	T1	127	0.8	127	0.8	0.480	12.4	LOS A	1.3	9.3	0.79	0.95	0.92	36.7
3	R2	84	0.0	84	0.0	0.480	16.2	LOS B	1.3	9.3	0.79	0.95	0.92	37.0
Approach		220	0.5	220	0.5	0.480	13.8	LOS A	1.3	9.3	0.79	0.95	0.92	37.1
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.582	13.8	LOS A	2.0	14.1	0.85	1.01	1.06	36.6
5	T1	125	2.5	125	2.5	0.582	13.9	LOS A	2.0	14.1	0.85	1.01	1.06	37.5
6	R2	115	0.9	115	0.9	0.582	17.4	LOS B	2.0	14.1	0.85	1.01	1.06	17.6
6u	U	2	0.0	2	0.0	0.582	18.9	LOS B	2.0	14.1	0.85	1.01	1.06	11.8
Approach		279	1.5	279	1.5	0.582	15.4	LOS B	2.0	14.1	0.85	1.01	1.06	32.8
North: Rawson Street														
7	L2	49	27.7	49	27.7	0.760	14.8	LOS B	3.2	23.4	0.68	0.91	0.91	27.7
8	T1	179	0.6	179	0.6	0.760	13.1	LOS A	3.2	23.4	0.68	0.91	0.91	38.8
9	R2	180	4.7	180	4.7	0.760	16.9	LOS B	3.2	23.4	0.68	0.91	0.91	38.8
9u	U	43	0.0	43	0.0	0.760	18.1	LOS B	3.2	23.4	0.68	0.91	0.91	24.3
Approach		452	5.1	452	5.1	0.760	15.3	LOS B	3.2	23.4	0.68	0.91	0.91	37.3
West: Bridge Street														
10	L2	204	1.5	204	1.5	0.734	17.2	LOS B	3.2	23.0	0.91	1.14	1.32	34.0
11	T1	136	3.9	136	3.9	0.734	17.5	LOS B	3.2	23.0	0.91	1.14	1.32	36.0
12	R2	21	0.0	21	0.0	0.734	20.8	LOS B	3.2	23.0	0.91	1.14	1.32	40.6
12u	U	14	0.0	14	0.0	0.734	22.4	LOS B	3.2	23.0	0.91	1.14	1.32	41.0
Approach		375	2.2	375	2.2	0.734	17.7	LOS B	3.2	23.0	0.91	1.14	1.32	35.6
All Vehicles		1325	2.8	1325	2.8	0.760	15.7	LOS B	3.2	23.4	0.80	1.00	1.06	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	599	4.2	599	4.2	0.330	24.6	LOS B	6.9	49.8	0.63	0.75	0.63	33.3
22	T1	189	3.3	189	3.3	0.697	60.1	LOS E	7.3	52.3	1.00	0.85	1.05	28.8
Approach		788	4.0	788	4.0	0.697	33.1	LOS C	7.3	52.3	0.72	0.77	0.73	31.4
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1271	3.2	1271	3.2	* 0.879	48.9	LOS D	25.8	184.1	1.00	1.00	1.12	23.2
Approach		1291	3.2	1291	3.2	0.879	48.8	LOS D	25.8	185.3	1.00	0.99	1.12	23.5
NorthWest: Langston Pl														
27a	L1	44	9.5	44	9.5	0.581	66.3	LOS E	3.9	28.7	1.00	0.79	1.00	27.4
28	T1	273	1.5	273	1.5	* 0.775	61.9	LOS E	8.5	60.6	1.00	0.88	1.09	28.4
Approach		317	2.7	317	2.7	0.775	62.5	LOS E	8.5	60.6	1.00	0.87	1.08	28.3
West: Epping Rd														
10b	L3	329	3.8	326	3.7	0.820	13.4	LOS A	14.0	100.1	0.48	0.61	0.48	47.7
11	T1	1899	1.8	1882	1.8	0.820	6.8	LOS A	23.3	165.6	0.50	0.52	0.50	52.7
12a	R1	541	1.5	536	1.5	* 0.980	71.1	LOS F	19.1	135.5	1.00	1.15	1.37	26.0
Approach		2769	2.0	2743 N1	1.9	0.980	20.1	LOS B	23.3	165.6	0.59	0.65	0.67	43.4
All Vehicles		5165	2.6	5139 N1	2.6	0.980	31.9	LOS C	25.8	185.3	0.74	0.77	0.81	35.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											

P7 Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians	526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	55	1.9	55	1.9	0.533	50.9	LOS D	7.5	53.0	0.93	0.79	0.93	31.4
2	T1	299	0.4	299	0.4	* 0.888	53.7	LOS D	14.7	105.1	0.96	0.88	1.07	28.5
3	R2	224	3.3	224	3.3	0.888	68.2	LOS E	14.7	105.1	1.00	1.01	1.25	18.0
Approach		578	1.6	578	1.6	0.888	59.0	LOS E	14.7	105.1	0.97	0.93	1.13	25.2
East: Carlingford Rd														
4	L2	46	4.5	46	4.5	0.917	70.7	LOS F	20.1	145.7	1.00	1.09	1.28	32.0
5	T1	824	3.8	824	3.8	* 0.917	64.8	LOS E	20.1	145.7	1.00	1.09	1.29	33.6
6	R2	143	2.2	143	2.2	0.416	32.0	LOS C	3.1	21.8	0.92	0.79	0.92	40.8
Approach		1014	3.6	1014	3.6	0.917	60.4	LOS E	20.1	145.7	0.99	1.05	1.24	34.3
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.550	58.4	LOS E	5.3	36.8	0.97	0.83	0.97	20.2
8	T1	335	0.0	335	0.0	* 0.917	65.9	LOS E	11.5	80.7	0.99	1.00	1.23	26.2
9	R2	53	0.0	53	0.0	0.917	77.6	LOS F	11.5	80.7	1.00	1.10	1.38	25.6
Approach		419	0.0	419	0.0	0.917	66.8	LOS E	11.5	80.7	0.99	1.00	1.23	25.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.910	68.2	LOS E	20.3	147.2	1.00	1.08	1.26	28.0
11	T1	834	4.0	834	4.0	0.910	62.6	LOS E	20.3	147.2	0.99	1.07	1.26	19.9
12	R2	273	1.5	273	1.5	* 0.771	44.2	LOS D	7.7	54.8	1.00	0.90	1.09	32.7
Approach		1128	3.4	1128	3.4	0.910	58.3	LOS E	20.3	147.2	0.99	1.03	1.22	23.6
All Vehicles		3139	2.7	3139	2.7	0.917	60.2	LOS E	20.3	147.2	0.99	1.01	1.21	28.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
North: Midson Rd											

P3 Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96
All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access AM (Site Folder: Scenario 4 - Redistribution of Existing Traffic (AM only))]

Network: N101 [Sc. 4 AM - with POS mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	122	0.9	122	0.9	0.315	7.9	LOS A	0.6	4.4	0.47	0.27	0.53	37.5
2	T1	228	2.3	228	2.3	0.315	2.9	LOS A	0.6	4.4	0.47	0.27	0.53	23.5
Approach		351	1.8	351	1.8	0.315	4.6	NA	0.6	4.4	0.47	0.27	0.53	34.3
North: Rawson Street														
8	T1	334	7.3	334	7.3	0.301	3.0	LOS A	0.5	4.0	0.34	0.09	0.41	31.3
9	R2	44	2.4	44	2.4	0.301	13.8	LOS A	0.5	4.0	0.34	0.09	0.41	38.1
Approach		378	6.7	378	6.7	0.301	4.3	NA	0.5	4.0	0.34	0.09	0.41	34.0
West: Site Acces														
10	L2	126	1.7	126	1.7	0.324	9.4	LOS A	0.5	3.8	0.68	0.89	0.82	32.6
12	R2	33	0.0	33	0.0	0.324	14.9	LOS B	0.5	3.8	0.68	0.89	0.82	32.6
Approach		159	1.3	159	1.3	0.324	10.5	LOS A	0.5	3.8	0.68	0.89	0.82	32.6
All Vehicles		887	3.8	887	3.8	0.324	5.5	NA	0.6	4.4	0.45	0.30	0.53	33.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St AM - Pedestrian Operated Signals (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	489	1.1	489	1.1	* 0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
Approach		489	1.1	489	1.1	0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
North: Rawson Street														
8	T1	452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
Approach		452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
All Vehicles		941	3.0	941	3.0	0.589	9.8	LOS A	4.6	32.8	0.81	0.70	0.81	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19
All Pedestrians		858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	763	4.5	763	4.5	0.528	11.2	LOS A	5.3	38.9	0.39	0.69	0.39	41.4
2	T1	1070	2.7	1070	2.7	* 1.026	85.3	LOS F	33.4	239.0	0.98	1.24	1.46	23.2
Approach		1833	3.5	1833	3.5	1.026	54.5	LOS D	33.4	239.0	0.73	1.01	1.01	26.0
North: Beecroft Road														
8	T1	1354	0.9	1354	0.9	0.652	24.8	LOS B	12.3	86.4	0.74	0.65	0.74	33.3
9	R2	227	6.0	227	6.0	* 0.997	122.0	LOS F	6.6	48.5	1.00	1.16	1.85	12.1
Approach		1581	1.6	1581	1.6	0.997	38.8	LOS C	12.3	86.4	0.78	0.72	0.90	26.6
West: Carlingford Road														
10	L2	78	10.8	78	10.8	1.000	53.8	LOS D	7.6	55.0	1.00	1.02	1.40	16.9
12	R2	1445	3.1	1445	3.1	* 1.000	62.6	LOS E	7.7	55.0	1.00	1.04	1.36	3.3
Approach		1523	3.5	1523	3.5	1.000	62.2	LOS E	7.7	55.0	1.00	1.04	1.36	4.3
All Vehicles		4937	2.9	4937	2.9	1.026	51.8	LOS D	33.4	239.0	0.83	0.93	1.08	19.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	127	0.8	127	0.8	0.347	35.4	LOS C	7.5	52.6	0.76	0.71	0.76	9.4
2	T1	144	0.7	144	0.7	0.347	30.8	LOS C	7.5	52.6	0.76	0.71	0.76	28.5
3	R2	83	5.1	83	5.1	* 0.977	120.2	LOS F	4.9	35.7	1.00	1.21	1.88	2.9
Approach		355	1.8	355	1.8	0.977	53.4	LOS D	7.5	52.6	0.82	0.83	1.02	14.7
East: Carlingford Rd														
4	L2	174	9.7	174	9.7	0.557	28.3	LOS B	7.5	55.0	0.79	0.75	0.79	8.6
5	T1	807	3.4	807	3.4	0.557	28.4	LOS B	7.6	55.0	0.84	0.77	0.84	7.6
6	R2	4	100.0	4	100.0	0.557	35.6	LOS C	7.6	55.0	0.88	0.78	0.88	27.8
Approach		985	4.9	985	4.9	0.557	28.4	LOS B	7.6	55.0	0.83	0.76	0.83	8.0
North: Ray Rd														
7	L2	256	1.2	256	1.2	0.715	43.0	LOS D	10.0	70.9	0.90	0.86	0.94	23.2
8	T1	203	3.1	203	3.1	0.386	33.0	LOS C	6.8	48.6	0.79	0.69	0.79	26.3
9	R2	33	3.2	33	3.2	0.386	37.5	LOS C	6.8	48.6	0.79	0.69	0.79	26.3
Approach		492	2.1	492	2.1	0.715	38.5	LOS C	10.0	70.9	0.85	0.78	0.87	24.6
West: Carlingford Rd														
10	L2	20	0.0	20	0.0	1.013	110.8	LOS F	38.1	274.3	1.00	1.38	1.58	25.4
11	T1	1145	3.3	1145	3.3	* 1.013	106.1	LOS F	38.1	274.3	1.00	1.38	1.59	19.8
12	R2	2	100.0	2	100.0	1.013	113.3	LOS F	36.0	259.6	1.00	1.39	1.60	19.7
Approach		1167	3.4	1167	3.4	1.013	106.2	LOS F	38.1	274.3	1.00	1.38	1.59	19.9
All Vehicles		2999	3.5	2999	3.5	1.013	63.3	LOS E	38.1	274.3	0.90	1.01	1.16	18.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39

North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	421	59.8	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.480	12.5	LOS A	1.3	9.3	0.79	0.95	0.92	41.8
2	T1	127	0.8	127	0.8	0.480	12.4	LOS A	1.3	9.3	0.79	0.95	0.92	36.7
3	R2	84	0.0	84	0.0	0.480	16.2	LOS B	1.3	9.3	0.79	0.95	0.92	37.0
Approach		220	0.5	220	0.5	0.480	13.8	LOS A	1.3	9.3	0.79	0.95	0.92	37.1
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.582	13.8	LOS A	2.0	14.1	0.85	1.01	1.06	36.6
5	T1	125	2.5	125	2.5	0.582	13.9	LOS A	2.0	14.1	0.85	1.01	1.06	37.5
6	R2	115	0.9	115	0.9	0.582	17.4	LOS B	2.0	14.1	0.85	1.01	1.06	17.6
6u	U	2	0.0	2	0.0	0.582	18.9	LOS B	2.0	14.1	0.85	1.01	1.06	11.8
Approach		279	1.5	279	1.5	0.582	15.4	LOS B	2.0	14.1	0.85	1.01	1.06	32.8
North: Rawson Street														
7	L2	49	27.7	49	27.7	0.760	14.8	LOS B	3.2	23.4	0.68	0.91	0.91	27.7
8	T1	179	0.6	179	0.6	0.760	13.1	LOS A	3.2	23.4	0.68	0.91	0.91	38.8
9	R2	180	4.7	180	4.7	0.760	16.9	LOS B	3.2	23.4	0.68	0.91	0.91	38.8
9u	U	43	0.0	43	0.0	0.760	18.1	LOS B	3.2	23.4	0.68	0.91	0.91	24.3
Approach		452	5.1	452	5.1	0.760	15.3	LOS B	3.2	23.4	0.68	0.91	0.91	37.3
West: Bridge Street														
10	L2	204	1.5	204	1.5	0.734	17.2	LOS B	3.2	23.0	0.91	1.14	1.32	34.0
11	T1	136	3.9	136	3.9	0.734	17.5	LOS B	3.2	23.0	0.91	1.14	1.32	36.0
12	R2	21	0.0	21	0.0	0.734	20.8	LOS B	3.2	23.0	0.91	1.14	1.32	40.6
12u	U	14	0.0	14	0.0	0.734	22.4	LOS B	3.2	23.0	0.91	1.14	1.32	41.0
Approach		375	2.2	375	2.2	0.734	17.7	LOS B	3.2	23.0	0.91	1.14	1.32	35.6
All Vehicles		1325	2.8	1325	2.8	0.760	15.7	LOS B	3.2	23.4	0.80	1.00	1.06	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	599	4.2	599	4.2	0.330	24.6	LOS B	6.8	49.8	0.63	0.75	0.63	33.3
22	T1	189	3.3	189	3.3	0.697	60.1	LOS E	7.3	52.3	1.00	0.85	1.05	28.8
Approach		788	4.0	788	4.0	0.697	33.1	LOS C	7.3	52.3	0.72	0.77	0.73	31.4
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1271	3.2	1271	3.2	* 0.879	48.9	LOS D	25.8	184.0	1.00	1.00	1.12	23.2
Approach		1291	3.2	1291	3.2	0.879	48.7	LOS D	25.8	185.2	1.00	0.99	1.12	23.5
NorthWest: Langston Pl														
27a	L1	44	9.5	44	9.5	0.581	66.3	LOS E	3.9	28.7	1.00	0.79	1.00	27.4
28	T1	273	1.5	273	1.5	* 0.775	61.9	LOS E	8.5	60.6	1.00	0.88	1.09	28.4
Approach		317	2.7	317	2.7	0.775	62.5	LOS E	8.5	60.6	1.00	0.87	1.08	28.3
West: Epping Rd														
10b	L3	329	3.8	326	3.7	0.820	13.4	LOS A	14.0	100.1	0.48	0.61	0.48	47.7
11	T1	1899	1.8	1881	1.8	0.820	6.8	LOS A	23.3	165.6	0.50	0.52	0.50	52.7
12a	R1	541	1.5	536	1.5	* 0.980	71.1	LOS F	19.1	135.5	1.00	1.15	1.37	26.0
Approach		2769	2.0	2743 N1	2.0	0.980	20.1	LOS B	23.3	165.6	0.59	0.65	0.67	43.4
All Vehicles		5165	2.6	5139 N1	2.6	0.980	31.9	LOS C	25.8	185.2	0.74	0.77	0.81	35.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											

P7 Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians	526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	55	1.9	55	1.9	0.533	50.9	LOS D	7.5	53.0	0.93	0.79	0.93	31.4
2	T1	299	0.4	299	0.4	* 0.888	53.7	LOS D	14.7	105.1	0.96	0.88	1.07	28.5
3	R2	224	3.3	224	3.3	0.888	68.2	LOS E	14.7	105.1	1.00	1.01	1.25	18.0
Approach		578	1.6	578	1.6	0.888	59.0	LOS E	14.7	105.1	0.97	0.93	1.13	25.2
East: Carlingford Rd														
4	L2	46	4.5	46	4.5	0.917	70.7	LOS F	20.1	145.7	1.00	1.09	1.28	32.0
5	T1	824	3.8	824	3.8	* 0.917	64.8	LOS E	20.1	145.7	1.00	1.09	1.29	33.6
6	R2	143	2.2	143	2.2	0.416	32.0	LOS C	3.1	21.8	0.92	0.79	0.92	40.8
Approach		1014	3.6	1014	3.6	0.917	60.4	LOS E	20.1	145.7	0.99	1.05	1.24	34.3
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.550	58.4	LOS E	5.3	36.8	0.97	0.83	0.97	20.2
8	T1	335	0.0	335	0.0	* 0.917	65.9	LOS E	11.5	80.7	0.99	1.00	1.23	26.2
9	R2	53	0.0	53	0.0	0.917	77.6	LOS F	11.5	80.7	1.00	1.10	1.38	25.6
Approach		419	0.0	419	0.0	0.917	66.8	LOS E	11.5	80.7	0.99	1.00	1.23	25.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.910	68.2	LOS E	20.3	147.2	1.00	1.08	1.26	28.0
11	T1	834	4.0	834	4.0	0.910	62.6	LOS E	20.3	147.2	0.99	1.07	1.26	19.9
12	R2	273	1.5	273	1.5	* 0.771	44.2	LOS D	7.7	54.8	1.00	0.90	1.09	32.7
Approach		1128	3.4	1128	3.4	0.910	58.3	LOS E	20.3	147.2	0.99	1.03	1.22	23.6
All Vehicles		3139	2.7	3139	2.7	0.917	60.2	LOS E	20.3	147.2	0.99	1.01	1.21	28.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97

North: Midson Rd										
P3 Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96
All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - Remove Pedestrian Leg (AM Only))]

Network: N101 [Sc. 4 AM - with POS & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	122	0.9	122	0.9	0.285	7.8	LOS A	0.6	4.3	0.47	0.27	0.51	37.6
2	T1	228	2.3	228	2.3	0.285	2.8	LOS A	0.6	4.3	0.47	0.27	0.51	23.7
Approach		351	1.8	351	1.8	0.285	4.5	NA	0.6	4.3	0.47	0.27	0.51	34.4
North: Rawson Street														
8	T1	334	7.3	334	7.3	0.301	3.0	LOS A	0.5	4.0	0.34	0.09	0.41	31.3
9	R2	44	2.4	44	2.4	0.301	13.8	LOS A	0.5	4.0	0.34	0.09	0.41	38.1
Approach		378	6.7	378	6.7	0.301	4.3	NA	0.5	4.0	0.34	0.09	0.41	34.0
West: Site Acces														
10	L2	126	1.7	126	1.7	0.284	9.0	LOS A	0.5	3.6	0.68	0.87	0.77	32.8
12	R2	33	0.0	33	0.0	0.284	14.5	LOS A	0.5	3.6	0.68	0.87	0.77	32.8
Approach		159	1.3	159	1.3	0.284	10.1	LOS A	0.5	3.6	0.68	0.87	0.77	32.8
All Vehicles		887	3.8	887	3.8	0.301	5.4	NA	0.6	4.3	0.45	0.30	0.51	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St AM - Pedestrian Operated Signals (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	489	1.1	489	1.1	* 0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
Approach		489	1.1	489	1.1	0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
North: Rawson Street														
8	T1	452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
Approach		452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
All Vehicles		941	3.0	941	3.0	0.589	9.8	LOS A	4.6	32.8	0.81	0.70	0.81	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19
All Pedestrians		858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	763	4.5	763	4.5	0.559	12.3	LOS A	6.0	43.3	0.43	0.70	0.43	40.2
2	T1	1070	2.7	1070	2.7	* 0.975	69.0	LOS E	30.1	215.5	0.94	1.12	1.30	26.5
Approach		1833	3.5	1833	3.5	0.975	45.4	LOS D	30.1	215.5	0.73	0.94	0.94	28.9
North: Beecroft Road														
8	T1	1354	0.9	1354	0.9	0.603	22.0	LOS B	11.7	82.8	0.70	0.61	0.70	35.2
9	R2	227	6.0	227	6.0	* 0.892	85.8	LOS F	5.4	39.9	1.00	1.03	1.49	16.0
Approach		1581	1.6	1581	1.6	0.892	31.1	LOS C	11.7	82.8	0.74	0.67	0.81	30.0
West: Carlingford Road														
10	L2	78	10.8	78	10.8	0.320	34.4	LOS C	6.7	49.1	0.83	0.80	0.83	29.0
12	R2	1445	3.1	1445	3.1	* 0.931	48.8	LOS D	7.0	50.0	0.96	0.96	1.14	4.8
Approach		1523	3.5	1523	3.5	0.931	48.1	LOS D	7.0	50.0	0.96	0.96	1.12	6.4
All Vehicles		4937	2.9	4937	2.9	0.975	41.7	LOS C	30.1	215.5	0.80	0.86	0.96	23.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	90.8	38.0	0.42
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.9	28.4	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	127	0.8	127	0.8	0.334	38.0	LOS C	6.9	48.3	0.79	0.72	0.79	8.9
2	T1	144	0.7	144	0.7	* 0.996	50.9	LOS D	6.9	48.3	0.83	0.83	1.01	22.5
3	R2	83	5.1	83	5.1	0.996	121.5	LOS F	6.6	47.5	1.00	1.24	1.85	3.0
Approach		355	1.8	355	1.8	0.996	62.8	LOS E	6.9	48.3	0.85	0.89	1.13	13.1
East: Carlingford Rd														
4	L2	174	9.7	174	9.7	0.542	25.8	LOS B	6.8	50.0	0.74	0.71	0.74	8.7
5	T1	807	3.4	807	3.4	0.542	25.8	LOS B	6.9	50.0	0.80	0.73	0.80	7.8
6	R2	4	100.0	4	100.0	0.542	32.7	LOS C	6.9	50.0	0.84	0.75	0.84	28.9
Approach		985	4.9	985	4.9	0.542	25.9	LOS B	6.9	50.0	0.79	0.73	0.79	8.1
North: Ray Rd														
7	L2	256	1.2	256	1.2	0.800	54.6	LOS D	10.2	72.0	0.97	0.93	1.11	20.2
8	T1	203	3.1	203	3.1	0.587	48.4	LOS D	8.2	59.1	0.94	0.80	0.94	21.6
9	R2	33	3.2	33	3.2	0.587	52.9	LOS D	8.2	59.1	0.94	0.80	0.94	21.6
Approach		492	2.1	492	2.1	0.800	51.9	LOS D	10.2	72.0	0.96	0.87	1.03	20.9
West: Carlingford Rd														
10	L2	20	0.0	20	0.0	0.982	90.9	LOS F	34.8	250.4	1.00	1.27	1.45	28.3
11	T1	1145	3.3	1145	3.3	* 0.982	86.3	LOS F	34.8	250.4	1.00	1.28	1.46	22.7
12	R2	2	100.0	2	100.0	0.982	93.6	LOS F	32.8	236.7	1.00	1.29	1.47	22.5
Approach		1167	3.4	1167	3.4	0.982	86.4	LOS F	34.8	250.4	1.00	1.28	1.46	22.8
All Vehicles		2999	3.5	2999	3.5	0.996	58.1	LOS E	34.8	250.4	0.91	0.99	1.13	19.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											

P2 Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	90.7	37.4	0.41
North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	589	59.7	LOS E	1.1	1.1	0.96	0.96	89.2	35.4	0.40

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.480	12.5	LOS A	1.3	9.3	0.79	0.95	0.92	41.8
2	T1	127	0.8	127	0.8	0.480	12.4	LOS A	1.3	9.3	0.79	0.95	0.92	36.7
3	R2	84	0.0	84	0.0	0.480	16.2	LOS B	1.3	9.3	0.79	0.95	0.92	37.0
Approach		220	0.5	220	0.5	0.480	13.8	LOS A	1.3	9.3	0.79	0.95	0.92	37.1
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.582	13.8	LOS A	2.0	14.1	0.85	1.01	1.06	36.6
5	T1	125	2.5	125	2.5	0.582	13.9	LOS A	2.0	14.1	0.85	1.01	1.06	37.5
6	R2	115	0.9	115	0.9	0.582	17.4	LOS B	2.0	14.1	0.85	1.01	1.06	17.6
6u	U	2	0.0	2	0.0	0.582	18.9	LOS B	2.0	14.1	0.85	1.01	1.06	11.8
Approach		279	1.5	279	1.5	0.582	15.4	LOS B	2.0	14.1	0.85	1.01	1.06	32.8
North: Rawson Street														
7	L2	49	27.7	49	27.7	0.760	14.8	LOS B	3.2	23.4	0.68	0.91	0.91	27.7
8	T1	179	0.6	179	0.6	0.760	13.1	LOS A	3.2	23.4	0.68	0.91	0.91	38.8
9	R2	180	4.7	180	4.7	0.760	16.9	LOS B	3.2	23.4	0.68	0.91	0.91	38.8
9u	U	43	0.0	43	0.0	0.760	18.1	LOS B	3.2	23.4	0.68	0.91	0.91	24.3
Approach		452	5.1	452	5.1	0.760	15.3	LOS B	3.2	23.4	0.68	0.91	0.91	37.3
West: Bridge Street														
10	L2	204	1.5	204	1.5	0.734	17.2	LOS B	3.2	23.0	0.91	1.14	1.32	34.0
11	T1	136	3.9	136	3.9	0.734	17.5	LOS B	3.2	23.0	0.91	1.14	1.32	36.0
12	R2	21	0.0	21	0.0	0.734	20.8	LOS B	3.2	23.0	0.91	1.14	1.32	40.6
12u	U	14	0.0	14	0.0	0.734	22.4	LOS B	3.2	23.0	0.91	1.14	1.32	41.0
Approach		375	2.2	375	2.2	0.734	17.7	LOS B	3.2	23.0	0.91	1.14	1.32	35.6
All Vehicles		1325	2.8	1325	2.8	0.760	15.7	LOS B	3.2	23.4	0.80	1.00	1.06	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	599	4.2	599	4.2	0.330	24.6	LOS B	6.8	49.8	0.63	0.75	0.63	33.3
22	T1	189	3.3	189	3.3	0.697	60.1	LOS E	7.3	52.3	1.00	0.85	1.05	28.8
Approach		788	4.0	788	4.0	0.697	33.1	LOS C	7.3	52.3	0.72	0.77	0.73	31.4
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1271	3.2	1271	3.2	* 0.878	48.7	LOS D	25.7	183.9	1.00	1.00	1.12	23.3
Approach		1291	3.2	1291	3.2	0.878	48.6	LOS D	25.7	184.8	1.00	0.99	1.11	23.5
NorthWest: Langston Pl														
27a	L1	44	9.5	44	9.5	0.581	66.3	LOS E	3.9	28.7	1.00	0.79	1.00	27.4
28	T1	273	1.5	273	1.5	* 0.775	61.9	LOS E	8.5	60.6	1.00	0.88	1.09	28.4
Approach		317	2.7	317	2.7	0.775	62.5	LOS E	8.5	60.6	1.00	0.87	1.08	28.3
West: Epping Rd														
10b	L3	329	3.8	329	3.8	0.827	12.3	LOS A	12.6	90.4	0.43	0.58	0.43	48.5
11	T1	1899	1.8	1899	1.8	0.827	6.4	LOS A	23.8	168.9	0.49	0.51	0.49	53.0
12a	R1	541	1.5	541	1.5	* 0.990	75.7	LOS F	19.9	141.4	1.00	1.18	1.40	25.1
Approach		2769	2.0	2769	2.0	0.990	20.7	LOS B	23.8	168.9	0.58	0.65	0.66	43.1
All Vehicles		5165	2.6	5165	2.6	0.990	32.1	LOS C	25.7	184.8	0.73	0.77	0.81	35.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											
P7	Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95
All Pedestrians		526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	55	1.9	55	1.9	0.533	50.9	LOS D	7.5	53.0	0.93	0.79	0.93	31.4
2	T1	299	0.4	299	0.4	* 0.888	53.7	LOS D	14.7	105.1	0.96	0.88	1.07	28.5
3	R2	224	3.3	224	3.3	0.888	68.2	LOS E	14.7	105.1	1.00	1.01	1.25	18.0
Approach		578	1.6	578	1.6	0.888	59.0	LOS E	14.7	105.1	0.97	0.93	1.13	25.2
East: Carlingford Rd														
4	L2	46	4.5	46	4.5	0.917	70.7	LOS F	20.1	145.7	1.00	1.09	1.28	32.0
5	T1	824	3.8	824	3.8	* 0.917	64.8	LOS E	20.1	145.7	1.00	1.09	1.29	33.6
6	R2	143	2.2	143	2.2	0.416	32.0	LOS C	3.1	21.8	0.92	0.79	0.92	40.8
Approach		1014	3.6	1014	3.6	0.917	60.4	LOS E	20.1	145.7	0.99	1.05	1.24	34.3
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.550	58.4	LOS E	5.3	36.8	0.97	0.83	0.97	20.2
8	T1	335	0.0	335	0.0	* 0.917	65.9	LOS E	11.5	80.7	0.99	1.00	1.23	26.2
9	R2	53	0.0	53	0.0	0.917	77.6	LOS F	11.5	80.7	1.00	1.10	1.38	25.6
Approach		419	0.0	419	0.0	0.917	66.8	LOS E	11.5	80.7	0.99	1.00	1.23	25.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.910	68.2	LOS E	20.3	147.2	1.00	1.08	1.26	28.0
11	T1	834	4.0	834	4.0	0.910	62.6	LOS E	20.3	147.2	0.99	1.07	1.26	19.9
12	R2	273	1.5	273	1.5	* 0.771	44.2	LOS D	7.7	54.8	1.00	0.90	1.09	32.7
Approach		1128	3.4	1128	3.4	0.910	58.3	LOS E	20.3	147.2	0.99	1.03	1.22	23.6
All Vehicles		3139	2.7	3139	2.7	0.917	60.2	LOS E	20.3	147.2	0.99	1.01	1.21	28.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
North: Midson Rd											

P3 Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96
All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic- CR 3 Lanes (AM Only))]

Network: N101 [Sc. 4 AM - with POS, CR mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	122	0.9	122	0.9	0.283	7.8	LOS A	0.6	4.3	0.47	0.27	0.50	37.6
2	T1	228	2.3	228	2.3	0.283	2.8	LOS A	0.6	4.3	0.47	0.27	0.50	23.7
Approach		351	1.8	351	1.8	0.283	4.5	NA	0.6	4.3	0.47	0.27	0.50	34.4
North: Rawson Street														
8	T1	334	7.3	334	7.3	0.301	3.0	LOS A	0.5	4.0	0.34	0.09	0.40	31.3
9	R2	44	2.4	44	2.4	0.301	13.8	LOS A	0.5	4.0	0.34	0.09	0.40	38.1
Approach		378	6.7	378	6.7	0.301	4.3	NA	0.5	4.0	0.34	0.09	0.40	34.0
West: Site Acces														
10	L2	126	1.7	126	1.7	0.280	9.0	LOS A	0.5	3.6	0.68	0.87	0.77	32.9
12	R2	33	0.0	33	0.0	0.280	14.2	LOS A	0.5	3.6	0.68	0.87	0.77	32.9
Approach		159	1.3	159	1.3	0.280	10.0	LOS A	0.5	3.6	0.68	0.87	0.77	32.9
All Vehicles		887	3.8	887	3.8	0.301	5.4	NA	0.6	4.3	0.45	0.30	0.51	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St AM - Pedestrian Operated Signals (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	489	1.1	489	1.1	* 0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
Approach		489	1.1	489	1.1	0.589	9.8	LOS A	4.6	32.8	0.82	0.71	0.82	28.4
North: Rawson Street														
8	T1	452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
Approach		452	5.1	452	5.1	0.557	9.7	LOS A	4.2	30.8	0.80	0.69	0.80	14.5
All Vehicles		941	3.0	941	3.0	0.589	9.8	LOS A	4.6	32.8	0.81	0.70	0.81	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19
All Pedestrians		858	15.0	LOS B	0.9	0.9	0.88	0.88	175.8	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	763	4.5	763	4.5	0.559	12.3	LOS A	6.0	43.3	0.43	0.70	0.43	40.2
2	T1	1070	2.7	1070	2.7	* 0.975	69.0	LOS E	30.1	215.5	0.94	1.12	1.30	26.5
Approach		1833	3.5	1833	3.5	0.975	45.4	LOS D	30.1	215.5	0.73	0.94	0.94	28.9
North: Beecroft Road														
8	T1	1354	0.9	1354	0.9	0.603	22.0	LOS B	11.7	82.8	0.70	0.61	0.70	35.2
9	R2	227	6.0	227	6.0	* 0.892	85.8	LOS F	5.4	39.9	1.00	1.03	1.49	16.0
Approach		1581	1.6	1581	1.6	0.892	31.1	LOS C	11.7	82.8	0.74	0.67	0.81	30.0
West: Carlingford Road														
10	L2	78	10.8	78	10.8	0.320	34.3	LOS C	6.6	48.7	0.82	0.80	0.82	29.2
12	R2	1445	3.1	1445	3.1	* 0.931	43.4	LOS D	7.7	55.0	0.96	0.94	1.08	5.7
Approach		1523	3.5	1523	3.5	0.931	43.0	LOS D	7.7	55.0	0.95	0.93	1.07	7.4
All Vehicles		4937	2.9	4937	2.9	0.975	40.1	LOS C	30.1	215.5	0.80	0.85	0.94	24.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	90.8	38.0	0.42
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.9	28.4	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	127	0.8	127	0.8	0.326	35.8	LOS C	6.8	48.1	0.76	0.71	0.76	9.3
2	T1	144	0.7	144	0.7	* 0.972	43.8	LOS D	6.8	48.1	0.80	0.79	0.93	24.3
3	R2	83	5.1	83	5.1	0.972	112.9	LOS F	6.0	43.6	1.00	1.21	1.79	3.2
Approach		355	1.8	355	1.8	0.972	57.1	LOS E	6.8	48.1	0.83	0.86	1.07	14.0
East: Carlingford Rd														
4	L2	174	9.7	174	9.7	0.550	26.8	LOS B	7.5	55.0	0.73	0.70	0.73	9.0
5	T1	807	3.4	807	3.4	0.550	26.4	LOS B	7.6	55.0	0.80	0.73	0.80	8.1
6	R2	4	100.0	4	100.0	0.550	33.4	LOS C	7.6	55.0	0.85	0.75	0.85	28.8
Approach		985	4.9	985	4.9	0.550	26.5	LOS B	7.6	55.0	0.78	0.73	0.78	8.5
North: Ray Rd														
7	L2	256	1.2	256	1.2	0.676	41.0	LOS C	8.4	59.5	0.89	0.84	0.89	23.8
8	T1	203	3.1	203	3.1	0.550	46.3	LOS D	8.0	57.8	0.93	0.79	0.93	22.1
9	R2	33	3.2	33	3.2	0.550	50.9	LOS D	8.0	57.8	0.93	0.79	0.93	22.1
Approach		492	2.1	492	2.1	0.676	43.9	LOS D	8.4	59.5	0.91	0.81	0.91	23.0
West: Carlingford Rd														
10	L2	20	0.0	20	0.0	0.989	95.1	LOS F	35.8	257.4	1.00	1.29	1.48	27.7
11	T1	1145	3.3	1145	3.3	* 0.989	90.7	LOS F	35.8	257.4	1.00	1.30	1.49	22.0
12	R2	2	100.0	2	100.0	0.989	98.2	LOS F	33.3	240.1	1.00	1.31	1.50	21.8
Approach		1167	3.4	1167	3.4	0.989	90.7	LOS F	35.8	257.4	1.00	1.30	1.49	22.1
All Vehicles		2999	3.5	2999	3.5	0.989	58.0	LOS E	35.8	257.4	0.89	0.98	1.11	19.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39

North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	316	59.9	LOS E	1.1	1.1	0.97	0.97	88.9	34.8	0.39
All Pedestrians	421	59.8	LOS E	1.1	1.1	0.96	0.96	88.6	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	8	0.0	8	0.0	0.480	12.5	LOS A	1.3	9.3	0.79	0.95	0.92	41.8
2	T1	127	0.8	127	0.8	0.480	12.4	LOS A	1.3	9.3	0.79	0.95	0.92	36.7
3	R2	84	0.0	84	0.0	0.480	16.2	LOS B	1.3	9.3	0.79	0.95	0.92	37.0
Approach		220	0.5	220	0.5	0.480	13.8	LOS A	1.3	9.3	0.79	0.95	0.92	37.1
East: Bridge Street														
4	L2	37	0.0	37	0.0	0.582	13.8	LOS A	2.0	14.1	0.85	1.01	1.06	36.6
5	T1	125	2.5	125	2.5	0.582	13.9	LOS A	2.0	14.1	0.85	1.01	1.06	37.5
6	R2	115	0.9	115	0.9	0.582	17.4	LOS B	2.0	14.1	0.85	1.01	1.06	17.6
6u	U	2	0.0	2	0.0	0.582	18.9	LOS B	2.0	14.1	0.85	1.01	1.06	11.8
Approach		279	1.5	279	1.5	0.582	15.4	LOS B	2.0	14.1	0.85	1.01	1.06	32.8
North: Rawson Street														
7	L2	49	27.7	49	27.7	0.760	14.8	LOS B	3.2	23.4	0.68	0.91	0.91	27.7
8	T1	179	0.6	179	0.6	0.760	13.1	LOS A	3.2	23.4	0.68	0.91	0.91	38.8
9	R2	180	4.7	180	4.7	0.760	16.9	LOS B	3.2	23.4	0.68	0.91	0.91	38.8
9u	U	43	0.0	43	0.0	0.760	18.1	LOS B	3.2	23.4	0.68	0.91	0.91	24.3
Approach		452	5.1	452	5.1	0.760	15.3	LOS B	3.2	23.4	0.68	0.91	0.91	37.3
West: Bridge Street														
10	L2	204	1.5	204	1.5	0.734	17.2	LOS B	3.2	23.0	0.91	1.14	1.32	34.0
11	T1	136	3.9	136	3.9	0.734	17.5	LOS B	3.2	23.0	0.91	1.14	1.32	36.0
12	R2	21	0.0	21	0.0	0.734	20.8	LOS B	3.2	23.0	0.91	1.14	1.32	40.6
12u	U	14	0.0	14	0.0	0.734	22.4	LOS B	3.2	23.0	0.91	1.14	1.32	41.0
Approach		375	2.2	375	2.2	0.734	17.7	LOS B	3.2	23.0	0.91	1.14	1.32	35.6
All Vehicles		1325	2.8	1325	2.8	0.760	15.7	LOS B	3.2	23.4	0.80	1.00	1.06	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	599	4.2	599	4.2	0.330	24.6	LOS B	6.8	49.8	0.63	0.75	0.63	33.3
22	T1	189	3.3	189	3.3	0.697	60.1	LOS E	7.3	52.3	1.00	0.85	1.05	28.8
Approach		788	4.0	788	4.0	0.697	33.1	LOS C	7.3	52.3	0.72	0.77	0.73	31.4
East: Epping Rd														
4b	L3	20	5.3	20	5.3	0.041	40.0	LOS C	0.5	3.9	0.73	0.70	0.73	35.9
5	T1	1271	3.2	1271	3.2	* 0.878	48.7	LOS D	25.7	183.9	1.00	1.00	1.12	23.3
Approach		1291	3.2	1291	3.2	0.878	48.6	LOS D	25.7	184.8	1.00	0.99	1.11	23.5
NorthWest: Langston Pl														
27a	L1	44	9.5	44	9.5	0.581	66.3	LOS E	3.9	28.7	1.00	0.79	1.00	27.4
28	T1	273	1.5	273	1.5	* 0.775	61.9	LOS E	8.5	60.6	1.00	0.88	1.09	28.4
Approach		317	2.7	317	2.7	0.775	62.5	LOS E	8.5	60.6	1.00	0.87	1.08	28.3
West: Epping Rd														
10b	L3	329	3.8	329	3.8	0.827	12.3	LOS A	12.6	90.4	0.43	0.58	0.43	48.5
11	T1	1899	1.8	1899	1.8	0.827	6.4	LOS A	23.8	168.9	0.49	0.51	0.49	53.0
12a	R1	541	1.5	541	1.5	* 0.990	75.7	LOS F	19.9	141.4	1.00	1.18	1.40	25.1
Approach		2769	2.0	2769	2.0	0.990	20.7	LOS B	23.8	168.9	0.58	0.65	0.66	43.1
All Vehicles		5165	2.6	5165	2.6	0.990	32.1	LOS C	25.7	184.8	0.73	0.77	0.81	35.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	242	59.7	LOS E	0.9	0.9	0.96	0.96	227.7	218.4	0.96
NorthWest: Langston Pl											
P7	Full	232	59.7	LOS E	0.8	0.8	0.96	0.96	223.2	212.5	0.95

All Pedestrians	526	59.7	LOS E	0.9	0.9	0.96	0.96	225.6	215.7	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 125 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	55	1.9	55	1.9	0.533	50.9	LOS D	7.5	53.0	0.93	0.79	0.93	31.4
2	T1	299	0.4	299	0.4	* 0.888	53.7	LOS D	14.7	105.1	0.96	0.88	1.07	28.5
3	R2	224	3.3	224	3.3	0.888	68.2	LOS E	14.7	105.1	1.00	1.01	1.25	18.0
Approach		578	1.6	578	1.6	0.888	59.0	LOS E	14.7	105.1	0.97	0.93	1.13	25.2
East: Carlingford Rd														
4	L2	46	4.5	46	4.5	0.917	70.7	LOS F	20.1	145.7	1.00	1.09	1.28	32.0
5	T1	824	3.8	824	3.8	* 0.917	64.8	LOS E	20.1	145.7	1.00	1.09	1.29	33.6
6	R2	143	2.2	143	2.2	0.416	32.0	LOS C	3.1	21.8	0.92	0.79	0.92	40.8
Approach		1014	3.6	1014	3.6	0.917	60.4	LOS E	20.1	145.7	0.99	1.05	1.24	34.3
North: Midson Rd														
7	L2	32	0.0	32	0.0	0.550	58.4	LOS E	5.3	36.8	0.97	0.83	0.97	20.2
8	T1	335	0.0	335	0.0	* 0.917	65.9	LOS E	11.5	80.7	0.99	1.00	1.23	26.2
9	R2	53	0.0	53	0.0	0.917	77.6	LOS F	11.5	80.7	1.00	1.10	1.38	25.6
Approach		419	0.0	419	0.0	0.917	66.8	LOS E	11.5	80.7	0.99	1.00	1.23	25.8
West: Carlingford Rd														
10	L2	22	0.0	22	0.0	0.910	68.2	LOS E	20.3	147.2	1.00	1.08	1.26	28.0
11	T1	834	4.0	834	4.0	0.910	62.6	LOS E	20.3	147.2	0.99	1.07	1.26	19.9
12	R2	273	1.5	273	1.5	* 0.771	44.2	LOS D	7.7	54.8	1.00	0.90	1.09	32.7
Approach		1128	3.4	1128	3.4	0.910	58.3	LOS E	20.3	147.2	0.99	1.03	1.22	23.6
All Vehicles		3139	2.7	3139	2.7	0.917	60.2	LOS E	20.3	147.2	0.99	1.01	1.21	28.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97
East: Carlingford Rd											
P2	Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	223.2	216.4	0.97

North: Midson Rd										
P3 Full	53	56.8	LOS E	0.2	0.2	0.95	0.95	219.7	211.8	0.96
All Pedestrians	158	56.8	LOS E	0.2	0.2	0.95	0.95	222.1	214.9	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access AM (Site Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic - CR 3 Lanes & Remove Ped Leg (AM Only)]

Network: N101 [Sc. 4 AM - with POS, CR & Remove Ped mitigation (Network Folder: Scenario 4 - Mitigations - Redistribution of Existing Traffic)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	122	0.9	122	0.9	0.283	7.8	LOS A	0.6	4.3	0.47	0.27	0.50	37.6
2	T1	228	2.3	228	2.3	0.283	2.8	LOS A	0.6	4.3	0.47	0.27	0.50	23.7
Approach		351	1.8	351	1.8	0.283	4.5	NA	0.6	4.3	0.47	0.27	0.50	34.4
North: Rawson Street														
8	T1	334	7.3	334	7.3	0.301	3.0	LOS A	0.5	4.0	0.34	0.09	0.40	31.3
9	R2	44	2.4	44	2.4	0.301	13.8	LOS A	0.5	4.0	0.34	0.09	0.40	38.1
Approach		378	6.7	378	6.7	0.301	4.3	NA	0.5	4.0	0.34	0.09	0.40	34.0
West: Site Acces														
10	L2	126	1.7	126	1.7	0.280	9.0	LOS A	0.5	3.6	0.68	0.87	0.77	32.9
12	R2	33	0.0	33	0.0	0.280	14.3	LOS A	0.5	3.6	0.68	0.87	0.77	32.9
Approach		159	1.3	159	1.3	0.280	10.1	LOS A	0.5	3.6	0.68	0.87	0.77	32.9
All Vehicles		887	3.8	887	3.8	0.301	5.4	NA	0.6	4.3	0.45	0.30	0.51	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [XM. Rawson St PM - Pedestrian Operated Signals (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Pedestrian Crossing (Signalised) - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
2	T1	474	0.0	474	0.0	* 0.566	9.7	LOS A	4.4	31.1	0.81	0.70	0.81	28.6
Approach		474	0.0	474	0.0	0.566	9.7	LOS A	4.4	31.1	0.81	0.70	0.81	28.6
North: Rawson Street														
8	T1	361	4.4	361	4.4	0.443	9.1	LOS A	3.2	22.9	0.75	0.64	0.75	15.2
Approach		361	4.4	361	4.4	0.443	9.1	LOS A	3.2	22.9	0.75	0.64	0.75	15.2
All Vehicles		835	1.9	834 N1	1.9	0.566	9.4	LOS A	4.4	31.1	0.78	0.67	0.78	24.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson Street											
P1	Full	1047	15.1	LOS B	1.1	1.1	0.89	0.89	175.9	209.0	1.19
All Pedestrians		1047	15.1	LOS B	1.1	1.1	0.89	0.89	175.9	209.0	1.19

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 706 [1. Beecroft Rd/ Carlingford Rd PM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beecroft Road														
1	L2	939	4.3	920	4.3	0.619	13.2	LOS A	9.0	65.5	0.49	0.73	0.49	39.3
2	T1	1317	1.4	1290	1.4	* 0.991	86.4	LOS F	42.2	299.1	0.95	1.21	1.40	23.2
Approach		2256	2.6	2209 N1	2.6	0.991	55.9	LOS D	42.2	299.1	0.76	1.01	1.02	25.8
North: Beecroft Road														
8	T1	757	1.6	757	1.6	0.196	14.2	LOS A	4.6	32.8	0.52	0.44	0.52	41.1
9	R2	309	5.4	309	5.4	* 1.015	128.1	LOS F	9.2	67.7	1.00	1.17	1.85	11.6
Approach		1066	2.7	1066	2.7	1.015	47.3	LOS D	9.2	67.7	0.66	0.65	0.90	23.7
West: Carlingford Road														
10	L2	97	4.3	97	4.3	0.955	77.9	LOS F	7.0	50.0	1.00	1.13	1.27	18.2
12	R2	1079	1.4	1079	1.4	* 0.955	75.5	LOS F	7.1	50.0	1.00	1.07	1.28	3.2
Approach		1176	1.6	1176	1.6	0.955	75.7	LOS F	7.1	50.0	1.00	1.08	1.28	4.9
All Vehicles		4498	2.4	4452 N1	2.4	1.015	59.1	LOS E	42.2	299.1	0.80	0.94	1.06	20.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Beecroft Road											
P1B	Slip/ Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	81.8	27.0	0.33
West: Carlingford Road											
P4	Full	7	59.2	LOS E	0.0	0.0	0.95	0.95	88.3	35.0	0.40
All Pedestrians		60	59.3	LOS E	0.2	0.2	0.96	0.96	82.6	28.0	0.34

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1015 [2. Carlingford Rd/ Ray Rd/ Rawson St PM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

NRT 6AM - 10AM, 3PM - 7PM
N Leg Parking Restrictions AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson St														
1	L2	131	0.8	131	0.8	0.400	37.6	LOS C	7.9	55.8	0.80	0.73	0.80	8.9
2	T1	163	0.0	163	0.0	* 0.890	37.5	LOS C	8.3	58.0	0.82	0.77	0.86	26.1
3	R2	152	0.0	152	0.0	0.890	79.6	LOS F	8.3	58.0	1.00	1.08	1.43	4.3
Approach		446	0.2	446	0.2	0.890	51.9	LOS D	8.3	58.0	0.87	0.86	1.04	14.3
East: Carlingford Rd														
4	L2	177	6.0	174	6.0	0.668	29.8	LOS C	6.9	50.0	0.84	0.79	0.84	7.6
5	T1	1062	4.0	1047	4.0	0.668	27.3	LOS B	6.9	50.0	0.86	0.79	0.86	7.4
6	R2	4	100.0	4	100.0	0.668	32.3	LOS C	6.9	50.0	0.87	0.79	0.87	28.8
Approach		1243	4.6	1226 N1	4.6	0.668	27.7	LOS B	6.9	50.0	0.86	0.79	0.86	7.6
North: Ray Rd														
7	L2	145	0.7	145	0.7	0.439	39.1	LOS C	5.6	39.4	0.81	0.79	0.81	24.4
8	T1	122	3.5	122	3.5	0.254	33.3	LOS C	4.0	29.0	0.77	0.65	0.77	26.1
9	R2	22	4.8	22	4.8	0.254	37.9	LOS C	4.0	29.0	0.77	0.65	0.77	26.1
Approach		289	2.2	289	2.2	0.439	36.6	LOS C	5.6	39.4	0.79	0.72	0.79	25.2
West: Carlingford Rd														
10	L2	40	0.0	40	0.0	* 0.883	55.1	LOS D	19.6	139.8	0.96	1.04	1.17	35.6
11	T1	818	2.2	818	2.2	0.883	50.6	LOS D	19.6	139.8	0.96	1.04	1.18	30.5
12	R2	2	100.0	2	100.0	0.883	58.0	LOS E	18.1	129.9	0.96	1.05	1.20	30.2
Approach		860	2.3	860	2.3	0.883	50.8	LOS D	19.6	139.8	0.96	1.04	1.18	30.8
All Vehicles		2838	3.0	2820 N1	3.0	0.890	39.5	LOS C	19.6	139.8	0.88	0.87	0.98	22.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Rawson St											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.8	34.2	0.39
East: Carlingford Rd											

P2 Full	105	59.4	LOS E	0.4	0.4	0.96	0.96	88.4	34.8	0.39
North: Ray Rd										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	87.1	33.4	0.38
West: Carlingford Rd										
P4 Full	211	59.7	LOS E	0.7	0.7	0.96	0.96	88.7	34.8	0.39
All Pedestrians	421	59.5	LOS E	0.7	0.7	0.96	0.96	88.3	34.6	0.39

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [3. Rawson St/ Bridge St PM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

Site Category: -
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	28	0.0	28	0.0	0.538	17.3	LOS B	1.6	11.1	0.88	1.04	1.13	39.7
2	T1	93	0.0	93	0.0	0.538	17.2	LOS B	1.6	11.1	0.88	1.04	1.13	33.6
3	R2	67	0.0	67	0.0	0.538	21.0	LOS B	1.6	11.1	0.88	1.04	1.13	25.7
3u	U	6	0.0	6	0.0	0.538	23.9	LOS B	1.6	11.1	0.88	1.04	1.13	42.8
Approach		195	0.0	195	0.0	0.538	18.7	LOS B	1.6	11.1	0.88	1.04	1.13	31.8
East: Bridge Street														
4	L2	42	0.0	42	0.0	0.845	23.3	LOS B	5.9	41.3	1.00	1.24	1.62	31.9
5	T1	282	0.4	282	0.4	0.845	23.2	LOS B	5.9	41.3	1.00	1.24	1.62	32.6
6	R2	157	0.0	157	0.0	0.845	26.7	LOS B	5.9	41.3	1.00	1.24	1.62	12.8
6u	U	2	0.0	2	0.0	0.845	28.3	LOS B	5.9	41.3	1.00	1.24	1.62	10.3
Approach		483	0.2	483	0.2	0.845	24.3	LOS B	5.9	41.3	1.00	1.24	1.62	28.7
North: Rawson Street														
7	L2	52	16.3	52	16.3	0.496	6.6	LOS A	1.2	9.1	0.44	0.64	0.44	34.6
8	T1	124	0.8	124	0.8	0.496	6.0	LOS A	1.2	9.1	0.44	0.64	0.44	43.6
9	R2	136	4.7	136	4.7	0.496	9.6	LOS A	1.2	9.1	0.44	0.64	0.44	43.6
9u	U	49	0.0	49	0.0	0.496	11.0	LOS A	1.2	9.1	0.44	0.64	0.44	32.1
Approach		361	4.4	361	4.4	0.496	8.1	LOS A	1.2	9.1	0.44	0.64	0.44	42.1
West: Bridge Street														
10	L2	175	0.0	175	0.0	0.483	10.2	LOS A	1.3	9.3	0.74	0.87	0.83	38.9
11	T1	53	2.0	53	2.0	0.483	10.4	LOS A	1.3	9.3	0.74	0.87	0.83	40.7
12	R2	14	0.0	14	0.0	0.483	14.0	LOS A	1.3	9.3	0.74	0.87	0.83	43.9
12u	U	9	0.0	9	0.0	0.483	15.6	LOS B	1.3	9.3	0.74	0.87	0.83	44.5
Approach		251	0.4	251	0.4	0.483	10.7	LOS A	1.3	9.3	0.74	0.87	0.83	40.0
All Vehicles		1289	1.4	1289	1.4	0.845	16.3	LOS B	5.9	41.3	0.78	0.97	1.06	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 216 [4. Blaxland Rd/ Epping Rd - PM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blaxland Rd														
21a	L1	977	0.9	977	0.9	* 1.023	120.8	LOS F	36.8	259.5	1.00	1.20	1.66	12.1
22	T1	114	2.8	114	2.8	0.548	58.5	LOS E	4.2	30.4	0.98	0.79	0.98	29.1
Approach		1091	1.1	1091	1.1	1.023	114.3	LOS F	36.8	259.5	1.00	1.16	1.59	13.6
East: Epping Rd														
4b	L3	13	0.0	13	0.0	0.019	30.6	LOS C	0.3	2.0	0.62	0.68	0.62	39.5
5	T1	1618	2.4	1618	2.4	* 1.010	95.0	LOS F	53.7	385.1	1.00	1.31	1.49	14.7
Approach		1631	2.4	1631	2.4	1.010	94.5	LOS F	53.7	385.1	1.00	1.30	1.48	14.8
NorthWest: Langston Pl														
27a	L1	32	3.3	32	3.3	0.477	64.4	LOS E	3.4	24.4	0.98	0.77	0.98	27.9
28	T1	189	2.8	189	2.8	0.477	57.4	LOS E	4.8	34.2	0.97	0.77	0.97	29.4
Approach		221	2.9	221	2.9	0.477	58.4	LOS E	4.8	34.2	0.97	0.77	0.97	29.2
West: Epping Rd														
10b	L3	445	1.2	445	1.2	0.542	8.7	LOS A	2.9	20.8	0.17	0.51	0.17	49.9
11	T1	1103	1.9	1103	1.9	0.542	2.7	LOS A	5.6	39.3	0.18	0.25	0.18	56.2
12a	R1	322	0.7	322	0.7	1.011	77.1	LOS F	13.2	93.2	1.00	1.10	1.57	19.9
Approach		1871	1.5	1871	1.5	1.011	16.9	LOS B	13.2	93.2	0.32	0.46	0.42	41.8
All Vehicles		4813	1.8	4813	1.8	1.023	67.2	LOS E	53.7	385.1	0.73	0.92	1.07	22.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Blaxland Rd											
P5	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.5	217.4	0.96
East: Epping Rd											
P2	Full	168	59.6	LOS E	0.6	0.6	0.96	0.96	227.6	218.4	0.96
NorthWest: Langston Pl											
P7	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.7	212.5	0.95
All Pedestrians		274	59.4	LOS E	0.6	0.6	0.96	0.96	226.4	217.1	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1068 [5. Midson Rd/ Carlingford Rd - PM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Midson Rd														
1	L2	118	2.7	118	2.7	0.576	42.8	LOS D	8.1	57.6	0.92	0.80	0.92	33.5
2	T1	408	0.3	408	0.3	* 0.960	59.4	LOS E	18.4	130.7	0.97	1.04	1.26	27.2
3	R2	177	4.2	177	4.2	0.960	78.4	LOS F	18.4	130.7	1.00	1.20	1.49	16.5
Approach		703	1.6	703	1.6	0.960	61.4	LOS E	18.4	130.7	0.97	1.04	1.26	25.7
East: Carlingford Rd														
4	L2	74	1.4	73	1.4	1.000	97.6	LOS F	25.8	186.4	1.00	1.35	1.63	27.2
5	T1	918	4.2	912	4.2	* 1.000	92.7	LOS F	25.8	186.4	1.00	1.34	1.64	28.2
6	R2	186	0.0	185	0.0	0.534	28.9	LOS C	3.8	26.7	0.90	0.80	0.90	41.9
Approach		1178	3.4	1170 N1	3.4	1.000	82.9	LOS F	25.8	186.4	0.98	1.26	1.52	29.7
North: Midson Rd														
7	L2	39	2.7	39	2.7	0.557	50.9	LOS D	3.7	26.4	0.99	0.83	0.99	21.9
8	T1	262	1.6	262	1.6	* 0.929	61.5	LOS E	8.8	62.5	1.00	1.03	1.32	27.0
9	R2	49	0.0	49	0.0	0.929	74.1	LOS F	8.8	62.5	1.00	1.13	1.50	26.2
Approach		351	1.5	351	1.5	0.929	62.1	LOS E	8.8	62.5	0.99	1.02	1.31	26.5
West: Carlingford Rd														
10	L2	42	0.0	42	0.0	0.638	42.3	LOS C	9.9	70.4	0.93	0.80	0.93	34.8
11	T1	649	2.4	649	2.4	0.638	36.8	LOS C	10.1	71.8	0.93	0.80	0.93	27.3
12	R2	218	0.5	218	0.5	* 0.765	36.8	LOS C	5.0	35.0	1.00	0.86	1.13	35.0
Approach		909	1.9	909	1.9	0.765	37.0	LOS C	10.1	71.8	0.95	0.82	0.98	30.2
All Vehicles		3141	2.3	3133 N1	2.4	1.000	62.4	LOS E	25.8	186.4	0.97	1.05	1.28	28.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Midson Rd											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
East: Carlingford Rd											
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.4	1.00
North: Midson Rd											

P3 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	212.2	211.8	1.00
All Pedestrians	158	49.3	LOS E	0.2	0.2	0.95	0.95	214.6	214.9	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [6. Site Access PM (Site Folder: 4 - Background Growth with Development)]

Network: N101 [Sc. 4 PM - with POS mitigation (Network Folder: Scenario 4 BG & Pdev)]

New Site
Site Category: (None)
Give-Way (Two-Way)

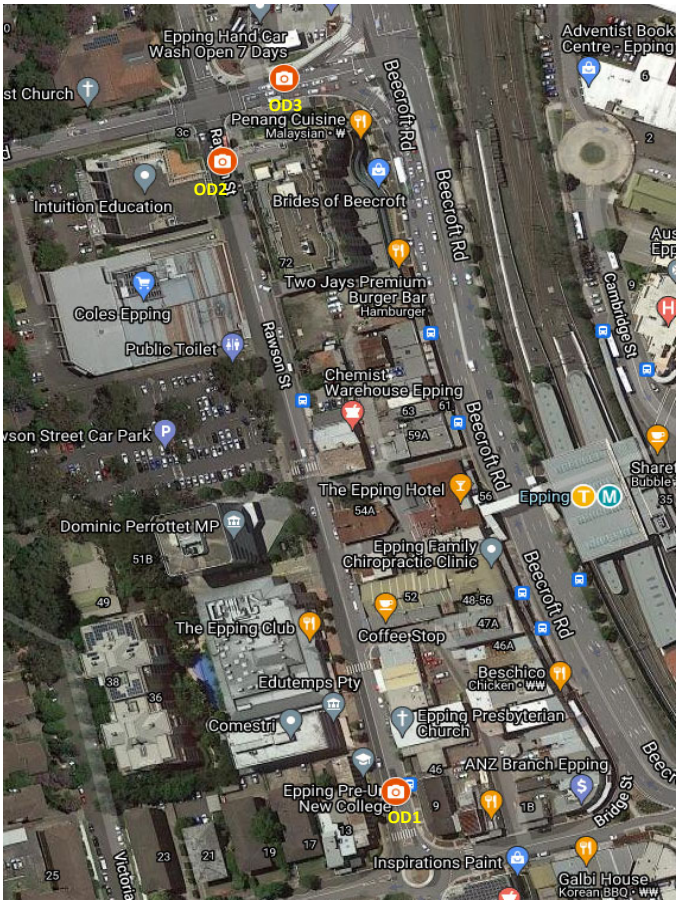
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rawson Street														
1	L2	202	0.0	202	0.0	0.425	9.7	LOS A	1.1	8.0	0.66	0.45	0.85	35.7
2	T1	212	3.0	212	3.0	0.425	5.3	LOS A	1.1	8.0	0.66	0.45	0.85	17.9
Approach		414	1.5	414	1.5	0.425	7.4	NA	1.1	8.0	0.66	0.45	0.85	32.5
North: Rawson Street														
8	T1	217	11.7	216	11.7	0.346	10.4	LOS A	1.2	8.7	0.76	0.30	0.95	18.0
9	R2	88	0.0	88	0.0	0.346	18.5	LOS B	1.2	8.7	0.76	0.30	0.95	33.1
Approach		305	8.3	304 N1	8.3	0.346	12.8	NA	1.2	8.7	0.76	0.30	0.95	26.6
West: Site Acces														
10	L2	249	0.0	249	0.0	0.579	14.6	LOS B	1.5	10.7	0.80	1.15	1.41	30.0
12	R2	48	0.0	48	0.0	0.579	19.9	LOS B	1.5	10.7	0.80	1.15	1.41	30.0
Approach		298	0.0	298	0.0	0.579	15.5	LOS B	1.5	10.7	0.80	1.15	1.41	30.0
All Vehicles		1017	3.1	1015 N1	3.1	0.579	11.4	NA	1.5	10.7	0.73	0.61	1.04	30.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Appendix F. Origin Destination Surveys



MATRIX
Traffic and Transport Data

[Location]

OD1. Rawson St immediately after rounadabout - Northbound
OD2. Rawson St south of Carlingford Rd - Northbound
OD3. Carlingford Rd between Rawson St and Beecroft Rd - Eastbound

AUNSW1021 - Epping - OD

Date 24/06/2021
Start Time 6:30 **End Time** 09:30
Match Time 15 minutes

Time Period	Match from OD1 to OD3			Match from OD2 to OD3			(OD1 to OD3) / (OD2 to OD3)
	Light	Heavy	Total	Light	Heavy	Total	
6:30 - 6:45	5	0	5	5	1	6	83.3%
6:45 - 7:00	8	0	8	9	0	9	88.9%
7:00 - 7:15	8	1	9	11	2	13	69.2%
7:15 - 7:30	13	0	13	16	0	16	81.3%
7:30 - 7:45	10	2	12	14	2	16	75.0%
7:45 - 8:00	4	0	4	10	0	10	40.0%
8:00 - 8:15	9	0	9	14	0	14	64.3%
8:15 - 8:30	11	1	12	14	1	15	80.0%
8:30 - 8:45	17	1	18	21	1	22	81.8%
8:45 - 9:00	16	0	16	27	0	27	59.3%
9:00 - 9:15	12	0	12	16	0	16	75.0%
9:15 - 9:30	14	1	15	21	3	24	62.5%
Total	**127**	**6**	133	**178**	**10**	**188**	**70.7%**

AUNSW1021 - Epping - OD

Date 24/06/2021

Start Time 15:00 **End Time** 19:00

Match Time 15 minutes

Time Period	Match from OD1 to OD3			Match from OD2 to OD3			(OD1 to OD3) / (OD2 to OD3)
	Light	Heavy	Total	Light	Heavy	Total	
15:00 - 15:15	13	1	14	34	1	35	40.0%
15:15 - 15:30	12	1	13	23	1	24	54.2%
15:30 - 15:45	8	0	8	32	0	32	25.0%
15:45 - 16:00	12	1	13	31	1	32	40.6%
16:00 - 16:15	13	0	13	41	0	41	31.7%
16:15 - 16:30	14	0	14	33	0	33	42.4%
16:30 - 16:45	11	0	11	24	1	25	44.0%
16:45 - 17:00	12	0	12	29	0	29	41.4%
17:00 - 17:15	14	0	14	33	0	33	42.4%
17:15 - 17:30	18	0	18	38	1	39	46.2%
17:30 - 17:45	9	0	9	35	0	35	25.7%
17:45 - 18:00	10	0	10	22	0	22	45.5%
18:00 - 18:15	10	0	10	27	0	27	37.0%
18:15 - 18:30	13	0	13	33	0	33	39.4%
18:30 - 18:45	13	0	13	31	0	31	41.9%
18:45 - 19:00	14	0	14	39	0	39	35.9%
Total	**196**	**3**	199	**505**	**5**	**510**	**39.0%**

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