

# Proposed Mixed-Use Development 8-16 Watt Street, Gosford

ADG Architects Pty Ltd
on behalf of
Jarre Pty Ltd

Traffic and Transport Study

March 2020





# 8-16 Watt Street, Gosford Traffic and Transport Study

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#### 1 Introduction

#### 1.1 Background

Seca Solution was commissioned by ADG Architects Pty Ltd on behalf of Jarre Pty Ltd to prepare a Traffic Impact Assessment for the proposed mixed-use development at 8-16 Watt Street, Gosford. This report will form part of the supporting documentation being prepared for a State Significant Development Application (SSDA) to the Department of Planning.

The project is located in the centre of Gosford CBD, on a key site (Gateway Centre) adjacent to Mann Street with Faunce and Watt Streets forming the north and east frontages. Mann Street in this location is a local road with Council being the road authority. Given the size of the proposed redevelopment of the site the project SEARs have been issued by the Department of Planning with concurrence required by Transport for NSW (TfNSW), previously the RMS.

Initial discussion has been held with Council to confirm the status of road modelling in the locality. It is understood that although a base AIMSUN model was developed, further modelling of the city centre did not progress. It is understood that Hunter Central Coast Development Corporation is also seeking to develop a suitable traffic model for Gosford.

This traffic impact assessment has been prepared in accordance with Austroads Guidelines and the Guide to Traffic Generating Developments (GtTGD) published by TfNSW.

#### 1.2 Scope of Report

The scope of this report is to review the traffic, parking and access impacts associated with the proposed development and to assess the access arrangements for the proposal. This report provides advice on road network capacity and access issues, the strategic planning for the CBD and opportunities for mode shift as well as reviewing the parking demands for the redevelopment of the subject site.

#### 1.3 Issues and Objectives of the study

The issues relative to the proposal are:

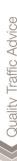
- Future plans for the revitalisation of Gosford City Centre by the Department of Planning, Industry and Environment;
- Consider access to the site by public transport;
- Determine the future traffic generation for the development within the strategic context of the CBD revitalisation and the mixed-use proposed for the site;
- Assess impact on the local road network of the additional flows;
- Review the access arrangements for the development;
- Assess any other transport impacts associated with the development;
- Assess the parking demands for the project against the Council DCP.

The objective of the report is to document the impacts of the proposed development and provide advice on any infrastructure work required on the external road network as part of the development.

#### 1.4 Planning Context

In preparing this document, the following guides and publications were used:

- Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;
- TDT 2013/04 "Update Traffic surveys August 2013"
- Gosford City Centre DCP 2018
- TfNSW Apartment Design Guide 2015
- SEPP (Affordable Rental Housing) 2009
- SEPP (Housing for Seniors) 2004
- SEPP (Gosford City Centre) 2018





### 1.1 Authority Requirements

The Department of Planning, Industry and Environment have provided SEAR's (Secretary's Environmental Assessment Requirements) that provide advice on what is to be assessed for the project and the information that is required to be provided. Relevant to traffic are the following:

Table 1-1 – Department of Planning and Environment SEARs

Requirement	Relevant Section of Seca Solution report
The assessment is to include traffic and parking generated by existing and approved developments, as well as that by the proposal, and consider car sharing facilities to reduce overall parking demands in the area;	Section 2.3, Section 2.5.3, Section 3.4, Section 4.1
Assess the traffic impacts of the development on the surrounding local and classified road network using SIDRA or similar traffic model and specify any road upgrade works (local and classified) required to maintain acceptable levels of service;	Section 2.3.7.2, Section 4.3
Estimate the total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips;	Section 3.6 Section 4.3
Assess the adequacy of public transport, pedestrian and bicycle provisions to meet the likely future demand of the proposed development;	Section 2.6, Section 3.5
Demonstrate the proposed road layout, access points, and car parking can comply with the relevant Australian Standards and Council requirements;	Section 2.2.1, Section 3.2
Demonstrate sufficient on-site car parking, loading/unloading, pedestrian and cycling facilities (including bicycle parking and end-of-trip facilities) would be provided for the development;	Section 3.4
Assess the impact of the proposal on car parking within the Gosford CBD during construction and operation of the proposed development;	Section 2.5, Section 3.4
Describe the measures to be implemented to promote sustainable means of travel, including public transport use, pedestrian and bicycle linkages;	Section 3.6
Prepare a preliminary Construction Traffic Management Plan for the proposal and outline how construction traffic, public transport, bicycle and pedestrian impacts, and parking impacts would be appropriately managed and mitigated;	Section 4.3.4
Detail the public transport options and pedestrian links for future residents of the proposed development.	Section 2.6, Section 3.5

Transport for NSW provided a response to DoP for the preparation of the SEARs which are provided below:

Table 1-2 – Transport for NSW requirements

Requirement	Relevant Section of Seca Solution report
Assessment of all relevant vehicular traffic routes and intersections for access to / from the subject properties.	Section 2.4.1, Section 2.5.1 Section 4
Current traffic counts for all of the traffic routes and intersections.	Section 2.5, Appendix F
The anticipated additional vehicular traffic generated from both the construction and operational stages of the project.	Section 4
The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.	Section 4.2
Consideration of the traffic impacts on existing and proposed intersections, in particular Henry Parry Drive and its intersections within the area defined by the	Section 4.4



Gosford SEPP, and the main intersections of the Gosford CBD catchment with the Central Coast Highway;	
The traffic report shall also assess the cumulative traffic impact of other proposed developments in the area, and the proponent should discuss utilising any existing traffic models available for the Gosford CBD with Central Coast Council.	Section 4.3
Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Transport for NSW and Council.	Section 3.2.1, Section 5
<ul> <li>Traffic analysis of any major / relevant intersections impacted, using Sidra or similar model, including:         <ul> <li>Current traffic counts and 10 year traffic growth projections</li> <li>With and without development scenarios</li> <li>95th percentile back of queue lengths</li> <li>Delays and level of service on all legs for the relevant intersections</li> <li>Electronic data for TfNSW to review</li> </ul> </li> <li>Note, it is encouraged that discussions occur with Transport regarding the appropriate model for the development prior to commencement of modelling. In this regard, initial discussions should occur between Council, the Department and Transport with a scoping note provided to ensure the correct approach taken.</li> </ul>	Section 4.4 Sidra Files to be Issued on request
Any other impacts on the regional and state road network including consideration of pedestrian, cyclist and public transport facilities and provision for service vehicles.	Section 3.1.2, Section 3.2.3, Section 3.2.6, Section 3.3.4, Section 3.4.6, Section 4.5, Section 4.6





# 2 Existing Situation

#### 2.1 Site Description and Proposed Activity

#### 2.1.1 Site Location and Access

The site is will see the consolidation of a number of sites being Gateway Centre (Lot 112 DP 1022614), 135 Faunce Street (Lot 3 DP 1191104) and 137 Faunce Street (Lot 1 DP 1191104). These are located within Gosford CBD with road frontage to Mann Street, Faunce Street and Watt Street (Figure 2-1 below). Vehicle access points are currently provided off Watt Street and Faunce Street only with no vehicle access provided off Mann Street. Quality pedestrian pathways are provided along each of these streets consistent with the site being part of the Gosford City Centre.

Although the site has been historically occupied by commercial premises including some retail outlets, currently many of the tenancies are vacant. A paid off-street carpark does however operate on site. The total gross floor area (GFA) of Gateway Centre is in the order of 8,000 m<sup>2</sup> with up to 250 parking spaces and the other minor buildings.

The zoning for the site is B3 Commercial Core.

The location of the site is shown below in Figure 2-1.

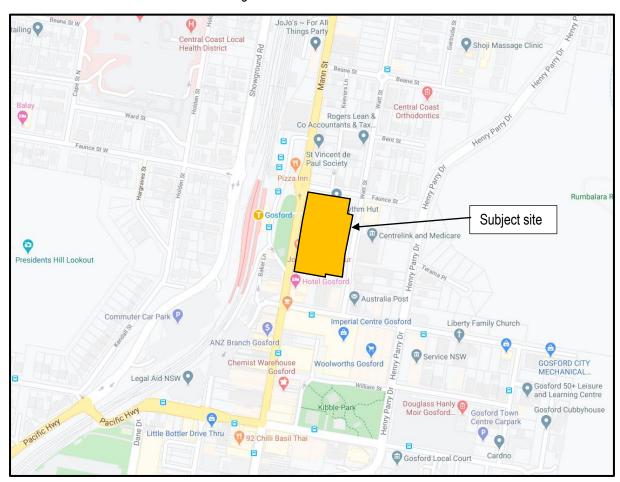


Figure 2-1 - Site Location in the context of the local road network (source: Google Maps)

The existing land use adjacent to the site is a mixture of retail and commercial.



#### 2.2 Existing Traffic Conditions

#### 2.2.1 Road Hierarchy

The major road through the locality is **Mann Street** which forms part of the Pacific Highway (HW10) which provides a road link through the CBD with a north-south orientation. Approximately 2 kms to the north, at Pennell Street, Mann Street becomes the Pacific Highway (HW10) which travels via Lisarow and Narara through to the M1 Pacific Motorway interchange at Ourimbah. To the south it provides a connection with the Central Coast Highway (HW30), Through the Gosford CBD, it generally provides a single lane of travel in both directions, with additional lanes provided at intersections to maintain capacity and reduce delays / congestion. Kerb side parking is provided (restrictions apply) along both sides of Mann Street in the immediate vicinity of the site. Parking lanes are removed at intersections to allow for additional traffic lanes to provide for turning vehicles. Footpaths are provided on both sides and there are a number of signal-controlled intersections along the length of the road that allow for pedestrian movements across Mann Street. Street lighting is provided throughout the locality.

The speed limit varies along its length and through the CBD is 40 km/h.

Mann Street connects with Faunce Street via a roundabout intersection with 3 legs, with the eastern leg being Faunce Street. It also connects with Erina Street East, to the south, via a four-way signalised intersection allowing for pedestrian movements on all legs. The western leg of this intersection provides access to a public car park and a small number of businesses.

Running along the eastern boundary of the subject site is **Watt Street**. This road runs parallel to Mann Street and provides access to the subject site. It is a local road which provides generally a single lane of travel in both directions and allows for parking along the western edge for the majority of its length. On the eastern side parking is permitted for 30 metres only near its intersection with Erina Street East with three travel lanes provided adjacent to the site frontage. The provision of two southbound lanes in this location appear to provide for turning vehicles entering the Gateway Centre carpark. Pedestrian footpaths and street lighting are provided to both sides and the road operates under the posted speed limit of 40 km/h.



Photo 1 – View south along Watt Street at its intersection with Faunce Street showing typical cross section and road layout of Watt Street





Watt Street connects with Faunce Street to the north via a give way-controlled intersection with Watt Street having priority. To the immediate north of this intersection a vertical speed calming device is installed across the width of Watt Street.

To the south of the site Watt Street connects with Erina Street East, via a priority-controlled T-intersection with Erina Street East having priority. Keep Clear markings are provided on Erina Street East to enable the turning vehicles into and out of Watt Street.

Along the northern boundary of the site is **Faunce Street**, which provides access to the site and connects between Mann Street and Watt Street. It allows for local residential connection to the town centre and the broader road network at Mann Street. It provides a single lane of travel in each direction and permits kerb side parking to both sides (restrictions applying). It provides footpaths to both sides and operates under the posted speed limit of 40 km/h. Faunce Street does not provide for through traffic to the east where it terminates. It is discontinuous with Faunce Street West due to the railway corridor to the west.



Photo 2 – View east along Faunce Street from Mann Street showing typical cross section with site to the right of photo

To the south of the site is **Erina Street East**, which connects Mann Street to Henry Parry Drive with Watt Street connecting as detailed above. It provides two lanes of travel westbound, allowing for turning movements at its intersection with Mann Street, and one lane of travel eastbound to the signalised intersection with Henry Parry Drive. Traffic signals at Mann Street provide for all turn movements as well as pedestrian crossing.

Kerbside parking (with restrictions) is available along its northern edge with no stopping along its southern edge to allow for the two travel lanes. Footpaths are provided along both sides along with and street lighting and the posted speed limit is 40 km/h within the subject area.

To the east of the Gosford CBD Henry Parry Drive operates as a sub-arterial route which bypasses the Gosford CBD. It typically provides two lanes of travel in both directions with pedestrian footpaths to both sides. Street lighting is provided at regular intervals and the posted speed limit is 50 km/hr through the locality which changes to 60 km/hr north of Gosford City. It connects with Erina Street East at a signalised intersection allowing for all turning movements.



Off Mann Street, north of the Erina Street East intersection, Baker Crescent provides access to the railway station and bus interchange. Baker Crescent provides access for light vehicles to pick up or drop off passengers and then circulate south to the Pacific Highway whilst buses and taxi can continue through the bus interchange and exit north of Faunce Street onto Mann Street. This is controlled by traffic signals allowing for both left and right turn movements. The entry off Mann Street to the south also allows for left and right turning traffic with a channelised right turn lane provided off Mann Street.

#### 2.2.2 Roadworks, Traffic Management and Bikeways

Consultation has commenced with both Central Coast Council and HCCDC.

There are limited cyclist facilities within the immediate vicinity of the subject site, although there are a number of connections to the north and south of the CBD. The Central Coast Bike Plan provides a list of priorities for future cycling facilities. Priority 1 is to provide connections to activity centres while Priority 2 is to provide connection to public transport facilities. A map of the existing and proposed cycling facilities within the locality is shown below in Section 2.7.

#### 2.3 Traffic Flows

#### 2.3.1 Peak Hour Flows

As part of the study work, Seca Solution completed traffic surveys during a typical morning and afternoon peak period at the following intersections:

- Mann Street and Faunce Street
- Mann Street and Erina Street East
- Faunce Street and Watt Street

These traffic surveys were undertaken on Wednesday 19<sup>th</sup> February 2019 being reflective of normal mid-week demands once schools had resumed. The surveys were conducting between 7:30-9:30 in the morning and 3:00-6:00 in the afternoon. The proposed development provides a mixture of commercial and retail, education, residential and some tourist uses.

The peak hour for each individual intersection is summarised in the Table below.

Table 2-1 Peak hour times at surveyed intersections

Intersection	AM Peak	PM Peak
Mann Street and Faunce Street	8:15 – 9:15	4:15 – 5:15
Mann Street and Erina Street East	8:30 – 9:30	4:15 – 5:15
Faunce Street and Watt Street	8:00 – 9:00	4:15 – 5:15



The results of these traffic surveys are summarised below.

Table 2-2 Peak hour traffic flows

Location	Northbound AM	Southbound AM	Two-way	Northbound PM	Southbound PM	Two-way
Mann Street north of Faunce Street	399	564	963	511	489	1,000
Mann Street south of Faunce Street	402	565	967	482	532	1,014
Mann Street north of Erina Street East	477	568	1,045	522	534	1,056
Mann Street south of Erina Street East	660	367	1,027	582	419	1,001
Watt Street north of Faunce Street	154	256	410	231	215	445
Watt Street south of Faunce Street	175	216	391	273	217	490
	Eastbound AM	Westbound AM	Two-way	Eastbound PM	Westbound PM	Two-way
Faunce Street east of Mann Street	99	124	223	94	201	295
Erina Street east of Mann Street	289	121	410	200	203	403
Faunce Street west of Watt Street	87	120	207	84	145	229

The above traffic volumes show that the current traffic flows in and around the site are relatively low and well within acceptable limits. For urban roads, providing a single lane of travel in both directions, the capacity of a road is given as 900 vehicles per hour per direction (source TfNSW) and it can be seen that all of the above one-way flows are well within this limit. The peak flow was observed northbound in the morning peak on Mann Street north of Erina Street East, with a flow of 660 vehicles. This represents a volume to capacity ratio of 0.733 indicating there is spare capacity in this road.



#### 2.3.2 Daily Traffic Flows

Peak hour traffic flows typically represent 10% of the daily flows, and on this basis the daily traffic flows in and around the subject site are provided below.

Table 2-3 Peak hour and daily traffic flows

Location	AM two-way	PM two-way	Daily flow
Mann Street, north of Faunce Street	963	1,000	9,815
Mann Street, between Faunce Street and Erina Street East	1,045	1,056	10,505
Mann Street, south of Erina Street East	1,027	1,001	10,140
Faunce Street, between Mann Street and Watt Street	223	295	2,590
Watt Street, south of Faunce Street	391	490	4,405
Erina Street East, east of Mann Street	410	403	4,065

#### 2.3.3 Daily Traffic Flow Distribution

The daily traffic volumes are reasonably balanced in both directions, with the above data indicating a bias in traffic movements south in the morning and an even split during the afternoon. This would be reflective of commuter and local business demands.

#### 2.3.4 Vehicle Speeds

No speed surveys were completed as part of the study work, however it is considered that there is little opportunity for drivers to speed in the immediate vicinity of the subject site, given the interaction with intersections, driveways, parked vehicles and the character of the roads within the CBD.

#### 2.3.5 Existing Site Flows

The site currently generates traffic flows associated with the existing carpark providing parking to the commercial and retail elements within the Gateway Centre as well as the broader CBD.

Based upon the observations made on site there were a total of 76 vehicles entering/exiting the carpark during the morning survey period with a peak of 60 vehicles entering/exiting between 8:00-9:00 AM. During the afternoon survey period at total of 85 vehicles entered/exited the carpark with a peak of 43 vehicles entering/exiting between 5:00-6:00 PM.

These would be less than historical flows given the high vacancy rate within the Gateway Centre.

#### 2.3.6 Heavy Vehicle Flows

Heavy vehicle movements in the vicinity of the subject site are relatively low, reflective of the limited through traffic movements through Gosford CBD. Heavy vehicles have a destination within Gosford, associated with delivering goods to the various shops in the locality as well as the subject site. There are however a large number of buses through the area due to the Gosford Bus Interchange located west of the site adjacent to Gosford train station.



During the morning peak, the heavy vehicle content represented some 7%% of the overall traffic movements whilst during the afternoon peak the heavy vehicle content represented some 5%. The majority of these heavy vehicle movements were associated with deliveries within the town centre and bus movements through the area.

#### 2.3.7 Current Road Network Operation

#### 2.3.7.1 Mid-Block Capacity Assessment

The mid-block capacity and level of service during the peak hour for Mann Street, Faunce Street, Watt Street and Erina Street East has been determined from the surveyed traffic volumes, applying the level of service criteria and capacities detailed in Appendix D. The results of this assessment are summarised in Table 2-4 below.

Table 2-4 - Existing mid-block capacities and Level of Service.

Location	Peak Period	Peak One-Way Flows (vph)	Mid-Block Capacity (vph)	Current LoS
Mann Street	AM	564	900	С
(north of Faunce Street)	PM	511	900	С
Mann Street	AM	568	900	С
(north of Erina Street East)	PM	534	900	С
Mann Street	AM	660	900	D
(south of Erina Street East)	PM	582	900	С
Faunce Street	AM	124	900	А
(east of Mann Street)	PM	201	900	В
Watt Street	AM	213	900	В
(south of Faunce Street)	PM	273	900	В
Erina Street East	AM	289	900	В
(east of Mann Street)	PM	203	900	В

#### 2.3.7.2 Intersection Capacity Assessment

The key intersections within the locality of the subject site have been modelled using *Sidra Intersection 8* to determine their current peak hour operation and level of service, allowing for the existing traffic volumes obtained from the traffic surveys.

Results for the existing intersection operation are summarised in Table 2-5 to 2-7 below showing the level of service, average delays and queuing for the critical movements and/or intersection approaches. Degree of Saturation is also reported for the traffic control signals at Mann Street / Erina Street East and three-way roundabout at Mann Street / Faunce Street.



Table 2-5 - Sidra Results - Intersection of Mann Street / Faunce Street - 2020 Existing Situation (AM/PM)

Approach	Degree of Saturation	Level of Service	Ave. Delay (s)	95% Queue (m)
Mann Street (northbound)	0.312 / 0.407	A/A	3.3 / 3.5	13.7 / 19.3
Faunce Street (westbound)	0.176 / 0.254	A/A	7.7 / 7.3	7.3 / 10.6
Mann Street (southbound)	0.479 / 0.394	A/A	3.1 / 2.9	31.9 / 23.3

The above results indicate that the intersection of Mann Street / Faunce Street operates well within its capacity with approaches on both Mann Street and Faunce Street operating at Level of Service (LoS) A during the morning and afternoon peak periods. Minimal delays and gueuing are reported for the various approaches.

Occasional delays and queuing were observed associated with the traffic control signals to the north (bus interchange egress) with queues seen to extend back to the roundabout intersection at Faunce Street delaying northbound traffic through this intersection. The delays created by these signals are minimal however with queues observed to clear quickly once the signals had changed to green.

Some delays and queues are also noted southbound on Mann Street associated with vehicles manoeuvring into or out of the kerbside parking to the south although these typically do not impact upon the operation of the roundabout at Faunce Street.

Table 2-6 - Sidra Results - Intersection of Faunce Street / Watt Street - 2020 Existing Situation (AM/PM)

Approach	Movement	Level of Service	Ave. Delay	95% Queue
Watt Street (northbound)	Right Turn	A/A	4.2 / 4.6	1.1 / 0.4
Faunce Street	Right Turn	A/A	7.3 / 7.6	0.3 / 1.0
(westbound)	Approach	A/A	6.1 / 6.1	0.37 1.0
Watt Street (southbound)	Right Turn	A/A	6.1 / 6.7	3.4 / 2.7
Faunce Street	Right Turn	A/A	8.6 / 9.9	2.6 / 3.1
(eastbound)	Approach	A/A	6.8 / 7.6	2.0 / 3.1

The above results indicate that the intersection of Faunce Street and Watt Street is currently operating well within its capacity, with very minimal delays or queuing, consistent with observations on site.

Table 2-7 - Sidra Results - Intersection of Mann Street / Erina Street East - 2020 Existing Situation (AM/PM)

Approach	Degree of Saturation	Level of Service	Ave. Delay (s)	95% Queue (m)
Mann Street (northbound)	0.596 / 0.677	A/A	9.6 / 13.1	79.3 / 78.1
Erina Street East (westbound)	0.576 / 0.649	D/C	47.1 / 29.3	37.9 / 35.0
Mann Street (southbound)	0.316 / 0.432	A/A	9.4 / 12.4	55.8 / 54.0
Intersection Overall	0.596 / 0.677	A/B	12.9 / 15.3	79.3 / 78.1

The traffic control signals at the intersection of Mann Street / Erina Street East create some delays for motorists travelling through the area, however these delays are less than 50 seconds on average and are well within the



limits accepted by the road authorities. Overall this intersection operates as a LoS A/B during the morning and afternoon peak periods.

The above results indicate that the roads and intersections within the vicinity of the proposed development are currently operated within their mid-block capacities, with Watt Street operating at LoS C/D during the peak periods with the local roads including Faunce Street, Watt Street and Erina Street each operating at LoS A/B.

#### 2.4 Traffic Safety and Accident History

Accident data provided for the locality by TfNSW (Appendix B) shows that there have been a relatively low number of recorded accidents within the vicinity of the site along Mann Street, Erina Street East, Watt Street and Faunce Street. The majority of the accidents have occurred at the various intersections within the vicinity, with off road collisions and pedestrian incidents both featuring in the results. Overall there has been 11 accidents and 7 casualties over the 5 year timeframe June 2014 to June 2019. A summary of the crash data is detailed below:

- Of the 11 accidents, 7 of these occurred at the various intersections
- 4 of the accidents involved pedestrians
- 4 of the accidents involved a vehicle heading off road into an object
- The 3 other accidents involved reverse manoeuvring, right through movement and heading off the end of the road
- Speeding was a factor in 3 of the accidents
- 3 accidents resulted in serious injury, 3 resulted in moderate injury and 1 a minor injury



Figure 2-2 Extent of crash data



#### 2.5 Parking

#### 2.5.1 On-street Parking Provision

Parking is permitted along both sides of the roads in the locality, either kerb side or within parking lanes with restrictions applying including normal restrictions in the immediate vicinity of intersections and driveways.

Below is a summary of the parking restrictions with the locality:

- Mann Street, between Faunce Street and Erina Street East (western edge) ¼ hour parking and 1 hours parking adjacent to Burns Place Park;
- Mann Street, between Faunce Street and Erina Street East (eastern edge) Disabled parking and 1 hours parking adjacent to site;
- Faunce Street, between Mann Street and Watt Street 1-hour parking along both sides;
- Watt Street, between Faunce Street and Erina Street East (western edge) 1-hour parking, no parking zone between business hours, disabled parking, and ¼ hour parking;
- Watt Street, between Faunce Street and Erina Street East (western edge) 1/4 hour parking; and
- Erina Street, between Mann Street and Henry Parry Drive (northern edge) 1-hour parking, ¼ hour parking and 5 minute parking.

#### 2.5.2 Off-Street Parking Provision

There is parking provided within the various lots in the immediate vicinity of the subject site. The subject site has up to 350 off street parking spaces provided for the commercial and retail tenancies within the building as well as public parking. There is a public commuter car park to the immediate north of the site off Faunce Street providing up to 87 spaces and south-west of the site at the Gosford City car park which provides up to 535 spaces.

Council is currently investigating the opportunity to relocate public parking from our of the city centre with the option to provide a park and ride service to the CBD.

#### 2.5.3 Parking Demand and Utilisation

Parking within the city centre is typically well utilised reflecting both local and commuter demands.

During the site work, vehicles were observed parked within the subject site car park as well as along both sides of the local roads in the general vicinity of the subject site. There was a high turnover of parking on-street within the locality consistent with the timed parking restrictions in place within the CBD. The carpark on-site saw a number of vehicles enter during the morning and exit during the afternoon with the carpark half full at midday.

#### 2.5.4 Set down or pick up areas

There is taxi drop off / pick up zones west of the site within the bus interchange adjacent to Gosford Station.

There are a small number of 15-minute parking spaces on Mann Street adjacent to Burns Place Park which allows for some high turnover parking for the pick-up and drop-off of shoppers and commuters to Gosford Station.

#### 2.6 Public Transport

#### 2.6.1 Rail Station Locations

Gosford Station is located within the immediate vicinity of the site to the west off Mann Street. It is situated on the Central Coast and Newcastle line and provides access to regular service to both Sydney Central to the south Newcastle to the north as well as regional and interstate XPT services.



#### **Facilities**

- Opal card top up or single trip ticket machine
- Payphone
- Baby change table
- · Wheelchair accessible payphone
- Taxi rank
- Kiss and ride stopping area
- Bike lockers

- Toilets
- Emergency help point
- Wheelchair accessible toilet
- Wheelchair accessible car space
- Commuter car park
- Bike racks

Extra services are provided during the peak morning and afternoon periods which for this station occur between 6-8am and 4-6.30pm.

#### 2.6.2 Bus Stops and Associated Facilities

There is a bus interchange located adjacent to the Gosford train station west of the subject site. This interchange provides services connecting to suburbs located through the Central Coast Region. Regular services are run throughout the day with additional services during peak periods. Maps for bus services connecting Gosford to suburbs within the Central Coast LGA are shown below along with the layout for the interchange. A summary of the key services are included in **Appendix E**.

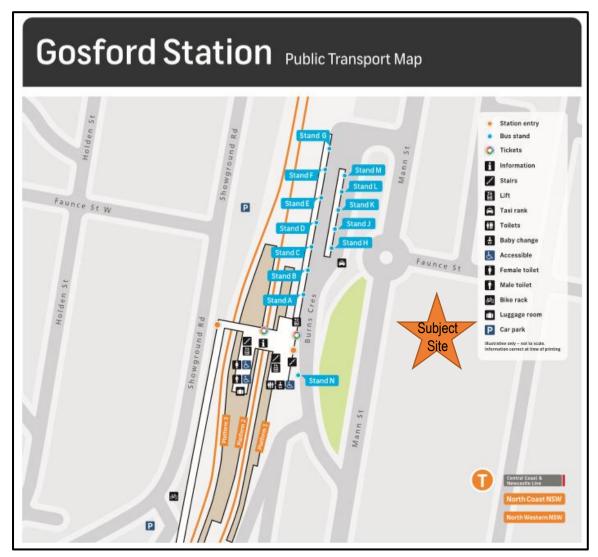


Figure 2-3 Gosford Railway Station and Bus Interchange



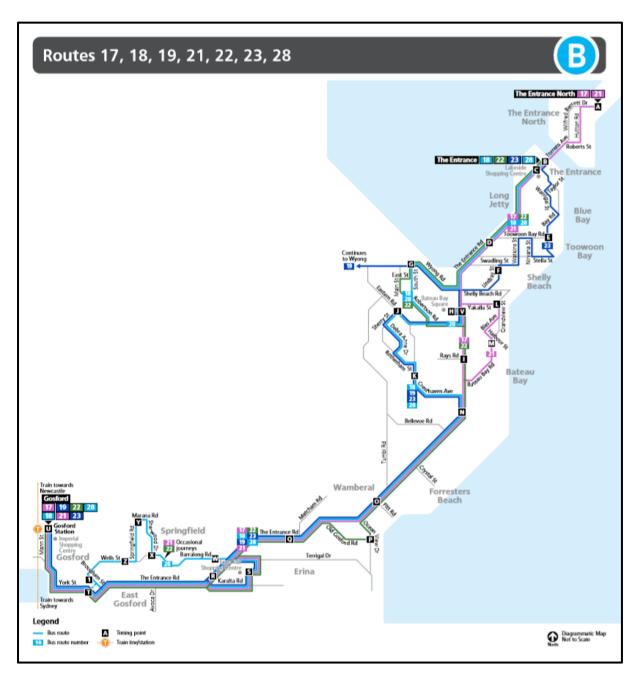


Figure 2-4 Red Bus services network map (Gosford to The Entrance Route Map)



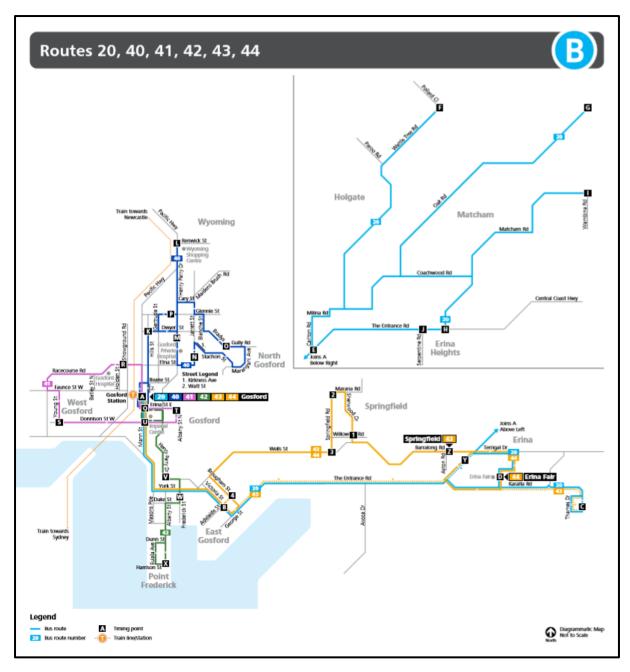


Figure 2-5 Red Bus services network map (Gosford City Route Map)



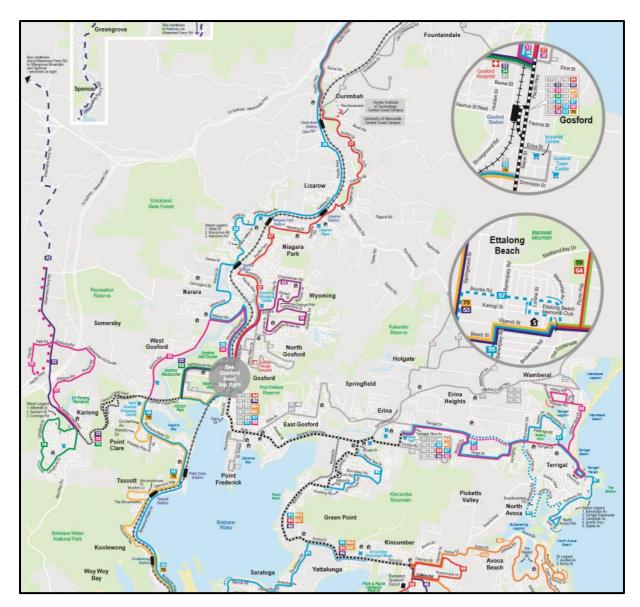


Figure 2-6 Busways services network map (Services to Woy Woy, Gosford, Erina and Wyong areas)

Central Coast Council has also initiated a free shuttle bus (December 2019) running from parking locations at Adcock Park and Racecourse Road. This service provides the opportunity for free parking for commuters to Gosford City and helps reduce the parking demand within the City.

#### 2.7 Pedestrian and Cyclist Facilities

There is an extensive pedestrian network within the Gosford CBD reflecting its function as a city centre. These include connection to public transport (Gosford Railway Station and Bus Interchange) as well as the Gosford Foreshore 1km south of the site. Pedestrian crossings are provided at signalised intersections and a number of zebra crossings are provided throughout the locality.

A pedestrian footbridge is provided across Mann Street which provides a link from Gosford Station to the Gateway Centre. Observations onsite note that there is a low demand for this pedestrian link with a low number of pedestrians utilising the footbridge during the peak periods or across the day.

The Draft Central Coast Bike Plan 2018 provides some advice to the future plans for the cycling network on the Central Coast. Within the bike plan the following priorities are noted which will provide improvements to the cycling facilities within Gosford CBD:



- Priority 1: Connections to activity centres
- Priority 2: Connections to public transport
- Priority 4: Connections between centres

A key project included in the plan is to connect the existing Brisbane Water shared path from Point Clare to Gosford along the rail corridor. This will provide a direct link between Woy Woy and Gosford. An excerpt from the draft bike plan is shown below and shows the existing and proposed cycling facilities within the Gosford Area.

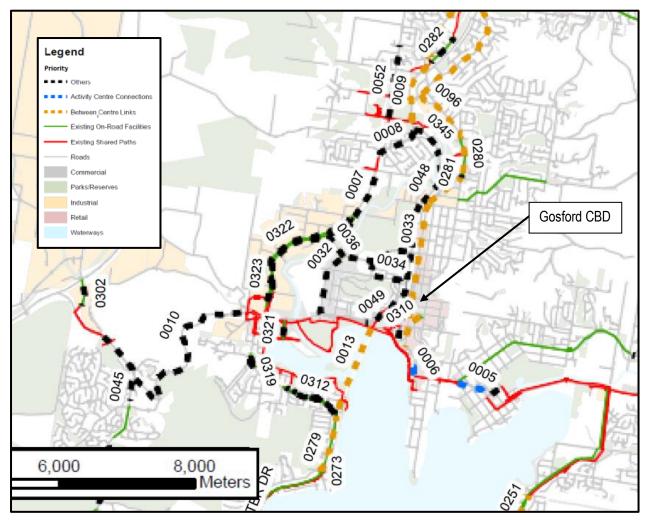


Figure 2-7 Existing and Proposed Cycling Infrastructure (Draft Central Coast Bike Plan 2018)

#### 2.8 Other Proposed Developments

A review of development applications within Gosford City include the following reflective of the revitalisation of the city centre:

#### **Approved Developments**

 DA 55994 18 Watt Street, Gosford - Boarding House Development comprising of 44 rooms, carparking and associated site works

The above project will have a minimal impact on traffic flows through the area.



#### <u>Developments Proposed or Under Review</u>

- DA 49578 321-331 Mann Street, Gosford shop top housing development consisting of 184 one, twoand three-bedroom units with 9 commercial tenancies across the lower levels
- **DA 49489** 333-337 Mann Street, Gosford mixed use development comprising commercial floor space and two cafés at the lower levels and shop top housing with 102 apartments above this.
- **DA 10132** 56 Beane Street, Gosford 41 affordable housing apartments and 19 basement level car parking spaces and associated tree removal, stormwater infrastructure and landscaping
- **SSD-9813** Donnison Street, Gosford mixed use development, which will provide a mix of residential and retail uses.
- **SSD-10114** 26-32 Mann Street, Gosford A three stage mixed use development including hotel, retail, commercial and residential facilities.
- SSD-10321 89 John Whiteway Drive, Gosford Residential flat building comprising 178 units.
- SSD-10374 1 Dane Drive, Gosford Mixed use development at existing Central Coast Leagues Club

The Gosford Hospital redevelopment continues with the multistorey carpark recently opening (March 2019) and upgrades to the Cancer Clinic soon to come.



# 3 Proposed Development

#### 3.1 The Development

The proposed State Significant Development Application (SSD DA) seeks concept development approval for the redevelopment of the Gosford Gateway Centre.

The concept development application will be subject to subsequent Development Applications with development approvals required for each stage.

The concept development proposes three mixed use towers and a public plaza in the centre. The development will be constructed in stages.

Full details of the proposal are included in the Environmental Impact Statement prepared by Barker Ryan Stewart.

For the purpose of this assessment the following has been considered as potential uses for the site with a combination allowed for.

- Tower 1 –to provide a hotel, entertainment facilities, retail, and commercial space, education facilities, student accommodation, a conference space/auditorium.
- Tower 2 to provide retail and commercial space, with independent living units located on the upper levels.
- Tower 3 A new tower building is to be constructed over the exiting commercial building and shall provide entirely for commercial uses.

Parking with up to 1,300 car parking spaces are proposed across 6 levels of underground car parking.

Servicing facilities are provided off street on Level 1.

A public plaza is to provide a pedestrian connection from Mann Street through to Watt Street.

The existing footbridge is to be demolished with a pedestrian crossing to be provided on Mann Street to allow a connection from the site to Gosford Station

#### 3.1.1 Phasing and Timing

The development will be built over a number of stages, to allow for continual trading for the retail and commercial elements within the existing site. The construction will allow for the construction of Tower 1 before demolition of the carpark and commencement of construction of Tower 2 followed by the construction of Tower 3. Whilst the market demands will dictate the timeframe for the full development, it is considered that the full development would be constructed within a 5-year timeframe.

This assessment has allowed for the full development impact to be determined and assessed.

#### 3.1.2 Access and Circulation Requirements

The new access points will all be designed and constructed in accordance with Council requirements and in accordance with AS2890.

Driveways are to be designed in accordance with AS2890.1 taking into consideration driveway controls with adequate storage for queuing within the site.



Per AS2890.1 two way roadways on ramps require a minimum width of 5.5m. Intersections between circulation roadways and ramps and with parking aisles shall be designed so that both the approach roadways and the intersection area are wide enough to accommodate turning vehicles with adequate intersection sight distance.

#### In accordance with GDCP

Driveways should be:

- a. provided from lanes and secondary streets rather than the primary street, wherever practical
- b. Driveway grades, vehicular ramp width/grades and passing bays must be in accordance with the relevant Australian Standard, (AS 2890.1).

Where a waste vehicle is required to enter the site, access and circulation areas shall be designed to accommodate a vehicle with the following specification:

Vehicle length 10.5m
Vehicle height 4.0m
Ramp width 4m
Turning circle AUSROADS template for HRV, R=12.5m, speed 5kph
Minimum truck loading 23 tonne.

Service docks and loading / unloading areas

Design circulation and access to be in accordance with AS 2890.1.

#### 3.2 Access

#### 3.2.1 Driveway Location

One of the two new driveways off Watt Street shall be located similar to the existing site access driveway. A second driveway shall be located to the south of this at the southern boundary to the site. A further driveway shall be located halfway along Faunce Street. All driveways shall allow for two way movements and provide entry and exit for vehicles accessing the basement carpark.

The Watt Street driveways are located on a straight section of road allowing for good visibility for drivers approaching and departing the site.

The access driveway off Faunce Street is located around 30 metres south of the intersection with Watt Street. This driveway is located on a straight section of road allowing for good visibility for drivers approaching and departing the site. This driveway also provides access for service vehicles.

#### 3.2.2 Sight Distance

All of these site access points are located within a 40 km/h speed zone and based upon AS2890 require sight line distances of 55 metres desirable and 35 metres minimum. For heavy vehicles the sight line requirements are 89 metres desirable and 55 metres minimum.

For both proposed access driveways on Watt Street, over 100 metres of sight distance is available in both directions and thereby satisfies the requirements. For the proposed driveway off Faunce Street there is up to 60 metres sight distance to the left which sights the roundabout intersection of Faunce Street and Mann Street and 100 metres sight distance to the right through the intersection at Watt Street. Each of these driveways can therefore satisfy the sight distance requirements.

Sight distances to pedestrians can also be achieved in accordance with AS2890.1 Figure 3.3.

#### 3.2.3 Service Vehicle Access

Service vehicle entry is proposed to enable access to the Level 1 parking module and waste collection which shall allow vehicles to enter and exit the site in a forward direction. This access shall be designed in accordance with AS2890 to allow for the appropriate ramp widths and grades. These details shall be confirmed during the detailed design for the project.



#### 3.2.4 Access to Public Transport

The site is well located to benefit from public transport with convenient pedestrian access to the existing train and bus services at Gosford Station. These facilities are located opposite the site off Mann Street with pedestrian links via the signalised intersection of Mann Street and Erina Street East or from the proposed pedestrian refuge to be provided.

#### 3.3 Circulation

#### 3.3.1 Pattern of circulation

All vehicles will be able to enter and exit the site in a forward direction from the local road network, including light and heavy vehicles. The design of the car park allows for vehicles to enter and exit via either Watt Street or Faunce Street. The northern access off Watt Street provides direct connection to the centralised two-way ramp which provides for the movement of light vehicles throughout the various parking levels. Vehicles are then able to circulate around the various levels.

Whilst aisles allow for two way movements some are blind aisles.

The detailed design of the carpark shall be undertaken in response to the overall site user requirements.

#### 3.3.2 Road width

All internal parking aisles and driveways shall be designed in accordance with Council and AS2890 requirements. All internal car park aisles and access ramps shall allow for two-way traffic movements.

#### 3.3.3 Internal Bus Movements

No internal bus movements are required for this development. Any demands associated with buses can be accommodated within the Gosford bus interchange immediately west of the site.

#### 3.3.4 Service Area Layout

The service dock area shall be designed in accordance with AS2890 and allow for trucks to enter and exit the site in a forward direction. A truck turning area has been provided on the first floor of the basement parking which shall be designed to allow for the manoeuvring of service vehicles and to enable them to exit from the site in a forward direction. The design and manoeuvring shall be confirmed during the detailed design of the project.

#### 3.4 Parking

#### 3.4.1 Authority Parking Rates

The parking for the development will take into consideration the authority parking rates as well as allowing for the unique location of the site and its role in the revitalisation of the Gosford City Centre. The parking rates are shown in the table 3-1 below and makes use of the Gosford City Centre DCP 2018, SEPP (Gosford City Centre 2018), SEPP (Affordable Rental Housing), SEPP (Housing for Seniors) and the Apartment Design Guide (GtTGD Parking Rates).



Table 3-1 – Authority Parking Rates

Element	SEPP Parking Rate	DCP Parking Rate	Apartment Design Guide (TfNSW)
Commercial		<u>Commercial:</u> 1 per 75m <sup>2</sup>	
Retail		Shops: 1 per 40m <sup>2</sup>	
Educational Establishment		Educational Establishment: 1 space per 2 staff & 1 space per 30 students	
Auditorium / Conference		Place of Assembly: 1 space per 20m² GFA, or 1 space per 10 seats, whichever is greater.	
Entertainment		Recreational Use 1 space per 25m² GFA	
Hotel Accommodation		space per accommodation unit     space per 2 persons employed and     on duty at any time	
Student Accommodation	SEPP (Affordable Rental Housing) Division 5 - Car Parking is Not Required	Residential Flat Buildings:  1 space per one-bedroom dwelling 1.2 spaces per two-bedroom dwelling 1.5 spaces per dwelling with three or more bedrooms.  0.2 spaces per dwelling for visitors At least 10% of spaces to be accessible.	Residential Flat Buildings:  0.6 spaces per one- bedroom dwelling 0.9 spaces per two- bedroom dwelling 1.4 spaces per three- bedroom dwelling 1 visitor space per 5 dwellings
Independent Living	SEPP (Housing for Seniors):  At least 0.5 spaces for each bedroom, or At least 1 space per 5 dwellings where the development is made by, or jointly with a social housing provider.	Housing for Seniors:  Not less than 0.5 spaces per dwelling	

GDCP requires that to accommodate people with disabilities, a minimum of 4% of the required parking spaces, or minimum of 2 spaces per development, (whichever is the greater) are to be provided as an appropriately designated and signed disabled parking space.

#### 3.4.2 Parking Supply

The total proposed parking provision for the site is some 1,200 parking spaces, split over 5 basement parking levels. The final number of parking spaces are to be confirmed as part of the detailed design of the site.

#### 3.4.3 Demand

The parking demand for the proposed development is shown below in Table 3-2.

Table 3-2 - Parking provision, based upon individual elements and NO cross use of facilities





Element	GFA (m²)	Parking Rate	Number	Car Parking Demand
Commercial	50,525	1 per 75m <sup>2</sup>		674
Retail	6,200	1 per 40m <sup>2</sup>		155
Educational Establishment	255	1 space per 2 staff & 1 space per 30 students	150 student / 5 staff	8
Conference	2075	1 space per 20m² GFA, or 1 space per 10 seats, whichever is greater.	900 seats	90 - 104
Hotel Accommodation	3,280	1 space per accommodation unit 1 space per 2 persons employed and on duty at any time	128 rooms / 4 staff	130
Entertainment	1,210	1 space per 25m <sup>2</sup> GFA		49
Student Accommodation	5,830		192 1-bedroom units	0 under SEPP 116 + 39 visitor spaces Apartment Guide
Independent Living	105	Housing for Seniors DCP: Not less than 0.5 spaces per dwelling (private), or Not less than 1 space per 5 dwellings (state) No requirement for visitor parking.	52 2- bedroom units	26 (SEPP)
TOTAL parking		, , ,		1132-1301

The above table shows the parking demand has the potential to vary depending upon the basis applied for the various uses. The range of parking without any cross use would be 1132-1301 parking spaces.

The parking however is more complicated than simply an amalgamation of the various individual uses with the need to consider not only cross use of parking but also the unique location of the site and its role in being part of the revitalisation of the Gosford CBD. The following points are therefore made to support a reduction in the overall parking demand / provision:

- 1. The commercial elements provide the main part of the subject site and have been allowed for in total. The opportunity for active transport to and from the site has the potential to further reduce parking demands.
- 2. The retail elements form part of the city centre and are ancillary to the mixed-use facilities within the development as well as to the city centre as a whole. It could be argued therefore that visitors to these



- shops are already in the city and therefore benefit from shared parking opportunities or active transport and so do not need parking. As a compromise a parking rate of 1 per 75m<sup>2</sup> has been applied.
- 3. For the purpose of this assessment the educational establishment is assumed to be a tertiary campus. This sees an opportunity for students to benefit from and be a part of the revitalisation of the city centre by being housed locally in either student accommodation or various residences. The location of the campus immediately opposite the station and bus interchange will see ease of access via public transport whilst walking and cycling is also a viable option for this cohort. Staff numbers are not likely to be high (say 5) and again benefit from the convenience of public transport or the choice to live and work within the CBD. Therefore, consistent with other city-based campuses it is proposed that no parking be provided for the campus except a nominal number of spaces for specialised needs eg disabled parking.
- 4. The GFA for the conference centre includes both front of house and back of house facilities with the latter not typically being part of the GFA. The DCP rate for the seating has been utilised.
- 5. The conference centre would be ancillary to the hotel for conferences, events etc with guests of the hotel attending the auditorium/conference space. The conference centre would also be used during the evening/night when the commercial and retail facilities would not be in use. This dual and complementary use of the common off-street parking can provide further opportunity for reduced parking supply.
- 6. The Gosford City SEPP 2018 provides clause for parking within B3 Commercial Core zones and states the following:
  - "commercial activities, in relation to the use of a building, means the use of the building for the purposes of office premises, business premises, hotel or motel accommodation (but not hotel or motel accommodation that is subdivided under a strata scheme), food and drink premises or other like uses or a combination of such uses."
  - Applying this to the hotel accommodation the parking rate of 1 space per 75m<sup>2</sup> can be applied. This would reduce the hotel parking to 44 spaces on the basis that it is not subject to a strata scheme.
- 7. Entertainment uses can cater for a wide range of facilities including eating, drinking and dancing venues, cinemas, theatres, casinos etc. The above parking rate applied is that of Recreational Use however there is an argument to apply the SEPP Commercial Activity rate of 1 space per 75m<sup>2</sup>. This recognises that the facility is located within the CBD and allows for a degree of shared and contained trips.
- 8. If the student accommodation was provided under Division 5 of the SEPP (Affordable Rental Housing) no car parking would be required. Regardless, the location of the accommodation within the city centre with easy pedestrian access to substantial public transport opportunities supports the provision of this accommodation without parking. This is consistent with other city base campuses where accommodation is provided. This is further supported by the opportunity for employment in the CBD enabling students to live, study and work in the revitalised Gosford city centre. The accommodation may also provide for students studying and undertaking practical work at Gosford Hospital which is located 500m to the west of the site.
- 9. The DCP, while referencing the SEPP Housing for Seniors, nominates a parking rate **per unit**, rather than per bedroom. This therefore provides an opportunity for a lower parking quantum than the SEPP would require. The DCP rate has therefore been applied.





Table 3-3 – Parking provision applying relevant discounts

Element	GFA (m²)	Parking Rate	Number	Car Parking Demand
Commercial	50,525	1 per 75m <sup>2</sup>		674
Retail	6,200	1 per 75m <sup>2</sup>		83
Educational Establishment	255	Nominal parking only	150 student / 5 staff	3
Conference	3,720	1 space per 20m <sup>2</sup> GFA, or 1 space per 10 seats, whichever is greater.	900 seats	90
Hotel Accommodation	3,280	1 per 75m <sup>2</sup>	120 rooms / 4 staff	44
Entertainment	1,210	1 space per 75 m² GFA		17
Student Accommodation	5,830		192 1-bedroom units	0
Independent Living	105	Housing for Seniors:  Not less than 0.5 spaces per dwelling (private), or Not less than 1 space per 5 dwellings (state) No requirement for visitor parking.	52 2-bedroom units	26
TOTAL parking		Hollor parking.		937

Applying the above, the net parking demand for the proposed development is 947 parking spaces.

The proposal for 1,271 spaces is therefore adequate to meet the requirements for the site.

#### 3.4.4 Motorcycle Parking

The DCP also provides a rate for motorcycle parking for the various uses on site. The following table provides the parking demand for motorcycles for the proposed development.

Table 3-4 – Motorcycle parking provision, based upon Gosford City Centre DCP 2018 and the SEPP Gosford City Centre 2018

Element	Adjusted Car Parking Demand	DCP rate	Motorcycle Parking Demand
Commercial	674	1 per 25 car spaces	27
Retail	83	1 per 25 car spaces	4
Educational Establishment	3	1 per 25 car spaces	1
Conference	90	1 per 25 car spaces	2
Hotel Accommodation	44	1 per 25 car spaces	2
Entertainment	17	1 per 25 car spaces	1
Independent Living	26	N/A	-
TOTAL parking	937		37

#### 3.5 Pedestrian and Bicycle Facilities

The site is well located for pedestrian and cyclists' access and will allow for good connectivity between these users and the local area. There is an extensive pedestrian network within the CBD allowing for pedestrians to access the site easily, with connections to public transport at Gosford Station as well as through to the Gosford waterfront



foreshore. An at-grade pedestrian link is proposed through the centre of the site via a public plaza which will connect Mann Street through to Watt Street (east-west). A pedestrian refuge is also proposed on Mann Street which will provide a connection from Gosford Station through the site and public plaza.

This at-grade pedestrian crossing allows for enhanced pedestrian facilities and assist in activating the street frontage as well as this section of Mann Street. With the subject site identified as Key Site 2 the at grade pedestrian crossing actively supports the site and the connectivity to the Gosford railway station. The key sites form the major changes to allow for the redevelopment of the Gosford CBD to encourage increased commercial, retail and residential development as well as leisure activities. Whilst the at-grade crossing may create some traffic delays, the aim of the city centre redevelopment is to revitalise and increase activity to provide improved pedestrian usage and the delays to through traffic in the city centre will be acceptable.

The DCP also states that for the proposed key site a priority is for end of trip facilities to be provided in close proximity to the train station.

Bicycle parking is to be located in secure and accessible locations, with weather protection as per the DCP. Bike storage for staff of the commercial and retail elements as well as for students of the accommodation and campus should be integrated throughout the site. Casual bike parking for visitors to the site should also be included.

The DCP also requires that end of trip facilities for Commercial and Retail elements providing employment for 20 persons or more, shall provide adequate change and shower facilities for cyclists. Facilities should be conveniently located close to bike storage areas or in locations convenient to end users.

For cyclists, there are a number of existing bike paths and links in the area which allow for connection to Gosford and the general locality of the site as well as the Gosford foreshore to the south. Council has identified a number of local upgrades for cyclists paths as well as identifying key bike routes as noted in section 2.7 above. These routes will continue to be upgaded and allow for improved access to the city centre.

The final provision of bicyle parking and end of trip facilities will be dtermined in accordance with the DCP and reflecting the final design and mode share targets during the detailed design stage of the project.

#### 3.6 Active Travel

The revitalisation of the Gosford City Centre provides opportunity for a significant shift in mode share towards active travel. In a manner similar to that proposed for the Newcastle City Centre, Gosford can also be "ahead of the curve" by progressing to Stage 3 of the city development cycle as shown below.

Although the Central Coast LGA as a whole sees high private vehicle use, the convenient access to rail and bus travel provided within the Gosford CBD already offers efficient and sustainable modes of transport. The increased density that can result from the revitalisation of the city centre will support the development of a high quality public realm with a broad mix in uses facilitating trip containment. This has flow on effects in creating a more liveable and global city, attracting businesses, visitors and new residents from across the world.





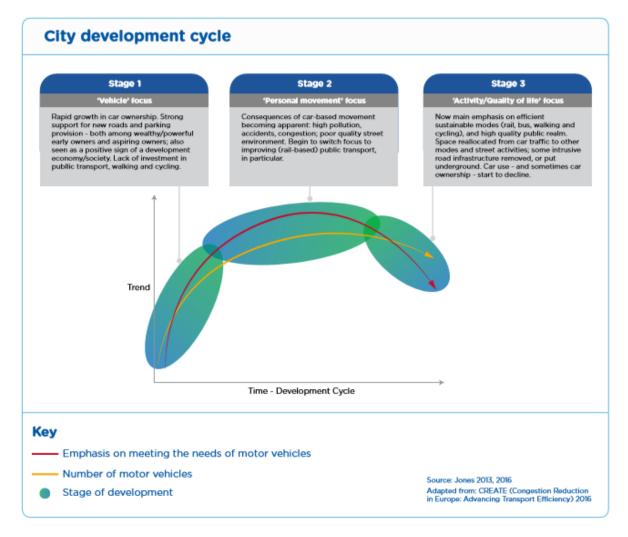


Figure 3-1 City Development Cycle (Source: Greater Newcastle Future Transport Plan)

Ongoing improvements to make public and active transport more viable through the city centre may include:

- Ongoing development of a strong public transport hierarchy across the Central Coast, connecting where
  people live to where they want to travel. Bus routes should respond to customer's travel needs, with
  priority given to buses on key corridors to provide comparable, if not quicker, journey times compared to
  private vehicles. Service levels should match the travel demand, with turn up and go frequencies on key
  corridors
- Planning for the CBD to ensure integration of Gosford Railway Station and Bus Interchange with the surrounding land uses, including providing feeder transport services such as on demand services, bike share, bike parking, footpaths as well as making sure adjoining development responds to the station through good urban design
- Reviewing car parking provision across the Gosford CBD where strong public transport exists and exploring opportunities for park and ride, carpooling and car sharing services
- Encouraging and working with stakeholders to develop travel demand management policies (re-time, re-mode, re-route and reduce travel) such as promoting people working from home or working with employers to promote sustainable working and organisational practices, travelling in off peak periods or reallocation of road space to reduce the number of single occupant vehicle trips
- Collaborating with local council and key stakeholder groups to develop a safe and connected cycling network and creating more walkable places throughout the city centre.



Looking at the journey to work, Gosford has relatively low shares of public transport and walking and cycling in comparison to similar cities internationally although walking only and train travel are well above the LGA rates.. The revitalisation of the Gosford CBD offers an opportunity for a significant increase in walking and cycling with a safe and connected regional bicycle network and people living closer to where they work and play. Gosford could achieve significant increases in the portion of trips taken by bus, train and on demand services when employment can be located within close proximity to key transport hubs.

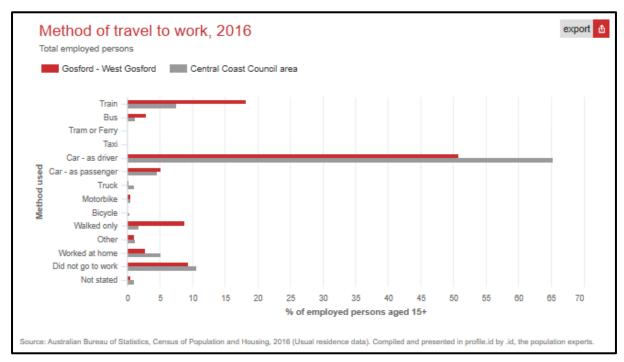


Figure 3-2 Method of Travel to Work for employed persons in Gosford and the Central Coast LGA

Mode targets seeing 25% of trips being by walking and cycling are reflective of contained trips within a residential subdivision and so as the Gosford CBD offers a broader range of opportunities to live, work and socialise within the city such a target becomes achievable. Similarly, more employment opportunities within the city centre will see higher percentages of people able to rely on public transport with a train target of 25% and a bus target of 10% desirable.

We can meet these targets by:

- Implementing travel demand management policies and behaviour change initiatives as well as infrastructure, supported by a high level of infill development with increased density within the CBD
- Increasing the frequency, reliability and directness of bus services along key corridors, which are not serviced by rail, including urban renewal corridors, making bus travel more competitive with private vehicle travel
- Introducing new point-to-point and on demand services in areas not well served by scheduled services
- Encouraging the use of carpooling and park and ride
- Connecting the regional cycleway network and providing safer ways for people to get to where they are going by bike
- Focusing urban renewal development around train stations, improving train services and improving connections to these services

An Active Travel Plan has been developed for the site outlining the available public transport opportunities and active travel routes to the site for staff, students, residents and visitors of the proposed development. This plan shall be refined to suit the end users for the development as part of the OC for the site and shall include information



on suitable policies and practices applicable to increase the attractiveness of walking, cycling, public transport, and car share.



# 4 Transportation Analysis

#### 4.1 Traffic Generation

The traffic demands created by the proposed Gateway Centre development have been determined from a combination of the following:

- Using standard trip rates provided by the Guide to Traffic Generating Developments (GtTGD) and associated technical directions
- Using surveyed trip rates of comparable developments
- Applying first principles with regard to the anticipated use and demands generated

#### **Commercial & Retail Use**

Whilst the Guide to Traffic Generating Developments nominates trip rates for office blocks, these rates have been determined from surveys of office type developments throughout Sydney with varying degrees of accessibility to public transport. As such, these rates do not necessarily take into account site specific considerations such as the availability of nearby public transport services, opportunities for walking or cycling, or scale of development.

Seca Solution Pty Ltd has completed surveys of similar mixed use developments located within the Newcastle City Centre (26 & 28 Honeysuckle Drive) to quantify peak hour trip rates for city centre developments with convenient access to public transport and access to city based employment and tertiary education. The peak hour trip rates were:

- Morning Peak Trips: 0.52 trips per 100m<sup>2</sup> GFA
- Afternoon Peak Trips: 0.37 trips per 100m<sup>2</sup> GFA

Each of these developments is located with excellent connectivity to public transport services including the Newcastle Light Rail Honeysuckle Stop within 200 metres and Newcastle Interchange within 800 metres and are reflective of the increased mode share associated with public transport use and active travel within this regional city. The proposed Gateway Centre provides a similar level of access to public transport, being located opposite Gosford Station and Bus Interchange and will over time see ongoing revitalisation in a manner consistent with Newcastle.

Applying these rates, proposed commercial and retail space ( $56,530 \text{ m}^2 \text{ GFA}$ ) would generate demands for 294 trips in the morning peak and 210 trips in the afternoon peak. It is assumed that 75% of these trips will be inbound in the morning peak hour with the reverse in the afternoon.

#### **Education**

No student parking is to be provided for the proposed education establishment and therefore trips generated by this use will be only those associated with staff travelling to or from the site. Whilst there is an opportunity for staff to travel to the site using public transport an allowance has been made based on parking numbers with 15 trips inbound during the morning peak, and 15 trips outbound in the evening peak.

There may be some trips to the Gosford City Centre associated with students who choose to drive to the site and seek parking elsewhere within the City Centre, however these trips are likely to vary, often be outside peak hours and cannot be quantified or assigned to the local road network.

#### **Auditorium / Conference**

The peak use of the auditorium/conference space is likely to be in the evening or on weekends outside of the typical commuter peak hours. Whilst there may be some use of the conference facilities throughout the day, many of those who attend these events are also likely to be guests of the hotel. Trips associated with the hotel accommodation have been considered separately below.

For these reasons, this is not considered to generate additional traffic demands in the commuter peak periods.



#### **Hotel Accommodation**

There are no trips rates for hotel accommodation provided within the Guide to Traffic Generating Developments.

Trip rates are provided for motels, however the TfNSW definition of a motel, *being 'a building used substantially for overnight accommodation of travellers and their vehicles'* inherently implies a higher rate of private vehicle travel than would be expected for other forms of accommodation located within the City Centre.

In the absence of more specific trip rates, and to ensure a robust assessment, the trip rates nominated for motel accommodation have however been applied:

- Weekday Morning Peak Hour Trips No rate provided.
- Weekday Evening Peak Hour Trips 0.4 per unit
- Weekday Daily Trips 3 trips per unit

For the 120 accommodation units, this equates to 48 trips in the evening peak hour, most of which are assumed to be inbound (~75%). This makes little allowance for public transport use.

Peak demands for the hotel accommodation would typically be of a Friday or Saturday evening with reduced demands at other times throughout the week (excluding potentially school holidays) although mid-week demands associated with conferences etc may be expected with these typically arriving around 2pm for check in and leaving after 10am.

#### Entertainment

Whilst the proposed entertainment use is not known at this time, it is considered that this would be ancillary to the other uses available within the site and therefore does not contribute to additional traffic demands.

There may be some demands for the use of this space associated with those who live or work within the Gosford City Centre, however these would be contained trips within the CBD and are therefore existing trips on the local road network.

#### **Student Accommodation**

As there is no parking provided for student accommodation, there are no trips generated by this use.

#### **Independent Living**

The Guide to Traffic Generating Developments nominates the following trip rates for Seniors Housing, which are suitable for this use:

- Weekday Morning Peak Hour Trips Does not coincide with network peak hour.
- Weekday Evening Peak Hour Trips 0.4 per dwelling
- Weekday Daily Trips 2.1 trips per dwelling

For the 50 independent living units this equates to 20 trips in the evening peak hour. It is assumed that 80% of these trips would be inbound, consistent with the typical distributions seen at residential developments.

#### Overall

Overall, the proposed Gateway Centre development is therefore expected to generate in the order of 309 trips in the morning peak hour and 293 trips in the afternoon peak hour as summarised in Table 4-1.

Surveys of the existing site flows indicate that the commercial building and associated parking on the site is generating demand for 60 vehicles entering or exiting in the morning peak, and 43 vehicles entering or exiting during the afternoon peak. Allowing for this, the net increase in traffic associated with the proposed Gateway Centre Development is 249 trips in the morning peak hour and 250 trips in the afternoon peak hour.



Table 4-1 – Traffic Demands

Use	m <sup>2</sup>		AM Peak Trips	PM Peak Trips
Commercial & Retail	56,725	0.52/0.37 per 100m <sup>2</sup> GFA	295	210
Education	255	1 per parking space	15	15
Conference	2,075	Not in peak	0	0
Hotel Accommodation	3,280	0.4 per unit	0	48
Entertainment	1,210		0	0
Student Accommodation	120 units		0	0
Independent Living	52 units	0.4 per dwelling	0	21
Total Traffic Demands			310	294
Less Existing Site Flows			-60	-43
Net Additional Traffic			250	251

#### 4.1.1 Daily and Seasonal Factors

Minimal variation in traffic demands during the working week however given the large commercial space weekend traffic would be expected to be much lower than mid-week. Allowing for the low volume of traffic associated with the education facility school holidays and Christmas shutdowns are unlikely to see a significant shift in traffic generation.

As the hotel is expected to appeal to both business and tourist demands, traffic would be expected to be consistent throughout the year allowing for some seasonal peak demands potentially during the summer.

Allowing for the above however it can be seen that during holiday periods and weekends when business are closed pedestrian demands associated with the site would be less. This would also be the case during school holidays when the education facility is typically closed, and students have returned home.

#### 4.1.2 Queuing at entrance to site

For access points on Watt Street and Faunce Street, the flows along both roads are relatively low, thereby ensuring minimal delays and queuing for vehicles entering the site. The major delays would be those associated with traffic exiting the site and these will be contained within the site with no impact on the external road network.

The provision of site controls shall be designed to provide sufficient queuing on entry within the site.

#### 4.1.3 Comparison with existing site access

The site currently has a number of accesses off Watt Street and Faunce Street which provide access into discrete parking areas. These shall be amalgamated or removed to form the three new proposed access points into the subject site. These three access points all allow for connection into all of the 1200 space carpark.

# 4.1.4 Pedestrian Movements

The development is expected to be a significant generator of pedestrian movements, both to the site and within the site. There is an extensive pedestrian network within the locality which allow for good connections with traffic signals allowing for safe crossing of the major roads. Pedestrian access to the site will be encouraged as part of the overall street design and layout of the site with the pedestrian connection from Mann Street through to Watt Street as well as from the site across Mann Street to the station and bus interchange.



# 4.2 Traffic Distribution and Assignments

All vehicles will enter or exit the site via the three driveways proposed off Faunce Street or Watt Street. For the purpose of this assessment, it is assumed that all vehicles will enter and exit the site via the driveways located on Watt Street. This represents a worst-case scenario should the driveway on Faunce Street provide for service access only to the site. Should the Faunce Street access also allow for light vehicle access the impacts on the intersection of Watt Street and Faunce Street shall be reduced.

# **Review of Journey to Work**

A review of 2016 Journey to Work Data from the 2016 Census, published online by the Bureau of Statistics indicates that the majority of commuters travelling to Gosford CBD for work reside within the Central Coast Local Government Area. This is reflected in Table 4-2 which shows the existing commuter demands to Gosford sorted by place of residence (Statistical Area Level 2).

Table 4-2 - Place of residence for commuters who travel to Gosford for work.

Place of Residence (SA2 Area)	Number of Commuters	Percentage of Commuters (%)
Gosford	2,716	14.42
Terrigal / North Avoca	1,023	5.43
Wyoming	988	5.25
Umina / Booker Bay / Patonga	973	5.17
Erina / Green Point	952	5.05
Bateau Bay / Killarney Vale	909	4.83
Narara	761	4.04
Niagara Park / Lisarow	726	3.85
Wamberal / Forresters Beach	633	3.36
Chittaway Bay / Tumbi Umbi	631	3.35
Saratoga / Davistown	586	3.11
Woy Woy / Blackwall	583	3.10
Box Head / Macmasters Beach	580	3.08
Point Clare / Koolewong	533	2.83
Kariong	500	2.65
Avoca / Copacabana	486	2.58
The Entrance	474	2.52
Gorokan / Kanwal / Charmhaven	472	2.51
Kincumber / Picketts Valley	443	2.35
Warnervale / Wadalba	414	2.20
Ourimbah	374	1.99
Blue Haven / San Remo	256	1.36
Wyong	228	1.21
Tuggerah	195	1.04
Calga / Kulnura	175	0.93
Budgewoi / Buff Point	168	0.89
Morisset / Cooranbong	154	0.82
Lake Munmorah	145	0.77
Toukley / Norah Head	129	0.68
Jilliby	104	0.55
Total	17,311	91.91



#### **Central Coast Regional Plan 2036**

The Central Coast Regional Plan 2036 indicates significant population growth throughout the Central Coat, with more than 75,000 more residents by 2036, requiring an additional 41,500 dwellings and the creation of approximately 25,000 new jobs. A key area in delivering this plan is the revitalisation of the Gosford City Centre to provide for and encourage more local business and employment.

The plan also nominates Growth Corridors to encourage further business growth and job creation as well as providing increased housing diversity to support the delivery of this plan. The Northern Growth Corridor is identified between Tuggerah and Warnervale and includes the significant land release areas near Warnervale and Wadalba as well as encompassing parts to the North Wyong Structure Plan.

The Southern Growth Corridor is identified between Somersby and Erina.

In addition to this, the North Wyong Structure Plan details the potential for new centres to be located further north including Lake Munmorah and Gwandalan.

Given the potential for the Gateway Centre Development to provide for these future employment needs a large number of staff associated with the commercial and retail elements are likely to be from the key growth areas such as Warnervale and Wadalba. This will see the increase in future demands for commuters travelling to the Gosford City Centre from key land release areas to the north.

#### 4.2.1 Origin / destinations assignment

The following origin / destination assignment has therefore been adopted for this assessment, which has taken into account the existing commuter demands associated with Gosford City Centre and the potential impacts that the Central Coast Regional Plan 2036 will have on this.

- 45% of commuter trips have an origin / destination north of the site via Mann Street towards the Pacific Highway and M1 Pacific Motorway. This includes future commuter trips associated with key land release areas to the north.
- 30% of commuter trips have an origin / destination east of the site towards key residential areas such as Erina and Terrigal. These trips are likely to be via Henry Parry Drive.
- 25% of commuter trips have an origin / destination west of the site towards Brisbane Water Drive or the M1 Pacific Motorway. These trips are likely to be south via Mann Street towards Showground Road which provides a more direct route to the Central Coast Highway.

Trips associated with the hotel accommodation would typically be from the broader area, with the majority of these trips being to or from the M1 Pacific Motorway. It is assumed that these trips could be equally split to the north and south of the site.

The distribution of development traffic onto the local road network is summarised below in Figure 4-1.



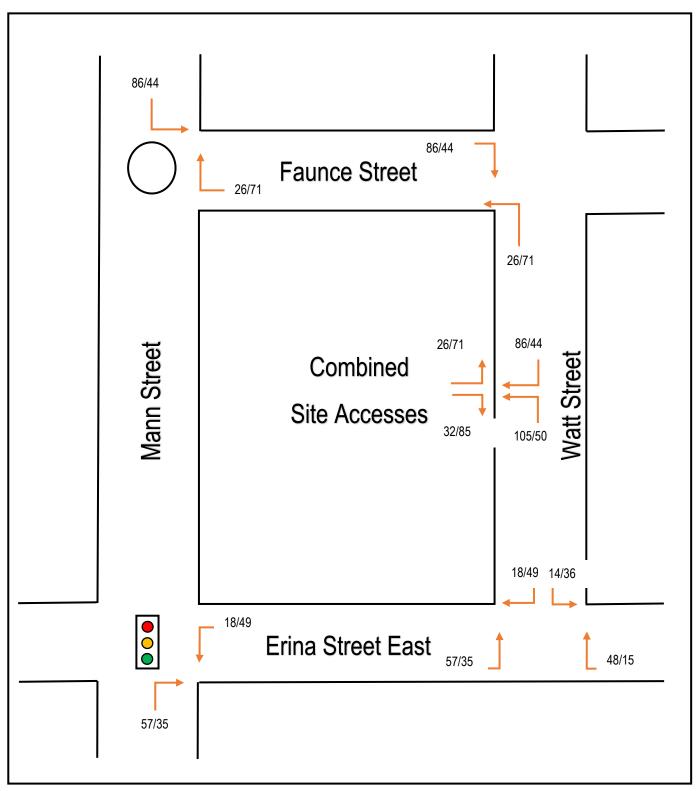


Figure 4-1 –Distribution of additional trips to/from the subject site (AM/PM)



# 4.3 Impact of Generated Traffic

#### 4.3.1 Impact on Mid-Block Capacity

It can be seen that the development has the potential to generate additional daily traffic flows. The mid-block capacity and level of service for Mann Street, Faunce Street, Watt Street and Erina Street East has been determined from the surveyed traffic volumes and additional traffic volumes as shown above in Figure 4-1, applying the level of service criteria and capacities (**Appendix D**). The results of this assessment are summarised in Table 4-3 below.

Table 4-3 – Future mid-block capacities and Level of Service.

Location	Peak Period	Peak One-Way Flows (vph)	Mid-Block Capacity (vph)	Current LoS
Mann Street	AM	673	900	D
(north of Faunce Street)	PM	560	900	С
Mann Street	AM	568	900	С
(north of Erina Street East)	PM	534	900	С
Mann Street	AM	731	900	D
(south of Erina Street East)	PM	621	900	С
Faunce Street	AM	157	900	A
(east of Mann Street)	PM	288	900	В
Watt Street	AM	319	900	В
(south of Faunce Street)	PM	358	900	В
Erina Street East	AM	360	900	В
(east of Mann Street)	PM	262	900	В

The above results indicate that the roads and intersections within the vicinity of the proposed development will continue to operate within their mid-block capacities, with Watt Street operating at LoS C/D during the peak periods with the local roads including Faunce Street, Watt Street and Erina Street each operating at LoS A/B.

# 4.3.2 Peak Hour Impacts on Intersections

The impact of the additional traffic generated by proposed Gateway Centre development on the nearby intersections has been assessed using *Sidra Intersection 8*, with the results of this assessment summarised in Tables 4-4 to 4-6 below. This has allowed for the surveyed traffic volumes together with the distribution of development traffic as detailed above.

Table 4-4 - Sidra Results - Intersection of Mann Street / Faunce Street - 2020 Flows + Development (AM/PM)

Approach	Degree of Saturation	Level of Service	Ave. Delay (s)	95% Queue (m)
Mann Street (northbound)	0.330 / 0.452	A/A	3.5 / 4.1	14.7 / 21.8
Faunce Street (westbound)	0.215 / 0.344	A/A	8.6 / 8.6	9.1 / 15.2
Mann Street (southbound)	0.543 / 0.426	A/A	3.3 / 3.0	39.7 / 26.6





Table 4-5 - Sidra Results - Intersection of Faunce Street / Watt Street - 2020 Flows + Development (AM/PM)

Approach	Movement	Level of Service	Ave. Delay	95% Queue
Watt Street (northbound)	Right Turn	A/A	4.3 / 4.6	1.1 / 0.4
Faunce Street	Right Turn	A/A	7.3 / 7.6	0.3 / 1.0
(westbound)	Approach	A/A	6.1 / 6.3	0.37 1.0
Watt Street (southbound)	Right Turn	A/A	6.2 / 7.1	3.4 / 2.9
Faunce Street	Right Turn	A/A	8.6 / 9.7	6.2 / 5.1
(eastbound)	Approach	A/A	7.7 / 8.3	0.2 / 3.1

The above results indicate that the proposed Gateway Centre development will have a low overall impact on the intersections of Mann Street / Faunce Street and Faunce Street / Watt Street, with no change to the existing level of service at either intersection. Slight increases to delays and queuing are reported, however are very low and well within acceptable limits.

Table 4-6 - Sidra Results - Intersection of Mann Street / Erina Street East - 2020 Flows + Development (AM/PM)

Approach	Degree of Saturation	Level of Service	Ave. Delay (s)	95% Queue (m)
Mann Street (northbound)	0.759 / 0.692	A/A	13.1 / 13.0	99.7 / 80.8
Erina Street East (westbound)	0.639 / 0.625	D/C	45.7 / 29.5	38.9 / 37.2
Mann Street (southbound)	0.361 / 0.413	A/A	11.3 / 12.2	64.2 / 55.4
Intersection Overall	0.759 / 0.692	B/B	15.6 / 15.6	99.7 / 80.8

For the signalised intersection of Mann Street / Erina Street East, the above results indicate that there will be some increases to the average delays and queuing, with a slight decrease to the intersection level of service during the morning peak period (LoS A reducing to LoS B). This is still within acceptable limits, and therefore the proposed development will have an acceptable impact on the above intersections over the short term.

Traffic generated by the proposed development will be distributed across a variety of routes with an origin/destination from the north, east or west. This traffic will use key arterial roads which connect with the local road network to service Gosford. Connections to the classified road network can occur using various intersections with the following detailing the typical routes.

For traffic heading north the main route will be Mann Street which become part of the Pacific Highway north of Pernell Street. Connections to this are shown on Figure 4-2 in green with traffic able to distribute across at least five different routes.

During the morning peak there will be up to an additional 112 vehicle movements to/from the north to the proposed site whilst the afternoon peak should see up to 115 vehicle movements. The impact of these additional trips on any single intersection shall be reduced given the various options available. These routes include:

- Route N1 Via Mann Street to the Pacific Highway via the intersection of Pacific Highway / Henry Parry Drive / Pemell Street;
- Route N2 Via Mann Street, Etna Street and Henry Parry Drive to the intersection of Pacific Highway / Henry Parry Drive / Pemell Street;
- Route N3 Via Mann Street, Dwyer Street and Henry Parry Drive to the intersection of Pacific Highway / Henry Parry Drive / Pemell Street;



- Route N4 Via Mann Street, Glennie Street and Henry Parry Drive to the intersection of Pacific Highway / Henry Parry Drive / Pemell Street;
- Route N5 Via Mann Street or Henry Parry Drive to the intersection with Cary Street to travel north east along Maidens Brush Road to Toomeys Road and The Ridgeway
- Route N6 Via Erina Street East and Henry Parry Drive to the intersection of Pacific Highway / Henry Parry Drive / Pemell Street.

For traffic heading east the main intersections are the signalised intersections of Erina Street East / Henry Parry Drive, Henry Parry Drive / Central Coast Highway, Henry Parry Drive / Wells Street and the Central Coast Highway / Terrigal Drive / the Entrance Road / Barralong Road. Connections to this are shown on Figure 4-2 in yellow with traffic able to distribute across at least two different routes.

During the morning peak there will be up to 62 additional trips to/from the east to the proposed site whilst the afternoon peak could see up to 51 additional trips. These vehicles will be able to disperse through a number of routes reducing the impact at any single connection point. These routes include:

- Route E1 Via Erina Street East and Henry Parry Drive to the intersection of Henry Parry Drive / Central Coast Highway;
- Route E2 Via Erina Street East, Henry Parry Drive and Wells Street to the signalised intersection of the Central Coast Highway / Terrigal Drive / the Entrance Road / Barralong Road.

Westbound traffic will travel through the signalised intersections of Erina Street East / Henry Parry Drive, and Mann Street / Donnison Street, the roundabout intersections of Mann Street / Georgianna, Donnison Street / Showground Road / Riou Street and the Central Coast Highway / Dane Drive. Connections to this are shown on Figure 4-2 in blue with traffic able to distribute across at least three different routes.

During the morning peak there will be up to 75 additional trips to/from the west to the proposed site whilst the afternoon peak could see 84 additional trips. These routes include:

- Route W1 Via Mann Street, Donnison Street and Riou Street which merges onto the Central Coast Highway;
- Route W2 Via Mann Street, Georgianna Terrace and Dane Drive to the roundabout intersection of the Central Coast Highway / Dane Drive;
- Route W3 Via Mann Street and Racecourse Road to the signalised intersection of the Central Coast Highway / Racecourse Road.

As can be seen, traffic associated with the project have a number of access options to and from the site which will allow for trips to be dispersed across a number of intersections and roads. This reduces the impact on any one intersection and route. It is further considered that the layout of the roads in this location together with intersection controls would allow drivers to alter their route to and from the site, depending upon the traffic conditions. Allowing for disbursement of trips across 6 or more routes, this would give around 40 additional trips per route and would have a minimal and acceptable impact upon the overall operation of the road network.



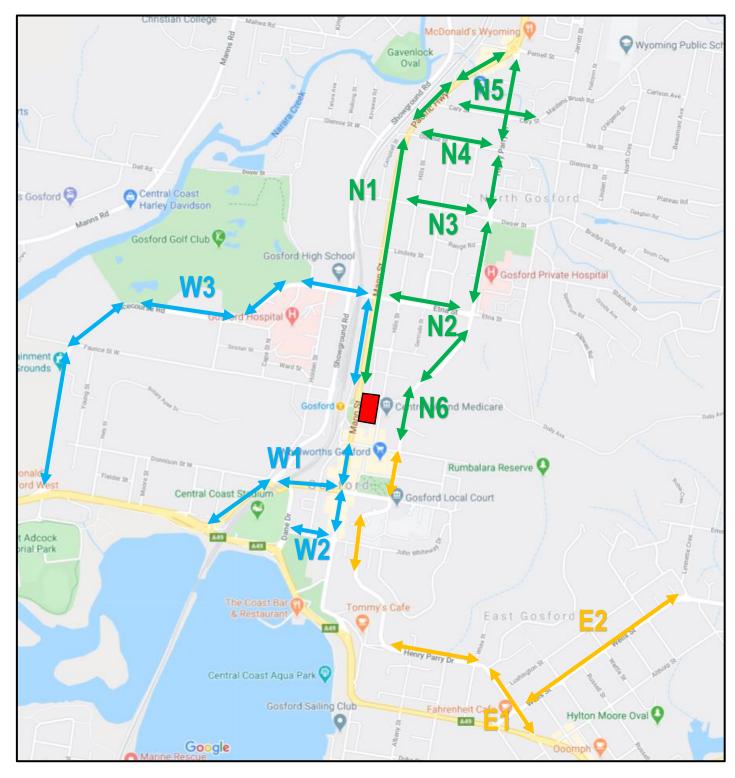


Figure 4-2 - Distribution of traffic through the wider road network



# 4.3.3 Background traffic and other developments

The Central Coast Regional Plan 2036 and Revitalisation of Gosford City Centre will see significant changes to the Gosford City Centre over the medium to long term, encouraging continued business growth and investment within the CBD to improve housing supply and diversity, create new jobs and employment, and provide the necessary infrastructure to ensure a well-connected city to reinforce Gosford as the region's capital.

The delivery of transport infrastructure improvements to support the changing transport needs associated with the revitalisation of Gosford City Centre requires an integrated planning approach to enable infrastructure to align with the long term strategic goals for the CBD and prioritises active travel and public transport to create a more sustainable and liveable city.

A more global approach to precinct planning has been identified as a key strategy in the implementation of the Central Coast Regional Plan 2036 and is expected to identify the long term road and intersection improvements to support the future traffic demands within the Gosford City Centre.

It is understood that the Hunter Central Coast Development Corporation is undertaking strategic transport modelling to provide for the Gosford revitalisation and it would be expected to identify any necessary changes to road and transport infrastructure to provide for the future demands of the city centre moving forward.

The future scenario allowing for ongoing growth has therefore not been assessed using Sidra modelling.

This future scenario will however allow significant shifts in mode share which will enable higher levels of contained trips by modes other than cars. The critical mass than can be provided by growth in employment and housing stock within the CBD will support car sharing programs such as Go Get as well as electric shared bikes and other forms of sustainable travel which rely on this increase in demand to be economically viable.

The proposed shift of public parking to areas external to the CBD shall see the relocation of these existing trips out of the city centre, reducing existing traffic flows within the immediate vicinity of the subject site which in turn can offset future trips associated with the development of sites such as Gateway Central.

The adoption by the planning authorities of a sustainable city centre with parking managed to support changes in travel and reduce local traffic demands will also enable the significant increase in density proposed by projects such as Gateway Central.

# 4.3.4 Impact of Construction Traffic

Refer the draft CTMP in Chapter 5.

# 4.4 Impact on Road Safety

The additional traffic flows associated with the development of the subject site will have a relatively low impact upon traffic safety. The site entry points have been designed in accordance with AS2890 and allow for good visibility for drivers as well as pedestrians. The extensive pedestrian facilities also provide a high level of safety for pedestrians moving through the CBD.

The accident data provided by the TfNSW shows that there have been limited accidents in the location, reflective of the low traffic speeds, low traffic demands and the good road layout in the location. It is considered that the proposed development will not have any significant impact upon road safety in the vicinity of the site.

#### 4.5 Public Transport

# 4.5.1 Options for improving services

It can be seen that the site is well serviced by public transport and the nature of the development allows for the active support of public transport use.



There is no specific improvements to public transport services required by the proposed development however any changes shall be determined in conjunction with the integrated planning for the Revitalisation of Gosford City Centre and implementation of the Central Coast Regional Plan 2036, to ensure suitable public transport to support the long term transport needs for the city.

The ongoing opportunities for shared car services such as Go Get may see the provision of parking suitable for such services within the site while the provision of pick up and drop off spaces along the site frontage can enable short term parking suitable for taxi/uber as well as valet parking for the future hotel.



# 5 Preliminary Construction Traffic Management Plan

The construction will require substantial works on site with the majority of the work to be staged and therefore able to be located on site, lessening impacts upon the surrounding roads. Until the construction methodology can be confirmed following the appointment of the future construction company the impact of construction traffic can only be determined in general terms.

This preliminary Construction Traffic and Pedestrian Management Plan (CTPMP) for the site. has been provided to outline the general site requirements and general controls necessary to mitigate the impacts of construction associated with the site. This shall be finalised and the necessary traffic control plans be developed in conjunction with the Construction Certificate, taking into account the proposed construction methodology to be confirmed by the contractor awarded the tender for construction.

The construction work shall require a number of heavy vehicle movements for the delivery of construction materials and removal of waste, as well as concrete pumps, cranes and other specialist equipment to support the construction activities. The construction is expected to be consistent with other large scale developments within the Gosford City Centre and will be completed over several stages, each requiring a number months to complete as the site is developed.

Parking for construction staff shall require consideration to ensure the impact of these can be managed to reduce the impact on the local road network.

The road network characteristics have been described previously in **Section 2.4**, with the current traffic volumes and road operation outlined in **Section 2.5**.

There would be periods of intense work on site associated with the concrete pours for the various levels involving a large number of concrete truck movements to and from the site. The project is to be developed in several stages with the towers being built separately. For the balance of the works on site, the extent of heavy vehicle movement will be much lower and associated with material drop off. Depending upon the final staging and construction methodology, it is expected that a works zone will likely be required along a site frontage for the unloading of construction materials as access to the site becomes constrained. To minimise potential disruptions to traffic within the Gosford City Centre, this would be most likely located on either Faunce Street or Watt Street. Each of these roads provide sufficient width to support a works zone whilst maintaining traffic flows past the site. Mann Street carries a higher demand for traffic and forms a key public transport route past the site so is unlikely to be considered suitable for a work zone.

Traffic Control Plans will be completed as part of the detailed CTPMP to manage vehicle and pedestrian movements where required. This would include traffic control along Faunce Street and/or Watt Street to allow for construction vehicle access to the site and provision of a works zone as required. The TCPs for the site shall manage traffic movements in and out of the site as well as ensure safety for pedestrians and other road users passing the site. There will be a construction fence provided to stop all non-authorised personnel from entering the site.

# 5.1 Methodology

Construction methodology is yet to be determined for the site, however, is expected to allow for the following key stages:

- Site establishment.
- Demolition of the existing buildings including access for heavy vehicles and removal of waste product.
- Construction of the new buildings.
- Required public domain works including streetscape improvements, footpaths, kerb and gutter, and street
  plantings.



An important factor for the construction will be the impact of construction workers and their vehicles. As part of the construction work, construction workers will be encouraged to carpool and use public transport to access the site rather than single occupant private vehicle use. This will help to reduce the impacts on car parking within the Gosford City Centre, which is highly utilised throughout the working week.

There is good public transport access available to the site with Gosford Station and Bus Interchange immediately opposite the site within 100 meters on Mann Street. Given the large site area and potential staging of the construction, there is an opportunity for temporary parking to be provided on site during the for construction works. This shall be further investigated once the contract has been awarded and construction methodology confirmed.

#### 5.2 Timing

To be confirmed in conjunction with preparation of the detailed CTPMP once the project has been approved and contract awarded.

# 5.3 Working Hours

Unless otherwise agreed by Central Coast Council or the Minister of Planning, standard demolition and construction hours shall be in accordance with the NSW Interim Construction Noise Guidelines (DECC 2009) as summarised below:

#### • Normal Construction:

- Monday to Friday 7am to 6pm
- Saturday 8am to 1pm
- No work on Sundays or Public Holidays

#### Blasting:

- Monday to Friday 9am to 5pm
- Saturday 9am to 1pm
- No blasting on Sundays or Public Holidays

No construction work is to be undertaken outside of these hours, except in the following situations:

- The delivery of material as requested by the NSW Police Force to other authorities for safety reasons;
- Emergency work to avoid the loss of life, property and / or material harm to the environment

# 5.4 Construction staff numbers

To be confirmed in conjunction with preparation of the detailed CTPMP once the project has been approved and contract awarded.

#### 5.5 Traffic Management Assessment

#### 5.5.1 Construction Traffic Generation

Construction traffic numbers will vary throughout the project and are dependent upon the construction methodology adopted for the project. Construction traffic generation is to be determined in conjunction with preparation of the detailed CTPMP once the project has been approved and contract awarded.

Peak construction and demands for heavy vehicles accessing the site typically coincides with concrete pours for the various levels, which could see a large number of concrete trucks arriving over several hours. These demands would be significantly less than those generated by the completed development and can therefore be accommodated on the existing roads and intersections with minimal impact.

The above assessment has indicated that the surrounding roads and intersections are currently operating within their capacity and shall be able to support the demands for construction traffic likely to be generated by the development.

#### 5.5.2 Construction Traffic Routes

Construction traffic can access the site locality via a number of routes with Mann Street and Henry Parry Drive providing the most likely routes for access to the Central Coast Highway and Pacific Highway respectively.



It is proposed that construction traffic to or from the south will be able to access the site via Mann Street, Donnison Street and Dane Drive, with Dane Drive connecting with the Central Coast Highway via a four-way roundabout controlled intersection. Construction traffic to or from the north will be able to access the site via Mann Street or Henry Parry Drive, depending upon the location of the works zone.

Vehicles access the site from either Mann Street or Henry Parry Drive will be able to travel along Erina Street East to access a potential works zone on Watt Street or Faunce Street.

A vehicle movement plan showing the proposed heavy vehicle routes is provided in Figure X below.



Figure 5-1 - Vehicle movement plan (two-way) for heavy construction traffic

# 5.6 Impacts to Other Users

# 5.6.1 Pedestrians and Cyclists

There will be no public access within the site during the construction works with a fence to be provided around the works area allowing for construction access only.

Where possible, pedestrian access will be maintained along the site frontages throughout the construction works or directed to footpaths on the opposite sides of the roadway. If necessary suitable grade hoardings can be



provided to maintain direct pedestrian access. This may be required along Mann Street due to higher pedestrian demands.

Where pedestrian diversions are necessary during the construction works, these will be catered for by Traffic Control Plans completed as part of the detailed design.

There are no dedicated cycling paths within the Gosford City Centre and therefore no impacts to cycling facilities associated with the construction works. Cyclists shall be able to continue using the local roads throughout the Gosford City Centre in the same manners as other vehicular traffic.

#### 5.6.2 Bus Services

No bus services operate along Faunce Street and only a single bus route operates along Watt Street (Route 40).

The potential for traffic control and a works zone located to the front of the site of Faunce Street shall therefore have no impact to bus services. Should traffic control be required on Watt Street, this may create some delays for bus services along this road, however these would be minimal, typically less than 90 seconds whilst a vehicle drives into or out of the works zone. No road closures are anticipated on either Faunce Street or Watt Street and therefore no diversions are required to public transport services.

There are no bus stops located along either site frontage which could be impacted upon by the construction works.

# 5.7 Summary

There will be minimal impact for emergency vehicles, heavy vehicles or cyclists with no diversions required for normal workdays. Overall, it is considered that the construction traffic impacts will be acceptable and with appropriate on-site controls can be appropriately managed.



# 6 Improvement Analysis

# 6.1 Improvements to Accommodate Existing Traffic

The existing road network in the immediate vicinity of the subject site is well developed and there are no road network upgrades currently occurring within the immediate vicinity of the subject site. The proposal by Council to decentralise public parking will reduce existing traffic demands in the city centre.

# 6.2 Improvements to Accommodate Background Traffic

To be determined as part of an integrated planning approach, taking into account the long term strategic goals and future transport needs for the Gosford City Centre associated with its ongoing revitalisation and implementation of the Central Coast Regional Plan 2036.

# 6.3 Additional Improvements to Accommodate Development Traffic

The above assessment indicates that there are no road capacity or intersection improvements required to support the Gateway Centre development.

#### 6.4 Alternative Improvements

Central Coast Council has indicated a desire to improve pedestrian connectivity between Gosford Station and Bus Interchange and land to the east of the rail corridor, including creation of a new pedestrian link through the Gateway Centre site and improved pedestrian access across Mann Street.

Warrants for pedestrian crossings are no longer specified within *Australian Standard AS1742 (Manual of Uniform Traffic Control Devices)* and are instead at the discretion of the relevant road authority.

Warrants for the installation of a signalised mid-block marked foot crossing are provided in the Traffic Signal Design guidelines published by RTA (now TfNSW), with the following warrants provided:

- (a) For each of four one-hour periods of an average day:
  - The pedestrian flow crossing the road exceeds 250 persons / hour; and
  - The vehicular flow exceeds 600 vehicles/hour in each direction; or where there is a central median at least 1.2 metres wide, 1,000 vehicles/hour in each direction.

or

- (b) For each of eight one-hour periods of an average day:
  - The pedestrian flow crossing the road exceeds 175 persons / hour; and
  - The vehicular flow exceeds 600 vehicles/hour in each direction; or where there is a central median at least 1.2 metres wide, 1,000 vehicles/hour in each direction; and
  - There is no other pedestrian crossing or signalised marked foot crossing within a reasonable distance

Warrants may be reduced if a site is used predominantly by children, the elderly or people with disabilities. A signalised mid-block marked foot crossing may also be consider in certain special situations if one of the following warrants is met:

(a) The flow warrants for a pedestrian crossing is realised but its provision could cause a hazard to pedestrians because of the width of the carriageway, insufficient sight distance to the crossing, or the speed or number of vehicles.

or

(b) There is a large seasonal variation in traffic flow and it can be shown to meet the warrants in the busy seasons, if not met during the rest of the year.



or

(c) The location has been the site of two or more pedestrian casualties over a three-year period that could have been prevent by traffic signals.

or

(d) The site meets the warrants for a pedestrian crossing, but a signalised marked foot crossing would improve traffic flow by enabling it to be coordinated with another site.

Despite the above warrants, the provision of a signalised mid-block marked foot crossing is to be avoided within 130 metres of an adjacent signalised intersection and must be located a minimum of 30 metres from any side streets. Exceptions to these requirements may be granted by the Manager Network Operations Transport Management Centre. An initial review of Mann Street in this location would indicate that such a crossing can be located to meet these requirements.



# 7 Summary and Recommendations

# 7.1 Summary

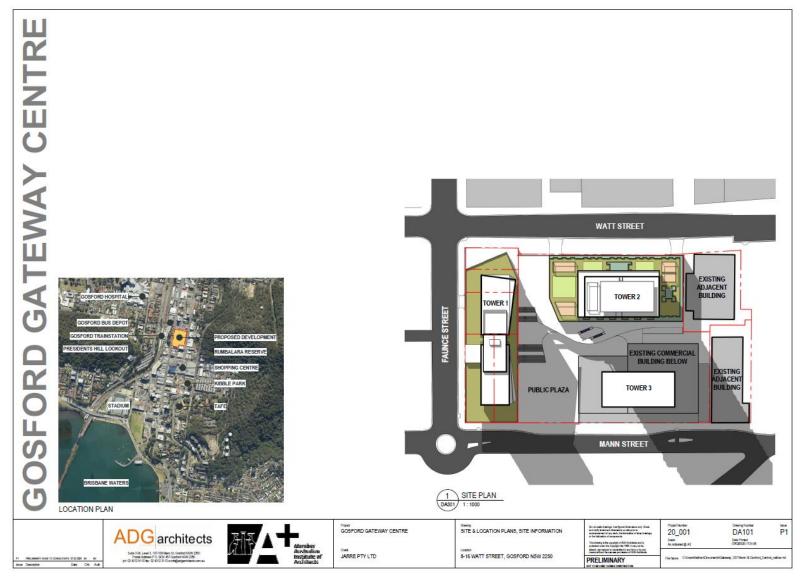
The following conclusions are drawn from the investigations into the proposed redevelopment at 8-16 Watt Street. Gosford to allow for a mixed-use development of commercial, retail, independent living, hotel, educational and student living in the Gosford City Centre:

- The proposal allows for a redevelopment of the existing Gateway Centre and adjacent lots, with a new
  multi-use development with three separate towers, one of which is to be constructed above an existing
  building on Mann Street. There will be 6 levels of basement parking with access to both Watt Street and
  Faunce Street as part of the development.
- 2. The site is located within the centre of Gosford CBD with frontage to Mann Street, Faunce Street and Watt Street with Erina Street East providing the east-west roadway to the south of the block. Mann Street which runs in a north-south direction provides connection to the broader road network to the north and south and in turn local suburbs and regional centres to the north, west and east of the site.
- 3. Vehicle access to the basement parking will be provided off Faunce Street and Watt Street and allows for safe and convenient access for all users. Service vehicle access is proposed off Faunce Street with a truck turning bay provided on Level 1 of the carpark.
- 4. Parking for the development has been assessed against the Council DCP, SEPP and Apartments Design Guide requirements, taking into account the proposed revitalisation of the Gosford City Centre, opportunities for contained trips and modal share as well as shared use of the parking. Allowing for this the parking provision is considered appropriate for the development.
- 5. The traffic demands associated with the proposed development have been assessed against the TfNSW guide and modelled using Sidra Network intersection simulation allowing for the mode split proposed for the subject site. Allowing for these additional trips to be disbursed over a number of access points and in turn across multiple routes, together with the current road network operations and spare capacity, the additional traffic movements associated with the proposed development will have an acceptable impact upon the local road network.
- 6. Whilst consideration has been given to Council's plans to decentralise public parking with its resulting reduction in city centre trips, this along with background growth for the Gosford City Centre has not been quantified. It is anticipated that the strategic planning being undertaken by HCCDC and Council for the revitalisation of the CBD is taking into consideration the infrastructure requirements to accommodate these future demands that shall include key sites such as Gateway Centre. Opportunities for the city to grow and provide employment and housing can reduce travel demands with access to quality public transport supporting the movement of people into and out of the city centre.
- 7. This at-grade pedestrian crossing allows for enhanced pedestrian facilities and assist in activating the street frontage as well as this section of Mann Street. With the subject site identified as Key Site 2 the at grade pedestrian crossing actively supports the site and the connectivity to the Gosford railway station. The key sites form the major changes to allow for the redevelopment of the Gosford CBD to encourage increased commercial, retail and residential development as well as leisure activities. Whilst the at-grade crossing may create some traffic delays, the aim of the city centre redevelopment is to revitalise and increase activity to provide improved pedestrian usage and the delays to through traffic in the city centre will be acceptable.

The overall conclusion from the investigations is that traffic, access and parking arrangements for the development proposal are satisfactory and that there is no traffic, access or parking impediments to the development. The development should therefore be approved on parking and traffic grounds.



# Appendix A Site Plans



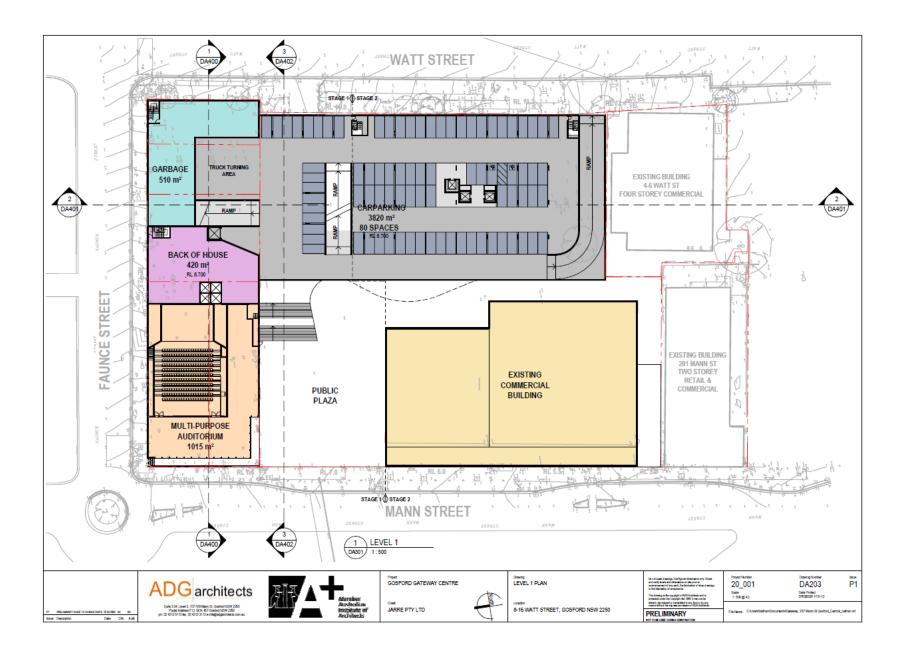
# SECA solution >>>>



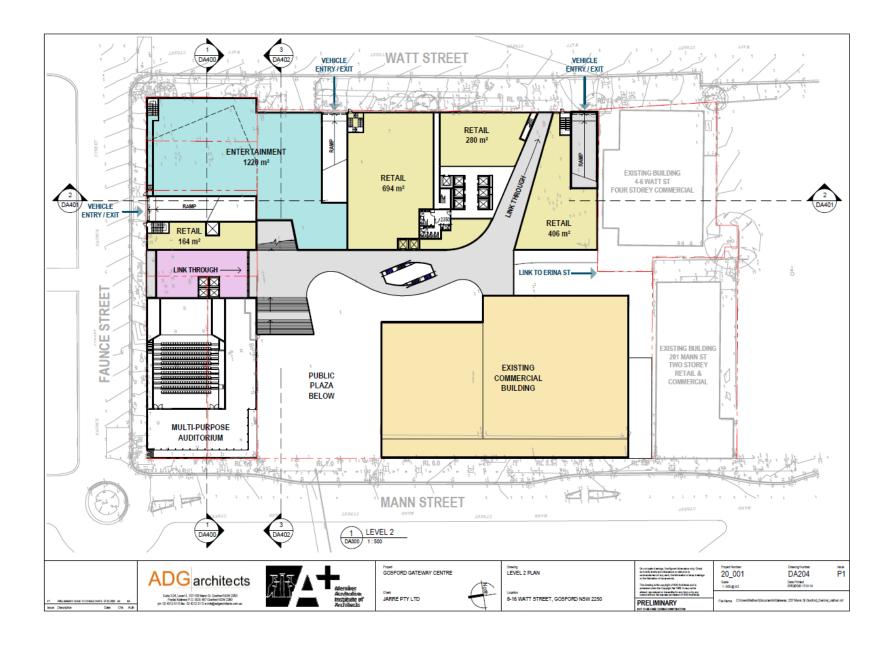


# Quality Traffic Advice



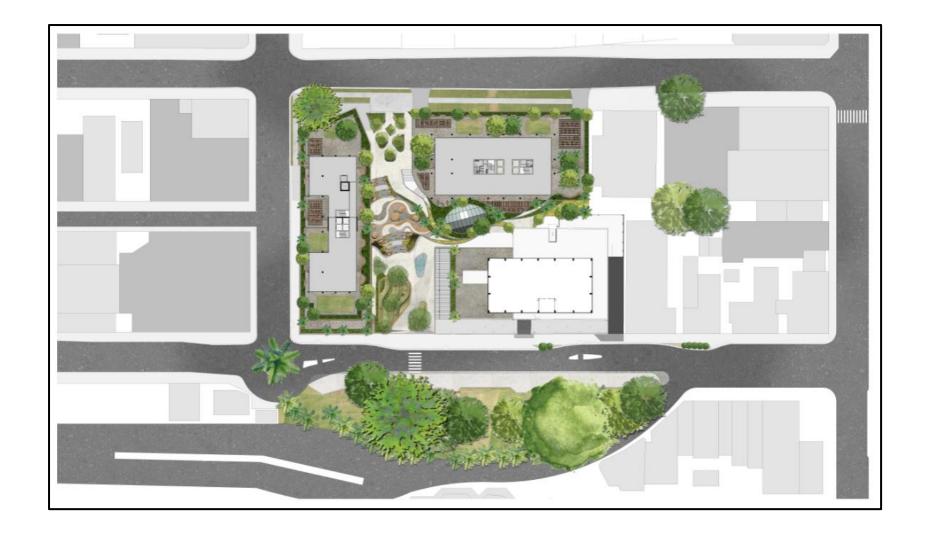


# SECA solution >>>>



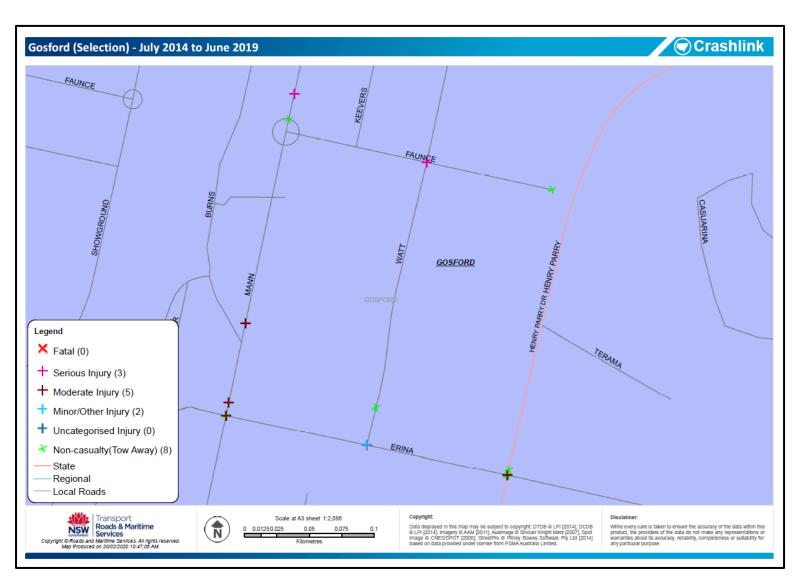


# **SECAsolution**





#### Appendix B Accident Data









Detailed Crash Report											Transport for NSW					
crash No. Data Source Date Day of Week	Distance ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling Manoeuvre	Degree of Crash-Detailed	Killed Seriously Ini	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors
Hunter Region Central Coast LGA Gosford	Natural Lighting															SF
Erina St 1060419 S 09/03/2015 Mon 11:00	at MANN ST	XJN	STR	Fine	Dry	40.2	4WD	Mgn	W in ERINA ST	Unk Reversing in lane	NC NC	0 1				
E57581531	Daylight			eversing	Diy	-ru 2			E in ERINA ST	Unk Proceeding in lane	140			U		
1088890 P 20/11/2015 Fri 11:50	at WATTST	TJN	STR	Fine	Dry	40 1			W in ERINA ST	Unk Turning right	sc	0	1 0		0	S
E59598826	Daylight	RUM 8		f left/rt bnd	•			fixed o				-		-	-	
1103323 P 09/05/2016 Mon 18:50	at MANN ST	XJN	STR	Fine	Dry	60 2	CAR		·	30 Turning right	MC	0 (	1	0	0	
249819195	Darkness	RUM 2	1 Ri	ght through	1		P/C	M63	S in MANN ST	Proceeding in lane						
1142804 P 17/05/2017 Wed 15:15	at WATTST	TJN	STR	Fine	Dry	40 2	CAR	F88	W in ERINA ST	10 Proceeding in lane	OC	0 (	0 0	1	0	
E65134273 Faunce <b>S</b> t	Daylight	RUM	0 Pe	d nearside	•		PED	M51	N in ERINA ST	Walk across carriageway						
1060201 S 19/02/2015 Thu 11:30	200 m E MANN ST	2WY	STR	Overcast	Dry	40 1	CAR	M61	E in FAUNCE ST	Unk Proceeding in lane	NC	0 (	0	0	0	
E58145353	Daylight			f end of ro												
1098480 P 12/04/2016 Tue 20:45	at MANN ST	RDB	STR	Fine	Dry	40 1			N in MANN ST	100 Proceeding in lane	NC	0 (	0 0	0	0	S
E61419229	Darkness	RUM: 7		f rd left =>					oncr/Jersey							
1139733 P 12/05/2017 Fri 10:40 =64723662 Henry Parry Dr	at WATTST Daylight	XJN RUM	STR 0 Pe	Overcast d nearside		40 2	BUS PED		W in FAUNCE ST E in WATT ST	5 Tuming right Walk across carriageway	SC	0	1 0	0	0	
1085671 S 24/03/2015 Tue 10:00	at ERINA ST	XJN	STR	Raining	Wet	50 1	M/C	M24	S in HENRY PARRY DR	Unk Other forward	MC	0 (	1	0	0	
E59394336	Daylight	RUM: 7	9 Ot	her straigh	it											
1067575 S 18/05/2015 Mon 18:25	at ERINA ST	XJN	STR	Fine	Dry	50 2	CAR	ΜU	N in HENRY PARRY DR	Unk Turning right	NC	0 (	0	0	0	
E57648014	Daylight	RUM 2	1 Ri	ght through	h		CAR			Unk Proceeding in lane						
1073376 S 20/06/2015 Sat 19:10	at ERINA ST	XJN	STR	Fine	Dry	50 2			S in HENRY PARRY DR	Unk Turning right	NC	0 (	0	0	0	
E58130945	Darkness	RUM 1		ght far					W in ERINA ST	Unk Proceeding in lane						
1104281 S 03/06/2016 Fri 10:15	at ERINA ST	XJN	STR	Overcast	Wet	50 2	CAR		E in ERINA ST	Unk Turning right	oc	0	0	1	0	
E60668709	Daylight			ght near			4WD			Unk Proceeding in lane						
1152490 S 12/09/2017 Tue 05:45	at ERINA ST	XJN	STR	Fine	Dry	50 1			N in HENRY PARRY DR	Unk Proceeding in lane	MC	0	1	0	0	
E64373460	Darkness	RUM: 7		f rd left =>			Utility									
1177774 P 08/06/2018 Fri 14:20	5 m N ERINAST	XJN	STR	Overcast	Wet	50 2			S in HENRY PARRY DR	10 Proceeding in lane	NC	0 (	0 0	0	U	
E67418670	Daylight CT	RUM: 3		ear end					S in HENRY PARRY DR N in HENRY PARRY DR	0 Stationary	NO					
1193162 S 16/01/2019 Wed 14:40 E69816513	at ERINA ST Daylight	XJN RUM 3	STR 9 Ot	Fine her same	Dry	50 2			N IN HENRY PARRY DR	Unk Other forward Unk Proceeding in lane	NC	0 1	, ,	U	U	
Rep ID: DCR01 Office: Hunter	User ID: gillettj					Page 1 of	f 2				Gen	erate	d: 2	0/02/	2020	10:48



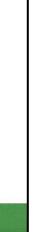
		Detailed	l Crash Report		Transport for NSW
Crash No. Data Source Date Day of Week	Distance ID Feature	Loc Type Alignment Weather Surface	Condition Speed Limit No. of Tus Tu Type/Obj Age/Sex	Street Travelling Speed Travelling Manoeuvre	Degree of Crash-Detailed Killed Seriously Inj. Moderately Inj. Minor/Other Inj. Uncateg'd Inj. Factors
	Natural Lighting				SF
Killed Crashid dataset Gosford (Selection) - Note: Ordered by: Crash Date. Data	for the 9 month period prior to the greported injuries began Oct 2014.	RUM 73	): 5 Minor/Other Injured(O): ncomplete and are subject to change	30 Proceeding in lane Run across carriageway ST 5 Proceeding in lane Run across carriageway ST 60 Proceeding in lane Run across carriageway Uncategorised Injury Crashes(UC): Uncategorised Injured(U): 0	MC 0 0 1 0 0  NC 0 0 0 0 0 S  Non-Casualty Crashes(NC): 8
Rep ID: DCR01 Office: Hunter	User ID: gillettj		Page 2 of 2		Generated: 20/02/2020 10:48







						Summary Crash	Report							COVER	Transp for NS	W
# Crash Type			Contribution	ng Factor	•	Crash Move	ement			CRASH	ES		18	CASUA	LTIES	10
Car Crash	13	72.2%	Speeding	3	16.7%	Intersection, adjacent approach	hes	2	11.1%	Fatal		0	0.0%	Killed	0	0.0
Light Truck Crash	1	5.6%	Fatigue	0	0.0%	Head-on (not overtaking)		0	0.0%	Serious inj.		3	16.7%	Seriously inj.	3	30.0
Rigid Truck Crash	0	0.0%	auguo		0.070	Opposing vehicles; turning		2	11.1%	Moderate inj.		5	27.8%	Moderately inj.	5	50.0
Articulated Truck Crash	0	0.0%				U-turn		0	0.0%	Minor/Other inj.		2	11.1%	Minor/Other inj.	2	20.0
Heavy Truck Crash	(0)	(0.0%)	Weat	her		Rear-end		1	5.6%	Uncategorised inj.		0	0.0%	Uncategorised in	j. 0	0.0
Bus Crash	1	5.6%	Fine	12	66.7%	Lane change		0	0.0%	Non-casualty		8	44.4%	^ Unrestrained	2	20.0
"Heavy Vehicle Crash	(1)	(5.6%)	Rain	2	11.1%	Parallel lanes; turning		0	0.0%	Calf Danastad Casab		0	44.44%	^ Belt fitted but not w	vorn, No restr	aint
Emergency Vehicle Crash	0	0.0%	Overcast	4	22.2%	Vehicle leaving driveway		0	0.0%	Self Reported Crash		8	44.44%	fitted to position OR	No helmet w	om
Motorcycle Crash	1	5.6%	Fog or mist	0	0.0%	Overtaking; same direction		0	0.0%	Time Croup		0/ of	Day	Crashes	Casu	alties
Pedal Cycle Crash	2	11.1%	Other	0	0.0%	Hit parked vehicle		0	0.0%	Time Group	_	% of	-	1	2019	
Pedestrian Crash	4	22.2%	Dood Curfoo	o Conditi		Hit railway train		0	0.0%	00:01 - 02:59	0		6 12.5%	2	2018	
Rigid or Artic. Truck " Heavy Tru	ick or He	eavy Bus	Road Surfac		- 1	Hit pedestrian		4	22.2%	03:00 - 04:59	0		6 8.3%	3	2017	
# These categories are NOT mut	tually ex	clusive	Wet	5	27.8%	Permanent obstruction on road	d	0	0.0%	05:00 - 05:59	1		6 4.2%	5	2016	
Location Typ	e		Dry	13	72.2%	Hit animal		0	0.0%	06:00 - 06:59	0		6 4.2%	7	2015	
*Intersection	14	77.8%	Snow or ice	0	0.0%	Off road, on straight		0	0.0%	07:00 - 07:59	0		6 4.2%			
Non intersection	4	22.2%				Off road on straight, hit object		4	22.2%	08:00 - 08:59	0	0.09	6 4.2%			
Up to 10 metres from an interse	otion.		Natural I	ighting		Out of control on straight		0	0.0%	09:00 - 09:59	0	0.09	6 4.2%			
Op to 10 metres nom an interse	cuon		Dawn	0	0.0%	Off road, on curve		0	0.0%	10:00 - 10:59	3	16.79	6 4.2%			
Collision Typ	oe .		Daylight	11	61.1%	Off road on curve, hit object		0	0.0%	11:00 - 11:59	3	16.79	6 4.2%			
Single Vehicle	7	38.9%	Dusk	1	5.6%	Out of control on curve		0	0.0%	12:00 - 12:59	0	0.09	6 4.2%			
Multi Vehicle	11	61.1%	Darkness	6	33.3%	Other crash type			27.8%	13:00 - 13:59	1	5.69	6 4.2%	McLean Periods	% V	/eek
mana vomoio		01.170	Durkiicaa		33.370				21.070	14:00 - 14:59	2	11.19	6 4.2%	Δ	1 5.6%	17.9
Road Classifica	ation		40 1		50.00	Speed Limit		0.00/		15:00 - 15:59	1	5.69	6 4.2%	В		7.1
Freeway/Motorway	0	0.0%	40 km/h or less	9	50.09			0.0%		16:00 - 16:59	0	0.09	6 4.2%	c s		17.9
State Highway	0	0.0%	50 km/h zone	7	38.99			0.0%		17:00 - 17:59	0	0.09	6 4.2%	D 0		3.5
Other Classified Road	7	38.9%	60 km/h zone	2	11.19		_	0.0%		18:00 - 18:59	3	16.79	6 4.2%	E (		3.0
Unclassified Road	11	61.1%	70 km/h zone	0	0.09	6 110 km/h zone	0	0.0%		19:00 - 19:59	1	5.69	6 4.2%	F 5		10.7
-, 07:20 00:20 or 14:20 17:00	on ocho	al days	~ 40km/h or less	4 11	******	Cobool Travel Time Involvement		1	5.6%	20:00 - 21:59	2	11.19	6 8.3%	G	21.070	7.
~ 07:30-09:30 or 14:30-17:00 o	on school	oi days				~ School Travel Time Involveme	ent		5.0%	22:00 - 24:00	1	5.69	6 8.3%	н 1	1 5.6%	7.
			•	he Week						Street Lighting Off/A	121	% of D	) arls	1	2 11.1%	12.5
Monday 3 16.7%		•	3 16.7% Friday				EEKEND	2	11.1%	Street Lighting Off/N						10.7
uesday 4 22.2%	Thurso	day	2 11.1% Saturd	ay	1 5.6	% WEEKDAY 16 88.9%				0 of 6	in E	Dark	0.0%	J (	0.0%	10.
				#H	oliday Pe	riods										
New Year 0 0	).0% E	aster	0 0.0	% Queen	-	1 5.6% Christmas	0	0.0% E	Easter S	H 1 5.69	6 Se	pt./Oc	t. SH	0 0.0%		
	0.0% A	ınzac Day	0.0	% Labou	r Day	0 0.0% January SH	1	5.6%	June/Jul	ly SH 0 0.09	6 De	cembe	er SH	0 0.0%		
	period p includ 2004 &	prior to the ling self i 2019 Q3	e generated date of t reported injuries be onwards contain ui	gan Öct 2 ncategori:	2014. Tre sed inj ci		ary from	previous	s yrs. Mo	ore unknowns are exp	ected	d in se	lf report	ed data.		
Rep ID: REG01 Office: Hu			ID: gillettj			Page 1 of 1								Generated: 20/0	02/2020 10	48



SECA solution >>>>



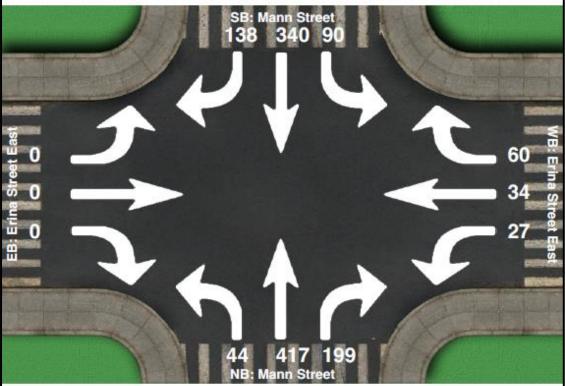
# Intersection Peak Hour

Location: Mann Street at Erina Street East, GPS Coordinates: Lat=-33.425049, Lon=151.342453

Date: 2020-02-19 Day of week: Wednesday

Weather:

Analyst: JH



# Intersection Peak Hour

08:30 - 09:30

	SouthBound			Westbound			Northbound			E	Total		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	iotai
Vehicle Total	90	340	138	27	34	60	44	417	199	0	0	0	1349
Factor	0.66	0.83	0.82	0.61	0.85	0.65	0.69	0.91	0.94	0.00	0.00	0.00	0.93
Approach Factor		0.88			0.69	- 6		0.93	0		0.00		3



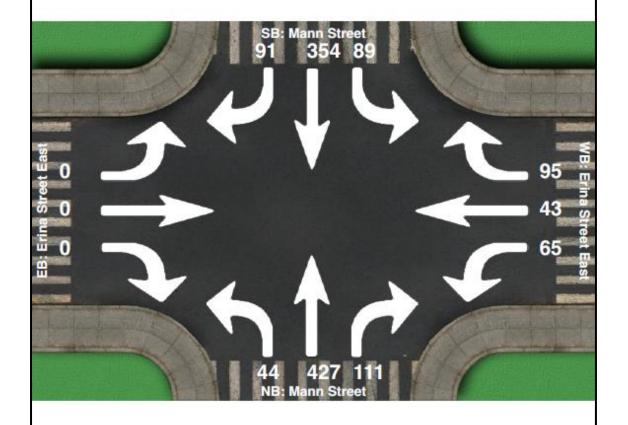
Location: Mann Street at Erina Street East,

**GPS Coordinates:** 

Date: 2020-02-19 Day of week: Wednesday

Weather:

Analyst: JH



# Intersection Peak Hour

16:15 - 17:15

	SouthBound			Westbound			Northbound			Ea	Total		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	rotar
Vehicle Total	89	354	91	65	43	95	44	427	111	0	0	0	1319
Factor	0.82	0.90	0.71	0.77	0.90	0.82	0.85	0.94	0.90	0.00	0.00	0.00	0.95
Approach Factor		0.88			0.86			0.94			0.00		





Location: Watt Street at Faunce Street, Gosford

**GPS Coordinates:** 

Date: 2020-02-19 Day of week: Wednesday Weather: **Cloudy Clearing** Analyst: Grahame

# Intersection Peak Hour

08:00 - 09:00

	SouthBound			Westbound			Northbound			E	Water		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Vehicle Total	13	183	60	4	4	4	56	104	15	46	12	29	530
Factor	0.65	0.88	0.62	0.50	0.50	0.50	0.82	0.90	0.54	0.77	0.75	0.72	0.93
Approach Factor		0.89			0.60			0.91	400		0.78	50	



Location: Watt Street at Faunce Street, Gosford

**GPS Coordinates:** 

Date: 2020-02-19

Day of week: Wednesday

Weather: Cloudy Clearing

Analyst: Grahame

SB: Watt Street
40 171 4

7 Faunce Street
14 To Street
13 Feet
91 178 4

# Intersection Peak Hour

16:15 - 17:15

3	SouthBound		Westbound			Northbound		Eastbound			Total		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Vehicle Total	4	171	40	13	14	7	91	178	4	46	5	33	606
Factor	0.33	0.87	0.77	0.65	0.50	0.44	0.69	0.82	0.50	0.82	0.62	0.82	0.85
Approach Factor		0.85			0.53			0.91			0.84		45



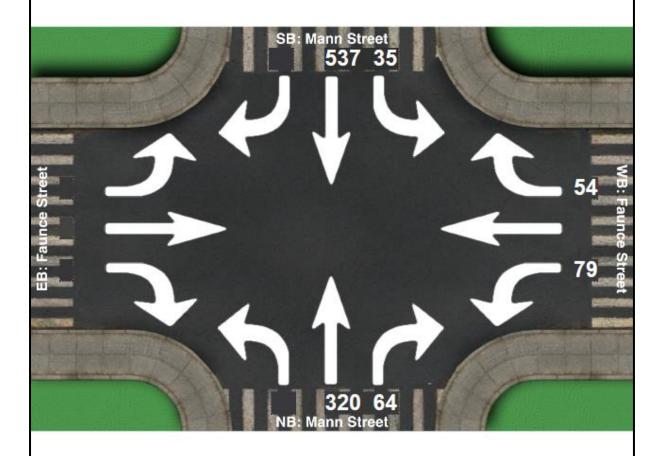


Mann Street at Faunce Street, Gosford Location:

**GPS Coordinates:** 

Date: 2020-02-19 Day of week: Wednesday Weather: Clearing Cloudy

Analyst: Jenny



# Intersection Peak Hour

08:15 - 09:15

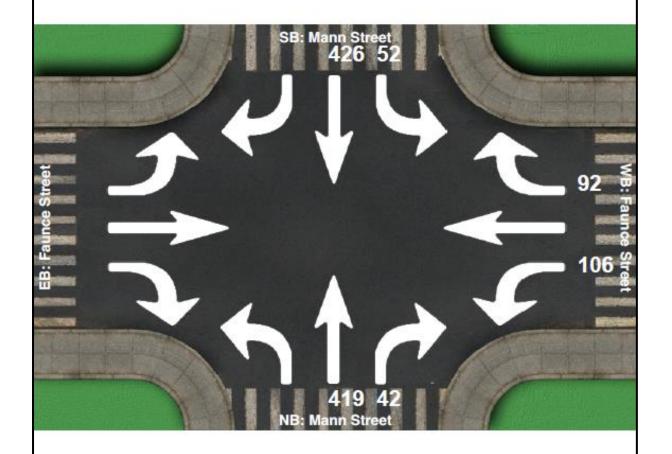


Location: Mann Street at Faunce Street, Gosford

**GPS Coordinates:** 

Date: 2020-02-19
Day of week: Wednesday
Weather: Clearing Cloudy

Analyst: Jenny



# Intersection Peak Hour

16:15 - 17:15



# Appendix D Road Capacity Assessment Criteria

The capacity of an urban road is typically assessed using Level of Service (LoS) criteria as outlined within Part 3 of the Austroads Guide to Traffic Management: Traffic Studies and Analysis. Level of Service is a qualitative measure describing the operational conditions within a traffic stream such as the general efficiency and comfort, travel speeds and ability of a driver to select their desired speed and manoeuvre within the traffic stream.

There are six different level of service classifications defined by the Austroads Guide which are summarised below:

- Level of Service A This, the top level, is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
- Level of Service B This level is in the zone of stable flow and drivers still have reasonable freedom to select their
  desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is
  a little less than that of the level of Service A.
- Level of Service C This service level is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
- Level of Service D This level is close to the limit of stable flow but is approaching unstable flow. All drivers are
  severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The
  general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational
  problems.
- Level of Service E This occurs when traffic volumes are at or close to capacity and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause a traffic-jam.
- Level of Service F This service level is in the zone of forced flow. With it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow break-down occurs and queuing and delays result.

Level of service is determined from the peak traffic volumes on a road, with the Guide to Traffic Generating Developments providing the following capacity thresholds corresponding with each level of service classification.

Level of Service Classifications (Table 4.4 of Guide to Traffic Generating Developments)

Level of Service	One Lane (vph)	Two Lanes (vph)
А	200	900
В	380	1,400
С	600	1,800
D	900	2,200
E	1,400	2,800

The capacity of an urban road is typically taken as the lower threshold corresponding with the LoS E although this is dependent upon the prevailing road conditions, the number of lanes provided in each direction, and is influenced by several factors including:

- Uninterrupted flow from a wider carriageway upstream of an intersection approach and flowing at capacity;
- Control or absence of crossing or entering traffic at minor intersections by major road priority controls;
- Control or absence of parking;
- Control or absence of right turns by banning turning at difficult intersections;
- High volume flows of traffic from upstream intersections occurs during more than one phase of a signal cycle;
- Good co-ordination of traffic signals along the route.



Typical mid-block capacities for urban roads are provided by the Guide to Traffic Generating Developments and are summarised below.

Typical mid-block capacities for urban roads (Table 4.3 of Guide to Traffic Generating Developments)

Type of Road	One-Way Mid-block Lane Capacity (vph)			
Median or Inner Lane	Divided Road	1,000		
Median of finer care	Undivided Road	900		
	With Adjacent Parking Lane	900		
Outer or Kerb Lane	Clearway Conditions	900		
	Occasional Parked Cars	600		
A Land Individed	Occasional Parked Cars	1,500		
4-Lane Undivided	Clearway Conditions	1,800		
4-Lane Divided	Clearway Conditions	1,900		

# Intersection Capacity Standards

The Level of Service (LoS) is the performance standard adopted by the Guide to Traffic Generating Developments when assessing the operation performance and efficiency of an intersection. It is a qualitative measure which represents the effects of factors such as speed, traffic volumes, geometric features and delays on the capacity and efficiency of an intersection. Level of Service is determined from a quantitative assessment of the average delays and queuing in accordance with the criteria shown in Table 2-4.

Table 0-1 - Level of Service (LoS) criteria for intersections (Source: Guide to Traffic Generating Developments)

Level of Service	Average Delay per Vehicle (secs)	Traffic Signals & Roundabouts	Give Way & Stop Signs
Α	d ≤ 14.5	Good operation	Good operation
В	14.5 ≤ d ≤ 28.5	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
С	$28.5 \le d \le 42.5$	Satisfactory	Satisfactory, accident study required
D	42.5 ≤ d ≤ 56.5	Operating near capacity	Near capacity, accident study required
E	56.5 ≤ d ≤ 70.5	At capacity; excessive delays; roundabout requires other control mode	At capacity, requires other control mode
F	70.5 ≤ d	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode

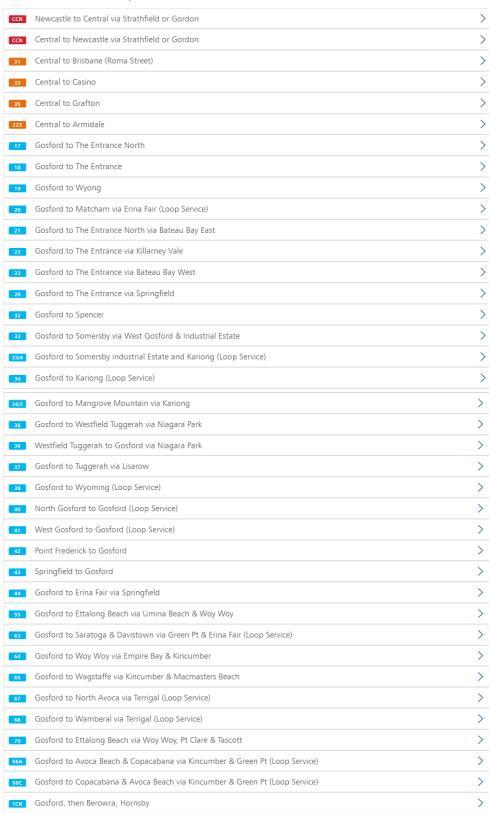
Note: The average delay for signalised intersections is for all movements. For roundabouts and sign controlled intersections, the average delay is for the critical movement.





#### Appendix E Gosford Station Rail and Bus Services

# Routes from this stop





4CN	Gosford, then all stations to Woy Woy	>
2010	Mt White to Henry Kendall HS	>
2042	Gosford Station to Gosford PS	>
2045	Imperial Centre to St Philips College	>
2050	Gosford Station to Point Clare PS	>
2082	Gosford Station to International Football School	>
2083	Gosford Station to International Football School	>
2100	Gosford HS to Gosford Station	>
2106	Gosford Station to St Phillips College	>
2220	Gosford Station to Melbourne St before Adelaide St	>
2221	Gosford Station to Gosford PS	>
2222	Gosford Station to Melbourne St before Adelaide St	>
2223	Gosford Interchange to Gosford HS	>
2501	St Patrick PS to Spring Rd before George Downes Dr	>
2547	St Patricks PS to Central Coast TAFE	>
2801	Gosford Station to Imperial Centre	>
\$713	Barralong Rd to Gosford PS via Springfield	>
5748	Bateau Bay to Central Coast Steiner School via Springfield & North Gosford	>
5781	Gosford Station to Narara Valley HS	>
5829	Ourimbah PS to Bateau Bay via North Gosford	>



## Appendix F Sidra Results

## **INTERSECTION SUMMARY**

Site: 101 [Mann / Faunce 2020 AM]

Intersection of Mann Street and Faunce Street

Site Category: (None)

Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Travel Speed (Average)	35.2 km/h	35.2 km/h
Travel Distance (Total)	319.8 veh-km/h	383.7 pers-km/h
Travel Time (Total)	9.1 veh-h/h	10.9 pers-h/h
Demand Flows (Total)	1164 veh/h	1397 pers/h
Percent Heavy Vehicles (Demand)	6.5 %	
Degree of Saturation	0.479	
Practical Spare Capacity	77.4 %	
Effective Intersection Capacity	2429 veh/h	
Control Delay (Total)	1.18 veh-h/h	1.42 pers-h/h
Control Delay (Average)	3.7 sec	3.7 sec
Control Delay (Worst Lane)	7.7 sec	
Control Delay (Worst Movement)	10.8 sec	10.8 sec
Geometric Delay (Average)	2.7 sec	
Stop-Line Delay (Average)	1.0 sec	
Idling Time (Average)	0.2 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	4.2 veh	
95% Back of Queue - Distance (Worst Lane)	31.9 m	
Queue Storage Ratio (Worst Lane)	0.21	
Total Effective Stops	491 veh/h	589 pers/h
Effective Stop Rate	0.42	0.42
Proportion Queued	0.34	0.34
Performance Index	25.8	25.8
Cost (Total)	278.46 \$/h	278.46 \$/h
Fuel Consumption (Total)	40.4 L/h	
Carbon Dioxide (Total)	96.6 kg/h	
Hydrocarbons (Total)	0.008 kg/h	
Carbon Monoxide (Total)	0.067 kg/h	
NOx (Total)	0.237 kg/h	

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Site Model Variability Index (Iterations 3 to N): 1.9 %

Number of Iterations: 5 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 3.1% 1.8% 0.9%







Site: 101 [Mann / Faunce 2020 AM]

Intersection of Mann Street and Faunce Street Site Category: (None) Roundabout

Move	ment	Performa	nce - \									
Mov	Turn	Demand	Flows				95% Back	of Queue	Prop.	Effective	Aver. No.	
ID	Tuiti	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Mann	Street										
2	T1	337	2.5	0.312	2.6	LOS A	1.9	13.7	0.20	0.39	0.20	36.3
3	R2	67	1.6	0.312	5.8	LOS A	1.9	13.7	0.20	0.39	0.20	36.7
3u	U	19	0.0	0.312	7.1	LOS A	1.9	13.7	0.20	0.39	0.20	38.6
Appro	ach	423	2.2	0.312	3.3	LOS A	1.9	13.7	0.20	0.39	0.20	36.5
East: I	Faunce	Street										
4	L2	83	1.3	0.176	6.6	LOS A	1.0	7.3	0.69	0.74	0.69	31.3
6	R2	46	0.0	0.176	9.5	LOS A	1.0	7.3	0.69	0.74	0.69	24.2
6u	U	1	0.0	0.176	10.8	LOS A	1.0	7.3	0.69	0.74	0.69	31.3
Appro	ach	131	0.8	0.176	7.7	LOS A	1.0	7.3	0.69	0.74	0.69	29.3
North:	Mann	Street										
7	L2	37	17.1	0.479	3.4	LOS A	4.2	31.9	0.36	0.38	0.36	31.6
8	T1	565	10.4	0.479	3.0	LOS A	4.2	31.9	0.36	0.38	0.36	36.0
9u	U	8	0.0	0.479	7.4	LOS A	4.2	31.9	0.36	0.38	0.36	25.1
Appro	ach	611	10.7	0.479	3.1	LOS A	4.2	31.9	0.36	0.38	0.36	35.7
All Vel	nicles	1164	6.5	0.479	3.7	LOS A	4.2	31.9	0.34	0.42	0.34	35.2

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

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

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

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

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**♥** Site: 101 [Mann / Faunce 2020 PM]

Intersection of Mann Street and Faunce Street

Site Category: (None)

Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Travel Speed (Average)	34.7 km/h	34.7 km/h
Travel Distance (Total)	332.2 veh-km/h	398.6 pers-km/h
Travel Time (Total)	9.6 veh-h/h	11.5 pers-h/h
Demand Flows (Total)	1234 veh/h	1480 pers/h
Percent Heavy Vehicles (Demand)	4.4 %	
Degree of Saturation	0.407	
Practical Spare Capacity	109.0 %	
Effective Intersection Capacity	3033 veh/h	
Control Delay (Total)	1.33 veh-h/h	1.60 pers-h/h
Control Delay (Average)	3.9 sec	3.9 sec
Control Delay (Worst Lane)	7.3 sec	
Control Delay (Worst Movement)	10.0 sec	10.0 sec
Geometric Delay (Average)	2.8 sec	
Stop-Line Delay (Average)	1.1 sec	
Idling Time (Average)	0.2 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	3.1 veh	
95% Back of Queue - Distance (Worst Lane)	23.3 m	
Queue Storage Ratio (Worst Lane)	0.16	
Total Effective Stops	550 veh/h	660 pers/h
Effective Stop Rate	0.45	0.45
Proportion Queued	0.36	0.36
Performance Index	27.4	27.4
Cost (Total)	304.68 \$/h	304.68 \$/h
Fuel Consumption (Total)	39.8 L/h	
Carbon Dioxide (Total)	94.5 kg/h	
Hydrocarbons (Total)	0.008 kg/h	
Carbon Monoxide (Total)	0.063 kg/h	
NOx (Total)	0.171 kg/h	

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Site Model Variability Index (Iterations 3 to N): 1.1 %

Number of Iterations: 5 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 1.8% 1.1% 0.6%





Site: 101 [Mann / Faunce 2020 PM]

Intersection of Mann Street and Faunce Street Site Category: (None) Roundabout

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demand I Total	Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back Vehicles	of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Mann	Street										
2	T1	441	1.2	0.407	3.0	LOS A	2.7	19.3	0.32	0.42	0.32	35.9
3	R2	44	2.4	0.407	6.2	LOS A	2.7	19.3	0.32	0.42	0.32	36.3
3u	U	22	0.0	0.407	7.5	LOS A	2.7	19.3	0.32	0.42	0.32	38.3
Appro	ach	507	1.2	0.407	3.5	LOS A	2.7	19.3	0.32	0.42	0.32	36.1
East: I	Faunce	Street										
4	L2	112	1.9	0.254	5.9	LOS A	1.5	10.6	0.64	0.72	0.64	31.7
6	R2	97	1.1	0.254	8.8	LOS A	1.5	10.6	0.64	0.72	0.64	24.7
6u	U	3	0.0	0.254	10.0	LOS A	1.5	10.6	0.64	0.72	0.64	32.0
Appro	ach	212	1.5	0.254	7.3	LOS A	1.5	10.6	0.64	0.72	0.64	29.1
North:	Mann	Street										
7	L2	55	26.9	0.394	3.3	LOS A	3.1	23.3	0.29	0.36	0.29	32.0
8	T1	448	6.6	0.394	2.7	LOS A	3.1	23.3	0.29	0.36	0.29	36.4
9u	U	12	0.0	0.394	7.2	LOS A	3.1	23.3	0.29	0.36	0.29	25.5
Appro	ach	515	8.6	0.394	2.9	LOS A	3.1	23.3	0.29	0.36	0.29	35.9
All Vel	hicles	1234	4.4	0.407	3.9	LOS A	3.1	23.3	0.36	0.45	0.36	34.7

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

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

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

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

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# ▽Site: 101 [Faunce / Watt 2020 AM]

Intersection of Faunce Street / Watt Street Site Category: (None)

Giveway / Yield (Two-Way)

Intersection Performance - Hourly Value	es	
Performance Measure	Vehicles	Persons
Travel Speed (Average)	40.0 km/h	40.0 km/h
Travel Distance (Total)	201.8 veh-km/h	242.2 pers-km/h
Travel Time (Total)	5.1 veh-h/h	6.1 pers-h/h
Demand Flows (Total)	558 veh/h	669 pers/h
Percent Heavy Vehicles (Demand)	2.5 %	
Degree of Saturation	0.150	
Practical Spare Capacity	553.9 %	
Effective Intersection Capacity	3723 veh/h	
Control Delay (Total)	0.54 veh-h/h	0.64 pers-h/h
Control Delay (Average)	3.5 sec	3.5 sec
Control Delay (Worst Lane)	6.8 sec	
Control Delay (Worst Movement)	8.6 sec	8.6 sec
Geometric Delay (Average)	3.0 sec	
Stop-Line Delay (Average)	0.5 sec	
Idling Time (Average)	0.1 sec	
Intersection Level of Service (LOS)	NA	
95% Back of Queue - Vehicles (Worst Lane)	0.5 veh	
95% Back of Queue - Distance (Worst Lane)	3.4 m	
Queue Storage Ratio (Worst Lane)	0.01	
Total Effective Stops	197 veh/h	236 pers/h
Effective Stop Rate	0.35	0.35
Proportion Queued	0.16	0.16
Performance Index	7.4	7.4
Cost (Total)	127.06 \$/h	127.06 \$/h
Fuel Consumption (Total)	16.6 L/h	
Carbon Dioxide (Total)	39.2 kg/h	
Hydrocarbons (Total)	0.003 kg/h	
Carbon Monoxide (Total)	0.026 kg/h	
NOx (Total)	0.047 kg/h	

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

NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 3 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 52.4% 5.3% 0.0%



ablaSite: 101 [Faunce / Watt 2020 AM]

Intersection of Faunce Street / Watt Street Site Category: (None) Giveway / Yield (Two-Way)

Move	ment	Performa	nce - \	Vehicl	es							
Mov	Turn	Demand	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Turn	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Watt	Street										
1	L2	59	1.8	0.099	3.6	LOS A	0.2	1.1	0.09	0.18	0.09	38.1
2	T1	109	1.0	0.099	0.1	LOS A	0.2	1.1	0.09	0.18	0.09	38.2
3	R2	16	0.0	0.099	4.2	LOS A	0.2	1.1	0.09	0.18	0.09	36.9
Appro	ach	184	1.1	0.099	1.6	NA	0.2	1.1	0.09	0.18	0.09	38.1
East:	Faunce	Street										
4	L2	4	0.0	0.014	5.5	LOS A	0.0	0.3	0.36	0.58	0.36	35.7
5	T1	4	0.0	0.014	5.5	LOS A	0.0	0.3	0.36	0.58	0.36	33.4
6	R2	4	0.0	0.014	7.3	LOS A	0.0	0.3	0.36	0.58	0.36	34.7
Appro	ach	13	0.0	0.014	6.1	LOS A	0.0	0.3	0.36	0.58	0.36	34.8
North:	Watt S	Street										
7	L2	14	0.0	0.150	6.1	LOS A	0.5	3.4	0.17	0.38	0.17	45.0
8	T1	193	2.2	0.150	2.5	LOS A	0.5	3.4	0.17	0.38	0.17	42.9
9	R2	63	1.7	0.150	6.1	LOS A	0.5	3.4	0.17	0.38	0.17	43.2
Appro	ach	269	2.0	0.150	3.5	NA	0.5	3.4	0.17	0.38	0.17	43.0
West:	Faunc	e Street										
10	L2	48	0.0	0.096	5.9	LOS A	0.4	2.6	0.26	0.59	0.26	35.8
11	T1	13	0.0	0.096	6.2	LOS A	0.4	2.6	0.26	0.59	0.26	33.3
12	R2	31	20.7	0.096	8.6	LOS A	0.4	2.6	0.26	0.59	0.26	34.8
Appro	ach	92	6.9	0.096	6.8	LOS A	0.4	2.6	0.26	0.59	0.26	35.2
All Ve	hicles	558	2.5	0.150	3.5	NA	0.5	3.4	0.16	0.35	0.16	40.0

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

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

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

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

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# ▽Site: 101 [Faunce / Watt 2020 PM]

Intersection of Faunce Street / Watt Street

Site Category: (None) Giveway / Yield (Two-Way)

Intersection Performance - Hourly Value	es	
Performance Measure	Vehicles	Persons
Travel Speed (Average)	39.5 km/h	39.5 km/h
Travel Distance (Total)	233.6 veh-km/h	280.3 pers-km/h
Travel Time (Total)	5.9 veh-h/h	7.1 pers-h/h
Demand Flows (Total)	638 veh/h	765 pers/h
Percent Heavy Vehicles (Demand)	4.5 %	
Degree of Saturation	0.153	
Practical Spare Capacity	541.8 %	
Effective Intersection Capacity	4178 veh/h	
Control Delay (Total)	0.56 veh-h/h	0.68 pers-h/h
Control Delay (Average)	3.2 sec	3.2 sec
Control Delay (Worst Lane)	7.6 sec	
Control Delay (Worst Movement)	9.9 sec	9.9 sec
Geometric Delay (Average)	2.6 sec	
Stop-Line Delay (Average)	0.6 sec	
Idling Time (Average)	0.1 sec	
Intersection Level of Service (LOS)	NA	
95% Back of Queue - Vehicles (Worst Lane)	0.4 veh	
95% Back of Queue - Distance (Worst Lane)	3.1 m	
Queue Storage Ratio (Worst Lane)	0.01	
Total Effective Stops	203 veh/h	244 pers/h
Effective Stop Rate	0.32	0.32
Proportion Queued	0.14	0.14
Performance Index	8.3	8.3
Cost (Total)	148.14 \$/h	148.14 \$/h
Fuel Consumption (Total)	20.5 L/h	
Carbon Dioxide (Total)	48.8 kg/h	
Hydrocarbons (Total)	0.004 kg/h	
Carbon Monoxide (Total)	0.032 kg/h	
NOx (Total)	0.089 kg/h	

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

NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 3 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 52.2% 7.5% 0.0%



ablaSite: 101 [Faunce / Watt 2020 PM]

Intersection of Faunce Street / Watt Street Site Category: (None) Giveway / Yield (Two-Way)

Move	ement	Performa	nce - \	<b>Vehicl</b>	es							
Mov	Turn	Demand	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Turri	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Watt	Street										
1	L2	96	0.0	0.153	3.5	LOS A	0.1	0.4	0.02	0.16	0.02	38.7
2	T1	187	2.2	0.153	0.0	LOS A	0.1	0.4	0.02	0.16	0.02	38.7
3	R2	4	25.0	0.153	4.6	LOS A	0.1	0.4	0.02	0.16	0.02	36.2
Appro	ach	287	1.8	0.153	1.2	NA	0.1	0.4	0.02	0.16	0.02	38.7
East:	Faunce	Street										
4	L2	14	0.0	0.039	5.5	LOS A	0.1	1.0	0.35	0.60	0.35	35.7
5	T1	15	0.0	0.039	6.0	LOS A	0.1	1.0	0.35	0.60	0.35	33.4
6	R2	7	0.0	0.039	7.6	LOS A	0.1	1.0	0.35	0.60	0.35	34.7
Appro	ach	36	0.0	0.039	6.1	LOS A	0.1	1.0	0.35	0.60	0.35	34.7
North	: Watt S	Street										
7	L2	4	25.0	0.131	6.9	LOS A	0.4	2.7	0.18	0.36	0.18	43.4
8	T1	180	3.5	0.131	2.6	LOS A	0.4	2.7	0.18	0.36	0.18	43.2
9	R2	42	10.0	0.131	6.7	LOS A	0.4	2.7	0.18	0.36	0.18	43.5
Appro	ach	226	5.1	0.131	3.5	NA	0.4	2.7	0.18	0.36	0.18	43.2
West:	Faunc	e Street										
10	L2	48	0.0	0.109	6.1	LOS A	0.4	3.1	0.36	0.62	0.36	34.9
11	T1	5	0.0	0.109	6.4	LOS A	0.4	3.1	0.36	0.62	0.36	32.1
12	R2	35	33.3	0.109	9.9	LOS A	0.4	3.1	0.36	0.62	0.36	33.8
Appro	ach	88	13.1	0.109	7.6	LOS A	0.4	3.1	0.36	0.62	0.36	34.4
All Ve	hicles	638	4.5	0.153	3.2	NA	0.4	3.1	0.14	0.32	0.14	39.5

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

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

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

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

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Site: 101 [Mann / Erina 2020 AM]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Intersection Performance - Hourly Valu	es		
Performance Measure	Vehicles	Pedestrians	Persons
Travel Speed (Average)	33.8 km/h	1.7 km/h	28.7 km/h
Travel Distance (Total)	435.1 veh-km/h	5.1 ped-km/h	527.2 pers-km/h
Travel Time (Total)	12.9 veh-h/h	2.9 ped-h/h	18.4 pers-h/h
Demand Flows (Total)	1420 veh/h	158 ped/h	1862 pers/h
Percent Heavy Vehicles (Demand)	6.8 %		
Degree of Saturation	0.596	0.069	
Practical Spare Capacity	51.0 %		
Effective Intersection Capacity	2382 veh/h		
Control Delay (Total)	5.08 veh-h/h	1.83 ped-h/h	7.93 pers-h/h
Control Delay (Average)	12.9 sec	41.8 sec	15.3 sec
Control Delay (Worst Lane)	50.2 sec		
Control Delay (Worst Movement)	52.3 sec	41.8 sec	52.3 sec
Geometric Delay (Average)	2.3 sec		
Stop-Line Delay (Average)	10.6 sec		
Idling Time (Average)	8.3 sec		
Intersection Level of Service (LOS)		LOS E	
95% Back of Queue - Vehicles (Worst Lane)	10.7 veh		
95% Back of Queue - Distance (Worst Lane)	79.3 m		
Queue Storage Ratio (Worst Lane)	0.49		
Total Effective Stops	799 veh/h	148 ped/h	1108 pers/h
Effective Stop Rate	0.56	0.94	0.59
Proportion Queued	0.53	0.94	0.57
Performance Index	61.2	3.7	65.0
Cost (Total)	486.90 \$/h	76.97 \$/h	563.87 \$/h
Fuel Consumption (Total)	68.6 L/h		
Carbon Dioxide (Total)	163.6 kg/h		
Hydrocarbons (Total)	0.015 kg/h		
Carbon Monoxide (Total)	0.167 kg/h		
NOx (Total)	0.456 kg/h		

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 3 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Main (Timing-Capacity) Iterations: 11.6% 6.4% 0.0%



## Site: 101 [Mann / Erina 2020 AM]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	Movement Performance - Vehicles											
Mov ID	Turn	Demand Total	Flows HV	Deg. Satn	Average	Level of Service	95% Back Vehicles	of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	пv %	v/c	sec	Service	verlicies	m	Queueu	Otop Nate	Cycles	km/h
South	South: Mann Street											
1	L2	46	0.0	0.596	14.3	LOS A	10.7	79.3	0.52	0.49	0.52	16.4
2	T1	439	7.4	0.596	8.7	LOS A	10.7	79.3	0.52	0.49	0.52	40.0
3	R2	209	0.0	0.328	10.4	LOS A	2.8	19.6	0.48	0.70	0.48	36.2
Appro	ach	695	4.7	0.596	9.6	LOS A	10.7	79.3	0.51	0.55	0.51	37.1
East: I	Erina S	treet East										
4	L2	28	14.8	0.070	36.5	LOS C	1.0	8.2	0.81	0.71	0.81	19.4
5	T1	36	0.0	0.576	46.4	LOS D	4.7	37.9	1.00	0.79	1.02	13.8
6	R2	63	30.0	0.576	52.3	LOS D	4.7	37.9	1.00	0.79	1.02	18.6
Appro	ach	127	18.2	0.576	47.1	LOS D	4.7	37.9	0.96	0.78	0.98	17.5
North:	Mann	Street										
7	L2	95	1.1	0.081	12.3	LOS A	1.6	11.5	0.40	0.67	0.40	38.1
8	T1	358	10.6	0.316	8.1	LOS A	7.3	55.8	0.48	0.42	0.48	41.8
9	R2	145	1.4	0.241	10.9	LOS A	1.9	13.2	0.49	0.72	0.49	30.9
Appro	ach	598	6.9	0.316	9.4	LOS A	7.3	55.8	0.47	0.53	0.47	38.5
All Vel	nicles	1420	6.8	0.596	12.9	LOS A	10.7	79.3	0.53	0.56	0.53	33.8

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

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

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

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

Move	Movement Performance - Pedestrians											
Mov		Demand	Average Level of	Average Back c	of Queue	Prop.	Effective					
ID	Description	Flow	Delay Service	Pedestrian	Distance	Queued	Stop Rate					
		ped/h	sec	ped	m							
P1	South Full Crossing	53	41.8 LOS E	0.1	0.1	0.94	0.94					
P2	East Full Crossing	53	41.8 LOS E	0.1	0.1	0.94	0.94					
P4	West Full Crossing	53	41.8 LOS E	0.1	0.1	0.94	0.94					
All Pe	destrians	158	41.8 LOS E			0.94	0.94					

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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Site: 101 [Mann / Erina 2020 PM]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Intersection Performance - Hourly Valu	es		
Performance Measure	Vehicles	Pedestrians	Persons
Travel Speed (Average)	31.7 km/h	2.4 km/h	28.3 km/h
Travel Distance (Total)	431.8 veh-km/h	5.1 ped-km/h	523.3 pers-km/h
Travel Time (Total)	13.6 veh-h/h	2.2 ped-h/h	18.5 pers-h/h
Demand Flows (Total)	1388 veh/h	158 ped/h	1824 pers/h
Percent Heavy Vehicles (Demand)	4.9 %		
Degree of Saturation	0.677	0.044	
Practical Spare Capacity	32.8 %		
Effective Intersection Capacity	2049 veh/h		
Control Delay (Total)	5.91 veh-h/h	1.07 ped-h/h	8.16 pers-h/h
Control Delay (Average)	15.3 sec	24.4 sec	16.1 sec
Control Delay (Worst Lane)	33.4 sec		
Control Delay (Worst Movement)	35.2 sec	24.4 sec	35.2 sec
Geometric Delay (Average)	2.1 sec		
Stop-Line Delay (Average)	13.2 sec		
Idling Time (Average)	9.8 sec		
Intersection Level of Service (LOS)	LOS B	LOS C	
95% Back of Queue - Vehicles (Worst Lane)	10.8 veh		
95% Back of Queue - Distance (Worst Lane)	) 78.1 m		
Queue Storage Ratio (Worst Lane)	0.48		
Total Effective Stops	967 veh/h	142 ped/h	1302 pers/h
Effective Stop Rate	0.70	0.90	0.71
Proportion Queued	0.75	0.90	0.76
Performance Index	61.4	2.9	64.3
Cost (Total)	541.41 \$/h	56.79 \$/h	598.20 \$/h
Fuel Consumption (Total)	72.3 L/h		
Carbon Dioxide (Total)	171.8 kg/h		
Hydrocarbons (Total)	0.016 kg/h		
Carbon Monoxide (Total)	0.174 kg/h		
NOx (Total)	0.414 kg/h		

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 2 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Main (Timing-Capacity) Iterations: 0.0% 0.0% 0.0%



Site: 101 [Mann / Erina 2020 PM]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	Movement Performance - Vehicles												
Mov ID	Turn	Demand Total		Deg. Satn	Average	Level of Service	95% Back Vehicles	of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		veh/h	%	v/c	sec		veh	m				km/h	
South	: Mann	Street											
1	L2	46	0.0	0.677	18.4	LOS B	10.8	78.1	0.77	0.70	0.79	14.5	
2	T1	449	4.9	0.677	12.9	LOS A	10.8	78.1	0.77	0.70	0.79	34.8	
3	R2	117	0.9	0.213	11.8	LOS A	1.3	9.4	0.65	0.72	0.65	34.6	
Appro	ach	613	3.8	0.677	13.1	LOS A	10.8	78.1	0.75	0.70	0.76	33.1	
East:	Erina S	Street East											
4	L2	68	4.6	0.110	20.7	LOS B	1.4	10.2	0.72	0.72	0.72	26.8	
5	T1	45	0.0	0.649	29.4	LOS C	4.4	35.0	1.00	0.85	1.12	18.5	
6	R2	100		0.649	35.2	LOS C	4.4	35.0	1.00	0.85	1.12	23.9	
Appro	ach	214	11.3	0.649	29.3	LOS C	4.4	35.0	0.91	0.81	0.99	23.6	
North:	Mann	Street											
7	L2	94	1.1	0.110	15.3	LOS B	1.5	10.9	0.59	0.70	0.59	35.4	
8	T1	373	5.4	0.432	11.6	LOS A	7.4	54.0	0.71	0.61	0.71	36.8	
9	R2	96	0.0	0.190	12.8	LOS A	1.1	7.5	0.69	0.74	0.69	29.0	
Appro	ach	562	3.7	0.432	12.4	LOS A	7.4	54.0	0.69	0.65	0.69	35.3	
All Ve	hicles	1388	4.9	0.677	15.3	LOS B	10.8	78.1	0.75	0.70	0.77	31.7	

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

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

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

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

Move	Movement Performance - Pedestrians											
Mov		Demand	Average Level of	Average Back of	f Queue	Prop.	Effective					
ID	Description	Flow	Delay Service	Pedestrian	Distance	Queued	Stop Rate					
		ped/h	sec	ped	m							
P1	South Full Crossing	53	24.4 LOS C	0.1	0.1	0.90	0.90					
P2	East Full Crossing	53	24.4 LOS C	0.1	0.1	0.90	0.90					
P4	West Full Crossing	53	24.4 LOS C	0.1	0.1	0.90	0.90					
All Pedestrians 158		24.4 LOS C			0.90	0.90						

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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Site: 101 [Mann / Faunce 2020 AM + Dev]

Intersection of Mann Street and Faunce Street

Site Category: (None)

Roundabout

Intersection Performance - Hourly Value	es	
Performance Measure	Vehicles	Persons
Travel Speed (Average)	34.8 km/h	34.8 km/h
Travel Distance (Total)	339.7 veh-km/h	407.6 pers-km/h
Travel Time (Total)	9.8 veh-h/h	11.7 pers-h/h
Demand Flows (Total)	1282 veh/h	1539 pers/h
Percent Heavy Vehicles (Demand)	5.9 %	
Degree of Saturation	0.543	
Practical Spare Capacity	56.5 %	
Effective Intersection Capacity	2361 veh/h	
Control Delay (Total)	1.43 veh-h/h	1.72 pers-h/h
Control Delay (Average)	4.0 sec	4.0 sec
Control Delay (Worst Lane)	8.6 sec	
Control Delay (Worst Movement)	10.9 sec	10.9 sec
Geometric Delay (Average)	2.9 sec	
Stop-Line Delay (Average)	1.1 sec	
Idling Time (Average)	0.2 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	5.3 veh	
95% Back of Queue - Distance (Worst Lane)	39.7 m	
Queue Storage Ratio (Worst Lane)	0.27	
Total Effective Stops	576 veh/h	692 pers/h
Effective Stop Rate	0.45	0.45
Proportion Queued	0.39	0.39
Performance Index	32.4	32.4
Cost (Total)	311.82 \$/h	311.82 \$/h
Fuel Consumption (Total)	44.8 L/h	
Carbon Dioxide (Total)	106.9 kg/h	
Hydrocarbons (Total)	0.009 kg/h	
Carbon Monoxide (Total)	0.077 kg/h	
NOx (Total)	0.244 kg/h	

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Site Model Variability Index (Iterations 3 to N): 1.8 %

Number of Iterations: 6 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 2.0% 1.1% 0.5%





Site: 101 [Mann / Faunce 2020 AM + Dev]

Intersection of Mann Street and Faunce Street Site Category: (None) Roundabout

Move	ment	Performa	nce - \	Vehicl	es							
Mov	Turn	Demand	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Tulli	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Mann	Street										
2	T1	337	2.5	0.330	2.7	LOS A	2.1	14.7	0.25	0.41	0.25	36.0
3	R2	67	1.6	0.330	6.0	LOS A	2.1	14.7	0.25	0.41	0.25	36.4
3u	U	19	0.0	0.330	7.2	LOS A	2.1	14.7	0.25	0.41	0.25	38.4
Appro	ach	423	2.2	0.330	3.5	LOS A	2.1	14.7	0.25	0.41	0.25	36.2
East:	Faunce	Street										
4	L2	83	1.3	0.215	6.8	LOS A	1.3	9.1	0.71	0.77	0.71	31.3
6	R2	74	0.0	0.215	10.7	LOS A	1.3	9.1	0.71	0.77	0.71	24.3
6u	U	1	0.0	0.215	10.9	LOS A	1.3	9.1	0.71	0.77	0.71	31.2
Appro	ach	158	0.7	0.215	8.6	LOS A	1.3	9.1	0.71	0.77	0.71	28.6
North:	Mann	Street										
7	L2	127	5.0	0.543	4.1	LOS A	5.3	39.7	0.40	0.40	0.40	33.3
8	T1	565	10.4	0.543	3.1	LOS A	5.3	39.7	0.40	0.40	0.40	36.1
9u	U	8	0.0	0.543	7.5	LOS A	5.3	39.7	0.40	0.40	0.40	25.1
Appro	ach	701	9.3	0.543	3.3	LOS A	5.3	39.7	0.40	0.40	0.40	35.6
All Ve	hicles	1282	5.9	0.543	4.0	LOS A	5.3	39.7	0.39	0.45	0.39	34.8

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

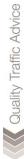
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Site: 101 [Mann / Faunce 2020 PM + Dev]

Intersection of Mann Street and Faunce Street

Site Category: (None)

Roundabout

Intersection Performance - Hourly Valu	es	
Performance Measure	Vehicles	Persons
Travel Speed (Average)	33.9 km/h	33.9 km/h
Travel Distance (Total)	353.6 veh-km/h	424.3 pers-km/h
Travel Time (Total)	10.4 veh-h/h	12.5 pers-h/h
Demand Flows (Total)	1355 veh/h	1626 pers/h
Percent Heavy Vehicles (Demand)	4.0 %	
Degree of Saturation	0.452	
Practical Spare Capacity	87.9 %	
Effective Intersection Capacity	2995 veh/h	
Control Delay (Total)	1.74 veh-h/h	2.09 pers-h/h
Control Delay (Average)	4.6 sec	4.6 sec
Control Delay (Worst Lane)	8.6 sec	
Control Delay (Worst Movement)	10.3 sec	10.3 sec
Geometric Delay (Average)	3.1 sec	
Stop-Line Delay (Average)	1.5 sec	
Idling Time (Average)	0.3 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	3.6 veh	
95% Back of Queue - Distance (Worst Lane)	26.6 m	
Queue Storage Ratio (Worst Lane)	0.18	
Total Effective Stops	680 veh/h	816 pers/h
Effective Stop Rate	0.50	0.50
Proportion Queued	0.43	0.43
Performance Index	34.2	34.2
Cost (Total)	344.48 \$/h	344.48 \$/h
Fuel Consumption (Total)	44.3 L/h	
Carbon Dioxide (Total)	105.1 kg/h	
Hydrocarbons (Total)	0.009 kg/h	
Carbon Monoxide (Total)	0.074 kg/h	
NOx (Total)	0.177 kg/h	

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

Site Model Variability Index (Iterations 3 to N): 1.2 %

Number of Iterations: 5 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 1.8% 1.2% 0.6%



♥ Site: 101 [Mann / Faunce 2020 PM + Dev]

Intersection of Mann Street and Faunce Street

Site Category: (None)

Roundabout

Move	Movement Performance - Vehicles												
Mov	Turn	Demand	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average	
ID	Turri	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed	
		veh/h	%	v/c	sec		veh	m				km/h	
South	South: Mann Street												
2	T1	441	1.2	0.452	3.6	LOS A	3.1	21.8	0.42	0.49	0.42	35.2	
3	R2	44	2.4	0.452	6.9	LOS A	3.1	21.8	0.42	0.49	0.42	35.6	
3u	U	22	0.0	0.452	8.1	LOS A	3.1	21.8	0.42	0.49	0.42	37.7	
Appro	ach	507	1.2	0.452	4.1	LOS A	3.1	21.8	0.42	0.49	0.42	35.4	
East:	Faunce	Street											
4	L2	112	1.9	0.344	6.2	LOS A	2.2	15.2	0.68	0.77	0.68	31.6	
6	R2	172	0.6	0.344	10.2	LOS A	2.2	15.2	0.68	0.77	0.68	24.8	
6u	U	3	0.0	0.344	10.3	LOS A	2.2	15.2	0.68	0.77	0.68	31.8	
Appro	ach	286	1.1	0.344	8.6	LOS A	2.2	15.2	0.68	0.77	0.68	28.1	
North:	Mann	Street											
7	L2	101	14.6	0.426	3.9	LOS A	3.6	26.6	0.31	0.38	0.31	33.3	
8	T1	448	6.6	0.426	2.7	LOS A	3.6	26.6	0.31	0.38	0.31	36.4	
9u	U	12	0.0	0.426	7.2	LOS A	3.6	26.6	0.31	0.38	0.31	25.4	
Appro	ach	561	7.9	0.426	3.0	LOS A	3.6	26.6	0.31	0.38	0.31	35.8	
All Ve	hicles	1355	4.0	0.452	4.6	LOS A	3.6	26.6	0.43	0.50	0.43	33.9	

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

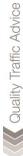
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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ablaSite: 101 [Faunce / Watt 2020 AM + Dev]

Intersection of Faunce Street / Watt Street Site Category: (None) Giveway / Yield (Two-Way)

Intersection Performance - Hourly Value	96	
Performance Measure	Vehicles	Persons
Travel Speed (Average)	40.0 km/h	40.0 km/h
Travel Distance (Total)		286.3 pers-km/h
Travel Time (Total)	6.0 veh-h/h	7.2 pers-h/h
Demand Flows (Total)	676 veh/h	811 pers/h
Percent Heavy Vehicles (Demand)	2.0 %	011 pc13/11
Degree of Saturation	0.225	
Practical Spare Capacity	254.9 %	
Effective Intersection Capacity	2998 veh/h	
Control Delay (Total)	0.80 veh-h/h	0.96 pers-h/h
Control Delay (Average)	4.3 sec	4.3 sec
Control Delay (Worst Lane)	7.7 sec	
Control Delay (Worst Movement)	8.6 sec	8.6 sec
Geometric Delay (Average)	3.4 sec	
Stop-Line Delay (Average)	0.9 sec	
Idling Time (Average)	0.3 sec	
Intersection Level of Service (LOS)	NA	
95% Back of Queue - Vehicles (Worst Lane)	0.9 veh	
95% Back of Queue - Distance (Worst Lane)	6.2 m	
Queue Storage Ratio (Worst Lane)	0.03	
Total Effective Stops	280 veh/h	335 pers/h
Effective Stop Rate	0.41	0.41
Proportion Queued	0.20	0.20
Performance Index	10.0	10.0
Cost (Total)	161.02 \$/h	161.02 \$/h
Fuel Consumption (Total)	21.6 L/h	
Carbon Dioxide (Total)	51.0 kg/h	
Hydrocarbons (Total)	0.004 kg/h	
Carbon Monoxide (Total)	0.038 kg/h	
NOx (Total)	0.052 kg/h	

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

NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 3 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 55.6% 6.0% 0.0%



ablaSite: 101 [Faunce / Watt 2020 AM + Dev]

Intersection of Faunce Street / Watt Street Site Category: (None) Giveway / Yield (Two-Way)

Move	ment	Performar	nce - \	Vehicl	es							
Mov	Т	Demand F	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Turn	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Watt	Street										
1	L2	86	1.2	0.114	4.3	LOS A	0.2	1.1	0.08	0.23	0.08	39.5
2	T1	109	1.0	0.114	0.1	LOS A	0.2	1.1	0.08	0.23	0.08	38.8
3	R2	16	0.0	0.114	4.3	LOS A	0.2	1.1	0.08	0.23	0.08	37.7
Appro	ach	212	1.0	0.114	2.1	NA	0.2	1.1	0.08	0.23	0.08	39.0
East:	Faunce	Street										
4	L2	4	0.0	0.014	5.5	LOS A	0.0	0.3	0.36	0.58	0.36	35.7
5	T1	4	0.0	0.014	5.6	LOS A	0.0	0.3	0.36	0.58	0.36	33.3
6	R2	4	0.0	0.014	7.3	LOS A	0.0	0.3	0.36	0.58	0.36	34.7
Appro	ach	13	0.0	0.014	6.1	LOS A	0.0	0.3	0.36	0.58	0.36	34.7
North	: Watt S	Street										
7	L2	14	0.0	0.151	6.2	LOS A	0.5	3.4	0.18	0.38	0.18	44.9
8	T1	193	2.2	0.151	2.5	LOS A	0.5	3.4	0.18	0.38	0.18	42.8
9	R2	63	1.7	0.151	6.2	LOS A	0.5	3.4	0.18	0.38	0.18	43.1
Appro	ach	269	2.0	0.151	3.6	NA	0.5	3.4	0.18	0.38	0.18	43.0
West:	Faunc	e Street										
10	L2	48	0.0	0.225	5.9	LOS A	0.9	6.2	0.35	0.67	0.35	34.8
11	T1	13	0.0	0.225	6.5	LOS A	0.9	6.2	0.35	0.67	0.35	31.8
12	R2	121	5.2	0.225	8.6	LOS A	0.9	6.2	0.35	0.67	0.35	37.9
Appro	ach	182	3.5	0.225	7.7	LOS A	0.9	6.2	0.35	0.67	0.35	36.7
All Ve	hicles	676	2.0	0.225	4.3	NA	0.9	6.2	0.20	0.41	0.20	40.0

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

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

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

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

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# Site: 101 [Faunce / Watt 2020 PM + Dev]

Intersection of Faunce Street / Watt Street Site Category: (None) Giveway / Yield (Two-Way)

Performance Measure         Vehicles         Persons           Travel Speed (Average)         39.9 km/h         39.9 km/h         39.9 km/h           Travel Distance (Total)         271.6 veh-km/h         325.9 pers-km/h           Travel Time (Total)         6.8 veh-h/h         8.2 pers-h/h           Demand Flows (Total)         759 veh/h         911 pers/h           Percent Heavy Vehicles (Demand)         3.7 %         911 pers/h           Degree of Saturation         0.193         91 pers-h/h           Degree of Saturation         0.193         91 pers-h/h           Practical Spare Capacity         330.2 %         92 pers-h/h           Effective Intersection Capacity         3934 veh/h         0.99 pers-h/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.3 sec         10.1 sec           Intersection Level of Service (LOS)         NA         95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.02         10.02	Intersection Performance - Hourly Value	00	
Travel Speed (Average)         39.9 km/h         39.9 km/h           Travel Distance (Total)         271.6 veh-km/h         325.9 pers-km/h           Travel Time (Total)         6.8 veh-h/h         8.2 pers-h/h           Demand Flows (Total)         759 veh/h         911 pers/h           Percent Heavy Vehicles (Demand)         3.7 %         911 pers/h           Degree of Saturation         0.193         91 pers/h           Practical Spare Capacity         330.2 %         91 pers/h           Effective Intersection Capacity         3934 veh/h         0.99 pers-h/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.3 sec         10.3 sec           Intersection Level of Service (LOS)         NA         95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.7 veh         9.1 mm           95% Back of Queue - Distance (Worst Lane)         0.02         343 pers/h           Total Effective Stops         286 veh/h         343 pers/h	•		Persons
Travel Distance (Total)         271.6 veh-km/h         325.9 pers-km/h           Travel Time (Total)         6.8 veh-h/h         8.2 pers-h/h           Demand Flows (Total)         759 veh/h         911 pers/h           Percent Heavy Vehicles (Demand)         3.7 %         911 pers/h           Degree of Saturation         0.193         3.7 %           Degree of Saturation         0.193         39.2 %           Effective Intersection Capacity         3934 veh/h         0.99 pers-h/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.8 sec         9.7 sec           Idling Time (Average)         0.3 sec         NA           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.02           Total Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued			
Travel Time (Total)         6.8 veh-h/h         8.2 pers-h/h           Demand Flows (Total)         759 veh/h         911 pers/h           Percent Heavy Vehicles (Demand)         3.7 %         911 pers/h           Degree of Saturation         0.193         91 pers/h           Practical Spare Capacity         330.2 %         91 pers/h           Effective Intersection Capacity         3934 veh/h         0.99 pers-h/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.8 sec         9.7 sec           Idling Time (Average)         0.3 sec         9.7 veh           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh         9.7 veh           95% Back of Queue - Distance (Worst Lane)         0.02         5.1 m           Queue Storage Ratio (Worst Lane)         0.02         343 pers/h           Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16			
Demand Flows (Total)         759 veh/h         911 pers/h           Percent Heavy Vehicles (Demand)         3.7 %         911 pers/h           Degree of Saturation         0.193           Practical Spare Capacity         330.2 %           Effective Intersection Capacity         3934 veh/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         8.3 sec         9.7 sec           Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.8 sec         Idling Time (Average)         0.3 sec           Intersection Level of Service (LOS)         NA         95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.7 veh         95% Back of Queue - Distance (Worst Lane)         5.1 m           Queue Storage Ratio (Worst Lane)         0.02         343 pers/h           Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index	, ,		•
Percent Heavy Vehicles (Demand)         3.7 %           Degree of Saturation         0.193           Practical Spare Capacity         330.2 %           Effective Intersection Capacity         3934 veh/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         8.3 sec         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec         9.7 sec           Stop-Line Delay (Average)         0.8 sec         Idling Time (Average)         0.3 sec           Intersection Level of Service (LOS)         NA         95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.7 veh         5.1 m           Queue Storage Ratio (Worst Lane)         0.02         3.43 pers/h           Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         60.6 kg/h           <	, ,	0.0.10.1.1	
Degree of Saturation         0.193           Practical Spare Capacity         330.2 %           Effective Intersection Capacity         3934 veh/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         8.3 sec         9.7 sec           Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         5.1 sec           Stop-Line Delay (Average)         0.3 sec         10.3 sec           Intersection Level of Service (LOS)         NA         95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh         5.1 m         0.02           Total Effective Stops         286 veh/h         343 pers/h         433 pers/h           Effective Stop Rate         0.38         0.38         0.38           Proportion Queued         0.16         0.16         0.16           Performance Index         10.5         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         60.6 kg/h         0.005 kg/h           Carbon Monoxide (Total)	,		911 per3/11
Practical Spare Capacity         330.2 %           Effective Intersection Capacity         3934 veh/h           Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         8.3 sec         9.7 sec           Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.8 sec         Idling Time (Average)         0.3 sec           Intersection Level of Service (LOS)         NA         95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         0.7 veh         95% Back of Queue - Distance (Worst Lane)         5.1 m           Queue Storage Ratio (Worst Lane)         0.02         5.1 m         0.02           Total Effective Stops         286 veh/h         343 pers/h         66 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38         0.38         0.38         0.38         0.38         0.38         0.38         0.38         0.38         0.38         0.16         0.16         0.16         0.16         0.16         0.16         0.16         0.16	, , ,	/	
Effective Intersection Capacity  Control Delay (Total)  Control Delay (Average)  Control Delay (Worst Lane)  Control Delay (Worst Lane)  Control Delay (Worst Movement)  Geometric Delay (Average)  Stop-Line Delay (Average)  Intersection Level of Service (LOS)  Sack of Queue - Vehicles (Worst Lane)  Queue Storage Ratio (Worst Lane)  Effective Stops  Effective Stop Rate  Proportion Queued  Performance Index  Cost (Total)  Carbon Monoxide (Total)  Control Delay (Average)  3.9 sec  3.9 sec  3.9 sec  3.9 sec  9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9.7 sec 9			
Control Delay (Total)         0.82 veh-h/h         0.99 pers-h/h           Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         8.3 sec         9.7 sec           Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec         9.7 sec           Stop-Line Delay (Average)         0.8 sec         10.3 sec           Idling Time (Average)         0.3 sec         10.7 veh           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh         5.1 m           95% Back of Queue - Distance (Worst Lane)         0.02         5.1 m           Queue Storage Ratio (Worst Lane)         0.02         343 pers/h           Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h           Carbon Dioxide (Total)         0.005 kg/h           Carbon Monoxide (Total)         0.044 kg/h			
Control Delay (Average)         3.9 sec         3.9 sec           Control Delay (Worst Lane)         8.3 sec           Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec           Stop-Line Delay (Average)         0.8 sec           Idling Time (Average)         0.3 sec           Intersection Level of Service (LOS)         NA           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         5.1 m           Queue Storage Ratio (Worst Lane)         0.02           Total Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h           Carbon Dioxide (Total)         0.005 kg/h           Carbon Monoxide (Total)         0.044 kg/h			0 99 ners-h/h
Control Delay (Worst Lane)         8.3 sec           Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec           Stop-Line Delay (Average)         0.8 sec           Idling Time (Average)         0.3 sec           Intersection Level of Service (LOS)         NA           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         5.1 m           Queue Storage Ratio (Worst Lane)         0.02           Total Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h           Carbon Dioxide (Total)         0.005 kg/h           Carbon Monoxide (Total)         0.044 kg/h	, ,		•
Control Delay (Worst Movement)         9.7 sec         9.7 sec           Geometric Delay (Average)         3.1 sec           Stop-Line Delay (Average)         0.8 sec           Idling Time (Average)         0.3 sec           Intersection Level of Service (LOS)         NA           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         5.1 m           Queue Storage Ratio (Worst Lane)         0.02           Total Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h           Carbon Dioxide (Total)         0.005 kg/h           Carbon Monoxide (Total)         0.044 kg/h	, ,		0.0 300
Geometric Delay (Average)       3.1 sec         Stop-Line Delay (Average)       0.8 sec         Idling Time (Average)       0.3 sec         Intersection Level of Service (LOS)       NA         95% Back of Queue - Vehicles (Worst Lane)       0.7 veh         95% Back of Queue - Distance (Worst Lane)       5.1 m         Queue Storage Ratio (Worst Lane)       0.02         Total Effective Stops       286 veh/h       343 pers/h         Effective Stop Rate       0.38       0.38         Proportion Queued       0.16       0.16         Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h       60.6 kg/h         Carbon Dioxide (Total)       0.005 kg/h       0.044 kg/h	,		9.7 sec
Stop-Line Delay (Average)       0.8 sec         Idling Time (Average)       0.3 sec         Intersection Level of Service (LOS)       NA         95% Back of Queue - Vehicles (Worst Lane)       0.7 veh         95% Back of Queue - Distance (Worst Lane)       5.1 m         Queue Storage Ratio (Worst Lane)       0.02         Total Effective Stops       286 veh/h       343 pers/h         Effective Stop Rate       0.38       0.38         Proportion Queued       0.16       0.16         Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h       60.6 kg/h         Carbon Dioxide (Total)       0.005 kg/h       0.004 kg/h         Carbon Monoxide (Total)       0.044 kg/h			0.7 000
Idling Time (Average)       0.3 sec         Intersection Level of Service (LOS)       NA         95% Back of Queue - Vehicles (Worst Lane)       0.7 veh         95% Back of Queue - Distance (Worst Lane)       5.1 m         Queue Storage Ratio (Worst Lane)       0.02         Total Effective Stops       286 veh/h       343 pers/h         Effective Stop Rate       0.38       0.38         Proportion Queued       0.16       0.16         Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h       60.6 kg/h         Carbon Dioxide (Total)       0.005 kg/h       0.004 kg/h         Carbon Monoxide (Total)       0.044 kg/h	, , , , ,		
Intersection Level of Service (LOS)         NA           95% Back of Queue - Vehicles (Worst Lane)         0.7 veh           95% Back of Queue - Distance (Worst Lane)         5.1 m           Queue Storage Ratio (Worst Lane)         0.02           Total Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h           Carbon Dioxide (Total)         0.005 kg/h           Carbon Monoxide (Total)         0.044 kg/h			
95% Back of Queue - Vehicles (Worst Lane)	, ,	NA	
95% Back of Queue - Distance (Worst Lane)       5.1 m         Queue Storage Ratio (Worst Lane)       0.02         Total Effective Stops       286 veh/h       343 pers/h         Effective Stop Rate       0.38       0.38         Proportion Queued       0.16       0.16         Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h         Carbon Dioxide (Total)       60.6 kg/h         Hydrocarbons (Total)       0.005 kg/h         Carbon Monoxide (Total)       0.044 kg/h		0.7 veh	
Queue Storage Ratio (Worst Lane)       0.02         Total Effective Stops       286 veh/h       343 pers/h         Effective Stop Rate       0.38       0.38         Proportion Queued       0.16       0.16         Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h         Carbon Dioxide (Total)       60.6 kg/h         Hydrocarbons (Total)       0.005 kg/h         Carbon Monoxide (Total)       0.044 kg/h	,		
Total Effective Stops         286 veh/h         343 pers/h           Effective Stop Rate         0.38         0.38           Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h         Carbon Dioxide (Total)         60.6 kg/h           Hydrocarbons (Total)         0.005 kg/h         0.044 kg/h	,		
Effective Stop Rate       0.38       0.38         Proportion Queued       0.16       0.16         Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h         Carbon Dioxide (Total)       60.6 kg/h         Hydrocarbons (Total)       0.005 kg/h         Carbon Monoxide (Total)       0.044 kg/h	, , ,		343 pers/h
Proportion Queued         0.16         0.16           Performance Index         10.5         10.5           Cost (Total)         184.64 \$/h         184.64 \$/h           Fuel Consumption (Total)         25.5 L/h           Carbon Dioxide (Total)         60.6 kg/h           Hydrocarbons (Total)         0.005 kg/h           Carbon Monoxide (Total)         0.044 kg/h	·	0.38	•
Performance Index       10.5       10.5         Cost (Total)       184.64 \$/h       184.64 \$/h         Fuel Consumption (Total)       25.5 L/h         Carbon Dioxide (Total)       60.6 kg/h         Hydrocarbons (Total)       0.005 kg/h         Carbon Monoxide (Total)       0.044 kg/h		0.16	0.16
Fuel Consumption (Total)  Carbon Dioxide (Total)  Hydrocarbons (Total)  Carbon Monoxide (Total)  25.5 L/h  60.6 kg/h  0.005 kg/h  0.044 kg/h	· ·	10.5	10.5
Carbon Dioxide (Total) 60.6 kg/h Hydrocarbons (Total) 0.005 kg/h Carbon Monoxide (Total) 0.044 kg/h	Cost (Total)	184.64 \$/h	184.64 \$/h
Carbon Dioxide (Total) 60.6 kg/h Hydrocarbons (Total) 0.005 kg/h Carbon Monoxide (Total) 0.044 kg/h	Fuel Consumption (Total)	25.5 L/h	·
Hydrocarbons (Total) 0.005 kg/h Carbon Monoxide (Total) 0.044 kg/h	. , ,	60.6 kg/h	
Carbon Monoxide (Total) 0.044 kg/h	,	•	
	, ,	-	
NOx (Total) 0.094 kg/h	NOx (Total)	0.094 kg/h	

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

NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 3 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 58.7% 9.5% 0.0%





▽Site: 101 [Faunce / Watt 2020 PM + Dev]

Intersection of Faunce Street / Watt Street Site Category: (None) Giveway / Yield (Two-Way)

		renonna	nce - ۱	<b>Vehicl</b>	es							
Mov		Demand			Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Turn	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South: \	Watt 9	Street										
1	L2	171	0.0	0.193	4.5	LOS A	0.1	0.4	0.01	0.25	0.01	40.6
2	T1	187	2.2	0.193	0.0	LOS A	0.1	0.4	0.01	0.25	0.01	39.5
3	R2	4	25.0	0.193	4.6	LOS A	0.1	0.4	0.01	0.25	0.01	37.1
Approa	ch	362	1.5	0.193	2.2	NA	0.1	0.4	0.01	0.25	0.01	39.9
East: Fa	aunce	Street										
4	L2	14	0.0	0.041	5.5	LOS A	0.1	1.0	0.36	0.61	0.36	35.4
5	T1	15	0.0	0.041	6.5	LOS A	0.1	1.0	0.36	0.61	0.36	33.0
6	R2	7	0.0	0.041	7.6	LOS A	0.1	1.0	0.36	0.61	0.36	34.4
Approa	ch	36	0.0	0.041	6.3	LOS A	0.1	1.0	0.36	0.61	0.36	34.4
North: \	Watt S	Street										
7	L2	4	25.0	0.134	7.3	LOS A	0.4	2.9	0.21	0.35	0.21	43.2
8	T1	180	3.5	0.134	2.7	LOS A	0.4	2.9	0.21	0.35	0.21	43.0
9	R2	42	10.0	0.134	7.1	LOS A	0.4	2.9	0.21	0.35	0.21	43.3
Approa	ch	226	5.1	0.134	3.7	NA	0.4	2.9	0.21	0.35	0.21	43.1
West: F	aunc	e Street										
10	L2	48	0.0	0.186	6.2	LOS A	0.7	5.1	0.42	0.69	0.42	34.1
11	T1	5	0.0	0.186	6.9	LOS A	0.7	5.1	0.42	0.69	0.42	30.9
12	R2	81	14.3	0.186	9.7	LOS A	0.7	5.1	0.42	0.69	0.42	36.3
Approa	ch	135	8.6	0.186	8.3	LOS A	0.7	5.1	0.42	0.69	0.42	35.3
All Vehi	icles	759	3.7	0.193	3.9	NA	0.7	5.1	0.16	0.38	0.16	39.9

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

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

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

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

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Site: 101 [Mann / Erina 2020 AM + Dev]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Intersection Performance - Hourly Valu	es		
Performance Measure	Vehicles	Pedestrians	Persons
Travel Speed (Average)	31.2 km/h	1.7 km/h	27.0 km/h
Travel Distance (Total)	459.9 veh-km/h	5.1 ped-km/h	556.9 pers-km/h
Travel Time (Total)	14.7 veh-h/h	2.9 ped-h/h	20.6 pers-h/h
Demand Flows (Total)	1499 veh/h	158 ped/h	1957 pers/h
Percent Heavy Vehicles (Demand)	6.5 %		
Degree of Saturation	0.759	0.069	
Practical Spare Capacity	18.6 %		
Effective Intersection Capacity	1975 veh/h		
Control Delay (Total)	6.49 veh-h/h	1.83 ped-h/h	9.63 pers-h/h
Control Delay (Average)	15.6 sec	41.8 sec	17.7 sec
Control Delay (Worst Lane)	52.1 sec		
Control Delay (Worst Movement)	54.2 sec	41.8 sec	54.2 sec
Geometric Delay (Average)	2.5 sec		
Stop-Line Delay (Average)	13.1 sec		
Idling Time (Average)	10.4 sec		
Intersection Level of Service (LOS)	LOS B	LOS E	
95% Back of Queue - Vehicles (Worst Lane)	13.5 veh		
95% Back of Queue - Distance (Worst Lane)	) 99.7 m		
Queue Storage Ratio (Worst Lane)	0.61		
Total Effective Stops	934 veh/h	148 ped/h	1269 pers/h
Effective Stop Rate	0.62	0.94	0.65
Proportion Queued	0.58	0.94	0.61
Performance Index	74.7	3.7	78.5
Cost (Total)	565.21 \$/h	76.97 \$/h	642.18 \$/h
Fuel Consumption (Total)	76.4 L/h		
Carbon Dioxide (Total)	182.1 kg/h		
Hydrocarbons (Total)	0.017 kg/h		
Carbon Monoxide (Total)	0.185 kg/h		
NOx (Total)	0.491 kg/h		

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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

Site Model Variability Index (Iterations 3 to N): 7.9 %

Number of Iterations: 5 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Main (Timing-Capacity) Iterations: 20.8% 2.8% 0.0%



Site: 101 [Mann / Erina 2020 AM + Dev]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Move	ment	Performai	nce - \	Vehicl	es							
Mov	Turn	Demand	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Turn	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South	: Mann	Street										
1	L2	46	0.0	0.759	19.6	LOS B	13.5	99.7	0.59	0.58	0.64	14.0
2	T1	439	7.4	0.759	14.1	LOS A	13.5	99.7	0.59	0.58	0.64	33.5
3	R2	269	0.0	0.386	10.4	LOS A	3.4	23.9	0.51	0.72	0.51	36.2
Appro	ach	755	4.3	0.759	13.1	LOS A	13.5	99.7	0.56	0.63	0.60	33.1
East:	Erina S	treet East										
4	L2	47	8.9	0.092	32.5	LOS C	1.6	12.1	0.77	0.72	0.77	20.9
5	T1	36	0.0	0.639	48.3	LOS D	4.8	38.9	1.00	0.82	1.09	13.4
6	R2	63	30.0	0.639	54.2	LOS D	4.8	38.9	1.00	0.82	1.09	18.2
Appro	ach	146	15.8	0.639	45.7	LOS D	4.8	38.9	0.92	0.79	0.99	17.8
North:	Mann	Street										
7	L2	95	1.1	0.088	14.5	LOS A	1.9	13.2	0.46	0.68	0.46	36.1
8	T1	358	10.6	0.361	10.6	LOS A	8.4	64.2	0.55	0.48	0.55	38.1
9	R2	145	1.4	0.222	11.0	LOS A	1.7	12.0	0.50	0.73	0.50	30.9
Appro	ach	598	6.9	0.361	11.3	LOS A	8.4	64.2	0.52	0.57	0.52	36.1
All Vel	hicles	1499	6.5	0.759	15.6	LOS B	13.5	99.7	0.58	0.62	0.61	31.2

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

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

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

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

Movement Performance - Pedestrians											
Mov		Demand	Average Level of	Average Back	of Queue	Prop.	Effective				
ID	Description	Flow	Delay Service	Pedestrian	Distance	Queued	Stop Rate				
		ped/h	sec	ped	m						
P1	South Full Crossing	53	41.8 LOS E	0.1	0.1	0.94	0.94				
P2	East Full Crossing	53	41.8 LOS E	0.1	0.1	0.94	0.94				
P4	West Full Crossing	53	41.8 LOS E	0.1	0.1	0.94	0.94				
All Pe	All Pedestrians 158		41.8 LOS E			0.94	0.94				

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.







Site: 101 [Mann / Erina 2020 PM + Dev]

Intersection of Mann Street / Erina Street East

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

Intersection Performance - Hourly Valu	es		
Performance Measure	Vehicles	Pedestrians	Persons
Travel Speed (Average)	31.4 km/h	2.2 km/h	28.1 km/h
Travel Distance (Total)	459.7 veh-km/h	5.1 ped-km/h	556.7 pers-km/h
Travel Time (Total)	14.6 veh-h/h	2.3 ped-h/h	19.8 pers-h/h
Demand Flows (Total)	1477 veh/h	158 ped/h	1930 pers/h
Percent Heavy Vehicles (Demand)	4.6 %		
Degree of Saturation	0.692	0.048	
Practical Spare Capacity	30.1 %		
Effective Intersection Capacity	2135 veh/h		
Control Delay (Total)	6.42 veh-h/h	1.18 ped-h/h	8.88 pers-h/h
Control Delay (Average)	15.6 sec	26.8 sec	16.6 sec
Control Delay (Worst Lane)	34.9 sec		
Control Delay (Worst Movement)	36.8 sec	26.8 sec	36.8 sec
Geometric Delay (Average)	2.3 sec		
Stop-Line Delay (Average)	13.3 sec		
Idling Time (Average)	10.1 sec		
Intersection Level of Service (LOS)	LOS B	LOS C	
95% Back of Queue - Vehicles (Worst Lane)	11.1 veh		
95% Back of Queue - Distance (Worst Lane)	) 80.8 m		
Queue Storage Ratio (Worst Lane)	0.49		
Total Effective Stops	1009 veh/h	144 ped/h	1354 pers/h
Effective Stop Rate	0.68	0.91	0.70
Proportion Queued	0.72	0.91	0.74
Performance Index	69.3	3.1	72.4
Cost (Total)	575.99 \$/h	59.66 \$/h	635.65 \$/h
Fuel Consumption (Total)	75.8 L/h		
Carbon Dioxide (Total)	180.1 kg/h		
Hydrocarbons (Total)	0.017 kg/h		
Carbon Monoxide (Total)	0.183 kg/h		
NOx (Total)	0.411 kg/h		

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

Intersection LOS value for Vehicles is based on average delay for all vehicle movements.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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

Site Model Variability Index (Iterations 3 to N): 0.0 %

Number of Iterations: 2 (Maximum: 10)

Largest change in Lane Degrees of Saturation for the last three Main (Timing-Capacity) Iterations: 0.0% 0.0% 0.0%



Site: 101 [Mann / Erina 2020 PM + Dev]

Intersection of Mann Street / Erina Street East Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov	Turn	Demand	Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Aver. No.	Average
ID	Tulli	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South: Mann Street												
1	L2	46	0.0	0.692	18.3	LOS B	11.1	80.8	0.73	0.67	0.75	14.6
2	T1	449	4.9	0.692	12.8	LOS A	11.1	80.8	0.73	0.67	0.75	34.9
3	R2	154	0.7	0.277	11.9	LOS A	1.9	13.3	0.64	0.73	0.64	34.5
Appro	ach	649	3.6	0.692	13.0	LOS A	11.1	80.8	0.71	0.68	0.73	33.2
East: I	East: Erina Street East											
4	L2	120	2.6	0.197	22.9	LOS B	2.8	20.0	0.76	0.75	0.76	25.5
5	T1	45	0.0	0.625	31.0	LOS C	4.7	37.2	0.99	0.83	1.07	18.0
6	R2	100	21.1	0.625	36.8	LOS C	4.7	37.2	0.99	0.83	1.07	23.3
Appro	ach	265	9.1	0.625	29.5	LOS C	4.7	37.2	0.89	0.79	0.93	23.3
North:	North: Mann Street											
7	L2	94	1.1	0.104	15.0	LOS B	1.6	11.2	0.56	0.70	0.56	35.6
8	T1	373	5.4	0.413	11.4	LOS A	7.6	55.4	0.68	0.59	0.68	37.2
9	R2	96	0.0	0.187	12.6	LOS A	1.1	7.9	0.66	0.73	0.66	29.1
Appro	ach	562	3.7	0.413	12.2	LOS A	7.6	55.4	0.66	0.63	0.66	35.6
All Vel	hicles	1477	4.6	0.692	15.6	LOS B	11.1	80.8	0.72	0.68	0.74	31.4

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

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

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

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

Movement Performance - Pedestrians										
Moν		Demand A	Average	Level of	Average Back	of Queue	Prop.	Effective		
ID	Description	Flow	Delay	Service	Pedestrian	Distance	Queued	Stop Rate		
		ped/h	sec		ped	m				
P1	South Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91		
P2	East Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91		
P4	West Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91		
All P	edestrians	158	26.8	LOS C			0.91	0.91		

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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