Attachment C - Traffic Impact Assessment

Mosbri Crescent, The Hill

By AECOM, December 2015

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Nine Network Australia - Newcastle NBN site residential development

Traffic Impact Assessment

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Nine Network Australia - Newcastle NBN site residential development

Traffic Impact Assessment

Client: Nine Network Australia

ABN: 88 008 685 407

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

22-Dec-2015

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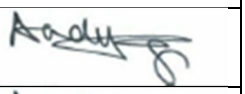
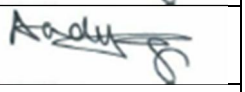
A	21-Dec-2015	Draft Report	Andy Yung Associate Director	
B	22-Dec-2015	Final Report	Andy Yung Associate Director	

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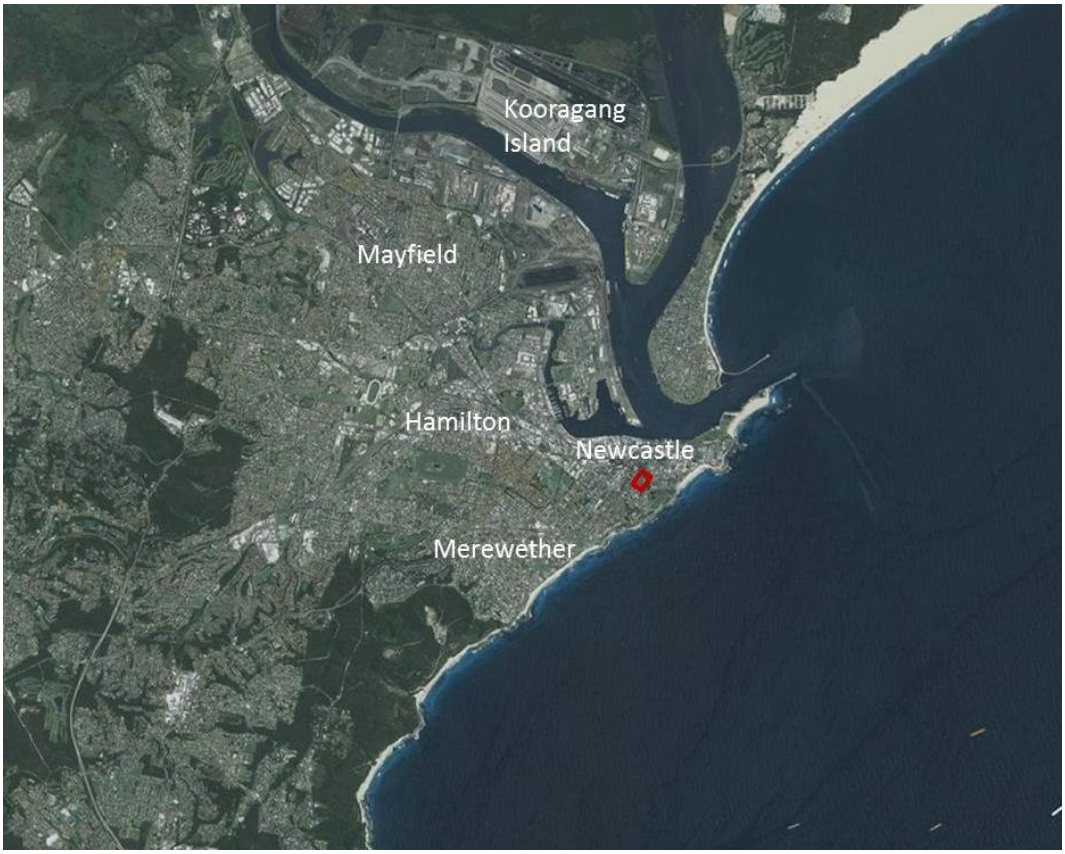
1.0 Introduction

1.1 Background

AECOM has been commissioned by Nine Network Australia Pty Ltd (NNA) to prepare a Traffic Impact Assessment in support of a Planning Proposal for the residential development of the NBN site at 11 Mosbri Crescent, Newcastle. The site is currently used as NBN's headquarter with administration and studios and also contains a TPG office.

The preferred concept plan proposes a total of 208 residential dwellings comprised of medium to high density dwellings. The project site in relation to its regional context is shown in **Figure 1**.

Figure 1 Location of the project site



Source: AECOM 2015

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1.2 Report structure

The report is structured as follows:

- **Section 2** summarises the existing conditions in the area surrounding the site, including travel patterns and behaviour, public transport, cyclist and pedestrian facilities as well as the existing performance of the road network.
- **Section 3** provides details of the development proposal including vehicular access and parking arrangements.
- **Section 4** provides a traffic impact assessment of the site on the existing road network. This includes the trip generation exercise and intersection performance testing using the SIDRA modelling software.
- **Section 5** provides the potential measures to manage travel demand.
- **Section 6** provides a summary and conclusions of the report.

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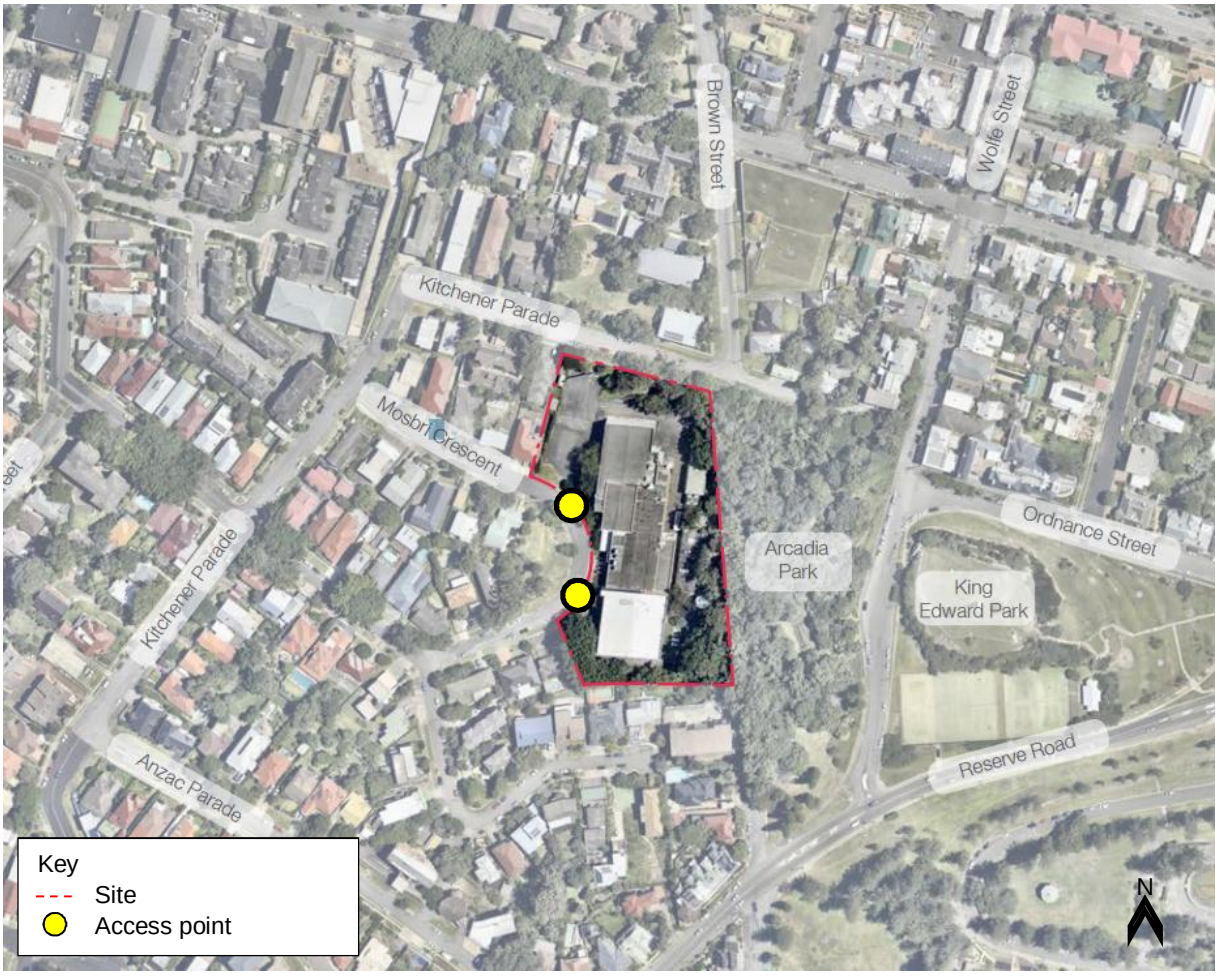
2.0 Existing Conditions

2.1 Site description

The NBN Newcastle site is located in The Hill which is an inner city, residential suburb of Newcastle, New South Wales. It is located within the Newcastle Local Government Area (LGA) and immediately south (within 500m) of Newcastle's CBD. Hamilton Railway Station is approximately 3km east of the site which provide train services and connection to Gosford and Maitland areas.

The site is bounded by Kitchener Parade to the north, Mosbri Crescent to the west, Arcadia Park to the east and residential dwellings to the south. The extent of the site is highlighted by the red dotted line in **Figure 2**.

Figure 2 Site boundary



Source: SJB, 2015; modified by AECOM, 2015

The site is located within 10 minute walking distance to Darby Street, Wolfe Street and Hunter Street which have bus stops providing bus services to key areas in Newcastle. 2011 census data showed that approximately 5 per cent per cent of journey-to-work trips from Newcastle area were made by public transport.

2.1.1 Site access

The NBN Newcastle site is accessed from Mosbri Crescent which provides two access points to on-site parking facilities. The northern access point is located approximately 120m east of Kitchener Parade and the southern access point is located approximately 80m east of Swan Street.

2.1.2 On-site parking provision

There are currently 117 parking spaces provided on site (off street parking), which are reserved for staff and visitors.

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2.2 Road network

The site has good access to Newcastle's strategic road network, with surrounding roads providing links to state and regional roads. The Pacific Highway is less than 2 km east of the site. Hunter Street is classified as arterial road; Darby Street and King Street are the main roads, while other streets as Swan Street, Parkway Avenue are classified as collector and local roads.

Figure 3 Road network

2.2.1 Hunter Street

Hunter Street is a major road in the Newcastle CBD with commercial and retail activity. It is an undivided road with two lanes and a parking lane on both sides and a 50km/h speed limit. Hunter Street links to the Pacific Highway to the west and Darby Street to the east.

2.2.2 King Street

King Street is a regional road which runs parallel to Hunter Street to the south. It is a four lane divided road between Union Street and the Pacific Highway and , it is a four lane road to its western part and two lane road to its eastern part. It has a post speed limit of 40km/h on the eastern part and 50km/h on the western part. King Street also connects to Darby Street and Pacific Highway.

2.2.3 Darby Street

Darby Street is a regional road and a shopping precinct within Newcastle. It runs in a north-south direction with one lane each way and has parking lane on both sides. It has a speed limit of 40km/h and connects Hunter Street and Parkway Avenue. Darby Street also provides connectivity to the residential area of Newcastle with intersections to a number of local roads including Queen Street which provides links to the site.

2.2.4 Mosbri Crescent

Mosbri Crescent is a local road with two lanes and a speed limit of 40km/h. It runs along the proposed site and connects to Kitchener Parade to the north and Swan Street / Hillview Crescent to the south. It provides vehicular access for vehicles in and out of the site.

2.2.5 Swan Street / Kitchener Parade

Swan Street and Kitchener Parade are both local roads linking Mosbri Crescent to the surrounding road network. It is an undivided road with one traffic lane and parking lane on both sides.

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2.3 Traffic volumes

2.3.1 Daily traffic counts

Historical traffic data was obtained from RMS to establish background traffic growth in the vicinity of the site. The Average Annual Daily Traffic (AADT) data from selected RMS count survey location in the area surrounding the site are presented in **Table 1**, with the location of the traffic count stations shown in **Figure 4**.

Table 1 Daily traffic volume

Station	Location	2011 AADT	2012 AADT	2013 AADT	2014 AADT	2015 AADT
05206	Glebe Road – Merewether West of Henry Street	15,465	15,403	15,369	15,117	15,107

Note:

AADT (Annual Average Daily Traffic was calculated on 365 days of data)

Source: RMS, 2015

Figure 4 Traffic count location

Source: AECOM 2015

The data indicates that traffic on Glebe Road in the vicinity of the site has gradually declined between 2011 and 2015. For the purpose of any future year analysis, traffic growth is assumed to be at zero per cent rather than a negative growth as a worst case.

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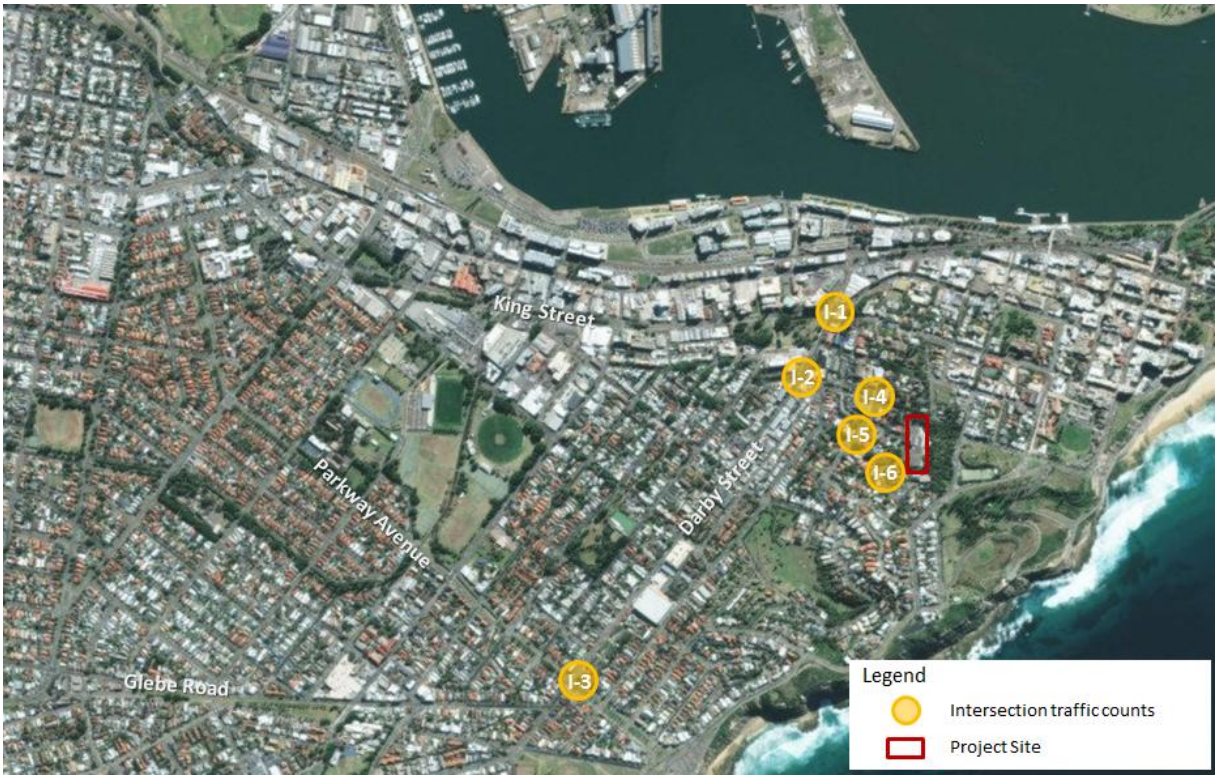
2.3.2 Intersection traffic counts

Classified turning movement counts were undertaken by Trans Traffic Survey (TTS) during the morning (6am to 9am) and evening (3pm to 6pm) peak periods on 12 November, 2015 at the following intersections:

- Darby Street / King Street (I-1)
- Darby Street / Queen Street (I-2)
- Darby Street / Parkway Avenue (I-3)
- Kitchener Parade / Mosbri Crescent (I-4)
- Swan Street / Kitchener Street (I-5)
- Mosbri Crescent / Swan Street / Hillview Crescent (I-6)

Figure 5 Intersection traffic count location



Source: AECOM, 2015

These intersections are considered to be critical in the movement to and from the site, as they are the main intersections connecting to King Street, Glebe Road and Parkway Avenue.

The traffic intersection counts revealed that the AM and PM peak hour occurred during 8am to 9am and 5pm to 6pm respectively. The AM and PM peak hour intersection counts are shown in **Appendix A**.

Based on the intersection surveys undertaken, a summary of peak hour midblock traffic counts on the local road network at locations surrounding the site is shown in **Table 2**. **Figure 6** shows the total peak hour traffic on the Darby Street and Queen Street approaches as well as the component of traffic generated by the existing operation of Newcastle NBN site (as shown in brackets).

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Table 2 Peak hour traffic volume

Midblock location	Direction	AM peak hour (veh/hr)	PM peak hour (veh/hr)
Queen Street, East of Darby Street	EB	171	194
	WB	187	223
	Total Peak Hour Traffic	**358**	**417**
Darby Street, North of Queen Street	SB	463	700
	NB	618	586
	Total Peak Hour Traffic	**1,081**	**1,286**
Darby Street, South of Queen Street	SB	376	615
	NB	525	442
	Total Peak Hour Traffic	**901**	**1,057**

Figure 6 Midblock traffic volumes in the vicinity of the site

Source: AECOM 2015

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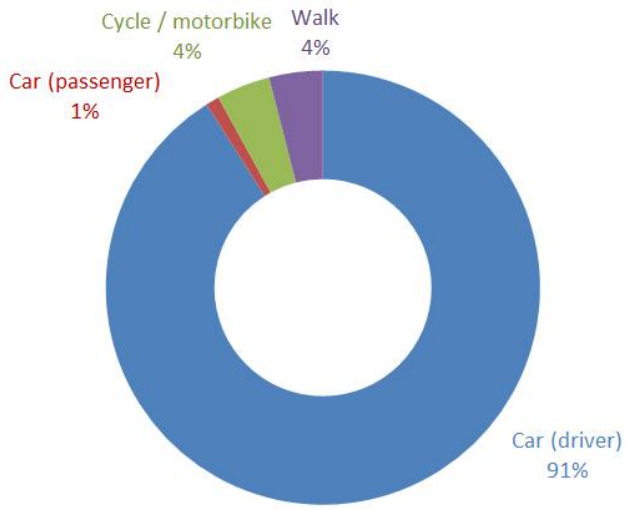
2.3.3 Existing trip generation from site

At present, the staff level at the existing Newcastle NBN site is approximately 143 people (including TPG staff). A travel survey was undertaken on November 2015, where the results would be used to determine current traffic volumes being generated by the site on the surrounding road network during the AM and PM peak hour period.

Approximately 53 per cent of staff participated in the survey which showed majority worked from Monday to Friday, ranging from 83 per cent to 97 per cent, and less than 40 per cent staffs worked on the weekend.

In terms of mode of travel to work, the survey showed 91 per cent of staff would drive, 4 per cent walked, 4 per cent arrived by bicycle/motorbike and 1 per cent were car passengers. For those who drive to work, majority of staff parked within the off-street parking facility.

Figure 7 Mode Split



Source: AECOM, 2015

Analysis of the survey data indicated 52 per cent of staff driving to the site travelled within the AM peak hour and 40 per cent travelled within the PM peak hour during a typical weekday. Therefore, the total number of trips generated by the site between 8am to 9am is 74, and 57 trips between 5pm to 6pm.

The survey also showed approximately 63 per cent of staff come from the north via King Street, 37 per cent of from the south via Darby Street.

It is assumed 95 per cent of the total traffic generated in AM peak will be inbound, 5 per cent will be outbound, and the opposite will be applied in PM peak.

Table 3 shows the trips into and out of Mosbri Crescent (at Kitchener Parade | Mosbri Crescent and Swan Street | Mosbri Crescent) and validates the inbound and outbound trips assumed to be generated by the Newcastle NBN site. Given the number of inbound trips assumed for the Newcastle NBN site during the AM peak is higher than the intersection counts, it is assumed the total number of inbound trips (65) is associated with the Newcastle NBN site.

Table 3 Validation of traffic generated by the NBN site

Mosbri Crescent	AM Peak		PM peak	
	Inbound	Outbound	Inbound	Outbound
Intersection counts*	**65**	47	25	58
Assumption based on Travel Survey	71	**3**	**3**	**54**
Within intersection counts?	N	Y	Y	Y

* the number of trips shown does not include turning movements associated with Hillview Crescent given its proximity to the site it is assumed people who live on this street do not drive to work.

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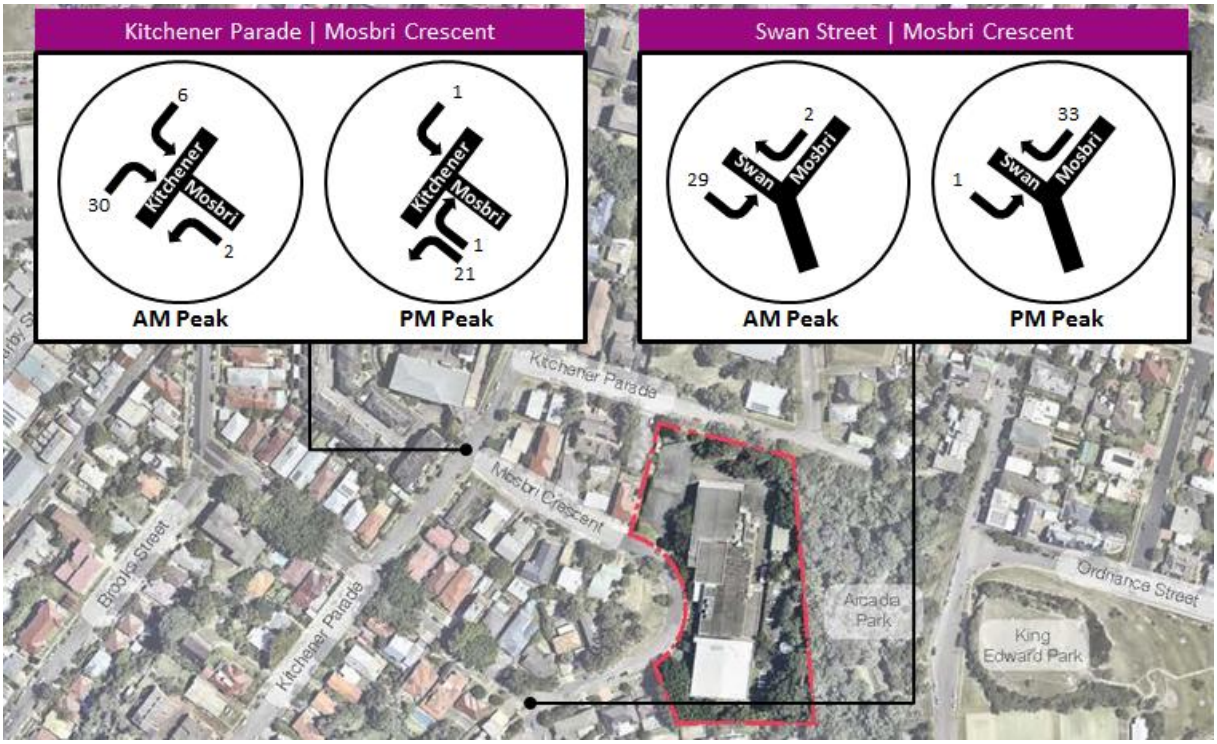
Figure 8 summarises the assumed turning movements generated by the Newcastle NBN Site at the two intersections providing access to the site. It shows the existing site currently generates 68 and 57 vehicles movements during AM and PM peak respectively.

Figure 8 Trip generated by the existing site (November 2015)



Source: AECOM, 2015

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2.4 Existing intersection performance

Intersection performances have been evaluated using *SIDRA Intersection 6.1*, a computer based modelling package designed for calculating isolated intersection performance.

The main performance indicators for SIDRA 6.1 include:

- Degree of Saturations (DoS) – a measure of the ratio between traffic volumes and capacity of the intersection is used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase. Satisfactory operations usually occur with a DoS range between 0.7-0.8 or below.
- Average Delay – duration, in seconds, of the average vehicle waiting at an intersection.
- Level of Service (LoS) – a measure of the overall performance of the intersection (this is explained further in **Table 4**.

Table 4 Level of Service criteria for intersections

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

Source: RMS, 2002

The existing performance of the key intersections has been assessed and the results are presented in **Table 5** for the AM and PM peak hour period. The table summarises intersection performance based on the 2015 traffic flows for the weekday morning and evening peak hours. SIDRA detail results are provided in **Appendix B**.

Table 5 Intersection performance – existing 2015 weekday

Location	Demand Flow (veh/h)	Level of Service	Degree of Saturation	Ave Delay (sec)	95% Back of Queue (m)
Darby Street / King Street					
AM Peak	1,770	D	1.08	46	265
PM Peak	2,084	D	1.05	46	263
Darby Street / Queen Street					
AM Peak	1,198	A	0.57	13	76
PM Peak	1,427	A	0.58	13	76
Darby Street / Parkway Avenue					
AM Peak	1,727	A	0.62	8	42
PM Peak	2,046	A	0.80	12	87
Hillview / Mosbri Crescent / Swan Street					
AM Peak	98	A	0.02	2.9	1
PM Peak	110	A	0.03	2.0	1

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Location	Demand Flow (veh/h)	Level of Service	Degree of Saturation	Ave Delay (sec)	95% Back of Queue (m)
Kitchener Parade / Mosbri Crescent					
AM Peak	168	A	0.05	2	1
PM Peak	124	A	0.03	2	1
Kitchener Parade / Swan Street					
AM Peak	316	A	0.07	5.1	2
PM Peak	316	A	0.09	4.8	2

Source: AECOM 2015

The modelling results indicate that in the existing AM and PM peak hour, all the intersections in the road network performed satisfactorily with the exception of Darby Street / King Street.

The intersection of Darby Street / King Street performs at a LoS D however operates at capacity with a degree of saturation greater than 1.0 during both the AM and PM peak hour. This is due to high volume of traffic turning right from western approach and insufficient green time allocated for right turn movement. The intersection also experiences queue of approximately 265 m from the western approach during both the AM peak and PM peak.

Figure 9 summarises the performance of the intersections assessed during the AM and PM peak.

Figure 9 Summary of existing intersection performance

Source: AECOM, 2015

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2.5 Travel behaviour

2.5.1 Journey to work data

Travel characteristics for NSW residents travelling to work are gathered from the journey-to-work data extracted from the Australian Bureau of Statistics (ABS) 2011 census data. Journey to work data (JTW) includes details of the origin and destination of trips, together with characteristics of the journey such as mode of travel. The project site is located within Newcastle LGA and Travel Zone (TZ) 6355. JTW data from and to the project site has been analysed and is summarised in the tables below.

Table 6 shows the mode share of trips travelling to and from the project site and **Table 7** shows the origins and destinations of trips to and from the project site.

Table 6 Journey to work mode split

Mode	Residents Site area as origin (from TZ 6355)*	Employees Site area as destination (to TZ 6355)
Total JTW Trips	1,069	1,214
Vehicle Driver	68%	77%
Vehicle Passenger	6%	5%
Bus	3%	5%
Train	4%	2%
Walked only	15%	9%
Other Modes	4%	3%

Note: excludes mode not stated and worked at home or did not work

Source: ABS Census Data 2011

The data indicates employees and residents within the travel zone have a high dependency on private vehicles as a mode of travel to work. Approximately 74 per cent of residents rely on cars with 15 per cent opting to walk to work. For people employed in the area, 82 per cent of JTW trips are made by private vehicle. This is probably due to the high availability of off-street parking in the area.

Table 7 Journey to work origins / destinations

Site Area Travel Zone (TZ 6355)			
Residents		Employees	
Destination	Proportion	Origins	Proportion
Newcastle	74%	Newcastle	56%
Lake Macquarie - East	10%	Lake Macquarie - East	23%
Port Stephens	5%	Lake Macquarie - West	6%
Lower Hunter	2%	Maitland	4%
Lake Macquarie - West	2%	Port Stephens	4%
Maitland	3%	Wyong	3%
Sydney Inner City	1%	Lower Hunter	2%
Wyong	1%	Gosford	1%
Gosford	1%	Leichhardt	1%

Source: ABS Census Data 2011

The JTW data shows that the majority of trips leaving the site area travel zone are self-contained within the Newcastle area (74 per cent). A high proportion of trips to Newcastle area were either made by vehicle (70 per cent) or walk (19 per cent).

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A high proportion of trips coming to the site area to work also originate within the Newcastle area (56 per cent) and a high proportion of trips originate from Lake Macquarie - East (23 per cent) and Lake Macquarie - West (6 per cent).

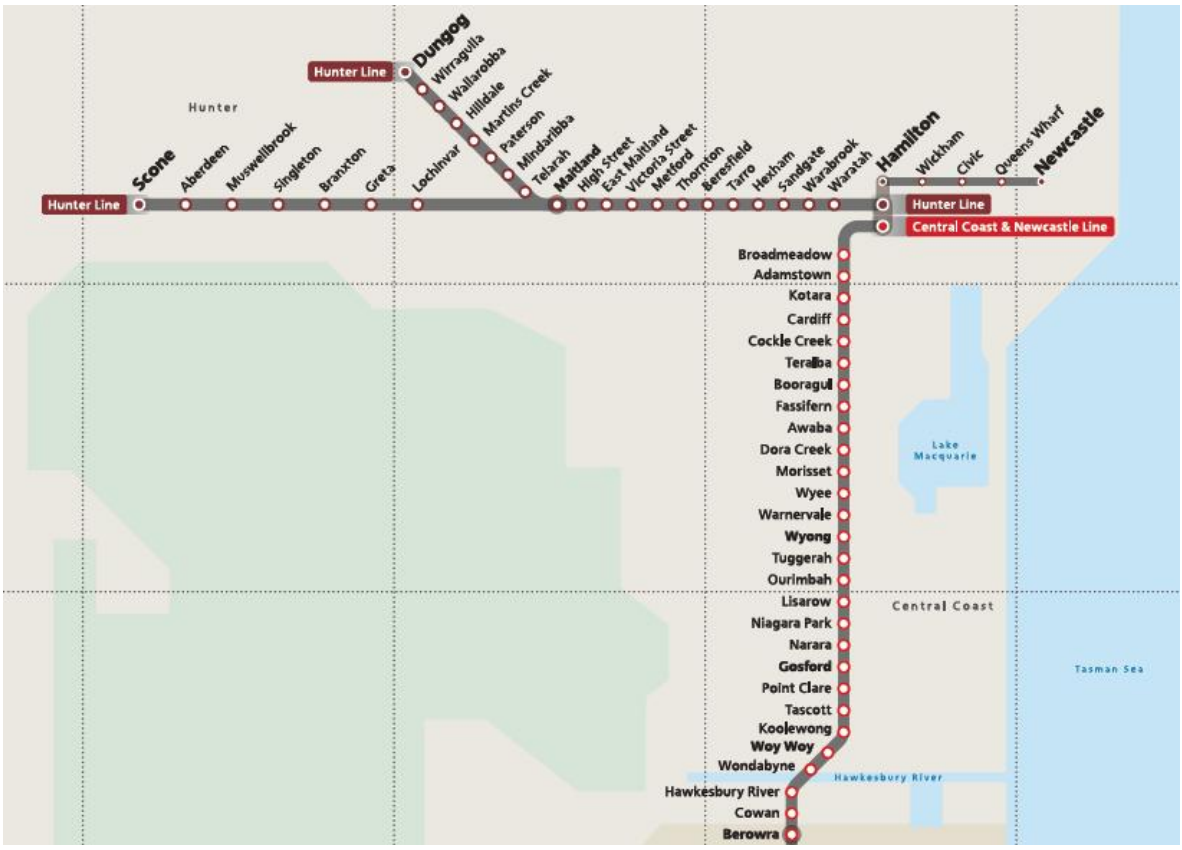
2.6 Public transport network

2.6.1 Rail services

Hamilton Station is the nearest railway station, approximately 3 km west of the site, which provides connectivity to the Sydney trains network. **Figure 10** shows that Hamilton Station is serviced by the Central Coast and Newcastle line which provides services to Newcastle and Central station and the Hunter line which provide services to Newcastle and Maitland, encouraging commuters to use public transport as a viable alternative to private motor vehicle transport. The number and frequency of railway services operating during peak hours is shown in **Table 8**.

The truncation of the rail line as part of works to revitalise Newcastle's CBD and deliver a fully accessible transport interchange at Wickham require rails services to terminate at Hamilton Station with rail services no longer operating between Hamilton and Newcastle Station.

Figure 10 Existing rail network



Source: Sydneytrains, 2015

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Table 8 Rail services at Hamilton Station

Key Destination	AM Peak (0700-0900)	PM Peak (1600-1800)
To Maitland	12-20 minutes 6 services	15-30 minutes 6 services
From Maitland	6-15 minutes 7 services	20-25 minutes 5 services
To Gosford / Central	10-60 minutes 4 services	10-30 minutes 5 services
From Gosford / Central	20-40 minutes 4 services	3-20 minutes 11 services

Source: Sydneytrains, 2015

2.6.2 Bus services

Newcastle Buses operate bus services in close proximity to the site along Darby Street and Wolfe Street which are illustrated in **Figure 11**, and include:

- Route 310 & 320 Belmont & Warners Bay – Charlestown & Newcastle
- Route 201 Hamilton – Marketown

Two bus services operate along Darby Street, which is less than 400m to the site. These bus services provide direct connection to Charlestown, Newcastle and Belmont. Two bus stops are located just north of Queen Street on Darby Street.

Bus route 201 runs on Wolfe Street and operates between Hamilton and Marketown. Bus stops for this service are located south of Tyrell Street.

Figure 11 Bus services in the vicinity of the site

Source: Newcastle Buses, 2010

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The number and frequency of bus services in the area are shown in **Table 9**.

Table 9 Frequency of bus services in the vicinity of the site

Bus Service	Route	Weekdays			Weekend
		AM Peak (0700-0900)	Off Peak	PM Peak (1600-1800)	
310	Belmont & Warners Bay – Charlestown & Newcastle	60 minutes 2 services	60 minutes	60 minutes 2 services	60 minutes
320	Belmont & Warners Bay – Charlestown & Newcastle	60 minutes 2 services	60 minutes	60 minutes 2 services	60 minutes
201	Hamilton - Marketown	60 minutes 3 services	60 minutes	60 minutes 3 services	60 minutes

Source: Sydneybuses.info, 2013

Hunter Street is the main bus corridor for the Newcastle area providing links to a number of surrounding key centres. The following bus services are also provided on Hunter Street, which is approximately a 15-min walk from the site:

Newcastle Buses

- Route 100, 106, 107 & 111: Mount Hutton, Charlestown & Jesmond - Newcastle
- Route 104: Jesmond - Newcastle East
- Route 118 (NightOwl bus service): Stockton - Newcastle
- Route 201: Hamilton - Marketown
- Route 222, 224 & 225: Wallsend & Jesmond - Newcastle East
- Route 226, 230, 231 & 235: Glendale, Maryland & Wallsend - Newcastle
- Route 310 & 320: Belmont & Warners Bay - Charlestown & Newcastle
- Route 317: Belmont - Newcastle
- Route 334: Glendale - Newcastle
- Route 349 & 350: Swansea - Newcastle
- Route 363: Warners Bay - Newcastle

Port Stephens Coaches

- Route 130: Fingal Bay - Newcastle
- Route 131: Shoal Bay – Newcastle

Hunter Valley Buses

- Route 138: Lemon Tree Passage - Newcastle
- Route 140: Raymond Terrace - Newcastle
- Route 267: West Wallsend - University of Newcastle

Rover Coaches

- Route 160: Cessnock - Newcastle

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2.6.3 Shuttle bus services

Transport of New South Wales is currently constructing a new transport interchange at Wickham, which will be a hub for the new light rail, trains, buses and taxis. Currently trains start and finish at Hamilton Station during the construction of the Wickham Interchange. With the closure of Wickham, Civic and Newcastle station, the Shuttle Bus (Route 110) replaces train services between Hamilton and Newcastle station. The shuttle bus runs every 10 minutes at peak times and regularly at other times, to meet trains arriving and departing at Hamilton Station.

2.7 Pedestrian routes and facilities

Pedestrian footpath is provided intermittently on both sides of Mosbri Crescent, however there is an extensive footpath network in the surrounding area, which allows easy and safe access for pedestrians to nearby shopping areas and restaurants on Darby Street, parks and bus stops.

2.8 Cycling routes and facilities

There are no dedicated cycle facilities along Mosbri Crescent and Darby Street. However, there is a number of on-road and off-road cycle routes in the surrounding area providing connections between key destinations including parks and reserves, and train stations as shown in **Figure 12.**

Figure 12 Newcastle cycle route map

Source: Newcastle City Council, 2015

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3.0 Proposed Development

3.1 Introduction

SJB Architects has prepared a Concept Plan for the redevelopment of the site at 11 Mosbri Crescent, The Hill, NSW. The concept plan proposes a residential development with approximately 208 dwellings which contains a mix of medium and high density dwellings. The preferred concept plan is shown in **Figure 13** and features three apartment blocks (A, B and D).

Figure 13 Preferred concept plan

Source: SJB, 2015

Table 10

Table 10 Proposed residential development

Block	Building type	Dwellings
A	Residential Flat Building	55
B	Tower	58
C	Terrace	16
D1	Residential Flat Building	32
D2	Residential Flat Building	27
E	Terrace	20
	Total	**208**

Source: SJB, 2015

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3.2 Vehicular access

Two access points to the site are proposed from Mosbri Crescent. One access point is located 120m from Kitchener Parade which provides direct access to Building A, B, C and D1. The other access point is located 80m from Swan Street / Mosbri Crescent / Hillview Crescent which provides direct access to building C, D2 and E. The two access points are approximately at the same location of the existing access points to the Newcastle NBN site. The distance between these two accesses is about 50m.

The proposed internal road network connects the two access points and provides vehicular access to parking facilities. The width and turning path of the internal road will be designed to allow access by refuse collection vehicles.

3.3 Parking provision

The parking rates would be minimum 1 space per dwelling, and with 1 space per 6 dwelling for visitor spot based on Newcastle DCP 2012. Therefore, it requires 208 car parking spaces for residents and 35 spaces for visitor parking. The concept plan proposes basement parking for the three apartment blocks (A, B and D).

Under the Newcastle DCP there is a requirement to provide 4 spaces for delivery and service vehicles based on the rate of 1 space per 50 flats / units for residential flat buildings under 200 flats / units.

3.4 Pedestrian and Cyclist Facilities

The design of the internal road network and internal footpaths will provide good connectivity to surrounding pedestrian and cyclist networks. Pedestrian access to the site will be provided from Mosbri Crescent & Kitchener Parade.

In order to encourage sustainable transport choices, the proposed development will include end-of-trip cycle facilities on site in accordance with the Newcastle DCP. The Newcastle DCP has the following bike parking rate for attached dwelling, multi dwelling housing, residential flat buildings and shop top housing:

- 1 space per dwelling unless separate storage is provided (Council determine the required class of security).
- 1 space per 10 dwellings (Class 3 – low security level) for visitors

Based on the bike parking rates set out in the DCP, 208 bike parking spaces for residents and 21 bike parking spaces for visitors are required as part of the development.

The close proximity to shops, parks, and recreational facilities and bus stops will encourage waking and cycling as an alternative to private car transport, which will in turn serve to reduce trip generation from the proposal and traffic impacts on the surrounding area.

3.5 Public Transport Facilities

The site has good accessibility to an existing public transport services and facilities. Bus stops at Darby Street can be easily accessed with a walking distance of less than 5-min.

Hamilton Station provides regular and frequent services on the Central Coast and Newcastle Line and Hunter Line. Currently shuttle buses are provided between Newcastle & Hamilton Station to replace train services with a stop at Civic Station which is less than a 15-min walk from the site

The future Newcastle light rail route proposes light rail stops on Hunter Street, which is approximately an 8 min walk from the Kitchener Parade pedestrian access point.

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4.0 Traffic Impact Assessment

This section of the report assesses the likely traffic impacts of the proposed development on the local road network and recommends mitigation measures to alleviate any impacts if required.

The traffic assessment has considered the impacts of the proposed development (up to 208 dwellings) during typical weekday AM and PM peak hour (based on 2015 traffic data collected by AECOM).

4.1 Trip generation

The concept plan contains a mix of medium and high density dwellings. The vehicle trip rate for the proposed development has been based on Roads and Maritime Services survey data for similar dwelling types within regional areas.

The following trip rates have been used to determine the number of trips generated by the development:

- Medium density: 0.51 trips per unit in AM peak and 0.58 trips per unit for PM peak.
- High density: 0.39 trips per unit in AM peak and 0.42 trips per unit for PM peak.

The trip rate for medium density dwellings have been based on surveys for a similar site in Maryville, located approximately 2.8 km north of the NBN site. These surveys were used as Roads and Maritime's Trip Generation Surveys for Medium Density Residential Dwellings.

The trip rate for high density dwellings have been based on surveys for a similar site in Charlestown, located approximately 8.4 km southwest of the NBN site.

Using the trip rates mentioned above, the forecasted trips generated by the proposed development during AM and PM peak are summarised in **Table 11**. The proposed development is expected to generate a total of 85 vehicle trips and 93 vehicle trips during the AM and PM peak hour. It is assumed that 10 per cent of trips will enter the site and 90 per cent will leave the site in the AM peak hour, with the reverse occurring in the PM peak

Table 11 Forecast site trip generation

Building	Type	No. of dwelling	Trip Rate		Trips	
			AM	PM	AM	PM
A	High Density	55	0.39	0.42	21	23
B	High Density	58	0.39	0.42	23	24
C	Medium Density	16	0.51	0.58	8	9
D1	High Density	32	0.39	0.42	12	13
D2	High Density	27	0.39	0.42	11	11
E	Medium Density	20	0.51	0.58	10	12

Source: AECOM, 2015

As shown in **Table 12,** the traffic generation of the proposed developments is maringally more than the existing traffic flows generated by the current operation of the Newcastle NBN site during the weekday peak hour. However, it is acknowledged that the direction of travel of the existing trips will be different to the future trips due to the change in land use type.

Table 12

	AM peak	PM peak
Existing NBN site	68	57
Proposed development	85	93
Net increase	**+17**	**+36**

Source: AECOM, 2015

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4.2 Trip distribution

In order to determine the net increase in trips in each travel direction, trip distribution for the vehicular movements for the current and future uses of the site have been determined using existing (2011) JTW patterns to and from the site area travel zone and the traffic turning volume survey undertaken for the existing project site respectively.

Table 13 and **Figure 14** show the expected travel directions of future residential trips for the AM peak hour. It has been assumed that the reverse travel pattern will occur for the PM peak hour.

Table 13 Distribution of proposed trips – AM peak hour

Direction	Strategic road link	In	Out
South	Via Glebe Road	25%	14%
North, West	Via King Street	39%	42%
Southwest (Newcastle)	Via Parkway Avenue	17%	21%
North East (Newcastle)	Via Kitchener Parade	19%	24%

Source: Journey to Work, 2011

Figure 14 Distribution of proposed outgoing trips – AM peak hour

Source: Journey to Work, 2011

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4.3 Forecast Traffic Flow

Typically, a traffic impact assessment is undertaken for a future design year of 10 year post opening / completion of the development. However, as historical traffic data on Glebe Road corridor shows a negative average annual growth rate in **Section 2.3.1**, as a worst case, the assessment has assumed there will be zero growth on the surrounding road network. Therefore forecast traffic flow on the surrounding road network has been estimated by using the existing 2015 traffic flows as background traffic, with the removal of existing traffic generated by the existing operations of the Newcastle NBN site before the addition of the proposed residential development traffic.

Trips have also been distributed on to the road network based on existing road network restrictions, i.e. right turn movement banned from King Street into Darby Street on the eastern approach of the intersection.

Table 14 and **Figure 15** show the midblock traffic volumes at locations in the vicinity of the subject site, with the residential development generated traffic present on the local road network (and the removal of existing operations traffic). It is evident that the total net increase of traffic as a result of the change of use of the proposed development is negligible across the network.

Table 14: Midblock traffic volumes with development traffic

Midblock location	Direction	AM peak hour			PM peak hour		
		Base	With Dev	Diff	Base	With Dev	Diff
Queen Street, East of Darby Street	EB	171	119	-52	194	259	65
	WB	187	242	55	223	176	-47
	Total	**358**	**361**	**3**	**417**	**435**	**18**
Darby Street, North of Queen Street	SB	463	430	-33	700	732	**32**
	NB	618	647	29	586	562	**-24**
	Total	**1081**	**1077**	**-4**	**1286**	**1294**	**8**
Darby Street, South of Queen Street	SB	376	402	26	615	592	**-23**
	NB	525	507	-18	442	476	**34**
	Total	**901**	**909**	**8**	**1057**	**1068**	**11**

Source: AECOM, 2015

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Figure 15 Midblock traffic volumes with development traffic

Source: AECOM, 2015

During the peak hours, the increase of traffic on Queen Street is in the range of five to eight per cent of existing traffic volumes in one direction. It should also be noted that there is a decrease in traffic in opposite direction due to the change of the current employment land use to the proposed residential land use.

The highest increase in traffic is expected at Queen Street, on the approach to Darby Street. An increase of 65 vehicles is expected in the eastbound direction during the AM peak and 55 vehicles in the westbound direction during the PM peak. However, the traffic volumes on Queen Street are still within the capacity of a local road.

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4.4 Intersection assessment

The key intersections in the vicinity of the proposed development have been remodelled in SIDRA 6.1 in the AM and PM peak hour. The intersection performance results for the road network during the AM and PM peak hour are shown in **Table 15** and the detailed results (with development) are contained in **Appendix C**.

Table 15: Intersection performance of road network – with development

Location	Demand Flow (veh/h)	Level of Service	Degree of Saturation	Ave Delay (sec)	95% Back of Queue (m)
Darby Street / King Street					
AM Peak	1,770	D	1.08	46	265
AM Peak with development	1,766	B	0.72	24	95
PM Peak	2,084	D	1.05	46	263
PM Peak With development	2,092	C	0.87	37	152
Darby Street / Queen Street					
AM Peak	1,198	A	0.57	13	76
AM Peak with development	1,202	A	0.52	13	69
PM Peak	1,427	A	0.58	13	76
PM Peak With development	1,446	A	0.66	14	78
Darby Street / Parkway Avenue					
AM Peak	1,727	A	0.62	8	42
AM Peak with development	1,734	A	0.61	8	41
PM Peak	2,066	A	0.80	12	87
PM Peak With development	2,066	A	0.79	12	82
Hillview / Mosbri Crescent / Swan Street					
AM Peak	98	A	0.02	3	1
AM Peak with development	100	A	0.04	3	1
PM Peak	110	A	0.03	2	1
PM Peak With development	113	A	0.04	2	1
Kitchener Parade / Mosbri Crescent					
AM Peak	168	A	0.05	2	1
AM Peak with development	190	A	0.05	2	1
PM Peak	124	A	0.03	2	1
PM Peak With development	157	A	0.04	2	1
Kitchener Parade / Swan Street					
AM Peak	316	A	0.07	5	2
AM Peak with development	318	A	0.10	5	3
PM Peak	316	A	0.09	5	2
PM Peak With development	333	A	0.10	5	2

Source: AECOM 2015

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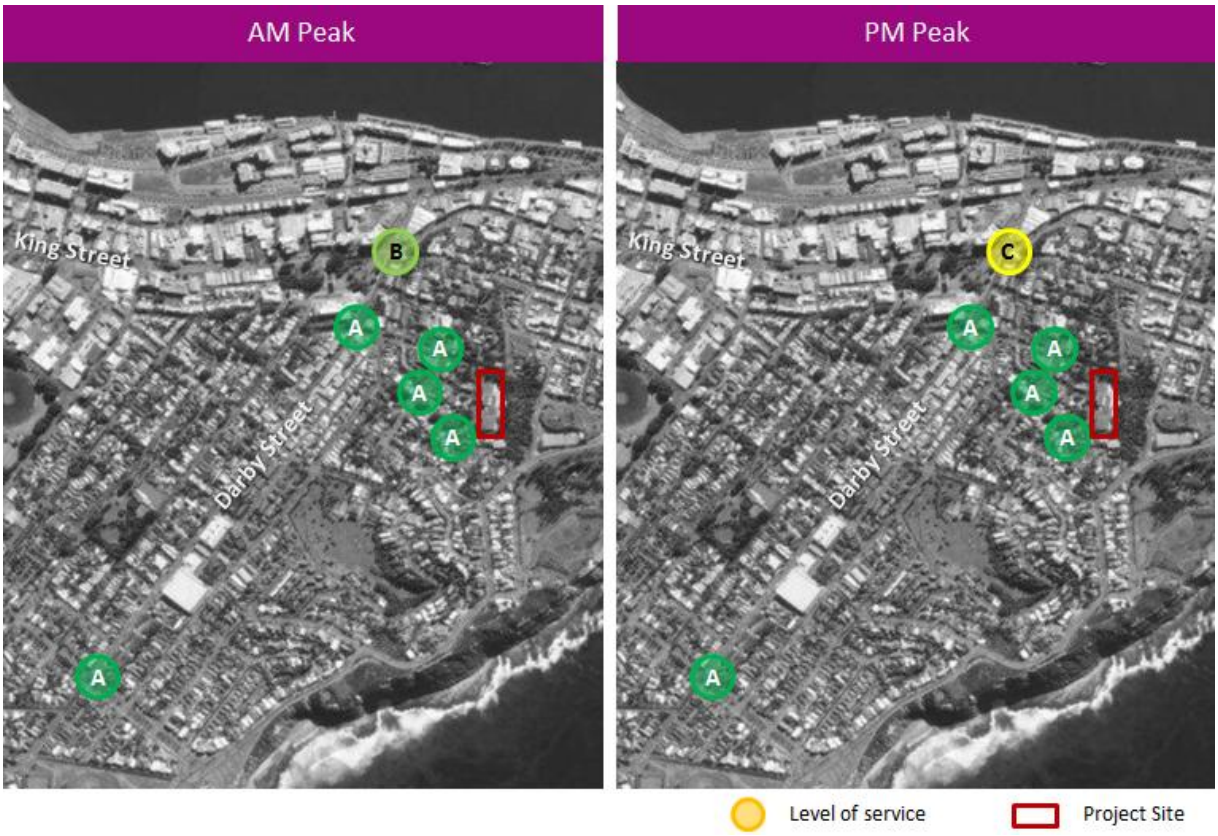
The SIDRA model outputs from **Table 15** were compared with the existing intersection performance to determine the likely changes in traffic performance at key intersections after the proposed development is in place. The intersection modelling results showed, with the proposed development in place, the intersections had comparable results to that of the existing intersection performance, with the exception of Darby Street / King Street.

The performance of the intersection of Darby Street / King Street improves from LoS D to LoS B and LoS C during the AM and PM peak respectively. The intersection also operates with spare capacity with a degree of saturation of less than 1.0. Queuing and average delays also improves.

Figure 16 summarises the performance of the intersections assessed during the AM and PM peak with the proposed development.

Figure 16 Summary of intersection performance with development



Source: AECOM, 2015

4.5 Impacts to on-street parking

The travel survey indicated that staff driving to work parked within the off-street parking facility provided. The proposed development will also provide sufficient off-street car park according to Council's DCP. Therefore, future residents and visitors are expected to park off-street and not impact the local streets in the surrounding area. Newcastle City Council may review the on-street parking scheme in the area after the development is in place.

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5.0 Travel Demand Management

5.1 Introduction

Travel Demand Management (TDM) strategies involve the application of policies, objectives, measures and targets to influence travel behaviour, to encourage uptake of sustainable forms of transport, i.e. non-car modes, wherever possible and to reduce the need to travel and hence reduce overall transport and travel demand and the impacts of new development.

5.2 Proposed sustainable travel measures

The measures include a range of different types of initiatives which together reinforce the principles and objectives of the sustainable travel strategy.

The measures support delivery of the high level transport and travel demand management objectives and support the wider principles discussed. This is how the precinct planning process will deliver a sustainable precinct, in which travel by car is not the only option for residents and visitors to make the journeys they wish to make.

5.2.1 Household Information Packs (HIPs) for each household

Each household in the proposed development would be provided with a household information pack (HIP) which would be a sustainable travel kit. This would incorporate public transport leaflets, route maps and timetables (including direction to the transport info travel information line and website and bus, train and fare information), pedestrian and cycle network maps including leisure maps, and information on sustainable community initiatives, such as Bicycle User Groups, Car Sharing Schemes, and other local community projects to reduce travel or encourage uptake of sustainable modes.

5.2.2 Car sharing scheme

The extension of providing car share parking spaces on site using an established provider (such as GoGet) for the proposed residential development should be considered. This would reduce residents need to own and operate their own vehicle, safe in the knowledge that there can get access to a vehicle if they require one.

5.2.3 Public transport measures

The public transport service improvements could encourage more people to reduce the car usage. It includes the improvements of:

- Bus network coverage
- Frequency of bus services
- Quality of bus stops.

5.2.4 Bicycle measures

The following measures could encourage bicycle use and promote bicycle rides and initiatives.

- Dedicated, high quality cycle routes
- Bicycle facilities such bicycle parking
- Encourage local Bicycle User Group (BUG)
- Promotion of bicycle initiatives – NSW bicycle week, cycle to work day

5.2.5 Pedestrian Measures

A highly permeable and safe pedestrian network throughout the development will encourage and facilitate pedestrian accessibility.

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6.0 Summary and Conclusions

AECOM has been commissioned by Nine Network Australia Pty Ltd (NNA) to prepare a Traffic Impact Assessment in support of a Planning Proposal for the residential development of the NBN site at Mosbri Crescent, Newcastle.

The site has very good accessibility to existing public transport services. Bus services and bus stops at Darby Street, Wolfe Street and Hunter Street can be easily accessed within a walking distance of less than ten-minutes. Bus stops at Darby Street provide services to Charlestown and Newcastle. Bus services on Hunter Street provide connectivity to a number of key areas within and surrounding Newcastle.

The shuttle bus service on Hunter Street provides services to Hamilton Station. Hamilton Station is within cycling distance to the proposed development. The station currently provides services on the Central Coast and Newcastle Line and Hunter Line. A new transport interchange is under construction at Wickham, which will be a hub for the new light rail, trains, buses and taxis. Accessibility to public transport will be further improved with the completion of the Newcastle Light Rail line.

A travel survey was undertaken which indicated 91 per cent of staff would drive, 4 per cent walked, 4 per cent arrived by bicycle/motorbike and 1 per cent were car passengers. For those who drive to work, majority of staff parked within the off-street parking facility. Based on the travel survey it has been assumed the existing NBN site generates a total of 68 and 57 vehicle trips during the AM and PM peak hour respectively. There are currently 117 parking spaces provided on site (off-street parking), which are reserved for staff and visitors.

The Concept Plan proposes a residential development of 208 residential dwellings which comprise a mix of medium and high density dwellings. Two access points to the site are proposed from Mosbri Crescent connected by the proposed internal road network providing access to parking facilities.

The proposed residential development is expected to generate 85 and 93 trips during the AM and PM peak hours respectively. With the removal of trips generated by the existing Newcastle NBN site, the proposed development is expected to generate a net increase of 17 and 36 trips during the AM and PM peak hours respectively.

The net vehicular impacts of the proposed development are considered negligible. SIDRA intersection modelling shows that the intersections assessed operate satisfactorily and no upgrades are required. The performance of the intersection of Darby Street / King Street improves from LoS D to LoS B and LoS C during the AM and PM peak respectively. The intersection also operates with spare capacity with a degree of saturation of less than 1.0.

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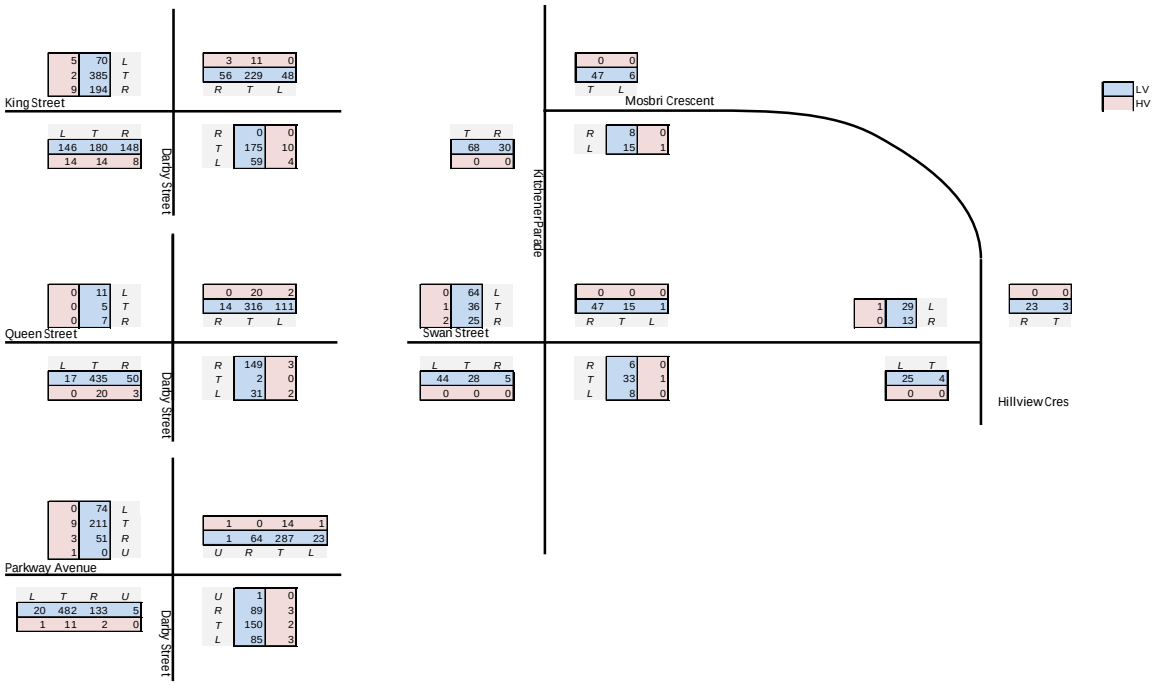
Appendix A

Existing Intersection Traffic Counts

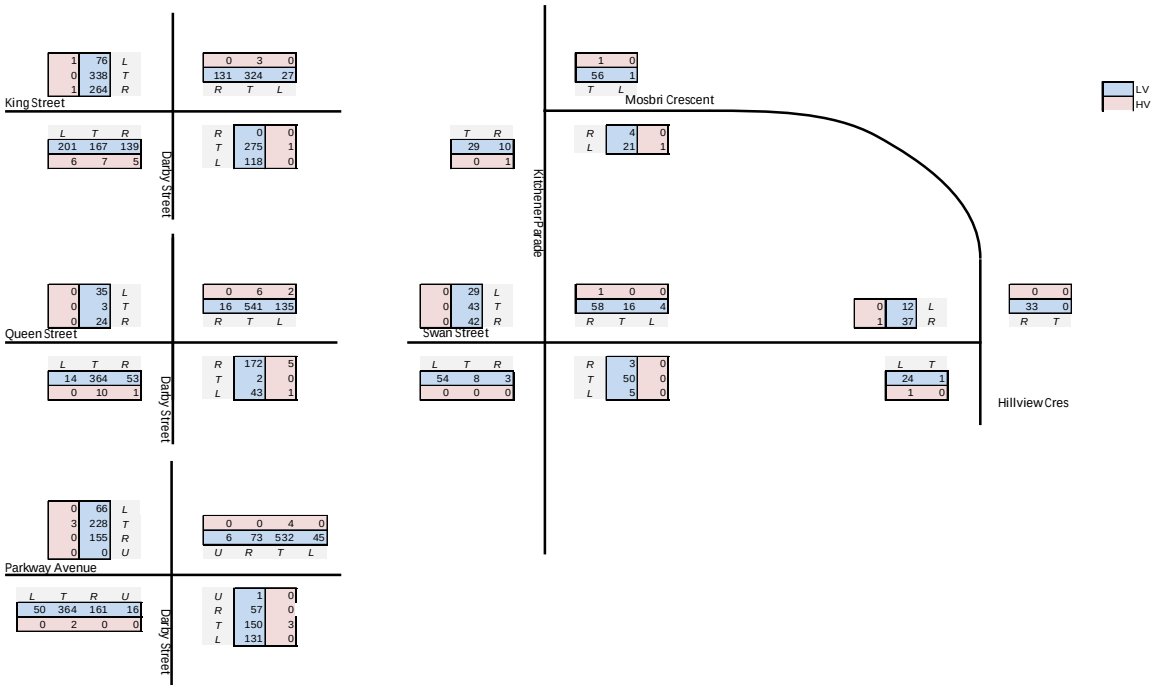
D R A F T

2015 Intersection Counts

AM Peak 1 hour (8-9am)



PM Peak 1 hour (5-6pm)



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Appendix B

Existing Intersection SIDRA Results

D R A F T

AM Peak

MOVEMENT SUMMARY

Site: King Street - Darby Street - AM turning counts

2015 AM Peak
Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	160	8.8	0.401	15.8	LOS B	7.8	58.2	0.67	0.65	34.8
2	T1	194	7.2	0.401	12.3	LOS A	7.8	58.2	0.67	0.65	34.7
3	R2	156	5.1	0.336	17.6	LOS B	3.4	25.1	0.80	0.74	33.5
Approach		510	7.1	0.401	15.0	LOS B	7.8	58.2	0.71	0.68	34.4
East: King Street East Approach											
4	L2	63	6.3	0.133	15.2	LOS B	1.1	7.8	0.79	0.70	34.4
5	T1	185	5.4	0.581	30.6	LOS C	6.2	45.3	0.97	0.79	29.9
Approach		248	5.6	0.581	26.7	LOS B	6.2	45.3	0.92	0.77	31.0
North: Darby Street North Approach											
7	L2	48	0.0	0.507	27.8	LOS B	8.0	57.5	0.86	0.79	31.8
8	T1	240	4.6	0.507	24.6	LOS B	8.0	57.5	0.86	0.79	31.4
9	R2	59	5.1	0.167	23.3	LOS B	1.5	11.2	0.76	0.71	31.8
Approach		347	4.0	0.507	24.8	LOS B	8.0	57.5	0.85	0.78	31.5
West: King Street West Approach											
10	L2	75	6.7	0.238	20.4	LOS B	3.9	28.3	0.73	0.66	33.4
11	T1	387	0.5	1.075	88.2	LOS F	37.2	265.3	0.94	1.51	20.2
12	R2	203	4.4	1.075	112.3	LOS F	37.2	265.3	1.00	1.76	18.1
Approach		665	2.4	1.075	87.9	LOS F	37.2	265.3	0.93	1.49	20.4
All Vehicles		1770	4.5	1.075	46.0	LOS D	37.2	265.3	0.85	1.01	26.6

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P2	East Full Crossing	53	24.6	LOS C	0.1	0.1	0.83	0.83
P3	North Full Crossing	53	29.8	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	22.1	LOS C	0.1	0.1	0.79	0.79
All Pedestrians		158	25.5	LOS C			0.85	0.85

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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D R A F T

AM Peak

MOVEMENT SUMMARY

Site: Darby Street - Parkway Avenue AM - turning counts

2015 AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	21	4.8	0.616	6.0	LOS A	5.9	42.3	0.75	0.73	45.3
2	T1	493	2.2	0.616	6.0	LOS A	5.9	42.3	0.75	0.73	46.1
3	R2	135	1.5	0.616	10.5	LOS A	5.9	42.3	0.75	0.73	46.4
3u	U	5	0.0	0.616	12.2	LOS A	5.9	42.3	0.75	0.73	47.1
Approach		654	2.1	0.616	7.0	LOS A	5.9	42.3	0.75	0.73	46.2
East: Parkway Avenue East Approach											
4	L2	88	3.4	0.383	6.2	LOS A	2.6	18.5	0.70	0.73	45.1
5	T1	152	1.3	0.383	5.8	LOS A	2.6	18.5	0.70	0.73	46.2
6	R2	92	3.3	0.383	10.3	LOS A	2.6	18.5	0.70	0.73	46.2
6u	U	1	0.0	0.383	12.0	LOS A	2.6	18.5	0.70	0.73	47.2
Approach		333	2.4	0.383	7.1	LOS A	2.6	18.5	0.70	0.73	45.9
North: Darby Street North Approach											
7	L2	24	4.2	0.426	5.6	LOS A	3.0	21.9	0.71	0.70	45.5
8	T1	301	4.7	0.426	5.7	LOS A	3.0	21.9	0.71	0.70	46.4
9	R2	64	0.0	0.426	10.1	LOS A	3.0	21.9	0.71	0.70	46.7
9u	U	2	50.0	0.426	13.6	LOS A	3.0	21.9	0.71	0.70	46.7
Approach		391	4.1	0.426	6.4	LOS A	3.0	21.9	0.71	0.70	46.4
West: Parkway Avenue West Approach											
10	L2	74	0.0	0.559	11.9	LOS A	5.0	36.5	0.93	1.05	42.6
11	T1	220	4.1	0.559	11.7	LOS A	5.0	36.5	0.93	1.05	43.5
12	R2	54	5.6	0.559	16.2	LOS B	5.0	36.5	0.93	1.05	43.5
12u	U	1	100.0	0.559	23.7	LOS B	5.0	36.5	0.93	1.05	43.8
Approach		349	3.7	0.559	12.5	LOS A	5.0	36.5	0.93	1.05	43.3
All Vehicles		1727	3.0	0.616	8.0	LOS A	5.9	42.3	0.77	0.78	45.6

Level of Service (LOS) Method: Delay (RTA NSW).
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.

Organisation: AECOM AUSTRALIA PTY LTD | Processed: Tuesday, 24 November 2015 1:11:01 PM
Project: \\ausyd1fp001\Projects\604X\60447663\4. Tech work area\4.1 Transport Planning\SIDRA\Darby Street - Parkway Avenue.sip6

D R A F T

AM Peak

MOVEMENT SUMMARY

Site: Darby Street - Queen Street - AM turning counts

2015 AM Peak
Signals - Fixed Time Isolated Cycle Time = 63 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	17	0.0	0.016	10.1	LOS A	0.2	1.6	0.46	0.58	39.2
2	T1	455	4.4	0.569	10.4	LOS A	10.4	75.5	0.71	0.64	35.8
3	R2	53	5.7	0.569	13.9	LOS A	10.4	75.5	0.71	0.64	38.8
Approach		525	4.4	0.569	10.7	LOS A	10.4	75.5	0.70	0.64	36.2
East: Queen Street East Approach											
4	L2	33	6.1	0.073	24.2	LOS B	0.8	5.8	0.79	0.69	34.5
5	T1	2	0.0	0.387	21.8	LOS B	4.1	29.0	0.87	0.78	36.8
6	R2	152	2.0	0.387	26.4	LOS B	4.1	29.0	0.87	0.78	33.7
Approach		187	2.7	0.387	25.9	LOS B	4.1	29.0	0.86	0.76	33.9
North: Darby Street North Approach											
7	L2	113	1.8	0.111	10.5	LOS A	1.6	11.6	0.50	0.63	39.0
8	T1	336	6.0	0.360	9.0	LOS A	6.2	45.4	0.61	0.53	36.4
9	R2	14	0.0	0.360	12.4	LOS A	6.2	45.4	0.61	0.53	39.5
Approach		463	4.8	0.360	9.4	LOS A	6.2	45.4	0.58	0.56	37.1
West: Queen Street West Approach											
10	L2	11	0.0	0.023	23.7	LOS B	0.3	1.8	0.77	0.65	34.7
11	T1	5	0.0	0.030	19.3	LOS B	0.3	2.0	0.78	0.61	38.4
12	R2	7	0.0	0.030	23.9	LOS B	0.3	2.0	0.78	0.61	35.1
Approach		23	0.0	0.030	22.8	LOS B	0.3	2.0	0.77	0.63	35.6
All Vehicles		1198	4.2	0.569	12.8	LOS A	10.4	75.5	0.68	0.63	36.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	53	23.2	LOS C	0.1	0.1	0.86	0.86
P2	East Full Crossing	53	9.7	LOS A	0.1	0.1	0.56	0.56
P3	North Full Crossing	53	23.2	LOS C	0.1	0.1	0.86	0.86
P4	West Full Crossing	53	9.7	LOS A	0.1	0.1	0.56	0.56
All Pedestrians		211	16.5	LOS B			0.71	0.71

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.

Organisation: AECOM AUSTRALIA PTY LTD | Processed: Tuesday, 24 November 2015 12:20:19 PM
Project: \\ausyd1fp001\Projects\604X\60447663\4. Tech work area\4.1 Transport Planning\SIDRA\Darby Street - Queen Street.sip6

D R A F T

AM Peak

MOVEMENT SUMMARY

Site: Mosbri Crescent - Swan Street - Hillview Crescent AM - turning counts

2015 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Hillview Crescent Southeast Approach											
5	T1	25	0.0	0.015	0.0	LOS A	0.0	0.2	0.04	0.08	49.5
6	R2	4	0.0	0.015	4.7	LOS A	0.0	0.2	0.04	0.08	48.5
Approach		29	0.0	0.015	0.7	NA	0.0	0.2	0.04	0.08	49.3
NorthEast: Mosbri Crescent Northeast Approach											
7	L2	3	0.0	0.021	4.6	LOS A	0.1	0.5	0.09	0.53	46.4
9	R2	23	0.0	0.021	4.7	LOS A	0.1	0.5	0.09	0.53	46.0
Approach		26	0.0	0.021	4.7	LOS A	0.1	0.5	0.09	0.53	46.0
NorthWest: Swan Street Northwest Approach											
10	L2	30	3.3	0.023	4.6	LOS A	0.0	0.0	0.00	0.37	47.4
11	T1	13	0.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.37	47.9
Approach		43	2.3	0.023	3.2	NA	0.0	0.0	0.00	0.37	47.6
All Vehicles		98	1.0	0.023	2.9	NA	0.1	0.5	0.04	0.33	47.7

Level of Service (LOS) Method: Delay (RTA NSW).
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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Project: \\ausyd1fp001\Projects\604X\60447663\4. Tech work area\4.1 Transport Planning\SIDRA\Hillview - Mosbri Crescent - Swan Street.sip6

D R A F T

AM Peak

MOVEMENT SUMMARY

Site: Mosbri Crescent - Kitchener Parade AM - turning counts

2015 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
2	T1	68	0.0	0.053	0.1	LOS A	0.2	1.1	0.09	0.17	48.8
3	R2	30	0.0	0.053	4.7	LOS A	0.2	1.1	0.09	0.17	47.9
Approach		98	0.0	0.053	1.5	NA	0.2	1.1	0.09	0.17	48.5
East: Mosbri Crescent East Approach											
4	L2	16	6.3	0.011	4.7	LOS A	0.0	0.3	0.12	0.50	46.3
6	R2	1	0.0	0.011	5.0	LOS A	0.0	0.3	0.12	0.50	45.9
Approach		17	5.9	0.011	4.8	LOS A	0.0	0.3	0.12	0.50	46.2
North: Kitchener Parade North Approach											
7	L2	6	0.0	0.027	4.6	LOS A	0.0	0.0	0.00	0.06	49.2
8	T1	47	0.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.06	49.6
Approach		53	0.0	0.027	0.5	NA	0.0	0.0	0.00	0.06	49.6
All Vehicles		168	0.6	0.053	1.5	NA	0.2	1.1	0.06	0.17	48.6

Level of Service (LOS) Method: Delay (RTA NSW).
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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Project: \\ausyd1fp001\Projects\604X\60447663\4. Tech work area\4.1 Transport Planning\SIDRA\Kitchener Parade - Mosbri Crescent.sip6

D R A F T

AM Peak
MOVEMENT SUMMARY
Site: Kitchener Parade - Swan Street AM - turning counts

2015 AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
1	L2	44	0.0	0.065	7.6	LOS A	0.2	1.7	0.11	0.96	44.9
2	T1	28	0.0	0.065	8.0	LOS A	0.2	1.7	0.11	0.96	44.7
3	R2	5	0.0	0.065	7.6	LOS A	0.2	1.7	0.11	0.96	44.5
Approach		77	0.0	0.065	7.7	LOS A	0.2	1.7	0.11	0.96	44.8
East: Swan Street East Approach											
4	L2	8	0.0	0.026	4.7	LOS A	0.0	0.3	0.07	0.15	48.4
5	T1	34	2.9	0.026	0.1	LOS A	0.0	0.3	0.07	0.15	48.9
6	R2	6	0.0	0.026	4.8	LOS A	0.0	0.3	0.07	0.15	48.0
Approach		48	2.1	0.026	1.4	NA	0.0	0.3	0.07	0.15	48.7
North: Kitchener Parade North Approach											
7	L2	1	0.0	0.073	7.6	LOS A	0.3	1.8	0.28	0.91	44.9
8	T1	15	0.0	0.073	7.9	LOS A	0.3	1.8	0.28	0.91	44.7
9	R2	47	0.0	0.073	8.2	LOS A	0.3	1.8	0.28	0.91	44.5
Approach		63	0.0	0.073	8.1	LOS A	0.3	1.8	0.28	0.91	44.5
West: Swan Street West Approach											
10	L2	64	0.0	0.071	4.6	LOS A	0.2	1.4	0.07	0.36	47.2
11	T1	37	2.7	0.071	0.1	LOS A	0.2	1.4	0.07	0.36	47.7
12	R2	27	7.4	0.071	4.8	LOS A	0.2	1.4	0.07	0.36	46.7
Approach		128	2.3	0.071	3.3	NA	0.2	1.4	0.07	0.36	47.3
All Vehicles		316	1.3	0.073	5.1	NA	0.3	1.8	0.12	0.59	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

PM Peak

MOVEMENT SUMMARY

Site: King Street - Darby Street - PM turning counts

2015 PM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	207	2.9	0.704	32.4	LOS C	13.3	95.9	0.95	0.93	30.0
2	T1	174	4.0	0.704	29.0	LOS C	13.3	95.9	0.95	0.93	29.9
3	R2	144	3.5	0.391	23.3	LOS B	4.0	29.1	0.88	0.76	31.9
Approach		525	3.4	0.704	28.8	LOS C	13.3	95.9	0.93	0.88	30.5
East: King Street East Approach											
4	L2	118	0.0	0.191	15.7	LOS B	2.3	15.8	0.75	0.71	34.2
5	T1	276	0.4	0.638	34.9	LOS C	11.2	78.8	0.96	0.81	28.9
Approach		394	0.3	0.638	29.1	LOS C	11.2	78.8	0.90	0.78	30.3
North: Darby Street North Approach											
7	L2	27	0.0	0.783	43.9	LOS D	15.1	106.6	0.96	0.95	27.9
8	T1	327	0.9	0.783	40.7	LOS C	15.1	106.6	0.96	0.95	27.6
9	R2	131	0.0	0.360	23.3	LOS B	3.6	25.4	0.88	0.76	31.9
Approach		485	0.6	0.783	36.2	LOS C	15.1	106.6	0.94	0.90	28.7
West: King Street West Approach											
10	L2	77	1.3	0.233	20.0	LOS B	5.2	36.7	0.66	0.61	33.5
11	T1	338	0.0	1.052	69.2	LOS E	37.5	263.1	0.88	1.22	22.5
12	R2	265	0.4	1.052	100.2	LOS F	37.5	263.1	1.00	1.53	19.2
Approach		680	0.3	1.052	75.7	LOS F	37.5	263.1	0.90	1.27	21.9
All Vehicles		2084	1.2	1.052	45.9	LOS D	37.5	263.1	0.92	0.99	26.6

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P2	East Full Crossing	53	32.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	33.0	LOS D	0.1	0.1	0.86	0.86
P4	West Full Crossing	53	29.7	LOS C	0.1	0.1	0.81	0.81
All Pedestrians		158	31.6	LOS D			0.84	0.84

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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D R A F T

PM Peak
MOVEMENT SUMMARY
Site: Darby Street - Parkway Avenue PM - turning counts

2015 PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	50	0.0	0.547	4.8	LOS A	4.6	32.1	0.70	0.64	45.5
2	T1	364	0.0	0.547	4.9	LOS A	4.6	32.1	0.70	0.64	46.3
3	R2	161	0.0	0.547	9.4	LOS A	4.6	32.1	0.70	0.64	46.6
3u	U	16	0.0	0.547	11.2	LOS A	4.6	32.1	0.70	0.64	47.3
Approach		591	0.0	0.547	6.3	LOS A	4.6	32.1	0.70	0.64	46.3
East: Parkway Avenue East Approach											
4	L2	131	0.0	0.598	13.8	LOS A	5.8	40.9	0.98	1.12	41.6
5	T1	153	2.0	0.598	13.5	LOS A	5.8	40.9	0.98	1.12	42.6
6	R2	57	0.0	0.598	17.9	LOS B	5.8	40.9	0.98	1.12	42.6
6u	U	1	0.0	0.598	19.7	LOS B	5.8	40.9	0.98	1.12	43.4
Approach		342	0.9	0.598	14.4	LOS A	5.8	40.9	0.98	1.12	42.2
North: Darby Street North Approach											
7	L2	45	0.0	0.803	15.3	LOS B	12.4	87.3	1.00	1.23	41.2
8	T1	536	0.7	0.803	15.4	LOS B	12.4	87.3	1.00	1.23	41.8
9	R2	73	0.0	0.803	19.9	LOS B	12.4	87.3	1.00	1.23	42.1
9u	U	6	0.0	0.803	21.7	LOS B	12.4	87.3	1.00	1.23	42.6
Approach		660	0.6	0.803	16.0	LOS B	12.4	87.3	1.00	1.23	41.8
West: Parkway Avenue West Approach											
10	L2	66	0.0	0.609	10.7	LOS A	6.0	42.0	0.90	1.01	42.8
11	T1	231	1.3	0.609	10.4	LOS A	6.0	42.0	0.90	1.01	43.8
12	R2	155	0.0	0.609	14.8	LOS B	6.0	42.0	0.90	1.01	43.8
12u	U	1	0.0	0.609	16.6	LOS B	6.0	42.0	0.90	1.01	44.7
Approach		453	0.7	0.609	12.0	LOS A	6.0	42.0	0.90	1.01	43.7
All Vehicles		2046	0.5	0.803	12.0	LOS A	12.4	87.3	0.89	0.99	43.5

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

PM Peak
MOVEMENT SUMMARY

Site: Darby Street - Queen Street - PM turning counts

2015 PM Peak
Signals - Fixed Time Isolated Cycle Time = 62 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	14	0.0	0.013	9.7	LOS A	0.2	1.3	0.45	0.57	39.4
2	T1	374	2.7	0.525	10.8	LOS A	8.7	61.9	0.70	0.64	35.6
3	R2	54	1.9	0.525	14.3	LOS A	8.7	61.9	0.70	0.64	38.6
Approach		442	2.5	0.525	11.2	LOS A	8.7	61.9	0.70	0.63	36.1
East: Queen Street East Approach											
4	L2	44	2.3	0.100	24.7	LOS B	1.1	7.5	0.81	0.71	34.4
5	T1	2	0.0	0.494	22.8	LOS B	4.9	35.1	0.91	0.80	36.4
6	R2	177	2.8	0.494	27.4	LOS B	4.9	35.1	0.91	0.80	33.4
Approach		223	2.7	0.494	26.9	LOS B	4.9	35.1	0.89	0.78	33.6
North: Darby Street North Approach											
7	L2	137	1.5	0.132	10.2	LOS A	1.9	13.8	0.50	0.63	39.2
8	T1	547	1.1	0.583	9.2	LOS A	10.7	75.9	0.67	0.60	36.3
9	R2	16	0.0	0.583	12.6	LOS A	10.7	75.9	0.67	0.60	39.4
Approach		700	1.1	0.583	9.5	LOS A	10.7	75.9	0.64	0.61	36.9
West: Queen Street West Approach											
10	L2	35	0.0	0.078	24.5	LOS B	0.8	5.8	0.80	0.70	34.4
11	T1	3	0.0	0.074	20.1	LOS B	0.6	4.5	0.80	0.68	37.6
12	R2	24	0.0	0.074	24.6	LOS B	0.6	4.5	0.80	0.68	34.4
Approach		62	0.0	0.078	24.3	LOS B	0.8	5.8	0.80	0.69	34.5
All Vehicles		1427	1.8	0.583	13.4	LOS A	10.7	75.9	0.70	0.65	36.0

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	53	23.6	LOS C	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	9.3	LOS A	0.1	0.1	0.55	0.55
P3	North Full Crossing	53	23.6	LOS C	0.1	0.1	0.87	0.87
P4	West Full Crossing	53	9.3	LOS A	0.1	0.1	0.55	0.55
All Pedestrians		211	16.5	LOS B			0.71	0.71

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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Project: \\ausyd1fp001\Projects\604X\60447663\4. Tech work area\4.1 Transport Planning\SIDRA\Darby Street - Queen Street.sip6

D R A F T

PM Peak
MOVEMENT SUMMARY

Site: Mosbri Crescent - Swan Street - Hillview Crescent PM - turning counts

2015 PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Hillview Crescent Southeast Approach											
5	T1	25	4.0	0.014	0.0	LOS A	0.0	0.0	0.01	0.02	49.8
6	R2	1	0.0	0.014	4.7	LOS A	0.0	0.0	0.01	0.02	48.9
Approach		26	3.8	0.014	0.2	NA	0.0	0.0	0.01	0.02	49.8
NorthEast: Mosbri Crescent Northeast Approach											
7	L2	1	0.0	0.028	4.7	LOS A	0.1	0.6	0.14	0.53	46.3
9	R2	33	0.0	0.028	4.8	LOS A	0.1	0.6	0.14	0.53	45.9
Approach		34	0.0	0.028	4.8	LOS A	0.1	0.6	0.14	0.53	45.9
NorthWest: Swan Street Northwest Approach											
10	L2	12	0.0	0.026	4.6	LOS A	0.0	0.0	0.00	0.13	48.8
11	T1	38	2.6	0.026	0.0	LOS A	0.0	0.0	0.00	0.13	49.2
Approach		50	2.0	0.026	1.1	NA	0.0	0.0	0.00	0.13	49.1
All Vehicles		110	1.8	0.028	2.0	NA	0.1	0.6	0.05	0.23	48.2

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

PM Peak
MOVEMENT SUMMARY

Site: Mosbri Crescent - Kitchener Parade PM - turning counts

2015 PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
2	T1	29	0.0	0.022	0.1	LOS A	0.1	0.5	0.09	0.15	49.0
3	R2	11	9.1	0.022	4.8	LOS A	0.1	0.5	0.09	0.15	47.9
Approach		40	2.5	0.022	1.4	NA	0.1	0.5	0.09	0.15	48.7
East: Mosbri Crescent East Approach											
4	L2	22	4.5	0.018	4.8	LOS A	0.1	0.5	0.14	0.50	46.2
6	R2	4	0.0	0.018	4.9	LOS A	0.1	0.5	0.14	0.50	45.9
Approach		26	3.8	0.018	4.8	LOS A	0.1	0.5	0.14	0.50	46.2
North: Kitchener Parade North Approach											
7	L2	1	0.0	0.030	4.6	LOS A	0.0	0.0	0.00	0.01	49.5
8	T1	57	1.8	0.030	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		58	1.7	0.030	0.1	NA	0.0	0.0	0.00	0.01	49.9
All Vehicles		124	2.4	0.030	1.5	NA	0.1	0.5	0.06	0.16	48.7

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

PM Peak
MOVEMENT SUMMARY

Site: Kitchener Parade - Swan Street PM - turning counts

2015 PM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
1	L2	54	0.0	0.051	7.6	LOS A	0.2	1.4	0.13	0.92	45.0
2	T1	8	0.0	0.051	8.0	LOS A	0.2	1.4	0.13	0.92	44.8
3	R2	3	0.0	0.051	7.9	LOS A	0.2	1.4	0.13	0.92	44.6
Approach		65	0.0	0.051	7.7	LOS A	0.2	1.4	0.13	0.92	45.0
East: Swan Street East Approach											
4	L2	5	0.0	0.030	4.6	LOS A	0.0	0.2	0.02	0.08	49.0
5	T1	50	0.0	0.030	0.0	LOS A	0.0	0.2	0.02	0.08	49.5
6	R2	3	0.0	0.030	4.8	LOS A	0.0	0.2	0.02	0.08	48.5
Approach		58	0.0	0.030	0.7	NA	0.0	0.2	0.02	0.08	49.4
North: Kitchener Parade North Approach											
7	L2	4	0.0	0.092	7.6	LOS A	0.3	2.3	0.28	0.92	44.8
8	T1	16	0.0	0.092	7.9	LOS A	0.3	2.3	0.28	0.92	44.6
9	R2	59	1.7	0.092	8.3	LOS A	0.3	2.3	0.28	0.92	44.4
Approach		79	1.3	0.092	8.2	LOS A	0.3	2.3	0.28	0.92	44.5
West: Swan Street West Approach											
10	L2	29	0.0	0.063	4.7	LOS A	0.3	1.8	0.12	0.32	47.4
11	T1	43	0.0	0.063	0.1	LOS A	0.3	1.8	0.12	0.32	47.8
12	R2	42	0.0	0.063	4.7	LOS A	0.3	1.8	0.12	0.32	46.9
Approach		114	0.0	0.063	3.0	NA	0.3	1.8	0.12	0.32	47.4
All Vehicles		316	0.3	0.092	4.8	NA	0.3	2.3	0.14	0.55	46.5

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

Appendix C

Future Intersection SIDRA Results

D R A F T

AM Peak
MOVEMENT SUMMARY

Site: King Street - Darby Street - AM with development

AM Peak with development
Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	189	7.4	0.537	21.5	LOS B	10.3	76.9	0.82	0.75	33.0
2	T1	194	7.2	0.537	18.0	LOS B	10.3	76.9	0.82	0.75	32.9
3	R2	156	5.1	0.465	23.1	LOS B	4.1	30.1	0.91	0.77	31.9
Approach		539	6.7	0.537	20.7	LOS B	10.3	76.9	0.85	0.75	32.6
East: King Street East Approach											
4	L2	63	6.3	0.157	16.2	LOS B	1.0	7.4	0.84	0.71	34.1
5	T1	185	5.4	0.697	34.3	LOS C	6.6	48.6	1.00	0.89	29.1
Approach		248	5.6	0.697	29.7	LOS C	6.6	48.6	0.96	0.85	30.2
North: Darby Street North Approach											
7	L2	48	0.0	0.689	34.5	LOS C	9.4	67.7	0.97	0.92	30.0
8	T1	240	4.6	0.689	31.3	LOS C	9.4	67.7	0.97	0.92	29.7
9	R2	59	5.1	0.218	28.8	LOS C	1.7	12.7	0.85	0.73	30.4
Approach		347	4.0	0.689	31.3	LOS C	9.4	67.7	0.95	0.89	29.8
West: King Street West Approach											
10	L2	75	6.7	0.160	15.3	LOS B	2.7	19.8	0.61	0.60	34.9
11	T1	387	0.5	0.722	20.6	LOS B	13.3	95.0	0.87	0.94	32.3
12	R2	170	5.3	0.722	25.8	LOS B	13.3	95.0	0.91	1.01	31.8
Approach		632	2.5	0.722	21.3	LOS B	13.3	95.0	0.85	0.92	32.4
All Vehicles		1766	4.5	0.722	24.3	LOS B	13.3	95.0	0.88	0.85	31.6

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P2	East Full Crossing	53	29.8	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	29.8	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	27.1	LOS C	0.1	0.1	0.88	0.88
All Pedestrians		158	28.9	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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D R A F T

MOVEMENT SUMMARY

Site: Darby Street - Parkway Avenue - AM with development

AM Peak with development
Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	21	4.8	0.609	6.2	LOS A	5.8	41.4	0.75	0.74	45.3
2	T1	474	2.3	0.609	6.2	LOS A	5.8	41.4	0.75	0.74	46.1
3	R2	135	1.5	0.609	10.7	LOS A	5.8	41.4	0.75	0.74	46.3
3u	U	5	0.0	0.609	12.4	LOS A	5.8	41.4	0.75	0.74	47.0
Approach		635	2.2	0.609	7.2	LOS A	5.8	41.4	0.75	0.74	46.1
East: Parkway Avenue East Approach											
4	L2	88	3.4	0.393	6.4	LOS A	2.7	19.2	0.72	0.75	45.0
5	T1	152	1.3	0.393	6.0	LOS A	2.7	19.2	0.72	0.75	46.1
6	R2	92	3.3	0.393	10.5	LOS A	2.7	19.2	0.72	0.75	46.1
6u	U	1	0.0	0.393	12.2	LOS A	2.7	19.2	0.72	0.75	47.1
Approach		333	2.4	0.393	7.3	LOS A	2.7	19.2	0.72	0.75	45.8
North: Darby Street North Approach											
7	L2	24	4.2	0.452	5.7	LOS A	3.3	23.6	0.72	0.71	45.4
8	T1	310	4.5	0.452	5.8	LOS A	3.3	23.6	0.72	0.71	46.3
9	R2	80	0.0	0.452	10.1	LOS A	3.3	23.6	0.72	0.71	46.6
9u	U	2	50.0	0.452	13.7	LOS A	3.3	23.6	0.72	0.71	46.6
Approach		416	3.8	0.452	6.6	LOS A	3.3	23.6	0.72	0.71	46.3
West: Parkway Avenue West Approach											
10	L2	75	0.0	0.548	11.3	LOS A	4.9	35.2	0.92	1.03	42.9
11	T1	220	4.1	0.548	11.1	LOS A	4.9	35.2	0.92	1.03	43.8
12	R2	54	5.6	0.548	15.7	LOS B	4.9	35.2	0.92	1.03	43.8
12u	U	1	100.0	0.548	23.0	LOS B	4.9	35.2	0.92	1.03	44.1
Approach		350	3.7	0.548	11.9	LOS A	4.9	35.2	0.92	1.03	43.6
All Vehicles		1734	2.9	0.609	8.0	LOS A	5.8	41.4	0.77	0.79	45.6

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

MOVEMENT SUMMARY

Site: Darby Street - Queen Street - AM with development

AM Peak with development
Signals - Fixed Time Isolated Cycle Time = 63 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	17	0.0	0.016	10.1	LOS A	0.2	1.6	0.46	0.58	39.2
2	T1	455	4.4	0.522	9.4	LOS A	9.4	68.6	0.66	0.60	36.2
3	R2	35	8.6	0.522	13.0	LOS A	9.4	68.6	0.66	0.60	39.2
Approach		507	4.5	0.522	9.7	LOS A	9.4	68.6	0.66	0.60	36.5
East: Queen Street East Approach											
4	L2	59	3.4	0.128	24.5	LOS B	1.4	10.3	0.80	0.72	34.4
5	T1	2	0.0	0.459	22.3	LOS B	5.0	35.2	0.89	0.79	36.6
6	R2	181	1.7	0.459	26.9	LOS B	5.0	35.2	0.89	0.79	33.5
Approach		242	2.1	0.459	26.2	LOS B	5.0	35.2	0.87	0.77	33.8
North: Darby Street North Approach											
7	L2	80	2.5	0.079	10.4	LOS A	1.1	8.1	0.49	0.62	39.1
8	T1	336	6.0	0.358	8.4	LOS A	6.0	44.1	0.59	0.52	36.6
9	R2	14	0.0	0.358	11.9	LOS A	6.0	44.1	0.59	0.52	39.7
Approach		430	5.1	0.358	8.9	LOS A	6.0	44.1	0.57	0.54	37.1
West: Queen Street West Approach											
10	L2	11	0.0	0.023	23.7	LOS B	0.3	1.8	0.77	0.65	34.7
11	T1	5	0.0	0.030	19.3	LOS B	0.3	2.0	0.78	0.61	38.4
12	R2	7	0.0	0.030	23.9	LOS B	0.3	2.0	0.78	0.61	35.1
Approach		23	0.0	0.030	22.8	LOS B	0.3	2.0	0.77	0.63	35.6
All Vehicles		1202	4.2	0.522	13.0	LOS A	9.4	68.6	0.67	0.61	36.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	53	23.2	LOS C	0.1	0.1	0.86	0.86
P2	East Full Crossing	53	9.7	LOS A	0.1	0.1	0.56	0.56
P3	North Full Crossing	53	23.2	LOS C	0.1	0.1	0.86	0.86
P4	West Full Crossing	53	9.7	LOS A	0.1	0.1	0.56	0.56
All Pedestrians		211	16.5	LOS B			0.71	0.71

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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D R A F T

MOVEMENT SUMMARY

Site: Mosbri Crescent - Swan Street - Hillview Crescent - AM with development

AM Peak with development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Hillview Crescent Southeast Approach											
5	T1	25	0.0	0.015	0.0	LOS A	0.0	0.2	0.02	0.08	49.5
6	R2	4	0.0	0.015	4.6	LOS A	0.0	0.2	0.02	0.08	48.6
Approach		29	0.0	0.015	0.6	NA	0.0	0.2	0.02	0.08	49.4
NorthEast: Mosbri Crescent Northeast Approach											
7	L2	3	0.0	0.043	4.6	LOS A	0.1	1.0	0.10	0.53	46.4
9	R2	51	0.0	0.043	4.7	LOS A	0.1	1.0	0.10	0.53	46.0
Approach		54	0.0	0.043	4.7	LOS A	0.1	1.0	0.10	0.53	46.0
NorthWest: Swan Street Northwest Approach											
10	L2	4	25.0	0.009	4.8	LOS A	0.0	0.0	0.00	0.13	48.5
11	T1	13	0.0	0.009	0.0	LOS A	0.0	0.0	0.00	0.13	49.4
Approach		17	5.9	0.009	1.1	NA	0.0	0.0	0.00	0.13	49.2
All Vehicles		100	1.0	0.043	2.9	NA	0.1	1.0	0.06	0.33	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

MOVEMENT SUMMARY

Site: Mosbri Crescent - Kitchener Parade - AM with development

AM Peak with development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
2	T1	68	0.0	0.037	0.0	LOS A	0.0	0.1	0.01	0.02	49.8
3	R2	3	0.0	0.037	4.7	LOS A	0.0	0.1	0.01	0.02	48.9
Approach		71	0.0	0.037	0.2	NA	0.0	0.1	0.01	0.02	49.8
East: Mosbri Crescent East Approach											
4	L2	43	2.3	0.051	4.7	LOS A	0.2	1.3	0.13	0.52	46.3
6	R2	27	0.0	0.051	5.0	LOS A	0.2	1.3	0.13	0.52	45.9
Approach		70	1.4	0.051	4.8	LOS A	0.2	1.3	0.13	0.52	46.1
North: Kitchener Parade North Approach											
7	L2	2	0.0	0.025	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
8	T1	47	0.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		49	0.0	0.025	0.2	NA	0.0	0.0	0.00	0.02	49.8
All Vehicles		190	0.5	0.051	1.9	NA	0.2	1.3	0.05	0.21	48.4

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

MOVEMENT SUMMARY

Site: Kitchener Parade - Swan Street - AM with development

AM Peak with development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
1	L2	44	0.0	0.065	7.7	LOS A	0.2	1.7	0.17	0.93	45.0
2	T1	28	0.0	0.065	7.9	LOS A	0.2	1.7	0.17	0.93	44.8
3	R2	5	0.0	0.065	7.7	LOS A	0.2	1.7	0.17	0.93	44.6
Approach		77	0.0	0.065	7.7	LOS A	0.2	1.7	0.17	0.93	44.9
East: Swan Street East Approach											
4	L2	8	0.0	0.039	4.6	LOS A	0.0	0.3	0.03	0.10	48.9
5	T1	61	1.6	0.039	0.0	LOS A	0.0	0.3	0.03	0.10	49.3
6	R2	6	0.0	0.039	4.7	LOS A	0.0	0.3	0.03	0.10	48.4
Approach		75	1.3	0.039	0.9	NA	0.0	0.3	0.03	0.10	49.2
North: Kitchener Parade North Approach											
7	L2	1	0.0	0.104	7.5	LOS A	0.4	2.6	0.27	0.92	44.9
8	T1	15	0.0	0.104	7.8	LOS A	0.4	2.6	0.27	0.92	44.6
9	R2	74	0.0	0.104	8.2	LOS A	0.4	2.6	0.27	0.92	44.5
Approach		90	0.0	0.104	8.1	LOS A	0.4	2.6	0.27	0.92	44.5
West: Swan Street West Approach											
10	L2	38	0.0	0.043	4.7	LOS A	0.2	1.2	0.13	0.42	46.7
11	T1	11	9.1	0.043	0.2	LOS A	0.2	1.2	0.13	0.42	47.1
12	R2	27	7.4	0.043	4.8	LOS A	0.2	1.2	0.13	0.42	46.1
Approach		76	3.9	0.043	4.1	NA	0.2	1.2	0.13	0.42	46.6
All Vehicles		318	1.3	0.104	5.3	NA	0.4	2.6	0.15	0.61	46.1

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

PM Peak

MOVEMENT SUMMARY

Site: King Street - Darby Street - PM with development

PM Peak with development
Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	183	3.3	0.720	33.7	LOS C	13.0	94.0	0.96	0.93	29.7
2	T1	174	4.0	0.720	30.2	LOS C	13.0	94.0	0.96	0.93	29.6
3	R2	144	3.5	0.551	28.7	LOS C	4.7	33.7	0.96	0.78	30.4
Approach		501	3.6	0.720	31.0	LOS C	13.0	94.0	0.96	0.89	29.9
East: King Street East Approach											
4	L2	118	0.0	0.272	19.5	LOS B	2.3	16.4	0.86	0.74	33.1
5	T1	276	0.4	0.851	47.1	LOS D	13.5	94.7	1.00	1.06	26.4
Approach		394	0.3	0.851	38.9	LOS C	13.5	94.7	0.96	0.96	28.1
North: Darby Street North Approach											
7	L2	27	0.0	0.852	51.2	LOS D	16.7	117.6	0.99	1.08	26.4
8	T1	327	0.9	0.852	48.0	LOS D	16.7	117.6	0.99	1.08	26.2
9	R2	131	0.0	0.489	28.1	LOS B	4.2	29.4	0.94	0.77	30.6
Approach		485	0.6	0.852	42.8	LOS D	16.7	117.6	0.97	0.99	27.3
West: King Street West Approach											
10	L2	77	1.3	0.192	16.1	LOS B	4.3	30.5	0.57	0.56	34.8
11	T1	338	0.0	0.870	33.0	LOS C	21.7	152.4	0.86	1.02	29.0
12	R2	297	0.3	0.870	45.9	LOS D	21.7	152.4	1.00	1.24	26.9
Approach		712	0.3	0.870	36.5	LOS C	21.7	152.4	0.89	1.06	28.6
All Vehicles		2092	1.1	0.870	37.1	LOS C	21.7	152.4	0.94	0.99	28.5

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P2	East Full Crossing	53	33.9	LOS D	0.1	0.1	0.87	0.87
P3	North Full Crossing	53	37.4	LOS D	0.1	0.1	0.91	0.91
P4	West Full Crossing	53	31.3	LOS D	0.1	0.1	0.84	0.84
All Pedestrians		158	34.2	LOS D			0.87	0.87

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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D R A F T

MOVEMENT SUMMARY

Site: Darby Street - Parkway Avenue - PM with development

PM Peak with development
Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	50	0.0	0.562	4.8	LOS A	4.8	33.9	0.70	0.63	45.5
2	T1	386	0.5	0.562	4.9	LOS A	4.8	33.9	0.70	0.63	46.3
3	R2	161	0.0	0.562	9.4	LOS A	4.8	33.9	0.70	0.63	46.6
3u	U	16	0.0	0.562	11.2	LOS A	4.8	33.9	0.70	0.63	47.3
Approach		613	0.3	0.562	6.2	LOS A	4.8	33.9	0.70	0.63	46.3
East: Parkway Avenue East Approach											
4	L2	131	0.0	0.586	13.1	LOS A	5.6	39.3	0.97	1.10	41.9
5	T1	153	2.0	0.586	12.9	LOS A	5.6	39.3	0.97	1.10	42.9
6	R2	57	0.0	0.586	17.2	LOS B	5.6	39.3	0.97	1.10	42.9
6u	U	1	0.0	0.586	19.1	LOS B	5.6	39.3	0.97	1.10	43.7
Approach		342	0.9	0.586	13.7	LOS A	5.6	39.3	0.97	1.10	42.5
North: Darby Street North Approach											
7	L2	45	0.0	0.788	14.5	LOS B	11.6	81.9	1.00	1.20	41.6
8	T1	530	0.8	0.788	14.6	LOS B	11.6	81.9	1.00	1.20	42.2
9	R2	64	0.0	0.788	19.1	LOS B	11.6	81.9	1.00	1.20	42.5
9u	U	6	0.0	0.788	20.9	LOS B	11.6	81.9	1.00	1.20	43.0
Approach		645	0.6	0.788	15.1	LOS B	11.6	81.9	1.00	1.20	42.2
West: Parkway Avenue West Approach											
10	L2	79	0.0	0.642	11.9	LOS A	6.7	47.2	0.93	1.06	42.3
11	T1	231	1.3	0.642	11.6	LOS A	6.7	47.2	0.93	1.06	43.2
12	R2	155	0.0	0.642	16.0	LOS B	6.7	47.2	0.93	1.06	43.3
12u	U	1	0.0	0.642	17.8	LOS B	6.7	47.2	0.93	1.06	44.1
Approach		466	0.6	0.642	13.1	LOS A	6.7	47.2	0.93	1.06	43.1
All Vehicles		2066	0.6	0.788	11.8	LOS A	11.6	81.9	0.89	0.99	43.6

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

MOVEMENT SUMMARY

Site: Darby Street - Queen Street - PM with development

PM Peak with development
Signals - Fixed Time Isolated Cycle Time = 62 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Darby Street South Approach											
1	L2	14	0.0	0.013	9.7	LOS A	0.2	1.3	0.45	0.57	39.4
2	T1	374	2.7	0.655	13.8	LOS A	10.9	77.7	0.81	0.73	34.5
3	R2	88	1.1	0.655	17.3	LOS B	10.9	77.7	0.81	0.73	37.3
Approach		476	2.3	0.655	14.3	LOS A	10.9	77.7	0.80	0.73	35.1
East: Queen Street East Approach											
4	L2	21	4.8	0.048	24.3	LOS B	0.5	3.6	0.79	0.68	34.5
5	T1	2	0.0	0.428	22.4	LOS B	4.2	29.9	0.89	0.78	36.5
6	R2	153	3.3	0.428	27.0	LOS B	4.2	29.9	0.89	0.78	33.5
Approach		176	3.4	0.428	26.6	LOS B	4.2	29.9	0.88	0.77	33.6
North: Darby Street North Approach											
7	L2	169	1.2	0.163	10.4	LOS A	2.4	17.3	0.51	0.64	39.1
8	T1	547	1.1	0.609	9.8	LOS A	11.1	78.4	0.69	0.62	36.1
9	R2	16	0.0	0.609	13.3	LOS A	11.1	78.4	0.69	0.62	39.2
Approach		732	1.1	0.609	10.0	LOS A	11.1	78.4	0.65	0.62	36.8
West: Queen Street West Approach											
10	L2	35	0.0	0.078	24.5	LOS B	0.8	5.8	0.80	0.70	34.4
11	T1	3	0.0	0.071	20.0	LOS B	0.6	4.5	0.80	0.68	37.6
12	R2	24	0.0	0.071	24.6	LOS B	0.6	4.5	0.80	0.68	34.4
Approach		62	0.0	0.078	24.3	LOS B	0.8	5.8	0.80	0.69	34.5
All Vehicles		1446	1.7	0.655	14.1	LOS A	11.1	78.4	0.74	0.68	35.7

Level of Service (LOS) Method: Delay (RTA NSW).
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 ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	53	23.6	LOS C	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	9.3	LOS A	0.1	0.1	0.55	0.55
P3	North Full Crossing	53	23.6	LOS C	0.1	0.1	0.87	0.87
P4	West Full Crossing	53	9.3	LOS A	0.1	0.1	0.55	0.55
All Pedestrians		211	16.5	LOS B			0.71	0.71

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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D R A F T

MOVEMENT SUMMARY

Site: Mosbri Crescent - Swan Street - Hillview Crescent – PM with development

PM Peak with development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Hillview Crescent Southeast Approach											
5	T1	25	4.0	0.014	0.0	LOS A	0.0	0.0	0.02	0.02	49.8
6	R2	1	0.0	0.014	4.8	LOS A	0.0	0.0	0.02	0.02	48.9
Approach		26	3.8	0.014	0.2	NA	0.0	0.0	0.02	0.02	49.8
NorthEast: Mosbri Crescent Northeast Approach											
7	L2	1	0.0	0.003	4.7	LOS A	0.0	0.1	0.13	0.52	46.3
9	R2	3	0.0	0.003	4.8	LOS A	0.0	0.1	0.13	0.52	45.9
Approach		4	0.0	0.003	4.8	LOS A	0.0	0.1	0.13	0.52	46.0
NorthWest: Swan Street Northwest Approach											
10	L2	45	0.0	0.044	4.6	LOS A	0.0	0.0	0.00	0.29	47.9
11	T1	38	2.6	0.044	0.0	LOS A	0.0	0.0	0.00	0.29	48.3
Approach		83	1.2	0.044	2.5	NA	0.0	0.0	0.00	0.29	48.1
All Vehicles		113	1.8	0.044	2.0	NA	0.0	0.1	0.01	0.24	48.4

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

MOVEMENT SUMMARY

Site: Mosbri Crescent - Kitchener Parade - PM with development

PM Peak with development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
2	T1	29	0.0	0.042	0.2	LOS A	0.2	1.4	0.16	0.32	47.8
3	R2	45	2.2	0.042	4.8	LOS A	0.2	1.4	0.16	0.32	46.9
Approach		74	1.4	0.042	3.0	NA	0.2	1.4	0.16	0.32	47.2
East: Mosbri Crescent East Approach											
4	L2	4	25.0	0.008	5.0	LOS A	0.0	0.2	0.16	0.52	45.9
6	R2	6	0.0	0.008	5.0	LOS A	0.0	0.2	0.16	0.52	45.8
Approach		10	10.0	0.008	5.0	LOS A	0.0	0.2	0.16	0.52	45.9
North: Kitchener Parade North Approach											
7	L2	16	0.0	0.038	4.6	LOS A	0.0	0.0	0.00	0.12	48.8
8	T1	57	1.8	0.038	0.0	LOS A	0.0	0.0	0.00	0.12	49.3
Approach		73	1.4	0.038	1.0	NA	0.0	0.0	0.00	0.12	49.2
All Vehicles		157	1.9	0.042	2.2	NA	0.2	1.4	0.09	0.24	48.0

Level of Service (LOS) Method: Delay (RTA NSW).
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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D R A F T

MOVEMENT SUMMARY

Site: Kitchener Parade - Swan Street - PM with development

PM Peak with development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kitchener Parade South Approach											
1	L2	54	0.0	0.050	7.5	LOS A	0.2	1.4	0.06	0.97	45.0
2	T1	8	0.0	0.050	8.2	LOS A	0.2	1.4	0.06	0.97	44.7
3	R2	3	0.0	0.050	7.9	LOS A	0.2	1.4	0.06	0.97	44.6
Approach		65	0.0	0.050	7.6	LOS A	0.2	1.4	0.06	0.97	44.9
East: Swan Street East Approach											
4	L2	5	0.0	0.015	4.7	LOS A	0.0	0.2	0.07	0.15	48.5
5	T1	20	0.0	0.015	0.1	LOS A	0.0	0.2	0.07	0.15	48.9
6	R2	3	0.0	0.015	4.9	LOS A	0.0	0.2	0.07	0.15	48.0
Approach		28	0.0	0.015	1.4	NA	0.0	0.2	0.07	0.15	48.7
North: Kitchener Parade North Approach											
7	L2	4	0.0	0.071	7.7	LOS A	0.2	1.8	0.30	0.91	44.8
8	T1	16	0.0	0.071	8.0	LOS A	0.2	1.8	0.30	0.91	44.6
9	R2	41	2.4	0.071	8.5	LOS A	0.2	1.8	0.30	0.91	44.4
Approach		61	1.6	0.071	8.3	LOS A	0.2	1.8	0.30	0.91	44.5
West: Swan Street West Approach											
10	L2	62	0.0	0.096	4.6	LOS A	0.3	2.1	0.06	0.30	47.7
11	T1	75	0.0	0.096	0.0	LOS A	0.3	2.1	0.06	0.30	48.1
12	R2	42	0.0	0.096	4.6	LOS A	0.3	2.1	0.06	0.30	47.2
Approach		179	0.0	0.096	2.7	NA	0.3	2.1	0.06	0.30	47.7
All Vehicles		333	0.3	0.096	4.6	NA	0.3	2.1	0.10	0.53	46.6

Level of Service (LOS) Method: Delay (RTA NSW).
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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