

HILFOR PROJECT PTY LTD

TRANSPORT REPORT FOR
PROPOSED REZONING,
32-48 SILVERWATER ROAD & I-17
GREY STREET, SILVERWATER

MAY 2014

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TABLE OF CONTENTS

1. INTRODUCTION	1
2. EXISTING CONDITIONS.....	5
3. IMPLICATIONS OF PROPOSED DEVELOPMENT	11

APPENDIX - SIDRA OUTPUT SUMMARIES

I. INTRODUCTION

I.1 Colston Budd Hunt and Kafes Pty Ltd has been commissioned by Hilfor Project Pty Ltd to prepare a report assessing the transport implications of a proposed rezoning at 32-48 Silverwater Road and 1-17 Grey Street at Silverwater. The site location is shown on Figure 1.

I.2 The site is occupied by a commercial building previously used by a dry cleaner, a café and residential dwellings. It is proposed to rezone the site to B2 local centre. A potential scale of development includes some 3,500m² retail, 500m² commercial plus 250 residential apartments.

I.3 The planning proposal was originally submitted in June 2013. A Council resolution of 4 December 2013 included the following:

I. That Council prepare a Planning Proposal in accordance with Section 55 of the Environmental Planning and Assessment Act 1979 (EP&A Act), to amend Auburn Local Environmental Plan 2010 to:

a) Rezone land at 1-17 Grey Street and 32-48 Silverwater Road, Silverwater to B2 Local Centre;

b) Prior to sending to Gateway undertake and complete the following studies;

i) Revise the current Transport Study as per the RMS' and Council's Preliminary comments;

I.4 The Council and RMS preliminary comments referred to in the resolution are included in section 4.3.1 and appendix 12 of the Council report considered at the meeting of 20 November 2013, and are as follows:

Council's engineering and planning units have assessed the above study submitted by the applicant as part of this application, and have provided the following comments:

- The study should take into account that there are residential properties in Grey Street west of the subject site which would be directly affected by the planning proposal;*
 - The traffic signals at the intersection of Carnarvon Street and Silverwater Road need to be analysed to assess whether extension of right turn lanes in Carnarvon Street approaching west and Silverwater Road northern approach is required. Any extension would require RMS approval.*
 - Carnarvon Street currently experiences excessive traffic queue lengths during peak hours and the proposed mix use development would aggravate this;*
 - The peak hour traffic entering the intersection from the western approach of Carnarvon Street would increase by approximately 50% as a result of this planning proposal;*
 - The queue length of vehicles on Carnarvon Street would adversely affect the operation of the Grey and Carnarvon Street intersection;*
 - The study does not consider existing traffic impacts of the Silverwater Road-Parramatta Road intersection located 530 metres south, and the M4 Motorway access ramps located on Silverwater Road approximately 300 metres south of the subject site;*
 - The subject site is not well serviced by cycle routes (as shown in Figure 1 of this report) and is located away from current on road, off road and proposed cycle routes;*
 - The subject site is serviced by Sydney bus routes 540 and 544. The 544 route operates between Auburn Railway Station and Macquarie Shopping Centre, and route 540 operates between Auburn Railway Station and Newington Village. The two bus routes operate at 20 to 30 minute intervals from Monday to Friday during morning and afternoon peak times, and have limited (ie hourly) bus services throughout the day during weekdays and weekends. It takes approximately 15-20 minutes to travel from the subject site to Auburn Railway Station during peak times. The closest bus stops to the subject site are at Carnarvon/Stanley Street and Carnarvon/Vore Street approximately 2 to 10 minutes walking distance from the subject site (refer Figure 1);*
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- *The M92 metro and Veolia bus routes operate between Parramatta Railway Station and Sutherland Railway Station and Bankstown Railway Station via Parramatta Road. The nearest bus stops to access these routes are located approximately 650 metres from the subject site, approximately 15 – 20 minutes walking distance away.*

Reference is made to Council's correspondence dated 19 July 2013 and associated traffic models received on 26 August 2013 with regard to the abovementioned rezoning proposal, which was referred to Roads and Maritime Services (RMS) for comment.

RMS appreciates this opportunity and provides the following preliminary comments to Council to the traffic models:

Silverwater Road/Carnarvon Street intersection

- *The maximum cycle time for the intersection is 130 seconds.*
 - *The length of kerbside lane on Carnarvon Road West is incorrectly coded.*
 - *The heavy vehicle percentage for all the movements in the existing weekday AM is 5%. However, it decreases to 3% in the weekday AM with the development.*
 - *There is no additional traffic on Carnarvon Street West approach in the Weekday AM+Dev model compared to the traffic volume in the Weekday AM model. In addition, only total 60 additional vehicles are in the Weekday PM+Dev model compared to the total traffic volume in the model for Weekday PM, which is inconsistent with the estimated traffic generation in the Transport Report for the Proposed Mixed Use Rezoning, 32-34 & 38-46 Silverwater Road. In this regard, the impact of the additional traffic generated from the development is not correctly modelled at this intersection. The traffic volume input data in the models needs to be reviewed and revised.*
 - *The adjacent signalised intersection of Silverwater Road and Fariola Street, north to the intersection is approximately 685 metre apart from this intersection which is larger than 500m. The arrival type for Silverwater Road North approach should be type 4-favourable.*
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Silverwater Road/Fariola Road intersection

- *The maximum cycle time for the intersection is 130 seconds.*
- *The length of the right turn bays on Silverwater Road is incorrectly coded. The taper area of the right turn bays should not be included.*
- *The length of the kerbside lane on Fariola Street East approach is incorrectly coded. The adjacent signalised intersection of Silverwater Road and Carnarvon Road, south to the intersection is approximately 685 metre apart from this intersection which is larger than 500 m. The arrival type for Silverwater Road South approach should be type 4-favourable.*

As a result of the above, the SIDRA models should be revised and re-submitted to RMS for review.

- 1.5 In addition, Council officers, in a letter dated 9 January 2014, have provided the following comments in relation to part 1(b)i) of the Council resolution:

Applicant to revise the current Transport Study (prepared by Colston Budd Hunt and Kafes Pty Ltd) as per Roads and Maritime Services' (RMS) comments included under Appendix 12 and Council's preliminary comments included under section 4.3.1 of Council's Planning Proposal Application Assessment.

- 1.6 This report assesses the transport implications of the potential scale of development through the following chapters:

- Chapter 2 - describing the existing conditions; and
 - Chapter 3 - assessing the transport implications of the proposed development, including the matters raised by the authorities.
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2. EXISTING CONDITIONS

Site Location and Road Network

- 2.1 The site is located at 32-48 Silverwater Road and 1-17 Grey Street at Silverwater, as shown on Figure 1. It occupies the entire block bounded by Silverwater Road, Carnarvon Street, Bligh Street and Grey Street. The site is occupied by a commercial building previously used by a dry cleaner, a café and residential dwellings. Vehicular access to the site is provided from all of the streets noted above.
- 2.2 Surrounding land use includes industrial and commercial development along Silverwater Road, and north of the site. There is residential development to the south and east. The M4 Motorway is south of the site. To the west are residential properties, industrial properties, open space and a church.
- 2.3 Silverwater Road is a major road which forms part of a north-south route connecting Hornsby, Pennant Hills and Carlingford in the north with Auburn, Bankstown and the southern suburbs of Sydney in the south. In the vicinity of the site it provides a six lane divided carriageway with three traffic lanes in each direction and a 70 kilometre per hour speed limit. Clearways operate in both directions during weekday peak periods. Major intersections are signalised with additional lanes for turning traffic.
- 2.4 Carnarvon Street intersects Silverwater Road at a signalised intersection, adjacent to the site, with all turns permitted. It provides for one traffic lane and one parking lane in each direction, clear of intersections. Carnarvon Street provides access to industrial development. There are bus stops west of the site.
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- 2.5 Bligh Street connects to Silverwater Road, south of the site, at an unsignalised t-intersection. Turns at the intersection are restricted to left in/left out by the median in Silverwater Road. Bligh Street provides access to industrial and residential development. It provides for one traffic lane and one parking lane in each direction, clear of intersections.
- 2.6 Grey Street connects Carnarvon Street with Bligh Street. Both intersections are unsignalised t-intersections, with all turns permitted. Grey Street provides access to industrial properties and the subject site. It provides for one traffic lane and one parking lane in each direction, clear of intersections, and has a three tonne load limit.

Traffic Flows

- 2.7 Traffic generated by the proposed development will have its greatest effects during weekday morning and afternoon peak periods when it combines with commuter traffic on the surrounding road network. In order to gauge traffic conditions, counts were undertaken during weekday morning and afternoon peak periods at the following intersections:
- Silverwater Road/Carnarvon Street;
 - Silverwater Road/Bligh Street;
 - Grey Street/Carnarvon Street; and
 - Grey Street//Bligh Street.
- 2.8 The results of the surveys are shown in Figures 2 and 3, and summarised in Table 2.1.
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Table 2.1: Existing two-way (sum of both directions) peak hour traffic flows			
Road	Location	AM peak hour	PM peak hour
Silverwater Road	North of Carnarvon Street	3,835	3,220
	North of Bligh Street	4,400	3,840
	South of Bligh Street	4,470	3,865
Carnarvon Street	East of Silverwater Road	530	555
	West of Silverwater Road	525	615
	West of Grey Street	545	595
Bligh Street	West of Silverwater Road	80	45
	West of Grey Street	65	50
Grey Street	South of Carnarvon Street	40	20
	North of Bligh Street	65	15

- 2.9 Table 2.1 shows that Silverwater Road carried some 3,200 to 4,500 vehicles per hour two-way during the weekday morning and afternoon peak hours. Carnarvon Street carried lower flows of some 500 to 600 vehicles per hour two-way. Flows on Bligh Street and Grey Street were less than 100 vehicles per hour two-way.

Intersection Operations

- 2.10 The capacity of the road network is largely determined by the capacity of its intersections to cater for peak period traffic flows. The surveyed intersections shown in Figures 2 and 3 have been analysed using the SIDRA program.
- 2.11 SIDRA simulates the operations of intersections to provide a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle. Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- ρ For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode.
>70	=	"F"	Unsatisfactory and requires additional capacity

- ρ For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

- 2.12 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all

movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

- 2.13 The SIDRA analysis found that the signalised intersection of Silverwater Road with Carnarvon Street is operating with average delays of less than 50 seconds per vehicle during peak periods. This represents levels of service D, a satisfactory level of service for a busy intersection during peak periods.
- 2.14 At the intersection of Silverwater Road with Bligh Street, observations indicate that traffic turns from Bligh Street when gaps are created in the traffic stream by the upstream traffic signals on Silverwater Road.
- 2.15 The intersections of Grey Street with Carnarvon Street and Bligh Street are operating with average delays for the highest delayed movements of less than 15 seconds per vehicle during peak periods. This represents levels of service A/B, a good level of service.

Public Transport

- 2.16 The closest railway station to the site is Auburn, which is some 20 minutes walking distance. Auburn is on the Western (Emu Plains/Richmond to North Sydney via the City) and South (Macarthur to City via Granville) Lines.
- 2.17 Services through Auburn are every 30 minutes in each direction on the Western Lines and every 15 to 30 minutes in each direction on the South Line. During weekday peak periods, services are every 10 to 15 minutes in each direction.
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- 2.18 Local bus services are provided by Sydney Buses. As previously discussed, there are bus stops on Carnarvon Street, west of the site.
- 2.19 Route 544 connects Auburn, Silverwater, Ermington, Eastwood, Deniston East, Macquarie University and Macquarie Centre. Services are every 60 minutes in each direction, Monday to Saturday, and every 15 to 30 minutes during weekday peak periods. Services include a link to Auburn railway station.
- 2.20 Route 540 operates along Carnarvon Street and Vore Street and connects Auburn and Newington. It provides a weekday peak period service.
- 2.21 There is a north-south cycle route west of site which connects Auburn with Sydney Olympic Park. This route connects to the wider cycle network within the LGA.
- 2.22 The draft Metropolitan Strategy for Sydney identifies the need for a future viable and frequent public transport service along the Parramatta Road corridor, in which the site is located.
- 2.23 The site is therefore accessible by existing public transport services, and close to future planned services along Parramatta Road.
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3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1 It is proposed to rezone the site to B2 local centre. A potential scale of development includes some 3,500m² retail, 500m² commercial plus 250 residential apartments. Vehicular access is proposed from Grey Street.

3.2 Parking will be provided in accordance with appropriate Council and RMS controls at the time that a development application is made. This chapter assesses the transport implications of the proposed development through the following sections:

- ❑ policy context;
- ❑ public transport, walking and cycling;
- ❑ travel access guide;
- ❑ access, servicing and internal layout;
- ❑ traffic generation and effects;
- ❑ matters raised by authorities; and
- ❑ summary.

Policy Context

- Metropolitan Transport Plan

3.3 The Metropolitan Transport Plan – Connecting the City of Cities has four key policy objectives:

- commuting to work easily and quickly;
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- transport and services accessible to all members of the community;
- an efficient, integrated and customer focused public transport system; and
- revitalized neighbourhoods with improved transport hubs.

3.4 It includes a target of 28 per cent of trips to work in the Sydney Metropolitan Region to be undertaken by public transport by 2016, compared to some 22 per cent in 2006.

3.5 To help achieve these objectives, it identifies, in conjunction with the metropolitan strategy, key areas of future housing and employment growth in Sydney to 2020 and 2036. Additionally, it outlines a 10 year funding program to 2020 for the following transport projects:

- rail line extensions for more platforms at CBD stations;
 - rail lines to north west and south west Sydney;
 - light rail in the CBD and further extension to the Inner West;
 - more air conditioned train carriages;
 - 1,000 additional buses;
 - completion of the 43 strategic bus corridors across Sydney;
 - completion of the highest priority missing links in the Sydney Strategic Cycleway Network.
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- NSW 2021

3.6 NSW 2021: A Plan to Make NSW Number One sets targets to increase the proportion of commuter trips made by public transport for various areas within Sydney by 2016, including:

- 80 per cent in the Sydney CBD;
- 50 per cent in the Parramatta CBD;
- 20 per cent in the Liverpool CBD; and
- 25 per cent in the Penrith CBD.

3.7 It also has targets to:

- improve road safety and reduce fatalities to 4.3 per 100,000 population by 2016;
- double the mode share of bicycle trips made in the metropolitan area by 2016; and
- increase the proportion of the population living within 30 minutes by public transport of a city or major centre in the metropolitan area.

3.8 The following sections discuss how the proposed development satisfies these objectives and the measures proposed to achieve them.

Public Transport, Walking and Cycling

3.9 As previously discussed, the site is accessible by bus services which connect to surrounding areas including Auburn, Silverwater, Ermington, Newington, Eastwood, Deniston East, Macquarie University and Macquarie Centre. Services include a link to Auburn railway station. There are bicycle routes close to the site which connects to surrounding areas and the wider network within Auburn. The planned future provision of public transport along Parramatta Road will further improve the site's accessibility.

- 3.10 Existing public transport services will provide for people to access the development by public transport, walking and cycling, for residents, and for employees in the retail component. To support accessibility by bicycles, appropriate bicycle parking, in accordance with Council requirements, should be provided. Provision will be included for a bus stop on Silverwater Road, adjacent to the site.
- 3.11 The development will therefore satisfy the objectives of the Metropolitan Transport Plan and NSW 2021 as follows:
- ❑ enabling commuters to readily access trains and buses close to the site (Metropolitan Transport Plan objective);
 - ❑ providing an appropriate level of on-site parking, with reference to appropriate Council and RMS requirements, to encourage public transport use and increase the proportion of trips by public transport (Metropolitan Transport Plan objective);
 - ❑ providing residential development close to employment centres in Silverwater and Sydney Olympic Park, to reduce the need for travel; and
 - ❑ improving pedestrian connectivity in the area by providing a through site pedestrian link between Grey Street and Silverwater Road.

Travel Access Guide

- 3.12 To encourage travel modes other than private vehicle, a travel demand management approach should be adopted, through a travel access guide to meet
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the specific needs of future residents, employees and visitors. The specific requirements and needs of these groups should be incorporated in the travel access guide to support the objectives of encouraging the use of public transport.

3.13 The principles of the travel access guide, which should be developed as part of a future development application in consultation with Council, RMS, public transport providers and other stakeholders, would include the following:

- encourage the use of public transport, including rail and bus services close to the site;
 - identify existing bus routes which stop near the site, including the location of bus stops and pedestrian crossings at signalised intersections;
 - work with public transport providers to improve services;
 - encourage public transport by residents and employees through the provision of information, maps and timetables in the travel access guide;
 - raise awareness of health benefits of walking and cycling (including maps showing walking and cycling routes);
 - encourage cycling by providing safe and secure bicycle parking, including the provision of lockers and rails;
 - provide appropriate on-site parking provision, consistent with appropriate Council/RMS controls and the objective of reducing traffic generation.
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- 3.14 The travel access guide should be developed in accordance with the principles identified by Transport for NSW and RMS, and distributed with marketing material for the site. The travel access guide would assist in delivering sustainable transport objectives by considering the means available for reducing dependence solely on cars for travel purposes, encouraging the use of public transport and supporting the efficient and viable operation of public transport services.

Access, Servicing and Internal Layout

- 3.15 Vehicular access to the proposed development would be provided from Grey Street. Driveways will provide for two-way traffic, with all movements permitted, and should be provided with widths and grades in accordance with the Australian Standard for Parking Facilities (Part 1: Off-street car parking), AS 2890.1:2004. The driveways will include maximum grades of 1:20 for six metres inside the property line for appropriate visibility between pedestrians and exiting vehicles.
- 3.16 A shared zone will be provided, running east-west through the site, for cars and pedestrians. It will provide vehicular access to buildings within the development, from Grey Street. It will not provide a vehicular connection to Silverwater Road. Pedestrians will be able to walk through the site between Grey Street and Silverwater Road.
- 3.17 At the development application stage, the parking space dimensions, aisle widths, column locations and height clearances should be provided in accordance with AS 2890.1:2004.
- 3.18 Appropriate provision for service vehicles should be included within the development. Service vehicles will include garbage collection and deliveries to the
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retail and commercial components. The design should provide for service vehicles to enter and exit the site in a forward direction, with service vehicle areas to be provided in accordance with AS 2890.2 – 2002. The size of trucks will depend on final retail tenancies, but will likely include rigid trucks and semi-trailers.

Traffic Generation and Effects

- 3.19 Traffic generated by the proposed development will have its greatest effects during weekday morning and afternoon peak periods when it combines with commuter traffic. The RMS “Guide to Traffic Generating Developments” indicates that high density residential apartments in town centre locations close to public transport generate 0.29 vehicles per hour per dwelling, two-way, during peak hours. Medium density developments generate some 0.4 to 0.65 vehicles per hour two-way.
- 3.20 Based on the above, the proposed development would be likely to have a traffic generation of some 0.3 to 0.4 vehicles per hour per dwelling two-way at peak times. Therefore, traffic generation of the residential component would be some 75 to 100 vehicles per hour two-way at peak times.
- 3.21 The RMS guidelines suggest a traffic generation of some two vehicles per hour per 100m² for commercial development at peak times. Therefore, the commercial component would generate some 10 vehicles per hour two-way at peak times.
- 3.22 The RMS “Guide to Traffic Generating Developments” indicates that small retail developments generate some 12.3 vehicles per hour per 100m² two-way during weekday afternoon peak hours. During the weekday morning peak hour, the generation is significantly lower as trading is low and many shops are not open.
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- 3.23 For the morning peak hour, we have assessed a generation of 20 per cent of the afternoon peak hour.
- 3.24 The retail component would therefore have a traffic generation of some 85 and 430 vehicles per hour two-way during morning and afternoon peak hours respectively. Total traffic generation would therefore be some 170 to 195 and 515 to 540 vehicles per hour two-way during morning and afternoon peak hours respectively.
- 3.25 The RMS guidelines indicate that some 25 per cent of retail traffic is passing trade (customers who would have driven past the site regardless of their visit to the site). Our assessment is based on 25 per cent of retail traffic being passing trade.
- 3.26 The additional traffic has been assigned to the road network. Existing traffic flows plus the additional development traffic are shown in Figures 2 and 3, and summarized in Table 3.1.

Table 3.1: Existing two-way peak hour traffic flows plus development traffic					
Road	Location	AM peak hour		PM peak hour	
		Existing	Plus development	Existing	Plus development
Silverwater Road	North of Carnarvon Street	3,835	+ 50	3,220	+ 130
	North of Bligh Street	4,400	+ 25	3,840	+ 65
	South of Bligh Street	4,470	+ 50	3,865	+ 130
Carnarvon Street	East of Silverwater Road	530	+ 20	555	+ 50
	West of Silverwater Road	525	+ 105	615	+ 315
	West of Grey Street	545	+ 20	595	+ 60
Bligh Street	West of Silverwater Road	80	+ 35	45	+ 135
	West of Grey Street	65	+ 20	50	+ 60
Grey Street	South of Carnarvon Street	40	+ 125	20	+ 375
	North of Bligh Street	65	+ 60	15	+ 130

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- 3.27 Table 3.1 shows that traffic increases on Silverwater Road, Carnarvon Street, Bligh Street and Grey Street would be some 20 to 125 vehicles per hour two-way during morning peak hours and some 50 to 375 vehicles per hour two-way during afternoon peak hours.
- 3.28 The intersections previously analysed in Chapter 2 have been re-analysed with SIDRA for the additional development traffic flows shown in Figures 2 and 3.
- 3.29 The analysis found that the intersection of Silverwater Road with Carnarvon Street would operate with average delays of less than 50 seconds per vehicle during peak periods. This represents levels of service D, a satisfactory level of service for a busy intersection during peak periods.
- 3.30 The modest additional traffic turning from Bligh Street into Silverwater Road would not have significant implications on its operation. Traffic will continue to turn from Bligh Street when gaps are created in the traffic stream by the upstream traffic signals on Silverwater Road.
- 3.31 The intersections of Grey Street with Carnarvon Street and Bligh Street will continue to operate with average delays for the highest delayed movements of less than 15 seconds per vehicle during peak periods. This represents levels of service A/B, a good level of service.
- 3.32 Therefore, the road network will be able to cater for the additional traffic from the proposed development.
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Matters Raised by Authorities

- Council matters

- *The study should take into account that there are residential properties in Grey Street west of the subject site which would be directly affected by the planning proposal;*

3.33 As noted in Chapter 2, there is a variety of surrounding land uses, including industrial, residential, open space and a church. The site adjoins Silverwater Road which is an arterial road with a variety of industrial and other uses and fronts Carnarvon Street which serves the adjacent industrial area.

3.34 There are seven residential properties on the western side of Grey Street. As noted in our previous report, there would be additional traffic in Grey Street, from where vehicular access to the development would be provided. The intersections of Grey Street with Carnarvon Street and Bligh Street will operate at good levels of service with the additional development traffic.

- *The traffic signals at the intersection of Carnarvon Street and Silverwater Road need to be analysed to assess whether extension of right turn lanes in Carnarvon Street approaching west and Silverwater Road northern approach is required. Any extension would require RMS approval.*

3.35 The SIDRA analysis indicates that with the additional development traffic, the 95th percentile queue length for vehicles turning right from Silverwater Road into Carnarvon Street would be some 66 and 108 metres during weekday morning and afternoon peak periods respectively. These queues will be readily accommodated in the existing right turn bay which is more than 170 metres long.

- *Carnarvon Street currently experiences excessive traffic queue lengths during peak hours and the proposed mix use development would aggravate this;*

3.36 The analysis indicates that with the additional development traffic, the 95th percentile queue length for vehicles turning right from Carnarvon Street into Silverwater Road would be some 74 and 113 metres during the morning and afternoon peak hours respectively. The morning queue length queue length would be accommodated between Silverwater Road and Grey Street. To accommodate the afternoon queue, the no parking restrictions on the northern side of Carnarvon Street could be extended to Stanley Street.

- *The peak hour traffic entering the intersection from the western approach of Carnarvon Street would increase by approximately 50% as a result of this planning proposal;*

3.37 The SIDRA modelling includes the additional development traffic using the Carnarvon Street approach to the Silverwater Road intersection.

- *The queue length of vehicles on Carnarvon Street would adversely affect the operation of the Grey and Carnarvon Street intersection;*

3.38 This matter relates to the ability for vehicles to turn right from Grey Street into Carnarvon Street, if the queue on Carnarvon Street from the Silverwater Road traffic signals extends to Grey Street. This could be addressed by implementing 'keep clear' controls at the intersection.

- *The study does not consider existing traffic impacts of the Silverwater Road-Parramatta Road intersection located 530 metres south, and the M4 Motorway access ramps located on Silverwater Road approximately 300 metres south of the subject site;*
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- 3.39 The study has considered the intersections closest to the site which would be most affected by traffic from the proposed development. The intersections of Silverwater Road with Parramatta Road and the M4 Motorway ramps are further from the site than those assessed in the traffic study and the effects of the development traffic on these intersections would be modest.
- 3.40 The additional traffic through the intersections of Silverwater Road/Parramatta Road and Silverwater Road/M4 ramps would be up to some 50 and 130 vehicles per hour two-way during weekday morning and afternoon peak hours respectively. We note that existing flows on Silverwater Road are some 4,500 vehicles per hour two-way and Parramatta Road and the M4 ramps carry in the order of up to 4,000 vehicles per hour two-way. The modest increases as a result of the proposed development would not have noticeable effects on the operations of these intersections.
- *The subject site is not well serviced by cycle routes (as shown in Figure 1 of this report) and is located away from current on road, off road and proposed cycle routes;*
- 3.41 As noted in Chapter 2, there is a cycle route close to and west of the site which connects Auburn with Sydney Olympic Park. The route is less than 100 metres from the site, and connects to the wider cycle network within the LGA. The existing cycle network in the area will therefore be readily accessible to residents in the proposed development.
- *The subject site is serviced by Sydney bus routes 540 and 544. The 544 route operates between Auburn Railway Station and Macquarie Shopping Centre, and route 540 operates between Auburn Railway Station and Newington Village. The two bus routes operate at 20 to 30 minute intervals from Monday to Friday during morning and afternoon peak times, and have limited (ie hourly) bus services throughout the day*
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during weekdays and weekends. It takes approximately 15-20 minutes to travel from the subject site to Auburn Railway Station during peak times. The closest bus stops to the subject site are at Carnarvon/Stanley Street and Carnarvon/Vore Street approximately 2 to 10 minutes walking distance from the subject site (refer Figure 1);

3.42 These matters are noted. We note that the Carnarvon Street bus stops are some one to four minutes' walk from the site, based on a walking speed of 80 metres per minute.

- *The M92 metro and Veolia bus routes operate between Parramatta Railway Station and Sutherland Railway Station and Bankstown Railway Station via Parramatta Road. The nearest bus stops to access these routes are located approximately 650 metres from the subject site, approximately 15 – 20 minutes walking distance away.*

3.43 These matters are noted. We note that a 650 metre walk would generally take around eight minutes, based on a walking speed of 80 metres per minute.

- RMS Matters

Silverwater Road/Carnarvon Street intersection

- *The maximum cycle time for the intersection is 130 seconds.*

3.44 We have not incorporated this amendment to the SIDRA model for the Silverwater Road/Carnarvon Street intersection, as the cycle time of 130 seconds identified by RMS is shorter than that measured by ourselves. We note that the operation of the intersection is relatively sensitive to small changes in the cycle time.

- *The length of kerbside lane on Carnarvon Road West is incorrectly coded.*

3.45 The Carnarvon Street west approach to the Silverwater Road intersection has been modified to include parking within 60 metres for the kerb side lane.

- *The heavy vehicle percentage for all the movements in the existing weekday AM is 5%. However, it decreases to 3% in the weekday AM with the development.*

3.46 Heavy vehicle percentages have been amended to two per cent for all scenarios. The previous SIDRA file sent to RMS for this intersection was prepared in association with another project and inadvertently sent to RMS.

- *There is no additional traffic on Carnarvon Street West approach in the Weekday AM+Dev model compared to the traffic volume in the Weekday AM model. In addition, only total 60 additional vehicles are in the Weekday PM+Dev model compared to the total traffic volume in the model for Weekday PM, which is inconsistent with the estimated traffic generation in the Transport Report for the Proposed Mixed Use Rezoning, 32-34 & 38-46 Silverwater Road. In this regard, the impact of the additional traffic generated from the development is not correctly modelled at this intersection. The traffic volume input data in the models needs to be reviewed and revised.*

3.47 The additional traffic from the proposed development is included in the amended SIDRA file.

- *The adjacent signalised intersection of Silverwater Road and Fariola Street, north to the intersection is approximately 685 metre apart from this intersection which is larger than 500m. The arrival type for Silverwater Road North approach should be type 4-favourable.*
-

- 3.48 The approach distance for southbound traffic on Silverwater Road has been amended to 685 metres. The arrival type for this approach has been amended to type 4 favourable.

Silverwater Road/Fariola Road intersection

- *The maximum cycle time for the intersection is 130 seconds.*
- *The length of the right turn bays on Silverwater Road is incorrectly coded. The taper area of the right turn bays should not be included.*
- *The length of the kerbside lane on Fariola Street East approach is incorrectly coded. The adjacent signalised intersection of Silverwater Road and Carnarvon Road, south to the intersection is approximately 685 metre apart from this intersection which is larger than 500 m. The arrival type for Silverwater Road South approach should be type 4-favourable.*

- 3.49 The intersection of Silverwater Road with Fariola Street was not counted in association with the project and the file for this intersection was inadvertently sent to RMS.

As a result of the above, the SIDRA models should be revised and re-submitted to RMS for review.

- 3.50 With the amended parameters, we have re-run the SIDRA model for Silverwater Road/Carnarvon Street. Copies of the output summaries are attached in the appendix.

- 3.51 With the development traffic, the intersection would operate at LOS D which is a satisfactory level of service.
-

3.52 Importantly, the additional development traffic would not have significant effects on the operation of the intersection. This is due, at least in part, to the fact that traffic from the residential component would be in the counter-peak direction (outbound in the morning and inbound in the afternoon), compared to the generally industrial traffic in the precinct which is inbound in the morning and outbound during the afternoon.

3.53 Therefore, the road network will be able to cater for the additional traffic from the proposed development.

Summary

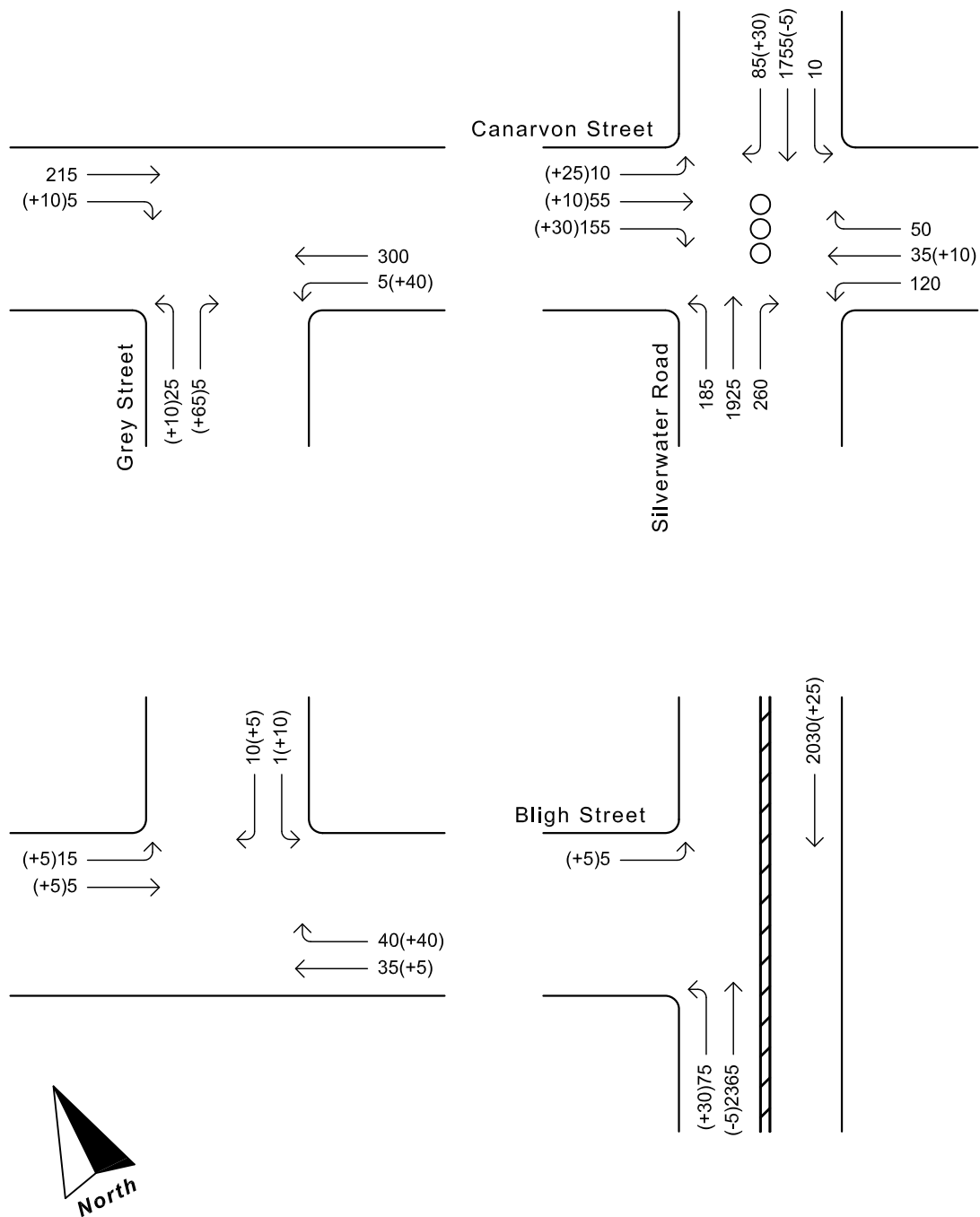
3.54 In summary, the main points relating to the transport implications of the proposed mixed use residential development are as follows:

- i) the proposed development will be accessible by public transport;
- ii) access, servicing and internal layout are considered appropriate;
- iii) the road network will be able to cater for the additional traffic from the proposed development; and
- iv) matters raised by the authorities are discussed in paragraphs 3.33 to 3.53.

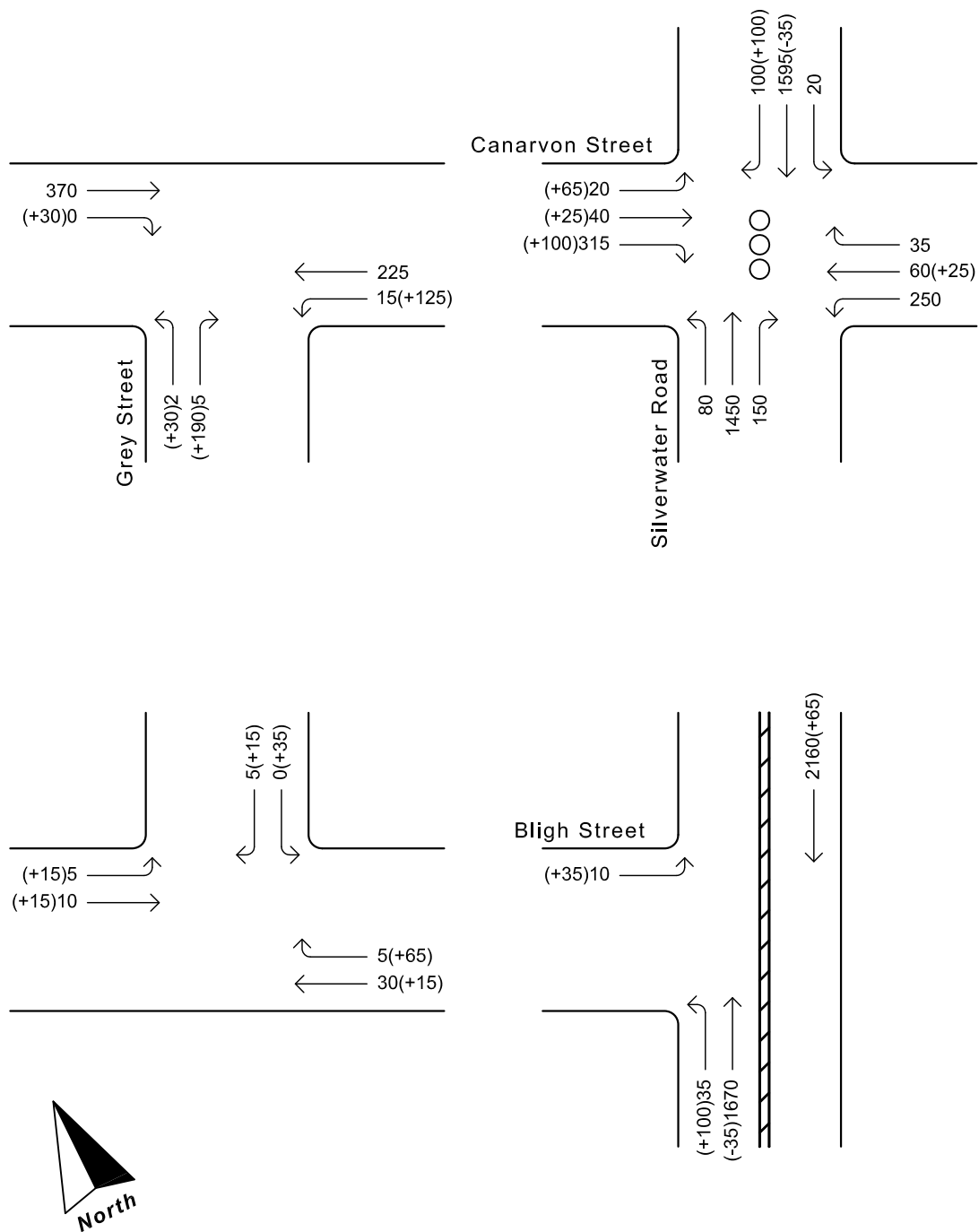


Location Plan

Figure 1



Existing weekday morning peak hour traffic flows plus development traffic



Existing weekday afternoon peak hour traffic flows plus development traffic

APPENDIX

SIDRA OUTPUT SUMMARIES

MOVEMENT SUMMARY

Site: Ex AM

Silverwater Road & Carnarvon Street

Existing morning peak hour

Signals - Fixed Time Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Silverwater Road south											
1	L	185	2.0	0.978	63.1	LOS E	60.5	430.9	1.00	1.06	23.4
2	T	1925	2.0	0.979	54.8	LOS D	60.5	431.1	1.00	1.07	25.1
3	R	260	2.0	0.968	89.8	LOS F	23.0	163.6	1.00	0.96	17.3
Approach		2370	2.0	0.979	59.3	LOS E	60.5	431.1	1.00	1.06	23.9
East: Carnarvon Street east											
4	L	120	2.0	0.189	44.0	LOS D	7.7	54.9	0.74	0.77	26.1
5	T	35	2.0	0.246	56.8	LOS E	7.0	49.5	0.90	0.71	20.2
6	R	50	2.0	0.246	64.4	LOS E	7.0	49.5	0.90	0.78	21.5
Approach		205	2.0	0.246	51.2	LOS D	7.7	54.9	0.81	0.76	23.8
North: Silverwater Road north											
7	L	10	2.0	0.805	67.0	LOS E	45.2	322.0	0.91	0.97	22.6
8	T	1755	2.0	0.819	48.0	LOS D	45.2	322.0	0.91	0.84	27.4
9	R	85	2.0	0.317	71.0	LOS F	7.0	49.9	0.90	0.77	20.5
Approach		1850	2.0	0.819	49.1	LOS D	45.2	322.0	0.91	0.83	27.0
West: Carnarvon Street west											
10	L	10	2.0	0.411	42.8	LOS D	6.1	43.2	0.91	0.77	26.9
11	T	55	2.0	0.411	35.1	LOS C	6.1	43.2	0.91	0.71	25.7
12	R	155	2.0	0.411	63.2	LOS E	9.7	69.1	0.94	0.79	21.6
Approach		220	2.0	0.411	55.3	LOS D	9.7	69.1	0.93	0.77	22.6
All Vehicles		4645	2.0	0.979	54.7	LOS D	60.5	431.1	0.95	0.94	25.0

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).

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

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P3	Across E approach	53	34.0	LOS D	0.2	0.2	0.67	0.67
P5	Across N approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	34.0	LOS D	0.2	0.2	0.67	0.67
All Pedestrians		212	51.6				0.82	0.82

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Ex PM

Silverwater Road & Carnarvon Street

Existing afternoon peak hour

Signals - Fixed Time Cycle Time = 128 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Silverwater Road south											
1	L	80	2.0	0.788	36.0	LOS C	25.7	183.0	0.84	0.96	33.6
2	T	1450	2.0	0.789	27.8	LOS B	26.0	184.8	0.84	0.76	35.9
3	R	150	2.0	0.807	69.1	LOS E	11.3	80.3	1.00	0.85	20.9
Approach		1680	2.0	0.807	31.9	LOS C	26.0	184.8	0.86	0.78	33.8
East: Carnarvon Street east											
4	L	250	2.0	0.334	43.9	LOS D	11.2	79.7	0.81	0.80	26.2
5	T	60	2.0	0.334	46.3	LOS D	9.1	65.0	0.89	0.72	22.5
6	R	35	2.0	0.334	53.8	LOS D	9.1	65.0	0.89	0.80	23.8
Approach		345	2.0	0.334	45.3	LOS D	11.2	79.7	0.83	0.79	25.3
North: Silverwater Road north											
7	L	20	2.0	0.834	63.4	LOS E	31.3	222.7	0.94	0.97	23.6
8	T	1595	2.0	0.833	47.1	LOS D	31.4	223.4	0.94	0.89	27.6
9	R	100	2.0	0.538	69.7	LOS E	7.7	54.8	0.98	0.78	20.8
Approach		1715	2.0	0.833	48.6	LOS D	31.4	223.4	0.95	0.88	27.1
West: Carnarvon Street west											
10	L	20	2.0	0.548	32.5	LOS C	8.1	57.5	0.89	0.80	30.4
11	T	40	2.0	0.547	24.8	LOS B	8.1	57.5	0.89	0.73	29.2
12	R	315	2.0	0.547	48.2	LOS D	12.4	88.0	0.93	0.81	25.1
Approach		375	2.0	0.547	44.8	LOS D	12.4	88.0	0.93	0.80	25.7
All Vehicles		4115	2.0	0.833	41.2	LOS C	31.4	223.4	0.90	0.82	29.1

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).

Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	58.1	LOS E	0.2	0.2	0.95	0.95
P3	Across E approach	53	33.1	LOS D	0.1	0.1	0.72	0.72
P5	Across N approach	53	58.1	LOS E	0.2	0.2	0.95	0.95
P7	Across W approach	53	33.1	LOS D	0.1	0.1	0.72	0.72
All Pedestrians		212	45.6				0.84	0.84

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Ex AM + dev

Silverwater Road & Carnarvon Street

Existing morning peak hour + development

Signals - Fixed Time Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Silverwater Road south											
1	L	185	2.0	0.978	63.1	LOS E	60.5	430.9	1.00	1.06	23.4
2	T	1925	2.0	0.979	54.8	LOS D	60.5	431.1	1.00	1.07	25.1
3	R	260	2.0	0.968	89.8	LOS F	23.0	163.6	1.00	0.96	17.3
Approach		2370	2.0	0.979	59.3	LOS E	60.5	431.1	1.00	1.06	23.9
East: Carnarvon Street east											
4	L	120	2.0	0.189	44.0	LOS D	7.7	54.9	0.74	0.77	26.1
5	T	45	2.0	0.278	57.3	LOS E	7.7	54.7	0.91	0.72	20.1
6	R	50	2.0	0.278	64.8	LOS E	7.7	54.7	0.91	0.79	21.4
Approach		215	2.0	0.278	51.6	LOS D	7.7	54.9	0.81	0.76	23.5
North: Silverwater Road north											
7	L	10	2.0	0.805	66.8	LOS E	44.9	319.9	0.91	0.96	22.7
8	T	1750	2.0	0.816	47.8	LOS D	44.9	319.9	0.91	0.83	27.4
9	R	115	2.0	0.428	72.3	LOS F	9.2	65.5	0.92	0.79	20.3
Approach		1875	2.0	0.816	49.4	LOS D	44.9	319.9	0.91	0.83	26.9
West: Carnarvon Street west											
10	L	35	2.0	0.517	42.7	LOS D	7.8	55.8	0.92	0.79	26.9
11	T	65	2.0	0.517	35.0	LOS C	7.8	55.8	0.92	0.73	25.6
12	R	185	2.0	0.517	65.3	LOS E	11.9	84.7	0.96	0.80	21.1
Approach		285	2.0	0.517	55.6	LOS D	11.9	84.7	0.94	0.79	22.6
All Vehicles		4745	2.0	0.979	54.8	LOS D	60.5	431.1	0.95	0.94	24.9

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).

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

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P3	Across E approach	53	34.0	LOS D	0.2	0.2	0.67	0.67
P5	Across N approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	34.0	LOS D	0.2	0.2	0.67	0.67
All Pedestrians		212	51.6				0.82	0.82

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Ex PM + dev

Silverwater Road & Carnarvon Street

Existing afternoon peak hour + development

Signals - Fixed Time Cycle Time = 129 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Silverwater Road south											
1	L	80	2.0	0.835	40.5	LOS C	28.3	201.3	0.90	0.96	31.5
2	T	1450	2.0	0.833	32.4	LOS C	28.5	202.6	0.90	0.83	33.4
3	R	150	2.0	0.660	63.1	LOS E	10.7	75.9	0.97	0.81	22.2
Approach		1680	2.0	0.833	35.5	LOS C	28.5	202.6	0.91	0.83	32.0
East: Carnarvon Street east											
4	L	250	2.0	0.355	41.5	LOS C	12.2	87.2	0.79	0.80	27.0
5	T	85	2.0	0.354	47.9	LOS D	9.2	65.8	0.91	0.73	22.2
6	R	35	2.0	0.354	55.5	LOS D	9.2	65.8	0.91	0.80	23.5
Approach		370	2.0	0.355	44.3	LOS D	12.2	87.2	0.83	0.79	25.4
North: Silverwater Road north											
7	L	20	2.0	0.856	68.5	LOS E	32.6	232.3	0.97	0.98	22.4
8	T	1560	2.0	0.861	52.3	LOS D	32.7	232.8	0.97	0.94	26.0
9	R	200	2.0	0.881	77.9	LOS F	15.1	107.6	1.00	0.92	19.2
Approach		1780	2.0	0.881	55.3	LOS D	32.7	232.8	0.98	0.93	25.0
West: Carnarvon Street west											
10	L	85	2.0	0.820	40.3	LOS C	13.5	95.8	0.95	0.90	27.5
11	T	65	2.0	0.820	32.6	LOS C	13.5	95.8	0.95	0.87	26.1
12	R	415	2.0	0.820	58.7	LOS E	19.3	137.4	0.98	0.91	22.5
Approach		565	2.0	0.820	52.9	LOS D	19.3	137.4	0.97	0.91	23.5
All Vehicles		4395	2.0	0.881	46.5	LOS D	32.7	232.8	0.94	0.88	27.1

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).

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

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	58.6	LOS E	0.2	0.2	0.95	0.95
P3	Across E approach	53	35.0	LOS D	0.1	0.1	0.74	0.74
P5	Across N approach	53	58.6	LOS E	0.2	0.2	0.95	0.95
P7	Across W approach	53	35.0	LOS D	0.1	0.1	0.74	0.74
All Pedestrians		212	46.8				0.84	0.84

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).