GTAconsultants

Parramatta Light Rail Traffic and Transport Existing Conditions

Client // Transport for NSW
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Parramatta Light Rail

Traffic and Transport Existing Conditions

Final Report

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Glossary and abbreviations

A glossary of terms and abbreviations used within this document are defined as follows.

Term	Definition
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
Aimsun	"Advanced Interactive Microscopic Simulator for Urban and Non-Urban Networks". Aimsun is a computer-based transport simulation software package developed by Transport Simulation Systems (TSS) Inc., and is used for travel demand and traffic data analysis, planning and traffic simulation.
BRT	Bus Rapid Transit
BTS	Bureau of Transport Statistics (a former division of Transport for NSW). It has merged with the Bureau of Freight Statistics to form Transport Performance and Analytics (TPA).
CBD	Central Business District
Council	City of Parramatta Council
DA	Development Application
DoS	Degree of Saturation (used in traffic engineering as a measure of how much demand a road is experiencing compared to its total capacity)
EIS	Environmental Impact Statement
GPOP	Greater Parramatta to the Olympic Peninsula
km/h	kilometres per hour
LGA	Local Government Area
LOS	Level of Service: A qualitative measure of traffic flow and crowding, with LOS A characterised by free flow and LOS F by forced flow or breakdowns. It is a qualitative measure of flow and crowding, with LOS A as the 'most pleasant' and F the 'least pleasant' in terms of pedestrian flow and crowding.
Mesoscopic simulation	Refers to a coarser level of detail in transport and traffic simulation modelling compared with microsimulation (refer below) that analyse transport elements in small groups, but easier to apply, calibrate and validate compared to microsimulation models. Mesoscopic models are typically used for larger study areas.
Microsimulation	Refers to the 'microscopic' level of traffic modelling and simulation, in which individual elements of the traffic stream, such as vehicles and/or pedestrians, is represented and analysed. It provides the greatest detail on individual movements, and are best applied to small areas, as microsimulation of large areas require significant inputs to calibrate and validate the model.
MPS	Mobility Parking Scheme
NRL	National Rugby League
Opal	Opal is the Transport for NSW public transport ticketing system
OTTTAR	Operational Traffic and Transport Technical Assessment Report
Rapid bus	Rapid bus route as defined in *Sydney's Bus Future* as a Tier 1 high frequency bus service along a designated arterial road corridor
SEARs	Secretary's Environmental Assessment Requirements
The project	Parramatta Light Rail Stage 1 (Westmead to Carlingford)
TPA	Transport Performance and Analytics (a division of Transport for NSW)
T-way	Transitway (rapid bus) as defined in NSW for the North-West T-way and Liverpool-Parramatta T-way as a dedicated bus corridor with bus only roads or bus only lanes
WSU	Western Sydney University with campuses in Parramatta CBD, Rydalmere and Westmead

1. Introduction

1.1 Report purpose and scope

Stage 1 of the Parramatta Light Rail project (the 'Project') extends between Westmead and Carlingford via North Parramatta, Parramatta CBD and Camellia. Three reports have been produced that together address the Secretary's Environmental Assessment Requirements (SEARs). This report addresses the existing conditions of the transport system and should be read in conjunction with the other two reports.

An assessment of the anticipated traffic and transport implications of the Project is addressed in the *Operational Traffic and Transport Technical Assessment Report* (OTTTAR) (GTA, 2017). While the traffic and transport impacts of the Project's construction are set out and assessed in the *Construction Traffic and Transport Impact Assessment Report* (GTA, 2017).

The key traffic and transport issues to be identified and addressed in the SEARs are listed with the relevant reports in Table 1.1.

Table 1.1: Key traffic and transport issues in the SEARs and where addressed

Key traffic / transport issue	Secretary's Environmental Assessment Requirement	Relevant report section
Construction Stage Traffic and Transport Impacts		
Construction transport and traffic impacts	The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to:	
	○ A considered approach to route identification and scheduling of transport movements	Construction Traffic and Transport Impact Assessment Report
	○ The number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements)	
	○ Construction worker parking	
	○ The nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements)	
	○ Access constraints and impacts on existing or planned public and community transport and drop off zones, pedestrians and cyclists	
	○ The need to close, divert or otherwise reconfigure elements of the road and active transport network associated with construction of the project, including impacts on existing precinct operations and access to health precincts for emergency vehicles.	
Alternative public transport arrangements	The Proponent must prepare a framework for alternative public transport arrangements for the period of time between the cessation of operations on the Carlingford heavy rail line and the commencement of light rail services.	
Westmead Hospital precinct	The Proponent must demonstrate how access to and from the Westmead Hospital precinct would be maintained during construction of the project. Particular consideration should be given to access and egress arrangements for emergency service vehicles.	Construction Traffic and Transport Impact Assessment Report
Operational Traffic and Transport Impacts		
Operational	The Proponent must assess (and model, where appropriate) the	Operational

Key traffic / transport issue	Secretary's Environmental Assessment Requirement	Relevant report section
transport impacts	operational transport impacts of the project, including:	Traffic and Transport Technical Assessment Report
	○ Performance of key interchanges and intersections by undertaking a level of service analysis at key locations for road and active transport users and pedestrians	
	○ Wider transport interactions (local and regional roads, active transport, public and freight transport)	
	○ Impacts on cyclists and pedestrian access and safety	
	○ The legibility and usability of the traffic and transport network.	
Westmead Hospital precinct	The Proponent must demonstrate how access to and from the Westmead Hospital precinct would be maintained during operation of the project. Particular consideration should be given to access and egress arrangements for emergency service vehicles.	Operational Traffic and Transport Technical Assessment Report

1.2 Existing conditions report

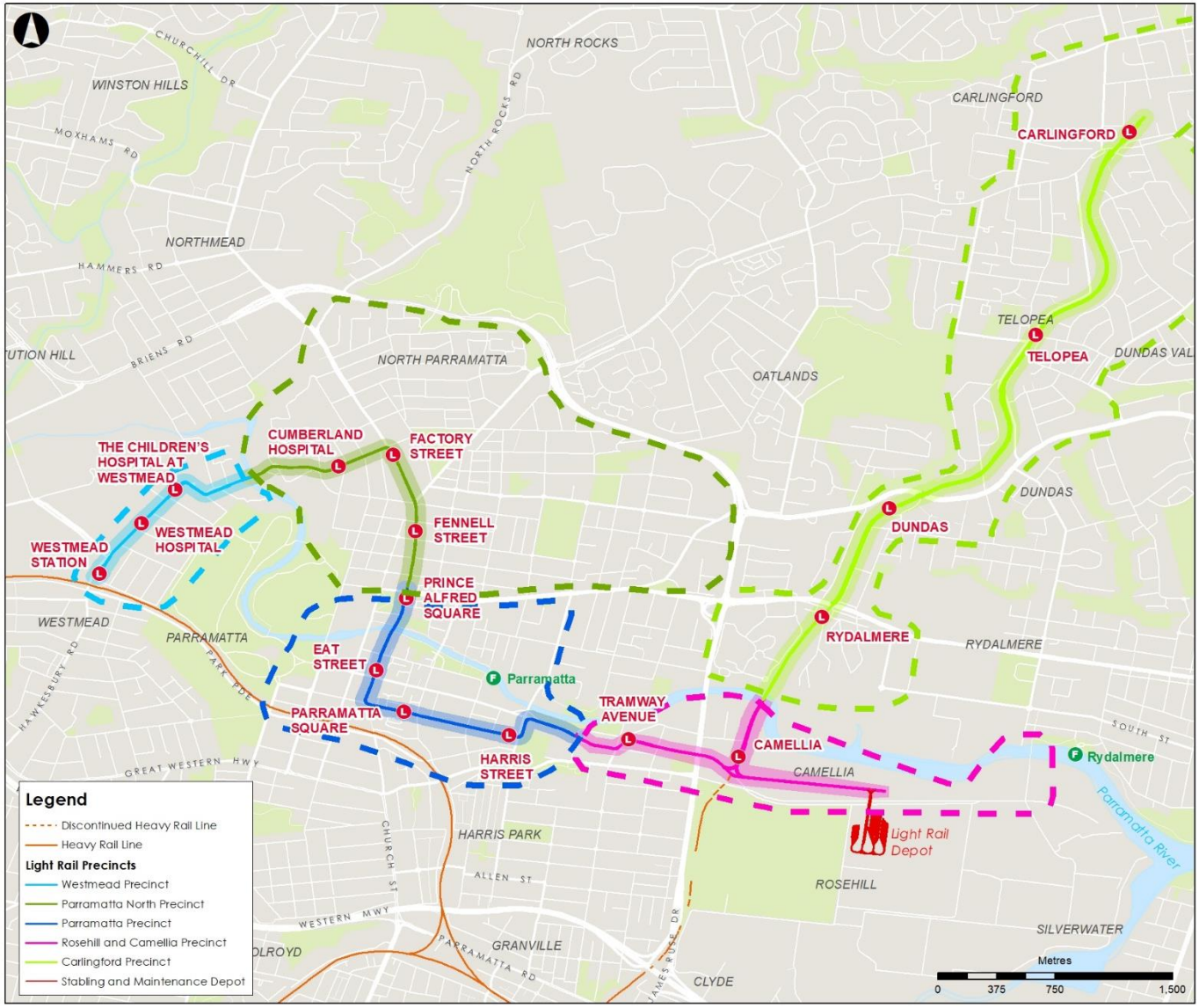
This report addresses the following:

- Existing land use in each precinct along the light rail corridor
- Existing travel demand.
- The prevailing traffic and access conditions including:
  - State and regional road network
  - Key road features.
  - Property access arrangements.
  - Traffic volumes.
  - Operational performance.
  - Freight and access routes.
- Parking conditions including supply, restrictions and demand conditions surrounding the project corridor.
- Public transport network and services, including heavy rail, buses and ferries.
- Pedestrian network and facilities.
- Cycling network and facilities.

1.3 Scope of the Parramatta Light Rail study area

The project between Westmead, Camelia and Carlingford is approximately 12 kilometres long. For assessment purposes, it is subdivided into five precincts with the corridor and precinct boundaries shown in Figure 1.1. The land uses in each precinct are discussed in the following sections.

Figure 1.1: Parramatta Light Rail Stage 1 precinct boundaries



1.3.1 Westmead precinct

The Westmead precinct is located between the Westmead terminus (north of Westmead Railway Station) and the Parramatta River crossing west of the Cumberland Hospital site. Road access is via:

- Darcy Road
- Hawkesbury Road
- Hainsworth Street
- The internal private roads in the Cumberland Hospital precinct, including the bridge over the Parramatta River
- Railway Parade north of the railway line
- Park Avenue along the western periphery of Parramatta Park

The Westmead precinct primarily comprises a mixture of health and educational institutes, as well as health and medical related facilities, street commercial and low, medium and high density residential land uses. The key institutes in the Westmead precinct include:

- Western Sydney University (Westmead campus)
- Catherine McAuley Westmead
- Parramatta Marist High School
- Westmead health precinct, incorporating Westmead Hospital, The Children's Hospital at Westmead and other medical research centres
- Cumberland health precinct

These institutes are undergoing significant redevelopment including alterations to the existing access arrangements and land uses.

Parramatta Park is located to the east of the Westmead precinct with access via Park Avenue at Queens Road for bicycles and pedestrians.

1.3.2 Parramatta North precinct

The Parramatta North precinct is located between the Parramatta River crossing west of the Cumberland Hospital site, north to Church Street at Board Street and south to Victoria Road north of Prince Alfred Square with road access via:

- Internal roads in the Cumberland Hospital precinct, including the bridge over the Parramatta River
- Eastern Circuit
- Factory Street
- Church Street

Parramatta North precinct primarily encompasses health-related facilities within the Cumberland health precinct and low and medium density residential land uses along Factory Street and its surrounds.

Along Church Street, a diverse mixture of land uses including mostly medium density residential is located along both sides of its northern end i.e. north of Pennant Hills Road. South of Pennant Hills Road, a mixture of medium to high density residential, commercial uses and specialty retail uses are located to the east and west of Church Street.

The Parramatta North development area would see significant land use modifications to a large proportion of the existing Cumberland health precinct in North Parramatta.

Richie Benaud Oval, Belmore Park, St Patricks Cemetery, Parramatta North Public School, Our Lady of Mercy College and Parramatta Leagues Club are located within a 400-metre walking distance of the alignment.

1.3.3 Parramatta CBD precinct

The Parramatta CBD precinct is located east of Parramatta Park, south of Victoria Road and west to Purchase Street/ Noller Parade, and includes the Robin Thomas Reserve, with road access via:

- Church Street, including the Lennox Bridge crossing of Parramatta River
- Macquarie Street
- Harris Street
- George Street.

Land uses in the Parramatta CBD precinct are consistent with a large urban centre that has a mixture of high density residential, retail and commercial uses, as well as some recreational uses.

Along Church Street, the key land uses are:

- Prince Alfred Square
- Novotel hotel
- Riverside Theatre
- Eat Street with cafés and restaurants
- University of New England, Parramatta campus
- High density residential uses.

Along Macquarie Street, the key land uses are:

- Centenary Square
- Parramatta Railway Station and Parramatta Interchange for buses
- Parramatta Square development (under construction)
- Arthur Phillip High School
- Parramatta Public School.

At the eastern end of the precinct, the key land uses are:

- Robin Thomas Reserve
- Low and medium density strata residential buildings
- Granville Waratah Soccer Football Club.

Western Sydney Stadium is currently under construction on the site of the existing Parramatta Stadium (west of O'Connell Street) in the Parramatta CBD. The stadium is expected to host 45 events per year, including NRL games, Western Sydney Wanderers games and other separate special events. The stadium is planned to have capacity for approximately 30,000 attendees replacing the former Pirtek Stadium which had a maximum capacity for 16,000 people.

Parramatta Park is located to the west of Parramatta CBD and occupies approximately 85 hectares of land. The historical park is currently configured with an existing shared one-way vehicle and bicycle loop around the park, with a narrow pedestrian loop. The Parramatta Park Trust is proposing to reconfigure Parramatta Park to minimise traffic flow within the park and prioritise walking and cycling.

Parramatta Park typically hosts sporting events, food festivals and music festivals. However, more recently, Parramatta Park has held larger events, including Tropfest and Australia Day celebrations, with up to 60,000 attendees per event.

1.3.4 Rosehill and Camellia precinct

The Rosehill and Camellia precinct is located between Purchase Street, Parramatta in the west, the stabling and maintenance facility in Rosehill to the east, and Parramatta River to the north. This precinct also includes the southern section of the existing Carlingford heavy rail line between the existing Camellia Railway Station and the Parramatta River, but does not include the railway bridge over the river. It is bisected by James Ruse Drive which is aligned north-south and is part of the outer ring road. This precinct also includes the existing heavy rail line, that extends south of the Camellia junction to Parramatta Road. Road access into the precinct is via:

- George Street
- Alfred Street
- Tramway Avenue
- Grand Avenue North including the grade separated crossing of James Ruse Drive
- Former Sandown Line (unused freight heavy rail line).

At its western end, the precinct is comprised of low to medium density residential uses as well as the nearly complete River Road high density residential developments.

East of James Ruse Drive, the Rosehill Gardens Racecourse is located to the south of the alignment, with the remainder of the Rosehill and Camellia precinct occupied primarily by industrial uses, although noting the future mixed-use redevelopment of this area.

Rosehill Gardens typically hosts race day events with a corresponding attendance of 5,000 to 10,000 people. A train shuttle service operates for standard race day events between Clyde and Rosehill railway stations in addition to the T6 Carlingford Line train services. Rosehill Gardens also hosts school exams and events, conferences and exhibitions.

1.3.5 Carlingford precinct

The Carlingford precinct includes the existing heavy rail line north of the Parramatta River in Rydalmere and the Carlingford Railway Station. It also includes the areas surrounding the existing heavy rail stations of Rydalmere, Dundas, Telopea and Carlingford. The railway bridge over the Parramatta River is part of this precinct.

The key land uses in the Carlingford precinct include the Western Sydney University Rydalmere campus, as well as industrial land uses to the east of the alignment in Rydalmere. To the north, the alignment is surrounded by low density residential uses and some small commercial centres located near existing railway stations.

Future mixed-use development is planned near the alignment in Rydalmere and Telopea with new urban precincts.

2. Planning context

2.1 Strategic planning background

2.1.1 A Plan for Growing Sydney

A Plan for Growing Sydney, released by the NSW Department of Planning and Environment in December 2014, serves as the overarching strategy for metropolitan Sydney, and is intended to guide land use planning decisions for the next 20 years. It outlines directions and actions for accommodating Sydney's predicted population growth over this time.

A Plan for Growing Sydney identifies Greater Parramatta as having the potential to accommodate 100,000 jobs over the next 20 years, and is identified as a Strategic Centre in the Plan. Key directions relevant to Parramatta include:

- Grow Greater Parramatta as Sydney's second CBD, by connecting and integrating Parramatta CBD, Westmead, Parramatta North, Rydalmere and Camellia.
- Grow the specialised health and education precincts at Westmead and Rydalmere.
- Renew Parramatta North to create a vibrant mixed-use precinct.

This strategy supports the Greater Parramatta to the Olympic Peninsula (GPOP) priority growth area, with key actions as follows:

- Government to deliver key infrastructure to enable population and jobs growth in the Priority Growth Area.
- Consideration of the potential for the Parramatta Light Rail to improve connections between the various precincts in the Priority Growth Area, Greater Parramatta and the Global Economic Corridor.
- Delivery of long-term transport connections across Duck River.
- Development of a structure plan for Camellia to underpin future redevelopment of the area.
- Delivery of a revitalised Parramatta North.
- Growing the Westmead Health Precinct.
- Planning and development of a business case for new sports facilities for Western Sydney.
- Identification of medium and long-term opportunities for urban renewal across the Greater Parramatta to Olympic Peninsula Priority Growth Area (Urban Renewal Area).

2.1.2 Greater Parramatta to the Olympic Peninsula (GPOP) Vision

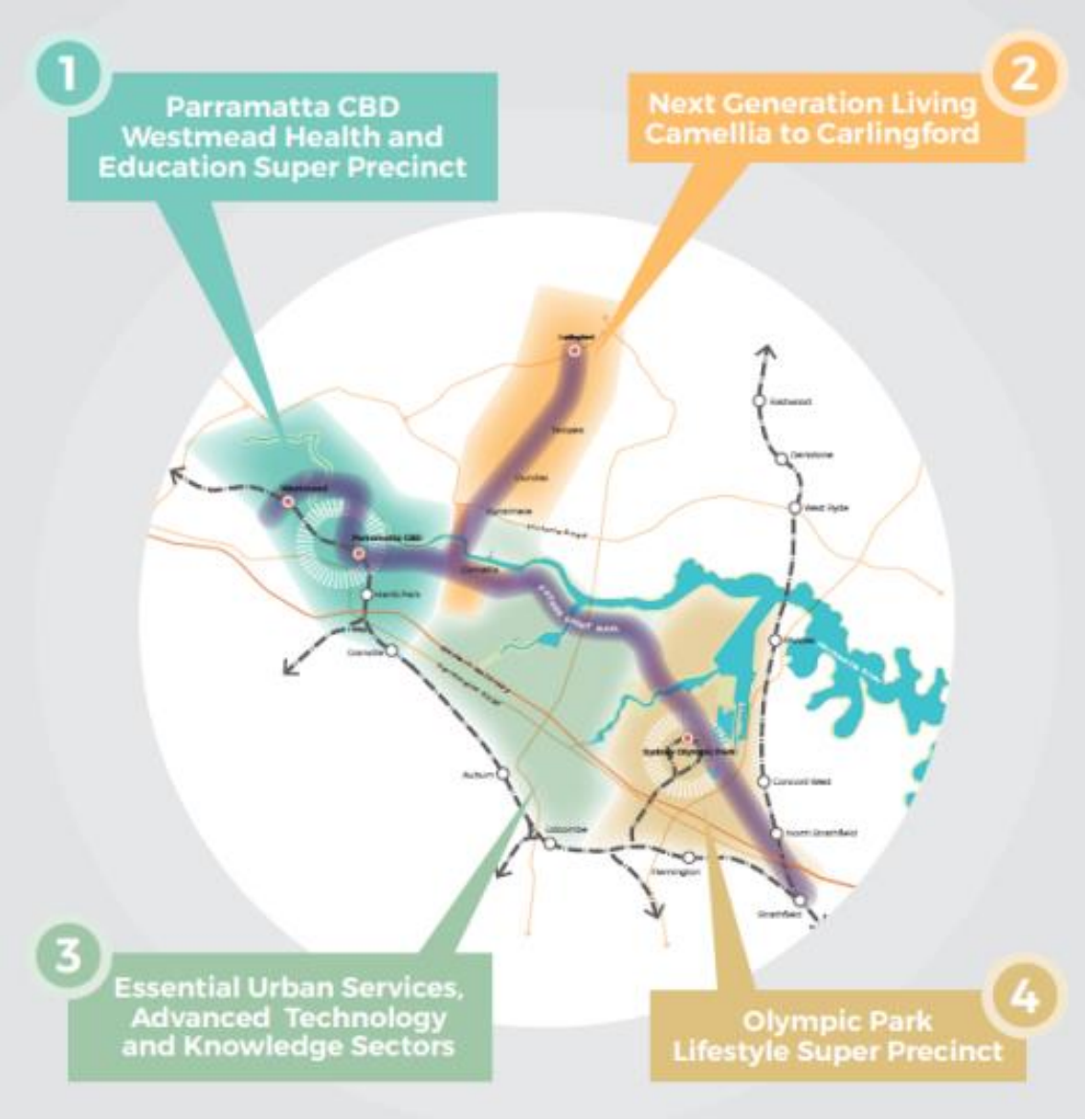
The Greater Sydney Commission released the Greater Parramatta to the Olympic Peninsula (GPOP) Vision in October 2016. It served to reinforce the overall framework of a three-city structure for the Sydney Region, with the GPOP priority growth area forming the Central City.

The GPOP plan envisages four distinct precincts within the GPOP area:

- Parramatta CBD and Westmead Health and Education Super Precinct
- Next Generation Living from Camellia to Carlingford
- Essential Urban Services, Advanced Technology and Knowledge Sectors in Camellia, Rydalmere, Silverwater and Auburn
- Olympic Park Lifestyle Super Precinct.

This plan supports Parramatta Light Rail by linking the GPOP precincts as shown in Figure 2.1, as well as connecting to the wider transport network of heavy rail, bus, ferry and active transport links for travel beyond the GPOP study area.

Figure 2.1: Precincts in the Greater Parramatta to the Olympic Peninsula area



Source: Greater Sydney Commission, 2016.

2.2 Parramatta Light Rail (Stage 1)

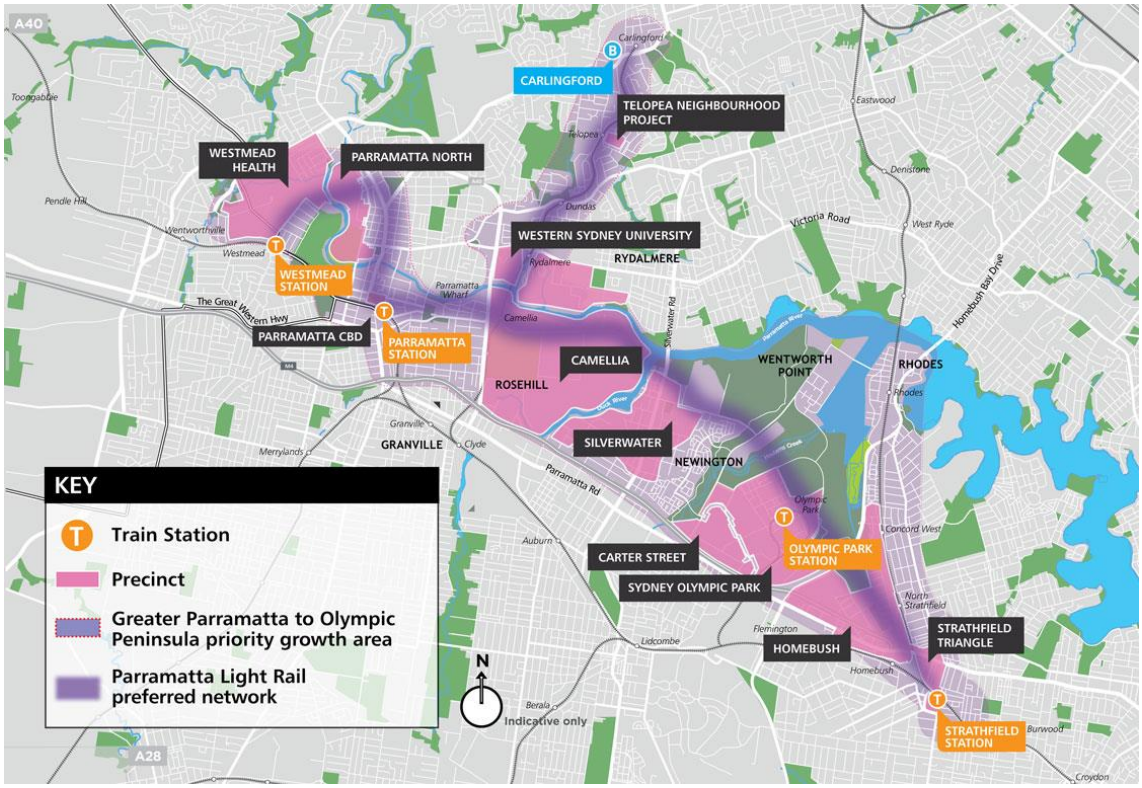
The project is a NSW Government commitment to support sustainable urban growth in the GPOP priority growth area and to make the City of Parramatta the focal point for Western Sydney.

The project would support urban growth by delivering a high-frequency, turn-up and-go light rail service that would attract people and jobs to the GPOP priority growth area. The project is the first stage of light rail to be implemented in the GPOP priority growth area, with the future stages subject to design development, assessments and approvals, as well as the consideration of other transport initiatives such as Sydney Metro West.

The project from Westmead to Carlingford would significantly improve local accessibility along the 12 kilometres of light rail alignment. It would provide integration with land use and other transport modes around the 16 light rail stops. It would be a catalyst for urban renewal, focused on the Westmead hospitals, Parramatta North Development area, Parramatta CBD, Camellia and Rydalmere with the Western Sydney University campus and Telopea on the Carlingford Line.

Parramatta Light Rail was announced by the NSW Government on 8 December 2015 as shown in Figure 2.2. The preferred route was to connect Parramatta's CBD to the key hubs of Sydney Olympic Park, Westmead Hospital, Western Sydney University and Strathfield, while connecting other major renewal areas and key destinations.

Figure 2.2: Parramatta Light Rail preferred network and study area



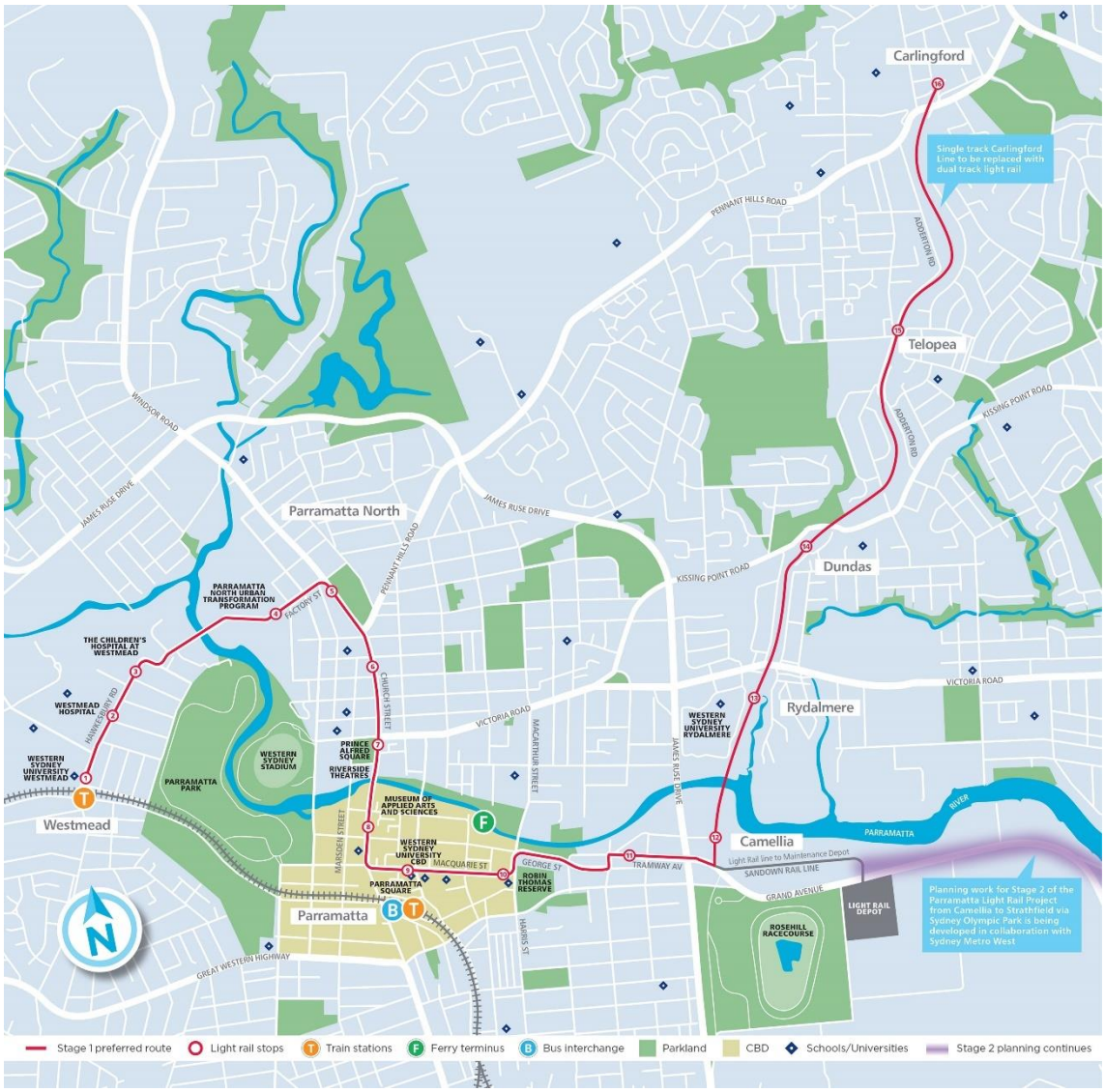
Source: Parramatta Light Rail Preferred Network Map, 2016.

Following the announcement of the Sydney Metro West project in late 2016, a staged approach to Parramatta Light Rail was identified, to ensure integrated planning of the two projects could occur, particularly at the eastern end of the project, with both Parramatta and Sydney Olympic Park identified as key areas along the Sydney Metro West alignment.

Based on this, a preferred alignment for the project was announced on 17 February 2017. The project would link Westmead Railway Station and Carlingford via North Parramatta, Parramatta CBD, Camellia and the T6 Carlingford Line north of Camellia, including Rydalmere with the Western Sydney University and the Telopea Urban Renewal Precinct.

The project route with the 16 stops and key land uses is shown in Figure 2.3.

Figure 2.3: The project route and stops for Parramatta Light Rail Stage 1



Source: Parramatta Light Rail, Transport for NSW, 2017.

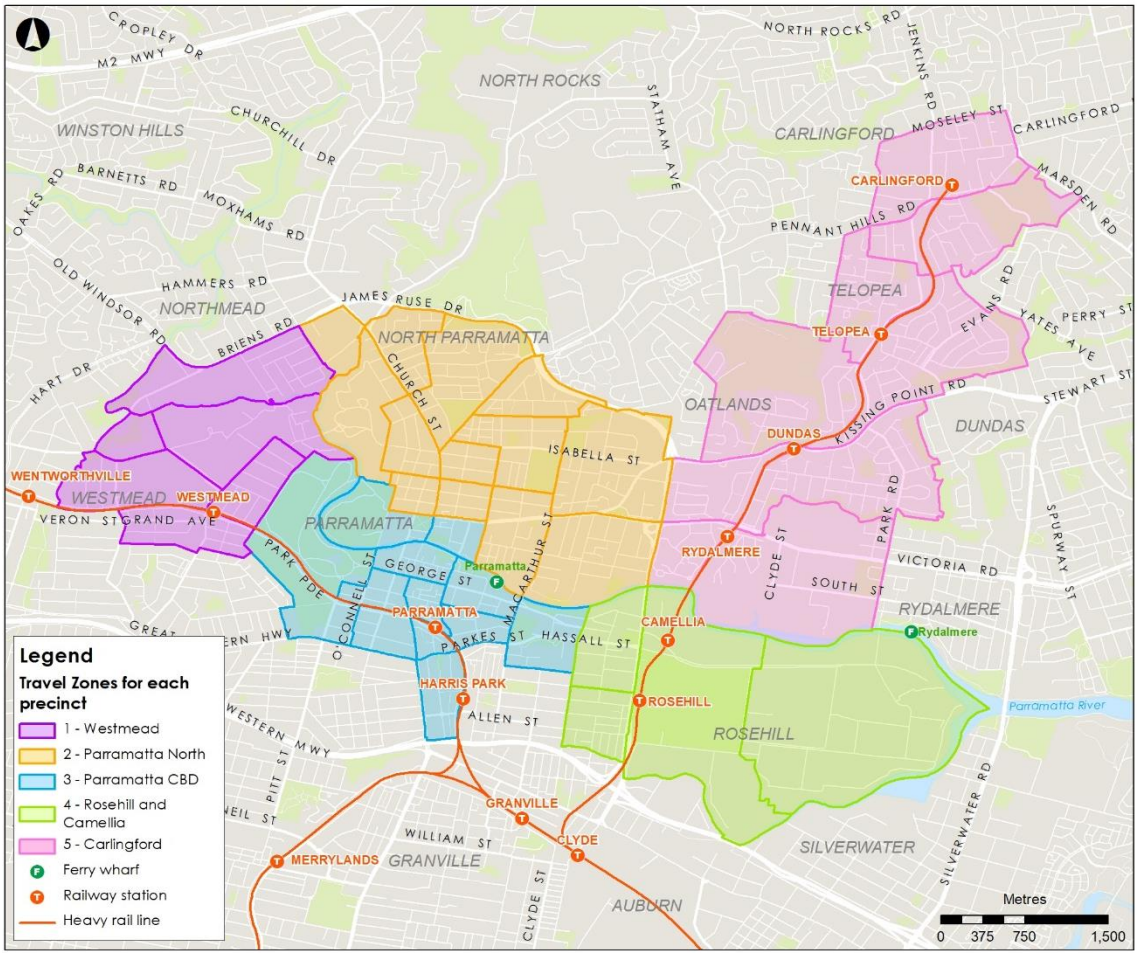
2.3 Existing travel demand

2.3.1 Travel to the Parramatta Light Rail study area

The ABS Census *Journey to Work* data 2011 is regarded as the most robust picture of existing travel patterns to and from zones in Sydney. The smallest geographical area for which the Journey to Work data is available is a travel zone. These census data were analysed to understand the existing mode share distribution for trips to and from work for each of the precincts.

The travel zones shown in Figure 2.4 were assessed for the areas surrounding the project including the Westmead precinct, Parramatta North precinct, Parramatta CBD precinct, Rosehill and Camellia precinct and Carlingford precinct.

Figure 2.4: Travel zones in the project area



Source: http://visual.bts.nsw.gov.au/jtwbasic/ accessed June 2017.

The 2011 Journey to Work statistics are based on 27,600 residents and 77,600 people who live and work in the selected travel zones respectively. The project area has significant employment density, with the number of employees almost ten times greater than the number of residents. The distribution of employees and residents for each of the precincts are provided in Table 2.1.

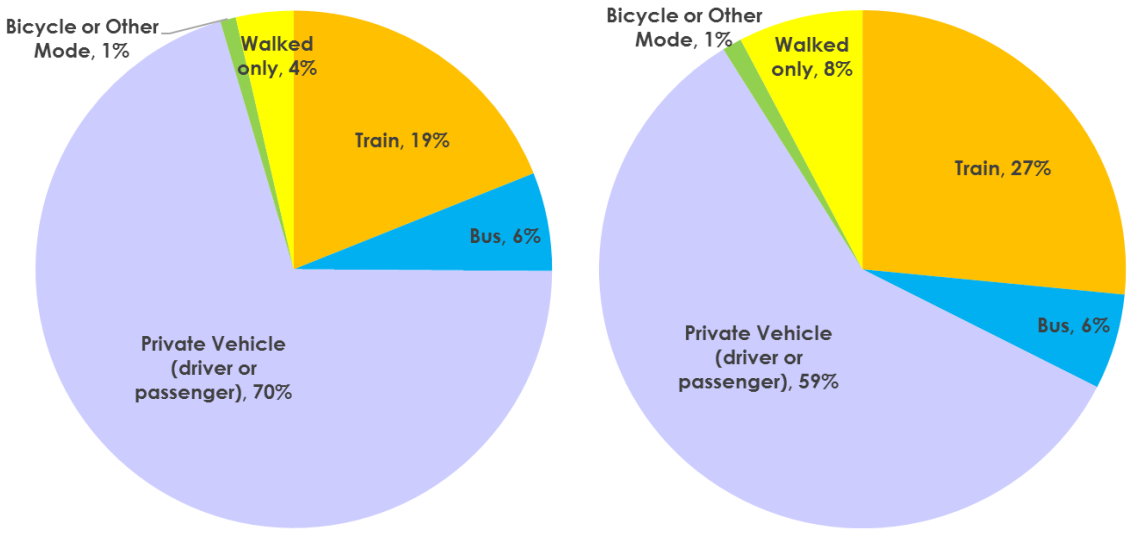
Table 2.1: Number of employees and residents in the project area by precinct

Precinct	Number of residents who are employed	Per cent of total employed residents	Number of employees	Per cent of total employees
Westmead	5,916	21%	14,868	19%
Parramatta North	9,346	34%	7,676	10%
Parramatta CBD	4,461	16%	39,799	51%
Rosehill and Camellia	1,015	4%	5,306	7%
Carlingford	6,843	25%	9,942	13%
Total	**27,581**	**100%**	**77,591**	**100%**

More than half of residents live in the Parramatta North precinct (34 per cent) and the Carlingford precinct (25 per cent) as shown in Table 2.1. Over 50 per cent of the employees of the project area work in the Parramatta CBD precinct. Furthermore, approximately 20 per cent of the total employees work in the Westmead precinct which indicates the importance of these two employment destinations that would be connected by the project.

The mode share for the journey to work trips of these residents and employees (excluding 'mode not stated' and 'worked from home') are shown in Figure 2.5. Private vehicles are the primary travel mode for the area accounting for 70 per cent of trips for employees of the area and nearly 60 per cent of trips for residents of the area (including vehicle driver and vehicle passenger). Public transport is used for 25 per cent of employed residents who live in the project study area and more than 30 per cent of employees who work in the project study area.

Figure 2.5: Mode share for employees and residents in the project study area

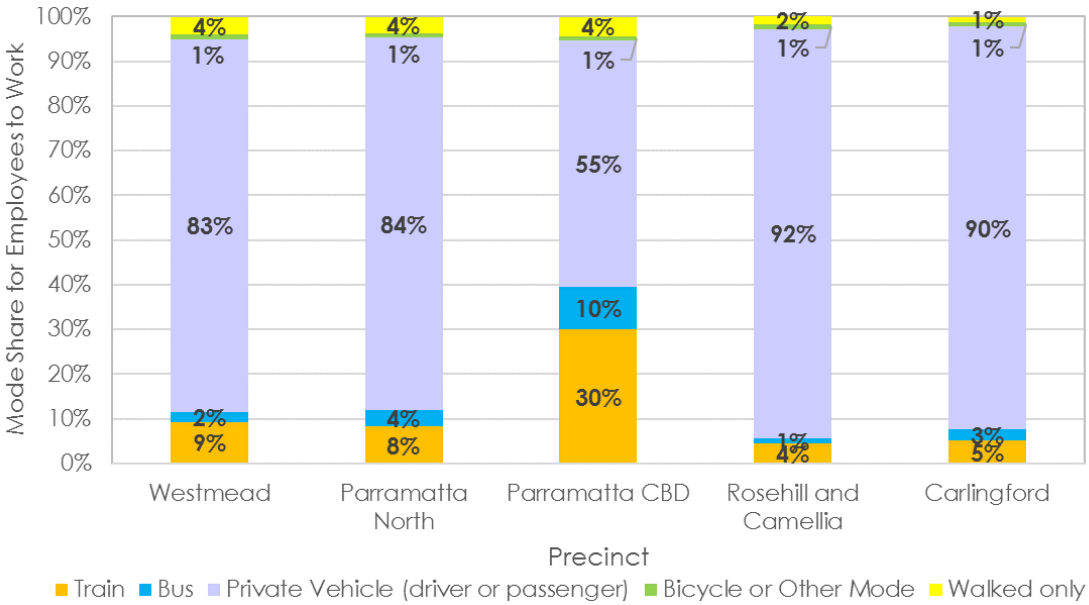


Journey to work mode share for employees

Journey to work mode share for residents

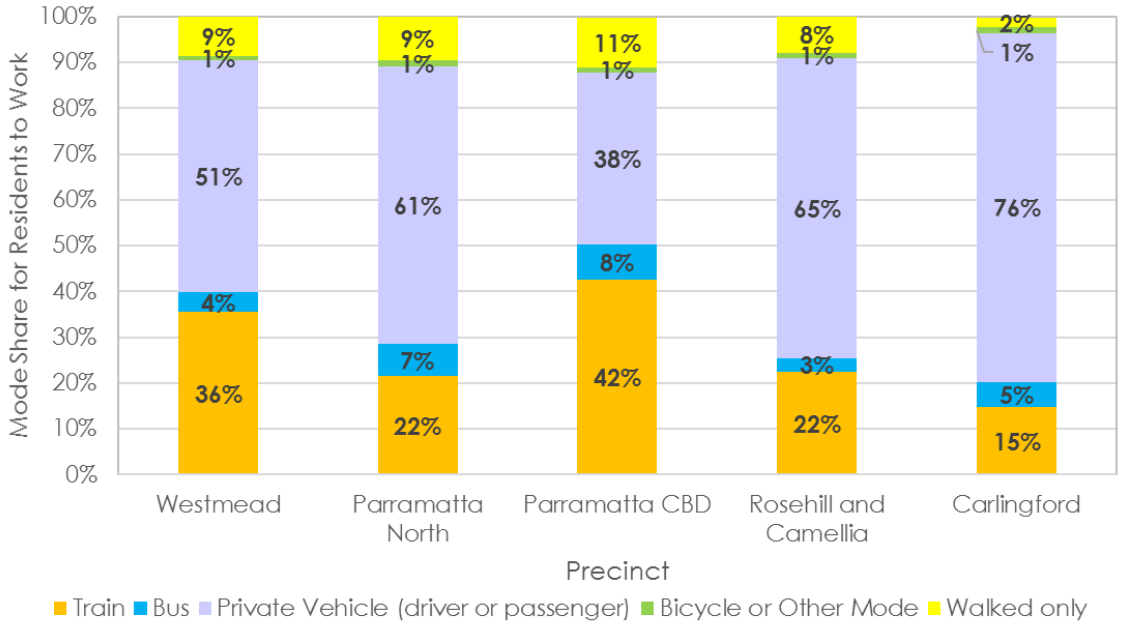
A summary of the transport mode for employees for each precinct is provided in Figure 2.6. Employees of the Parramatta CBD precinct use public transport for around 40 per cent of trips to work. Employees of the Westmead, Parramatta North, Rosehill and Camellia and Carlingford precincts mostly use the private vehicle.

Figure 2.6: Mode share for employees by Parramatta Light Rail precinct



A summary of the transport mode for residents of each precinct who are employed is provided in Figure 2.7. Residents in the Carlingford precinct have the greatest use of private vehicle at 75 per cent of journeys to work. Residents of the Westmead and Parramatta CBD precincts are more inclined to use public transport. Eight to 10 per cent of the residents of the Westmead, Parramatta North, Parramatta CBD and Rosehill and Camellia precincts walk to work because those people live closer to their employment.

Figure 2.7: Mode share for residents who are employed for each precinct



The top five origins and destinations based on the number of trips for the residents and employees of the area are summarised in Table 2.2. Approximately 14,400 journey to work trips occur to or from the Parramatta region in each peak period. Furthermore, about 13,100 residents of the north-west Sydney region travel to the regional area for work and 4, 330 residents of the regional area travel to the Sydney CBD for work.

Table 2.2: Key origins and destinations of commuters with work trips to or from the project area

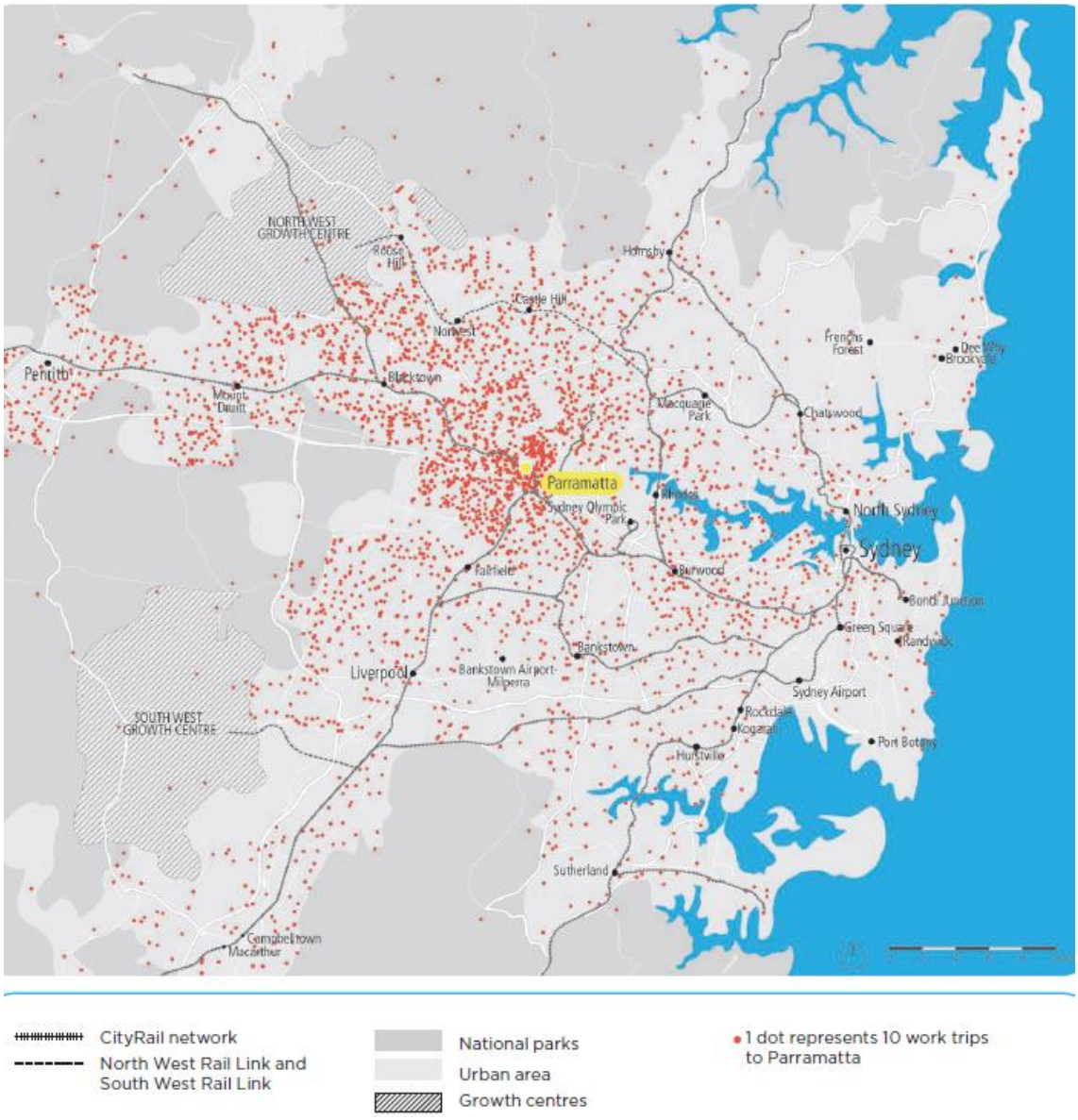
Rank	Origins for employees of the area	Number of trips	Key work destinations for residents	Number of trips
1	Parramatta	9,338	Parramatta	5,065
2	Blacktown	5,083	Sydney Inner City	4,330
3	Merrylands - Guildford	4,977	Ryde - Hunters Hill	1,967
4	Baulkham Hills	4,832	Carlingford	1,244
5	Penrith	3,189	Auburn	1,297
Total	**40% of all trips**	**27,419**	**56% of all trips**	**13,903**

2.3.2 Travel to Parramatta CBD

The *NSW Long Term Transport Master Plan* (NSW Government 2012) acknowledges Parramatta as the major economic centre of Western Sydney, accommodating more than 100,000 jobs. Private vehicles are the primary mode of transport. Public transport is used for 15 per cent of all trips to Parramatta and 40 per cent of trips during the peak periods.

On an average weekday, 26 per cent of commuters that travel to and from Parramatta CBD from across the Sydney region use public transport, with trip origins as shown in Figure 2.8. Based on the travel demand analysis used to prepare the NSW Long Term Transport Masterplan (Transport for NSW, 2012), this public transport mode share to and from Parramatta CBD is expected to increase by six per cent to 32 per cent by 2031 without any significant improvements to the existing public transport system and without Parramatta Light Rail.

Figure 2.8: Current work trip catchment for Parramatta CBD

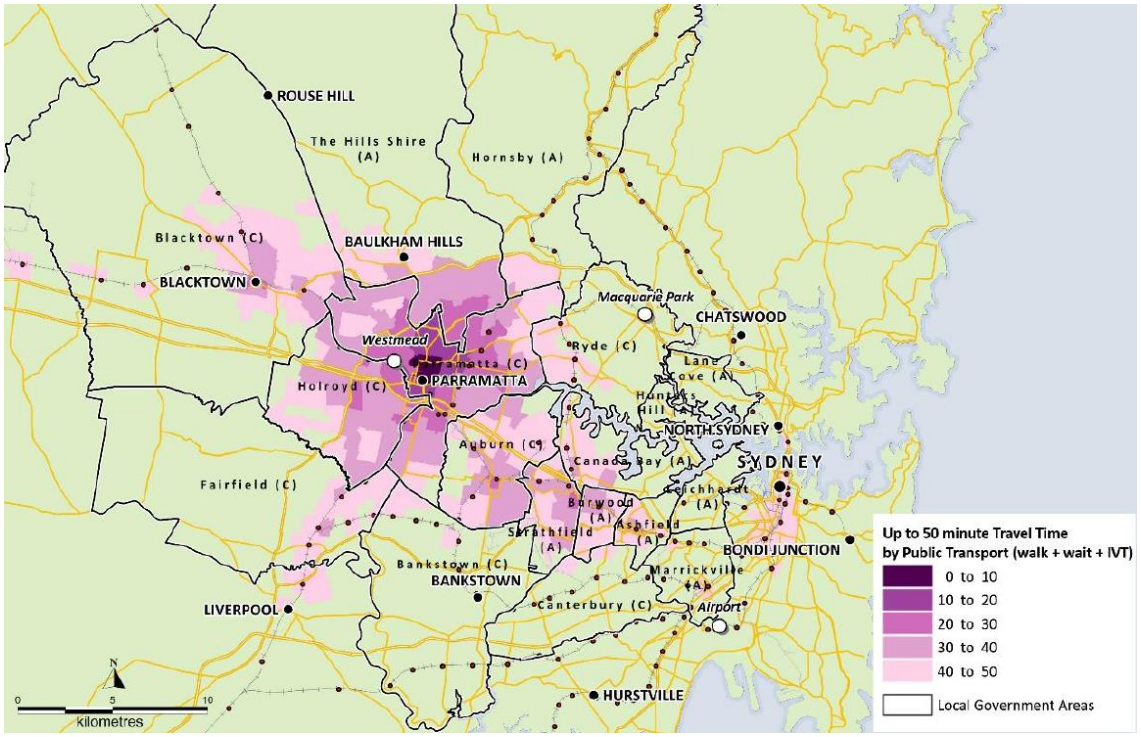


Source: *NSW Long Term Transport Master Plan* (NSW Government 2012).

Parramatta CBD travel times

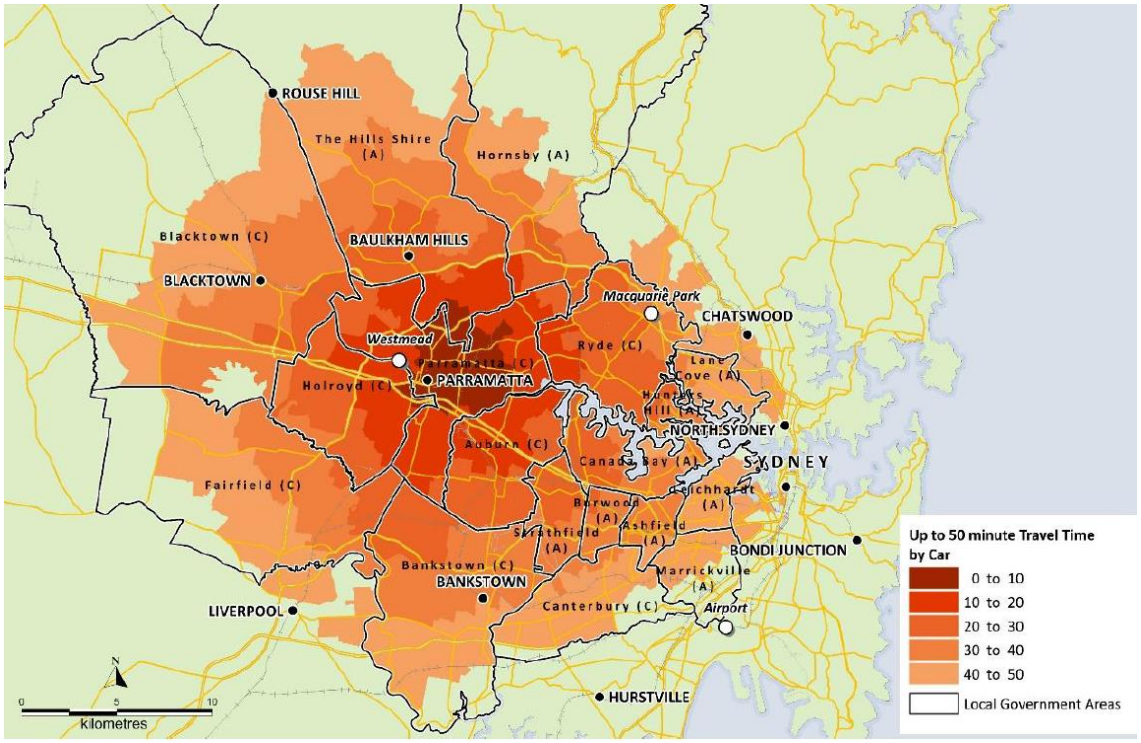
The 10 to 50-minute travel time isochrones for public transport and private vehicle access to Parramatta CBD are shown in Figure 2.9 and Figure 2.10 respectively. The isochrones indicate a wider travel catchment for private vehicle travel, as well as travel time increases for most public transport trips when compared to private vehicle.

Figure 2.9: Parramatta CBD public transport access travel time



Source: *Greater Parramatta and Olympic Peninsula Strategic Vision: Evidence base, Final report* (SGS Economics & Planning for the Greater Sydney Commission, September 2016).

Figure 2.10: Parramatta CBD private vehicle access travel time isochrones



Source: *Greater Parramatta and Olympic Peninsula Strategic Vision: Evidence base, Final report* (SGS Economics & Planning for the Greater Sydney Commission, September 2016).

2.4 Future transport challenges

The key challenges identified in the *NSW Long Term Transport Master Plan* (NSW Government, 2012) for the Parramatta transport network include:

- Peak period congestion around the Parramatta city centre affects bus services and local amenity
- Barriers to movement, including Parramatta River, Parramatta Park, major arterial roads and rail lines need to be traversed to provide better connectivity and to minimise congestion arising from movements being funnelled into a limited number of crossings
- The need for stronger transport connections to other parts of Greater Sydney to support business and economic activity
- The need for additional road and public transport infrastructure to manage travel times.

Another key challenge for Parramatta is that the city centre is serviced by only one railway station and one major bus interchange, and both are reaching their passenger capacity limits during the peak periods.

For bus operations, most bus routes have terminating services at Parramatta Interchange. This creates a significant problem due to insufficient space available to facilitate conveniently located bus layover infrastructure for use by the drivers.

3. Traffic and access conditions

3.1 State and regional road network conditions

The existing State and regional road network surrounding and within the Parramatta CBD is shown in Figure 3.1. These roads are grouped by category in Table 3.2.

Figure 3.1: Existing State and regional road network

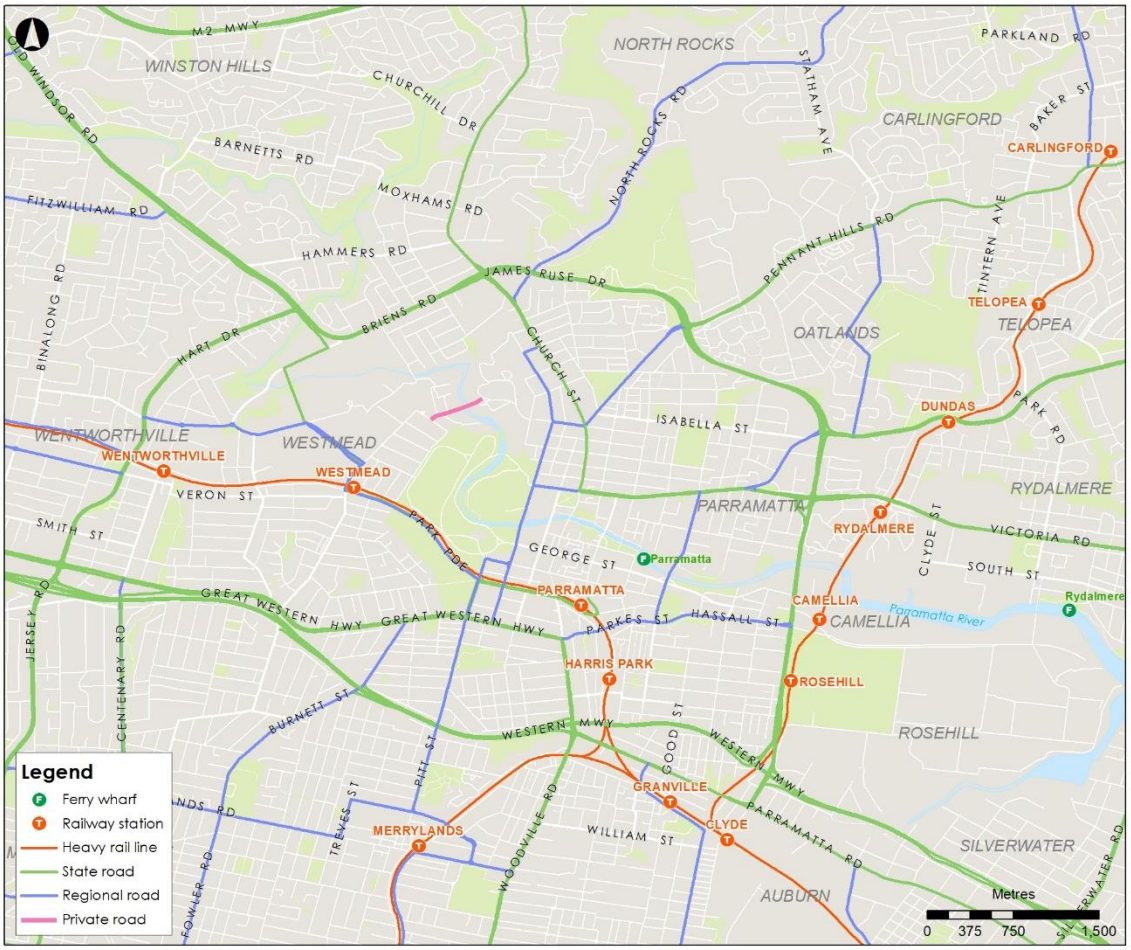
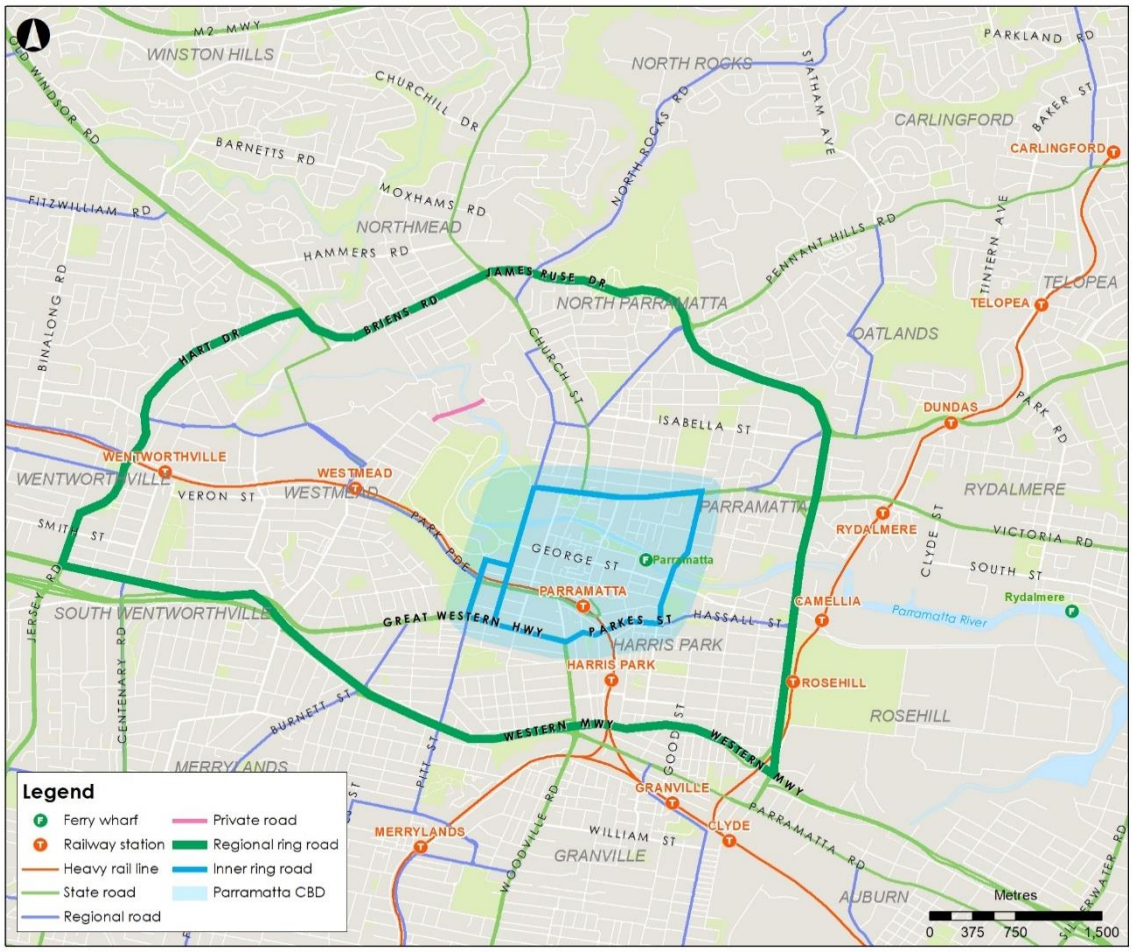


Table 3.1: State and regional roads in the Parramatta Light Rail study area

Category	Road Name and Suburb
State	○ Windsor Road, North Parramatta and Northmead ○ Old Windsor Road, Northmead ○ Briens Road, Westmead ○ T-way lanes in Argyle Street, Pitt Street and Darcy Road, Westmead and Parramatta ○ Church Street (north) (between North Rocks Road and Victoria Road) ○ Pennant Hills Road (east of James Ruse Drive), North Parramatta, Carlingford ○ Victoria Road (east of Church Street), Parramatta and Rydalmere ○ Great Western Highway, Parramatta ○ M4 Western Motorway, Parramatta ○ James Ruse Drive, North Parramatta, Camellia, Rosehill and Rydalmere ○ Lennox Bridge, Parramatta ○ Gasworks Bridge, Parramatta
Regional	○ Darcy Road, Westmead ○ Park Parade, Parramatta ○ Barney Street, North Parramatta ○ O'Connell Street (between Barney Street and Greater Western Highway), North Parramatta and Parramatta ○ Pennant Hills Road (between Church Street and James Ruse Drive), North Parramatta ○ Albert Street, North Parramatta ○ Victoria Road (between O'Connell Street and Church Street), Parramatta ○ Kissing Point Road (between Church Street and James Ruse Drive), North Parramatta ○ Kissing Point Road (between James Ruse Drive and Park Road), Dundas ○ Pennant Street, North Parramatta ○ MacArthur Street, Parramatta ○ Pitt Street, Parramatta ○ Parkes Street/ Hassall Street, Parramatta and Rosehill
Local	○ O'Connell Street (north of Barney Street), North Parramatta

The State and regional road network combines to provide an inner and outer ring road system around the Parramatta CBD as described in the following sections and shown in Figure 3.2.

Figure 3.2: Parramatta CBD ring road network



Inner ring road

The inner ring road provides a circulation route around the Parramatta CBD and access to the CBD. It includes a combination of Victoria Road to the north, MacArthur Street/ Harris Street to the east, Parkes Street/ Great Western Highway to the south and O'Connell Street/ Pitt Street to the west.

Outer ring road

The outer ring road provides a diversion route around Parramatta CBD reducing the need for vehicles to travel through the CBD for origins and destinations outside the CBD. The outer ring road includes a combination of James Ruse Drive to the north and east, the Cumberland Highway to the north and west and the M4 Western Motorway to the south.

The inner and outer road network form the key approach and departure routes for Parramatta CBD, as shown in Figure 3.3 and Figure 3.4 respectively.

Figure 3.3: Parramatta CBD key approach routes

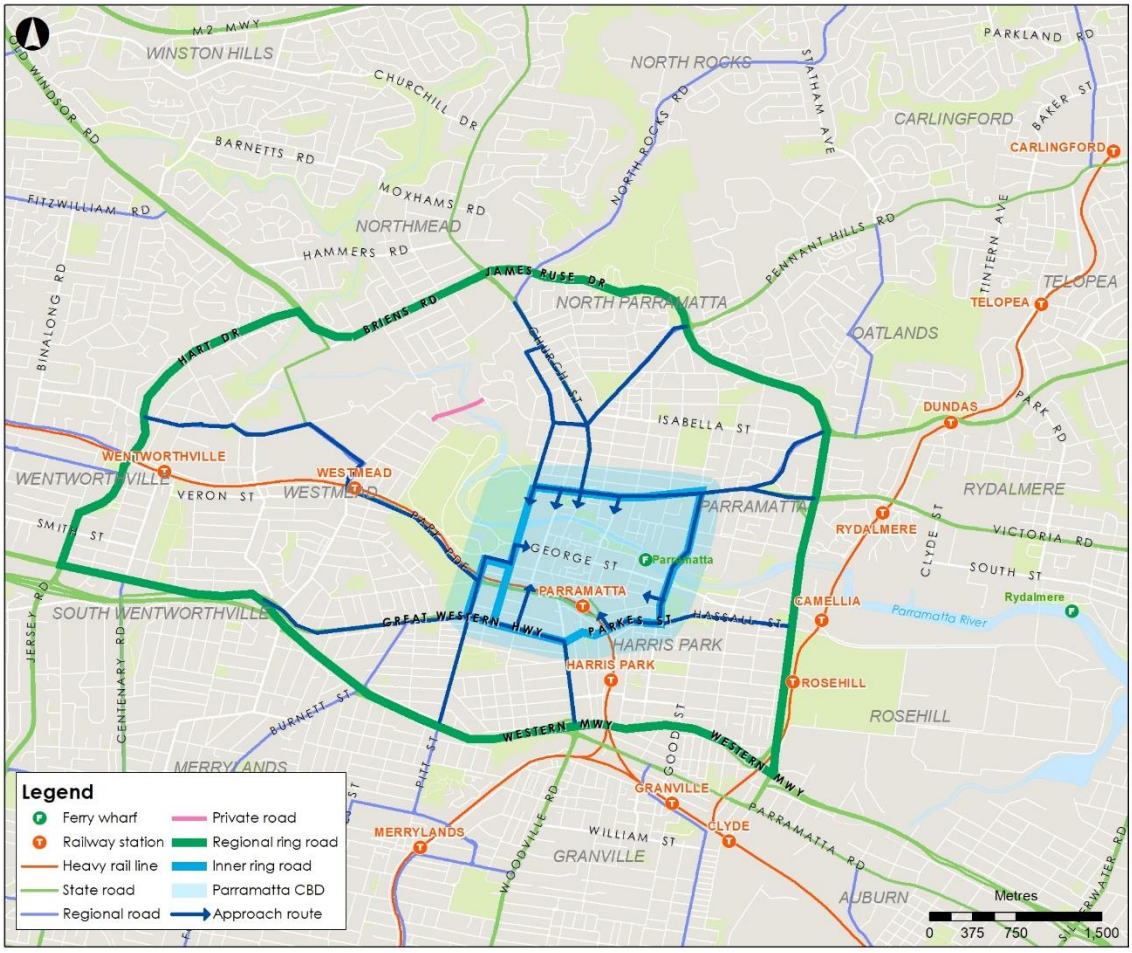
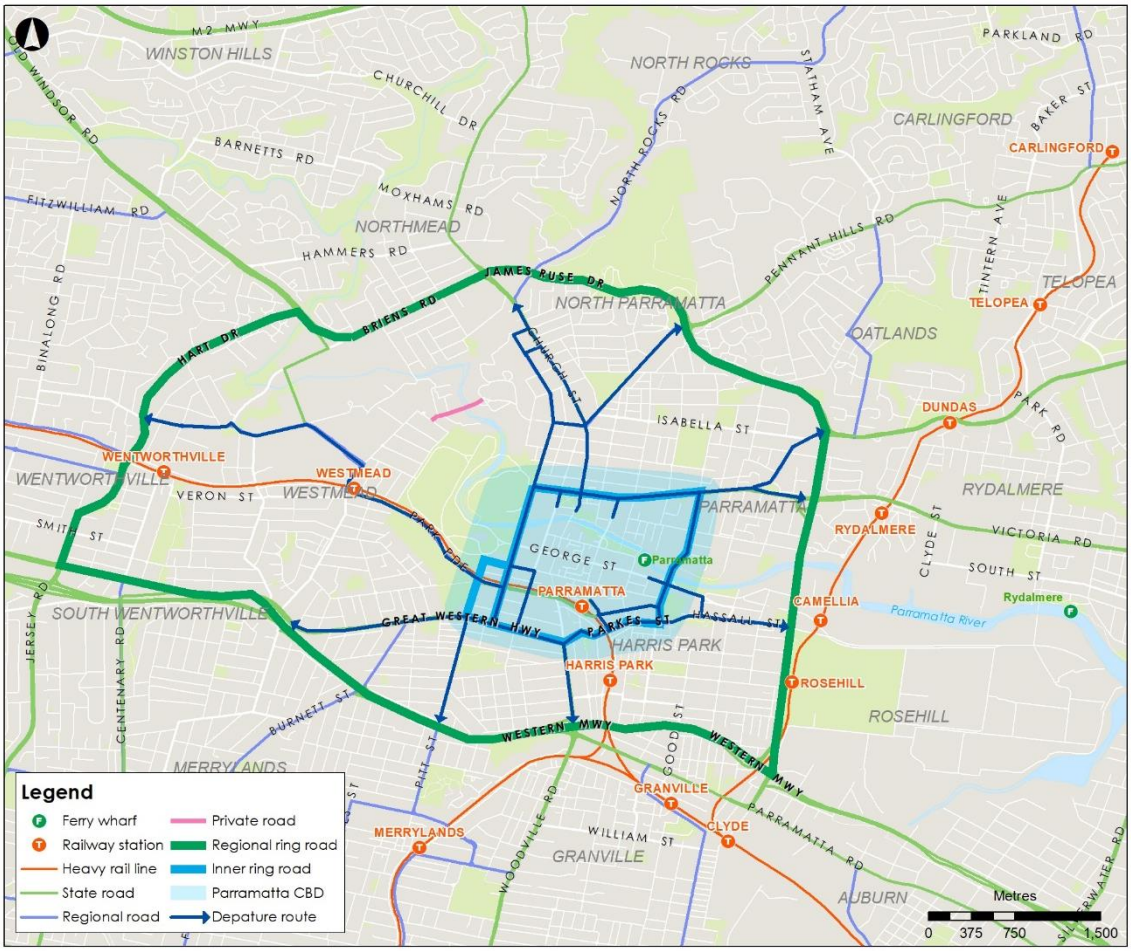


Figure 3.4: Parramatta CBD key departure routes



3.2 Key road features surrounding the project

Key roads along the project and their general configuration within each of the precincts that define the project areas are summarised in Table 3.2. The existing lane configurations and speed environment for the key roads and streets are shown in Figure 3.5 to Figure 3.8 for the five precincts.

Table 3.2: Existing road network characteristics along the project

Key roads	Road classification	Typical lane configuration	Posted speed limit	School zone
Westmead precinct				
Hawkesbury Road (Alexandra Avenue to Railway Parade)	Regional	Two-way, two lanes in each direction	50 km/h	No
	State (T-way)	Dedicated bus lane in the southbound direction		
Hawkesbury Road (Railway Parade to Darcy Road)	Regional	Two-way, two lanes in each direction	50 km/h	No
	State (T-way)	Dedicated bus lane in the southbound direction only		
Hawkesbury Road (Darcy Road to Hainsworth Street)	Local	Two-way, one lane in each direction with kerbside parking	40 km/h	No
Hainsworth Street	Local	Two-way, one lane in each direction with kerbside parking	40 km/h	No
Bridge Road in the Cumberland Hospital precinct (private access only)	Local	Two-way, one lane in each direction	20 km/h	No
Parramatta North precinct				
Cumberland Hospital internal roads (private access only)	Local	Two-way, one lane in each direction	20 km/h	No
Factory Street	Local	Two-way, one lane in each direction with kerbside parking	50 km/h	No
Church Street (Factory Street to Victoria Road)	State	Two-way, two lanes including bus lanes in both directions	60 km/h	No
Parramatta CBD precinct				
Church Street (Victoria Road to Market Street)	Local	Two-way, two-lanes in each direction with kerbside parking	60 km/h	No
Church Street (Market Street to George Street)	Local	Two-way, one-lane in each direction with kerbside parking	40 km/h	No
Church Street (George Street to Macquarie Street)	Local	One-way northbound with one lane and indented kerbside parking	40 km/h	No
Macquarie Street	Local	One-way westbound with two lanes with kerbside parking	50 km/h	Yes
Harris Street	Regional	Two-way, two lanes plus right turn lanes and kerbside parking along the western side	60 km/h	Yes
George Street (Harris Street to Noller Parade/ Purchase Street)	Local	One-way eastbound, two lanes with kerbside parking and a section of angled parking	50 km/h	No
Rosehill and Camellia precinct				
Alfred Street	Local	Two-way, two lanes with kerbside parking	50 km/h	No
Tramway Avenue	Local	Two-way, two lanes with kerbside parking	50 km/h	No
Grand Avenue North	Local	Two-way, two lanes and a separate carriageway with kerbside parking	60 km/h	No

Figure 3.5: Existing road configuration in the Westmead precinct

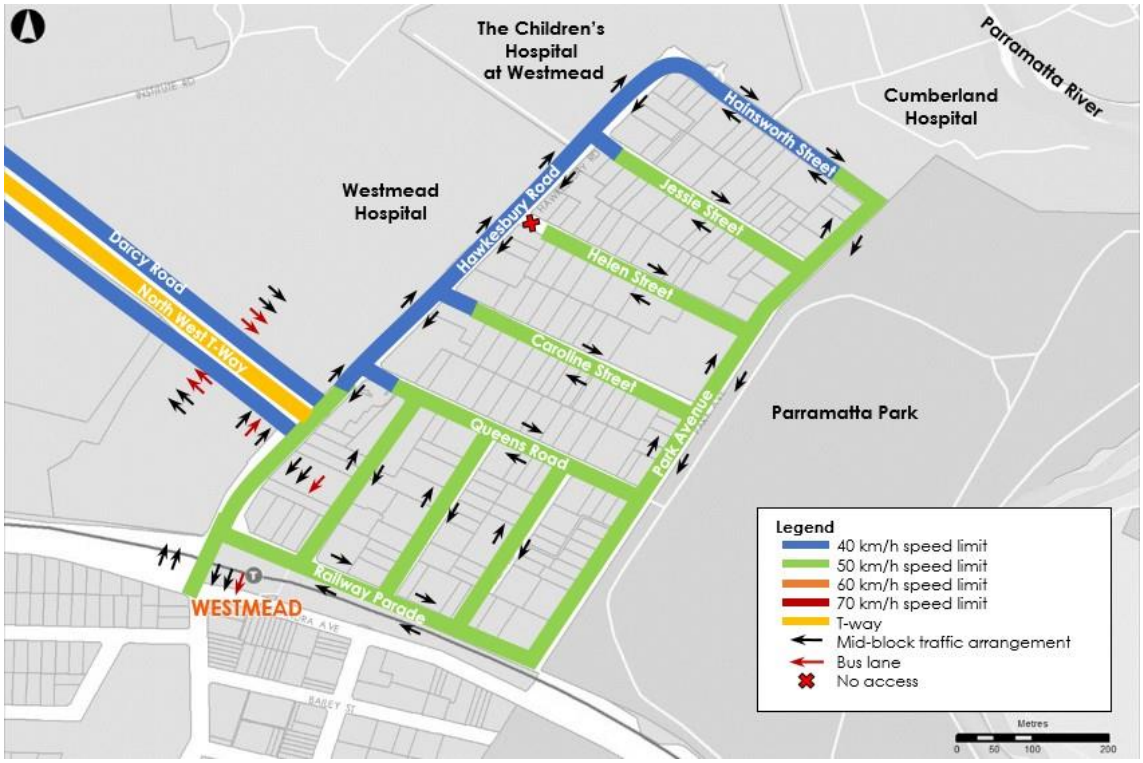


Figure 3.6: Existing road configuration in the Parramatta North precinct

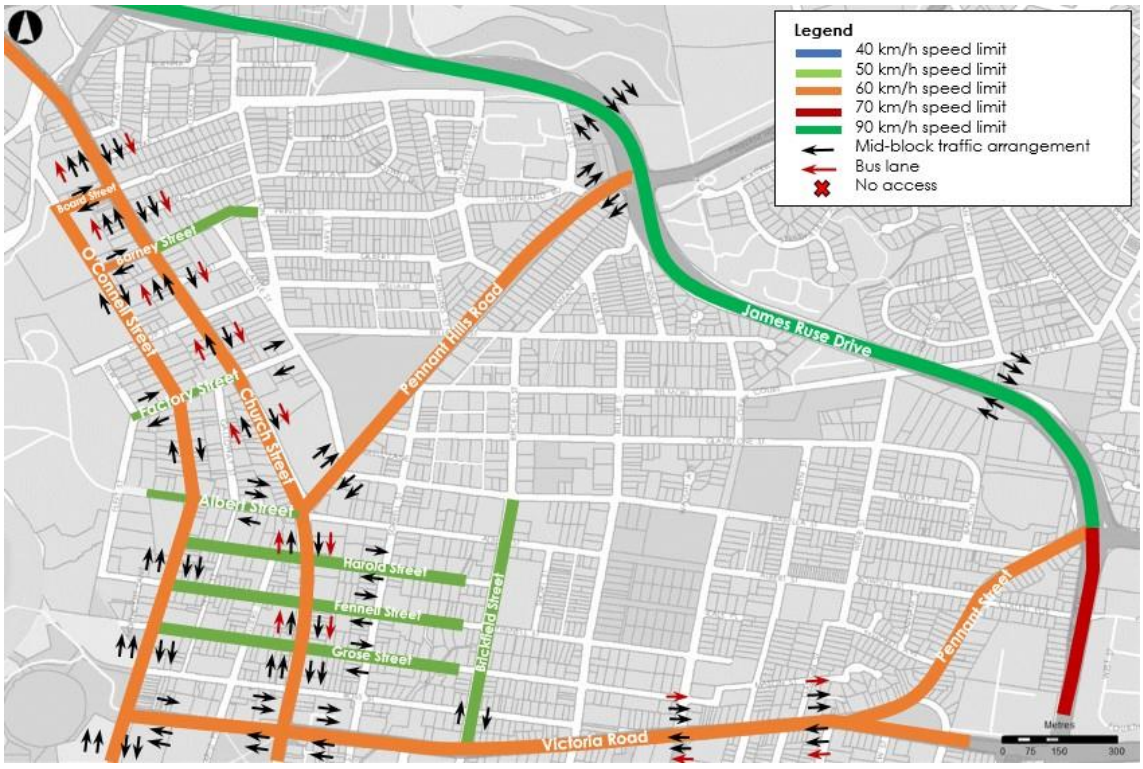


Figure 3.7: Existing road configuration in the Parramatta CBD precinct

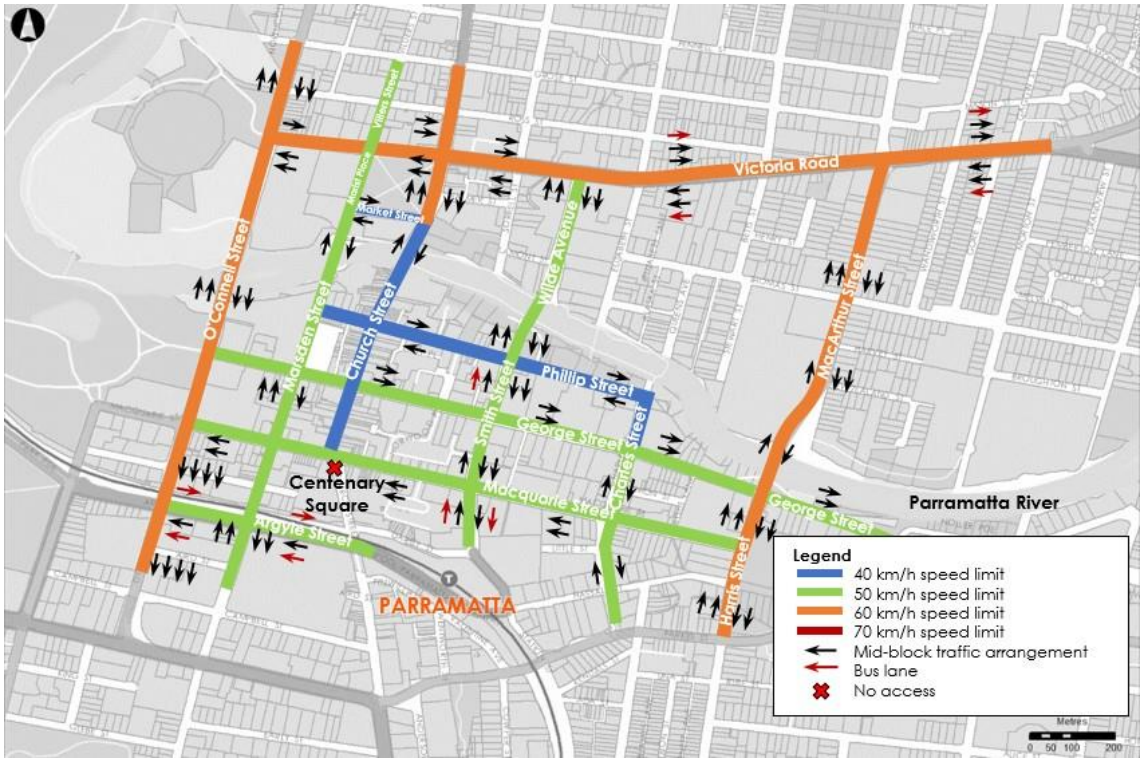
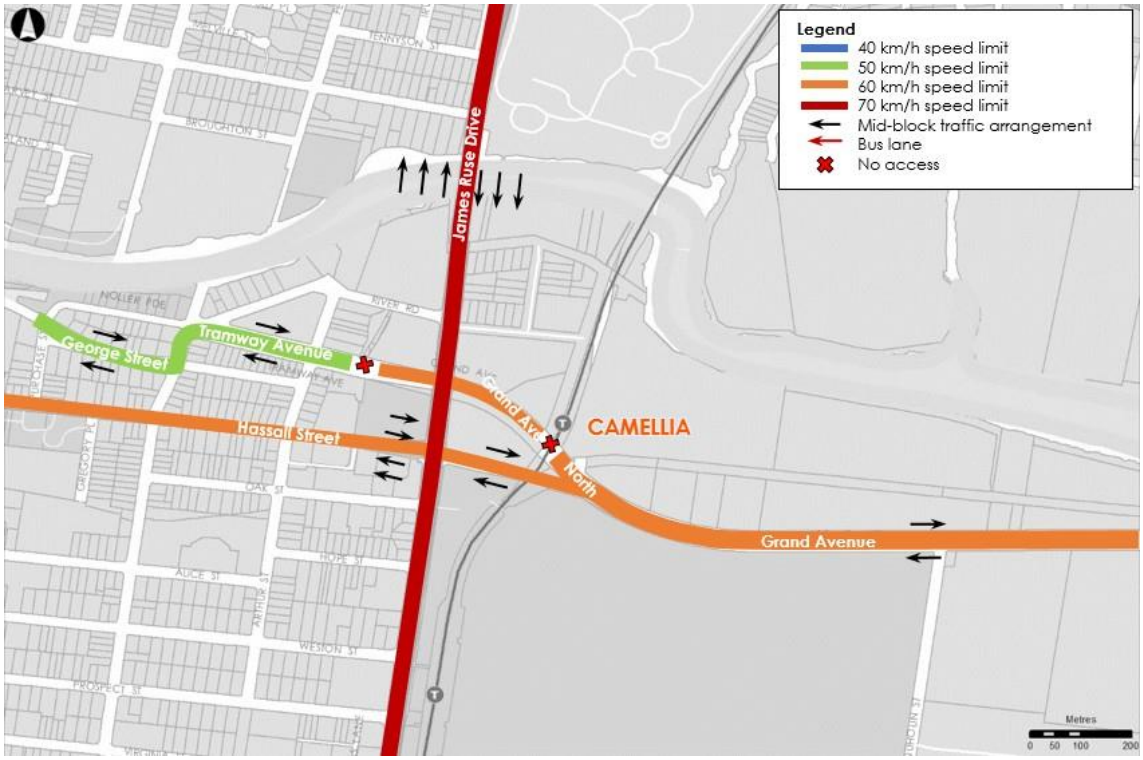


Figure 3.8: Existing road configuration in the Rosehill and Camellia precinct



3.3 Property access

The number of properties with vehicle access points and driveways onto the project corridor are summarised in Table 3.3 with the primary land uses on either side of each street.

Table 3.3: On-corridor property access conditions

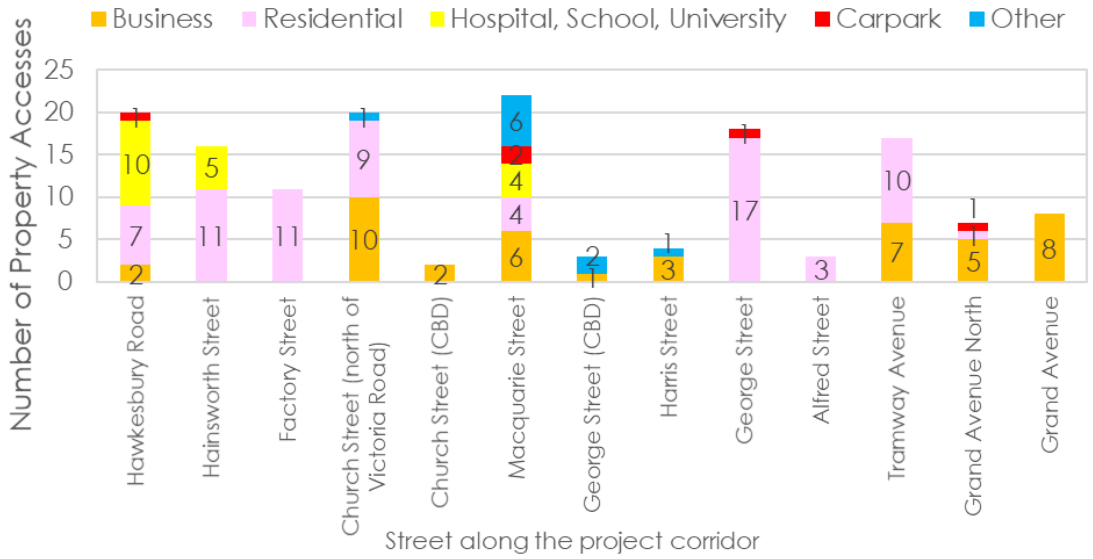
Road/ Street	Location between	Side of the road	Properties with on-corridor access and driveways [1]	Primary land uses
Westmead precinct				
Hawkesbury Road	Railway Parade and Hainsworth Street	West	11	Western Sydney University and the Westmead health precinct
		East	9	Strata residential, small retail and commercial premises and health related facilities
Hainsworth Street	Hainsworth Street and Parramatta River	North	5	The Children's Hospital at Westmead and the car park; Cumberland Hospital health campus
		South	11	Strata residential
Parramatta North precinct				
Factory Street	Fleet Street and Church Street	North	5	Strata residential
		South	6	Strata residential
Church Street	Factory Street and Victoria Road	East	6	Strata residential, a cemetery and businesses
		West	14	Strata residential and businesses
Parramatta CBD precinct				
Church Street	Victoria Road and Macquarie Street	East	2	Novotel Hotel, cafés, restaurants and shopping precinct
		West	0	Prince Alfred Square, Riverside Theatre, cafes, restaurants and shopping precinct
Macquarie Street	Church Street and Harris Street	North	7	Access via united laneway and Horwood Place next to the Bendigo Bank; Commercial development sites and Arthur Phillip High School
		South	15	Strata residential, commercial, retail, a church and mixed-use; Centenary Square at Church Street; includes Parramatta Square mixed-use development; includes Parramatta Public School, electrical sub-station and decked off-street car parks
Harris Street	George Street and Macquarie Street	East	1	Robin Thomas Reserve
		West	3	Albion Hotel
George Street	MacArthur Street/Harris Street and Purchase Street/ Noller Parade	North	0	Queen's Wharf public reserve and parklands
		South	3	Northern side of Robin Thomas Reserve; A social services facility and a church

Road/ Street	Location between	Side of the road	Properties with on-corridor access and driveways [1]	Primary land uses
Rosehill and Camellia precinct				
George Street	Purchase Street/ Noller Parade and Alfred Street	North	11	Strata residential
		South	7	Strata residential and a mechanic business
Alfred Street	George Street and Tramway Avenue	East	3	Strata residential
		West	0	Strata residential
Tramway Avenue	Alfred Street and Arthur Street	North	7	Light industrial
		South	10	Strata residential
Grand Avenue North	Arthur Street and Sandown Freight Line	North	3	Light industrial
		South	4	Rosehill Bowling Club and light industrial east of James Ruse Drive
Grand Avenue	James Ruse Drive and west of the future light rail depot site	North	5	Light industrial
		South	3	Recreational space; Rosehill Gardens Racecourse
Sandown Freight Line	Grand Avenue North and the Parramatta River	South	3	Heavy industrial

[1] Excludes properties with access via an access road or laneway which interfaces with the alignment.

The number of property accesses along the project streets by land use or property type is summarised in Figure 3.9. The "Other" category includes access to churches, community centres, cemeteries, public reserves and parks. Hawkesbury Road and Hainsworth Street in Westmead, Church Street north of Victoria Road in Parramatta North, Macquarie Street in Parramatta CBD, and George Street and Tramway Avenue in the Rosehill precinct have the greatest number of property accesses.

Figure 3.9: Property access to the project streets by precinct



3.4 Local street access

Key approach and departure routes provide connections between the State and regional road network and the local properties located within each precinct. The local area access routes are discussed in the following sections for each precinct.

3.4.1 Westmead precinct

Access to and from the Westmead precinct is generally via Darcy Road linking via Cumberland Highway or Hawkesbury Road to the M4 Western Motorway, Great Western Highway and Park Parade.

Hawkesbury Road provides access to and from the adjacent properties and local road network. Right turns are permitted at all intersections along Hawkesbury Road between Railway Parade and Hainsworth Street.

3.4.2 Parramatta North precinct

Church Street and O'Connell Street combined with a network of east-west aligned roads provide access to properties in the Parramatta North precinct.

Right turns across Church Street are generally restricted to signalised intersections with the following roads:

- Barney Street (southbound only)
- Factory Street
- Pennant Hills/ Albert Street (northbound only)
- Grose Street
- Victoria Road.

Right turns for access to properties along Church Street are generally legally permitted north of Pennant Hills Road, with a central median or major intersection controls restricting access between Pennant Hills Road and Victoria Road.

Within the Parramatta North precinct, right turns across O'Connell Street are generally limited to intersections with the following roads:

- Barney Street (priority controlled)
- Dunlop Street (roundabout)
- Albert Street, in the northbound direction (signalised)
- Fennell Street (priority controlled)
- Grose Street (signalised)
- Victoria Road (signalised).

3.4.3 Parramatta CBD precinct

O'Connell Street, Marist Place/ Marsden Street, Wilde Avenue/ Smith Street, MacArthur Street, and, to a lesser extent, Church Street form the key north-south links in the Parramatta CBD precinct because of their existing river crossings to the north and railway crossings to the south.

O'Connell Street is one-way southbound south of Macquarie Street and combines with Pitt Street to provide a one-way pair at the south-west corner of the CBD.

George Street and Macquarie Street combine to provide the key east-west corridors. George Street accommodates one-way eastbound traffic and Macquarie Street, one-way westbound traffic through the CBD.

Most intersections within the CBD are signalised with limited turn bans, though some right turn bans were identified in the eastern portion of the precinct, particularly along Hassall Street and Harris Street.

3.4.4 Rosehill and Camellia precinct

The Rosehill and Camellia precinct is dominated by the existing industrial land within the Camellia peninsula. The western part of the Rosehill and Camellia precinct west of James Ruse Drive is mostly residential and includes the new high density residential developments along River Road West near the Tramway Avenue light rail stop.

Access to all existing properties along the project is provided via Grand Avenue. Grand Avenue intersects with James Ruse Drive and provides direct access to the surrounding arterial road network.

Carlingford precinct

The Carlingford precinct is limited to the existing rail corridor and therefore does not have any existing local area road access provisions. Road crossings of the project are either road bridges or rail overpasses and are located at the following roads:

- Victoria Road north of Rydalmere light rail stop with the road over the project
- Kissing Point Road north of Dunas light rail stop with the project over the roadway
- Adderton Road south of Telopea light rail stop with the road over the project
- Pennant Hills Road south of Carlingford light rail stop with the road over the project.

Pedestrian and cyclist crossings of the project also exist at:

- WSU campus north of the Parramatta River with a shared use path under the project that connects along the north side of the river via the Bill Brewer pedestrian and cyclist bridge over the Vineyard Creek
- Dundas Railway Station between Kissing Point Road and Station Street
- Leamington Road, Telopea with a pedestrian walkway under the project
- Telopea Railway Station between Adderton Road and Sturt Street.

3.5 Key intersections

Key intersections were identified in the project area that would have an impact on the light rail operations or would impact on through or local traffic by the project affecting road capacity or intersection performance. Some of these intersections are on the inner ring route and none are on the outer ring route. Local access streets and driveways were excluded from these lists.

3.5.1 On-corridor intersections

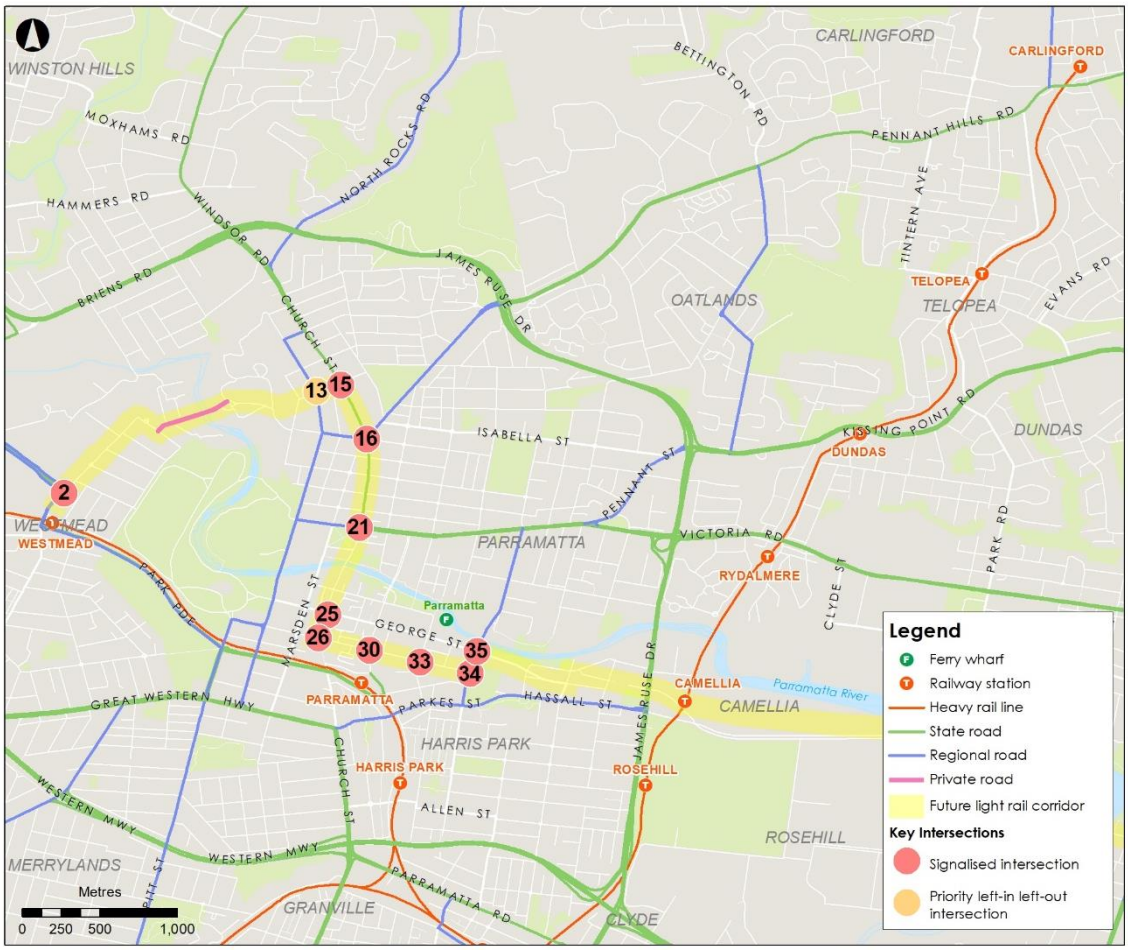
Key existing intersections along the project corridor are summarised in Table 3.4 and are shown in Figure 3.10.

Table 3.4: Key intersections along the project

Precinct	Intersection label	Key intersection	Existing control
Westmead	2	Darcy Road/ Hawkesbury Road	Signalised T-intersection with separated T-way
Parramatta North	13	O'Connell Street/ Factory Street	Priority controlled with left-in/ left-out only

Precinct	Intersection label	Key intersection	Existing control
	15	Church Street/ Factory Street	Signalised with bus lanes along Church Street
	16	Church Street/ Pennant Hills Road/ Albert Street	Signalised with bus lanes along Church Street
	21	Church Street/ Victoria Road	Signalised
Parramatta CBD	25	Church Street/ George Street	Signalised with one-way eastbound traffic on George Street
	26	Church Street/ Macquarie Street	Signalised with one-way westbound traffic on Macquarie Street and one-way northbound traffic on Church Street
	30	Macquarie Street/ Smith Street	Signalised with bus lanes along Smith Street
	33	Macquarie Street/ Charles Street	Signalised
	34	Macquarie Street/ Harris Street	Signalised
	35	MacArthur Street/ Harris Street/ George Street	Signalised

Figure 3.10: Key on-corridor intersections



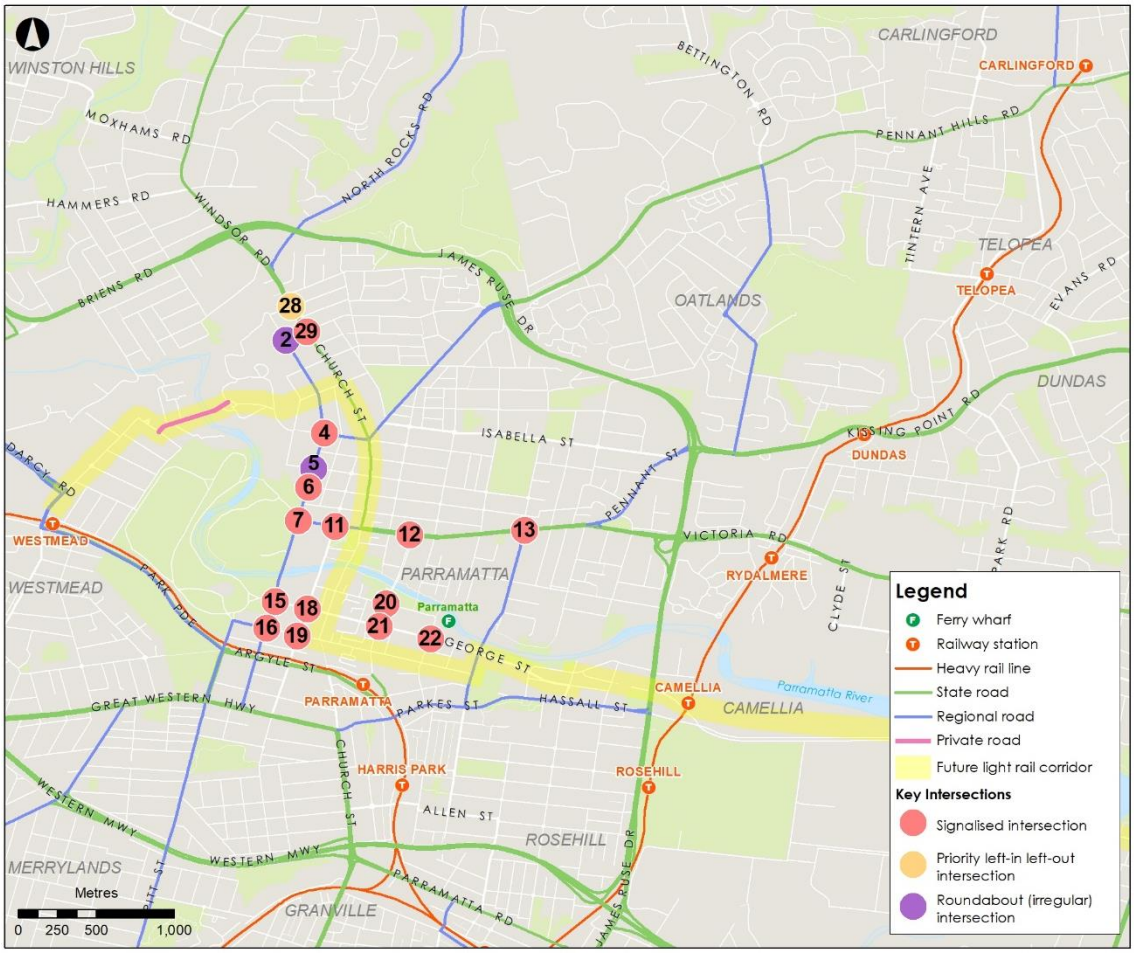
3.5.2 Off-corridor intersections

Key existing intersections surrounding the project corridor are summarised in Table 3.5 and are shown in Figure 3.11.

Table 3.5: Key off-corridor intersections

Precinct	Intersection label	Key intersection	Existing control
Parramatta North	A2	O'Connell Street/ Barney Street	Priority
	A4	O'Connell Street/ Albert Street	Signalised
	A5	O'Connell Street/ Fennell Street	Priority
	A6	O'Connell Street/ Grose Street	Signalised
	A7	O'Connell Street/ Victoria Road	Signalised
	A11	Victoria Road/ Marist Place	Signalised
	A12	Victoria Road/ Wilde Avenue	Signalised
	A13	Victoria Road/ MacArthur Street	Signalised
	A28	Church Street/ Board Street	Priority controlled with left-in/ left-out only
	A29	Church Street/ Barney Street	Signalised
Parramatta CBD	A15	O'Connell Street/ George Street	Signalised with one-way eastbound traffic on George Street
	A16	O'Connell Street/ Macquarie Street	Signalised
	A18	Marsden Street/ George Street	Signalised with one-way eastbound traffic on George Street
	A19	Marsden Street/ Macquarie Street	Signalised
	A20	Smith Street/ Phillip Street	Signalised
	A21	Smith Street/ George Street	Signalised with one-way eastbound traffic on George Street
	A22	Charles Street/ George Street	Signalised with one-way eastbound traffic on George Street

Figure 3.11: Key off-corridor intersections



3.6 Traffic volumes and patterns

3.6.1 Traffic surveys

Intersection counts were completed on behalf of Transport for NSW at key locations along the alignment and on the surrounding road network. They were undertaken on typical weekdays (excluding school holiday periods) between 2014 and 2016, as referenced in the *Parramatta to Olympic Peninsula Calibration and Validation* report (Jacobs, 2017).

The AM and PM peak hour surveyed results adopted for each of the precincts are given in Table 3.6.

Table 3.6: Peak hours for the traffic counts by precinct

Precinct	AM peak hour	PM peak hour
Westmead	7.30 - 8.30 am	3.30 - 4.30 pm
Parramatta North	8 - 9 am	5 - 6 pm
Parramatta CBD	8 - 9 am	5 - 6 pm
Rosehill and Camellia	7 - 8 am	5 - 6 pm

SCATS intersection traffic data was sourced for all signalised intersections within the Parramatta North and Parramatta CBD precincts for a weekday period between 2 May 2016 and 6 May 2016, to supplement the intersection counts. The SCATS data was subsequently incorporated into

the Parramatta to Olympic Peninsula mesoscopic traffic model, which was developed to assess the cumulative impacts of Parramatta Light Rail and other projects on the GPOP road network. The 2016 base traffic flows adopted in the existing conditions assessment were extracted from the calibrated mesoscopic base model.

The AM and PM peak hour traffic volumes at key intersections assessed in this report are summarised in Table 3.7. The intersection labels refer to the locations included in the OTTTAR.

Table 3.7: Traffic volumes at key intersections

Intersection label	Intersection	Total vehicles per hour (all movements)	
		AM peak	PM peak
On-corridor intersections			
2	Hawkesbury Road/ Darcy Road	1,810	1,630
13	Factory Street/ O'Connell Street	1,190	990
15	Church Street/ Factory Street	1,320	1,580
16	Church Street/ Pennant Hills Road/ Albert Street	2,210	2,250
21	Church Street/ Victoria Road	2,410	2,620
25	Church Street/ George Street	780	810
26	Church Street/ Macquarie Street	340	790
30	Macquarie Street/ Smith Street	1,160	1,070
33	Macquarie Street/ Charles Street	1,330	900
34	Macquarie Street/ Harris Street	1,900	2,090
35	Harris Street/ George Street/ MacArthur Street	1,760	2,680
Off-corridor intersections			
A2	O'Connell Street/ Barney Street	1,300	1,020
A4	O'Connell Street/ Albert Street	1,770	1,360
A5	O'Connell Street/ Fennell Street	2,540	2,010
A6	O'Connell Street/ Grose Street/ Eels Place	2,300	2,130
A7	O'Connell Street/ Victoria Road	2,850	2,790
A11	Victoria Road/ Marist Place/ Villiers Street	1,430	1,550
A12	Victoria Road/ Wilde Avenue	2,860	3,120
A13	Victoria Road/ MacArthur Street	2,690	3,580
A15	O'Connell Street/ George Street	3,140	2,700
A16	O'Connell Street/ Macquarie Street	3,530	3,170
A18	George Street/ Marsden Street	1,580	1,650
A19	Macquarie Street/ Marsden Street	1,490	2,130
A20	Phillip Street/ Smith Street/ Wilde Avenue	1,790	1,830
A21	George Street/ Smith Street	1,300	1,300
A22	George Street/ Charles Street	1,050	1,240
A28	Church Street/ Board Street	2,710	2,950
A29	Church Street/Barney Street	2,150	2,550

3.6.2 Travel time surveys

Travel time data was sourced from Google travel time surveys that were recorded continuously at 15-minute intervals from 21st to 30th March 2017 throughout Parramatta CBD.

The travel time performance surveys were conducted along sections of the following corridors:

- O'Connell Street between Board Street and Argyle Street
- Board Street between O'Connell Street and Church Street
- Barney St between O'Connell Street and Church Street
- Church Street between North Rocks Road and Parkes Street
- Pitt Street between Great Western Highway and Argyle Street
- Macquarie Street between O'Connell Street and Harris Street
- George Street between O'Connell Street and Harris Street
- Phillip Street between Marsden Street and Charles Street
- Victoria Road between O'Connell Street and Pennant Street
- Grose Street west of Sorrel Street
- Fennell Street west of Sorrell Street
- Marsden Street between Harold Street and Macquarie Street
- Pennant Hills Road between Church Street and Gladstone Street
- Wilde Avenue and Smith Street between Victoria Road and Hassall Street
- Charles Street between Phillip Street and Hassall Street
- Macarthur Street between George Street and Victoria Road
- River Road West.

The journey date and time, distance in metres, duration in traffic, and the latitude and longitude for the route start and end were recorded at selected junctions along route sections. The junctions for these surveys generally occurred at intersections with traffic signals. The data were analysed to provide the average travel times and speeds along roads in the project area.

Free-flow speed is defined as the 85th percentile travel speed, which generally represents ideal traffic conditions, such as weather conditions, construction activities and other unplanned traffic disruptions.

The free-flow speed along Church Street between Victoria Road and Barney Street was determined at 30 km/h for either direction from the Google data for the peak period on a typical weekday on Tuesday 28th March 2017. The two-hour average travel speeds for all traffic along Church Street in North Parramatta are given in Table 3.8. The average travel time between Barney Street and Victoria Road southbound was three minutes in the AM peak period and between Victoria Road and Barney Street northbound was four minutes in the PM peak period.

Table 3.8: Average travel speeds along Church Street in North Parramatta

Location along Church Street	Time period	Average speed (kilometres/hour)	Time period	Minimum speed (kilometres/hour)
Barney Street to Victoria Road southbound	7 am to 9 am	26	8:45 am	11
Grose Street to Victoria Road southbound	7 am to 9 am	15	8:45 am	13.6
Victoria Road to Barney Street northbound	4 pm to 6 pm	22	5:30 pm	11
Grose Street to Albert Street/ Pennant Hills Road northbound	4 pm to 6 pm	18.8	No data analysed-	
Factory Street to Barney Street northbound	4 pm to 6 pm	20.4	5:15 pm to 6 pm	6

3.7 Intersection performance

The operation of the intersections in the project area were assessed using SIDRA Intersection 7.0[1], a computer based modelling package which calculates intersection performance. The intersections which are expected to be most affected by the project are referred to as the key intersections.

The commonly used measure of intersection performance is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service. The criteria used in SIDRA Intersection analysis to assess the intersection level of service are provided in Table 3.9.

Table 3.9: SIDRA intersection level of service criteria

Level of service	Average delay per vehicle (seconds/vehicle)	Traffic signals, roundabout	Give way and stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents would cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

A level of service D or better is generally considered suitable for intersection performance. However, consideration of queues and delays on individual intersection approaches is typically required to fully understand the intersection performance.

Assessment constraints

The existing SIDRA Intersection modelling was completed using isolated intersection modelling only, but some roads along the project and its surrounds operate in a network with coordinated signal phasing and cycle times. Signal coordination occurs along the following corridors:

- Darcy Road/ Hawkesbury Road.
- O'Connell Street.
- Church Street.
- Victoria Road.
- Other connecting streets in the Parramatta CBD.

The SIDRA intersection results shown in the following sections provide an assessment of the existing traffic conditions for one set of results. They are based on the following assumptions:

- Signal timing and phasing may differ depending on the day and time data was collected
- Traffic volumes may vary depending on the day and time data was collected particularly in areas which have experienced considerable construction activity or completion of new developments.
- Intersection configuration at the time the assessment was completed.

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

AM peak intersection operation

A summary of the existing performance of the key intersections located on and off the future project during the AM peak hour is provided in Table 3.10 and Figure 3.12. The detailed SIDRA results are included in Appendix A.

Table 3.10: Existing operating conditions for key intersections -AM peak

Intersection label	Intersection	Degree of saturation	Average delay (seconds)	95th percentile queue (metres)	Level of service
On-corridor intersections					
2	Hawkesbury Road/ Darcy Road	0.64	34	183	C
13	Factory Street/ O'Connell Street	0.36	12	2	A
15	Church Street/ Factory Street	0.46	14	96	A
16	Church Street/ Pennant Hills Road/ Albert Street	0.66	33	198	C
21	Church Street/ Victoria Road	0.67	38	109	C
25	Church Street/ George Street	0.44	25	61	B
26	Church Street/ Macquarie Street	0.23	18	32	B
30	Macquarie Street/ Smith Street	0.61	44	81	D
33	Macquarie Street/ Charles Street	0.49	16	57	B
34	Macquarie Street/ Harris Street	0.56	11	95	A
35	Harris Street/ George Street/ MacArthur Street	0.61	14	177	A
Off-corridor intersections					
A2	O'Connell Street/ Barney Street	0.41	19	2	B
A4	O'Connell Street/ Albert Street	0.66	22	106	B
A5	O'Connell Street/ Fennell Street	1.00	263	89	F
A6	O'Connell Street/ Grose Street/ Eels Place	0.53	22	124	B
A7	O'Connell Street/ Victoria Road	0.76	27	189	B
A11	Victoria Road/ Marist Place/ Villiers Street	0.42	35	87	C
A12	Victoria Road/ Wilde Avenue	0.72	33	154	C
A13	Victoria Road/ MacArthur Street	0.53	31	136	C
A15	O'Connell Street/ George Street	0.65	14	133	A
A16	O'Connell Street/ Macquarie Street	0.70	14	142	A
A18	George Street/ Marsden Street	0.51	19	79	B
A19	Macquarie Street/ Marsden Street	0.41	8	35	A
A20	Phillip Street/ Smith Street/ Wilde Avenue	0.83	32	153	C
A21	George Street/ Smith Street	0.45	32	89	C
A22	George Street/ Charles Street	0.44	12	37	A
A28	Church Street/ Board Street	0.46	6	20	A
A29	Church Street/Barney St	0.82	27	187	B

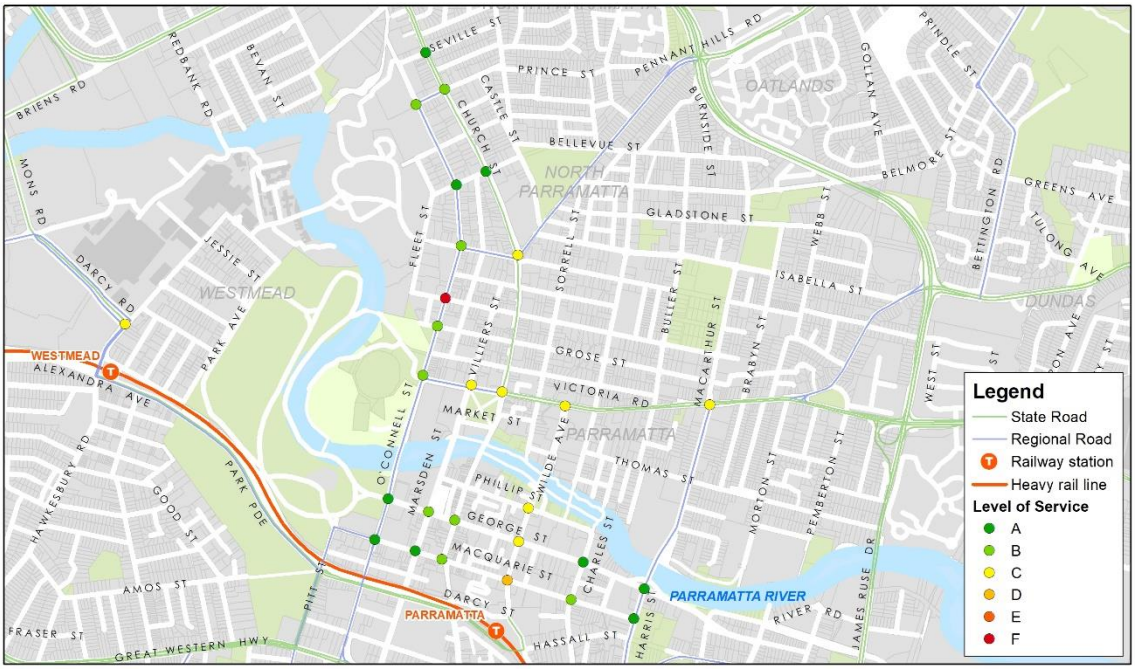
Most of the key intersections operate satisfactorily (level of service D or better) during the AM peak, with the following intersections approaching capacity (approaching a degree of saturation of one or higher):

- O'Connell Street/ Fennell Street
- O'Connell Street/ Victoria Road
- Victoria Road/ Wilde Avenue
- O'Connell Street/ Macquarie Street
- Phillip Street/ Smith Street/ Wilde Avenue
- Church Street/ Barney Street.

The impact of the project on these intersections has been given particular consideration in the OTTTAR.

The modelling results show that the O'Connell Street/ Fennell Street intersection is currently operating at a level of service F during the AM peak due to the modelled delays experienced on the eastern and western approaches. However, these results are inconsistent with on-site observations where significantly less traffic was observed on the side roads than that adopted in the base case volumes (extracted from the GPOP mesoscopic base model). This intersection is given special consideration in the OTTTAR.

Figure 3.12: Existing intersection operation in the AM peak



PM peak intersection operation

A summary of the existing operations and performance of the key intersections located on and off the future project during the PM peak hour is given in Table 3.11 and Figure 3.13. The detailed SIDRA results are included in Appendix A.

Table 3.11: Existing operating conditions for key intersections -PM peak period

Intersection label	Intersection	Degree of saturation	Average delay (seconds)	95th percentile queue (metres)	Level of service
On-corridor intersections					
2	Hawkesbury Road/ Darcy Road	0.80	32	158	C
13	Factory Street/ O'Connell Street	0.25	10	2	A
15	Church Street/ Factory Street	0.53	14	130	A
16	Church Street/ Pennant Hills Road/ Albert Street	0.56	30	152	C
21	Church Street/ Victoria Road	0.70	37	111	C
25	Church Street/ George Street	0.39	26	43	B
26	Church Street/ Macquarie Street	0.36	9	58	A
30	Macquarie Street/ Smith Street	0.65	46	63	D
33	Macquarie Street/ Charles Street	0.37	15	31	B
34	Macquarie Street/ Harris Street	0.72	10	148	A
35	Harris Street/ George Street/ MacArthur Street	0.99	44	545	D
Off-corridor Intersections					
A2	O'Connell Street/ Barney Street	0.30	11	1	A
A4	O'Connell Street/ Albert Street	0.43	13	53	A
A5	O'Connell Street/ Fennell Street	1.00	229	64	F
A6	O'Connell Street/ Grose Street/ Eels Place	0.56	18	80	B
A7	O'Connell Street/ Victoria Road	0.65	26	182	B
A11	Victoria Road/ Marist Place/ Villiers Street	0.46	36	103	C
A12	Victoria Road/ Wilde Avenue	0.82	35	251	C
A13	Victoria Road/ MacArthur Street	0.82	39	232	C
A15	O'Connell Street/ George Street	0.50	9	87	A
A16	O'Connell Street/ Macquarie Street	0.65	20	117	B
A18	George Street/ Marsden Street	0.58	19	110	B
A19	Macquarie Street/ Marsden Street	0.75	12	73	A
A20	Phillip Street/ Smith Street/ Wilde Avenue	0.89	30	124	C
A21	George Street/ Smith Street	0.36	30	75	C
A22	George Street/ Charles Street	0.40	14	38	A
A28	Church Street/ Board Street	0.36	6	13	A
A29	Church Street/Barney Street	0.78	27	136	B

Most of the key intersections operate satisfactorily (level of service D or better) during the PM peak, with the following intersections approaching capacity and are approaching a degree of saturation of one:

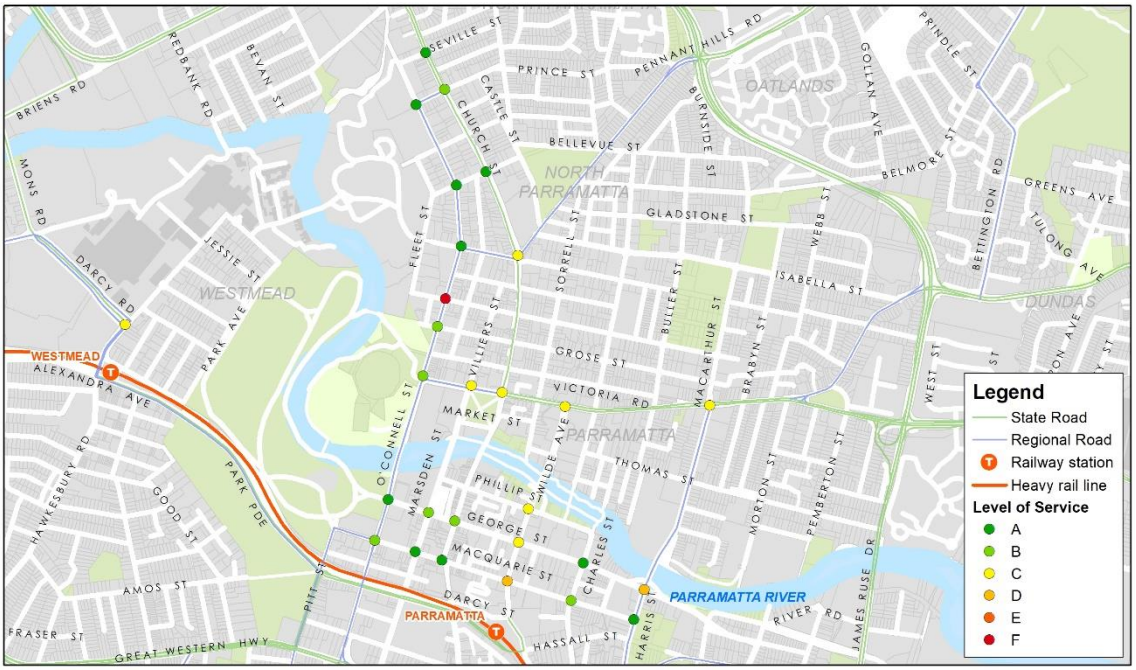
- Hawkesbury Road/ Darcy Road
- Church Street/ Victoria Road
- Harris Street/ George Street/ MacArthur Street
- O'Connell Street/ Fennell Street
- Macquarie Street/ Harris Street
- Victoria Road/ Wilde Avenue
- Victoria Road/ MacArthur Street
- Macquarie Street/ Marsden Street
- Phillip Street/ Smith Street/ Wilde Avenue
- Church Street/ Barney Street.

The intersection of Harris Street/ George Street/ MacArthur Street has vehicle queueing of up to 550 metres and is the worst location in the PM peak period.

The impact of the project on these intersections are given particular consideration as part of the OTTTAR.

The O'Connell Street/ Fennell Street intersection is currently operating at a level of service F, during the PM peak due to the modelled delays experienced on the eastern and western approaches. However, these results are inconsistent with on-site observations where significantly less traffic was observed on the side roads than that adopted in the base case volumes (extracted from the GPOP mesoscopic base model). This intersection is given special consideration in the OTTTAR.

Figure 3.13: Existing intersection operation in the PM peak

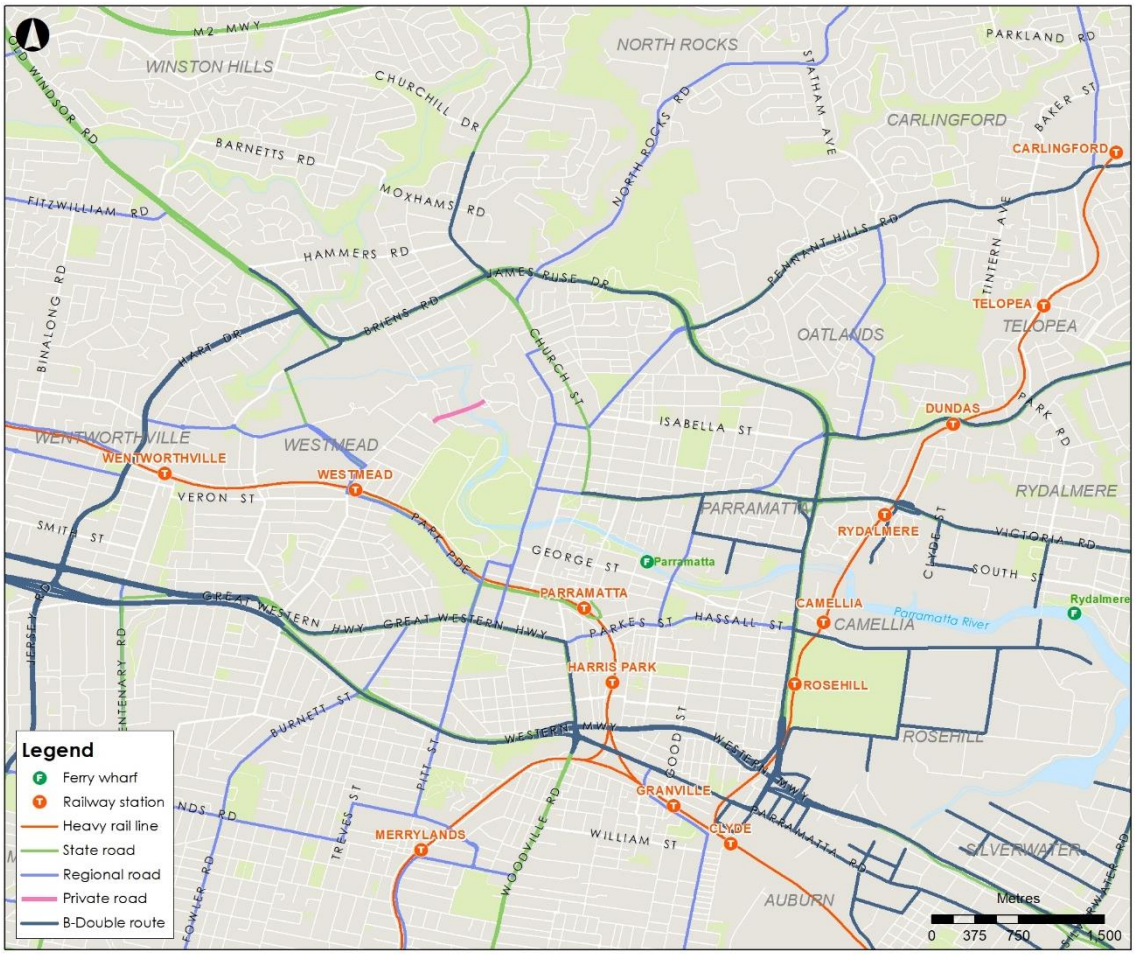


3.8 Freight and access routes

Relevant B-double routes that allow for vehicles up to 26 metres long are shown in Figure 3.14 and include the following:

- Victoria Road, Parramatta.
- Windsor Road, North Parramatta and Northmead.
- James Ruse Drive, Camellia, Rydalmere and North Parramatta.
- Kissing Point Road, Dundas and Telopea.
- Grand Avenue, Camellia.
- Pennant Hills Road, North Parramatta to Carlingford.

Figure 3.14: Relevant freight and access routes



Based on the current Restricted Access Vehicle Route maps, Church Street north of Victoria Road is an approved route with conditions for 4.6-metre high load vehicles.

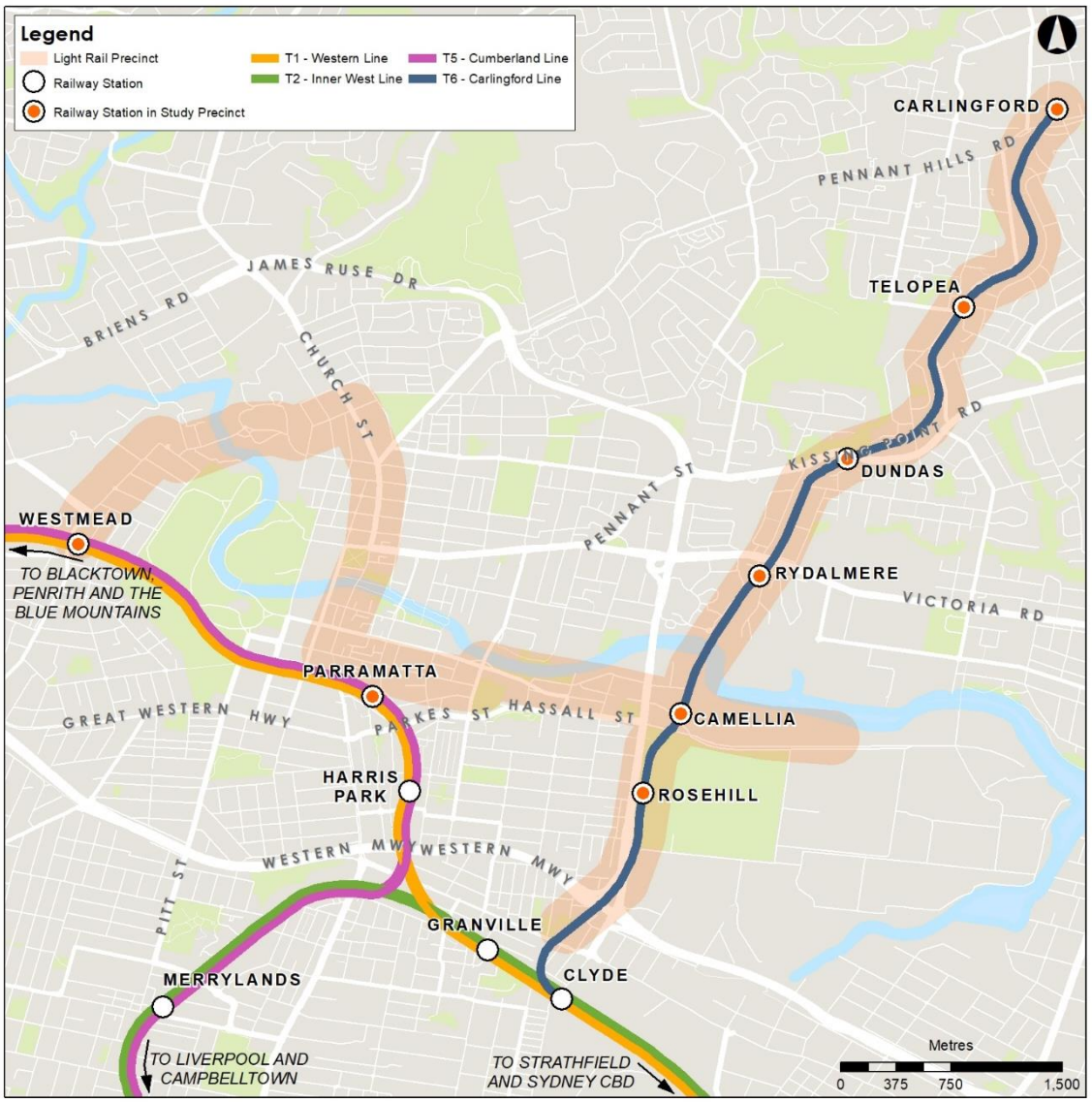
4. Public transport

4.1 Heavy rail

4.1.1 Train network and services

The existing railway stations in the project area and railway lines that operate the Sydney Trains rail network are shown in Figure 4.1. The relevant stations within the precincts are at Parramatta, Westmead, Carlingford, Telopea, Dundas, Rydalmere, Camellia and Rosehill.

Figure 4.1: Existing railway stations on the Sydney Trains network in the project area



The project area is serviced by heavy rail with the following lines:

- T1 Western Line – connecting Clyde, Granville, Harris Park and Parramatta Stations onto Blacktown, Richmond and Emu Plains Railway Stations.
- T5 Cumberland Line – connecting Campbelltown to Schofields Stations via Liverpool, Parramatta and Blacktown Railway Stations.
- T6 Carlingford Line – A dedicated heavy rail spur line, connecting Carlingford to Clyde Railway Stations via Telopea, Dundas, Rydalmere, Camellia and Rosehill Railway Stations. The AM peak service frequency is every 30 minutes with one train operating through to Sydney CBD and hourly services with a cross-platform transfer at Clyde Railway Station at all other times.
- Blue Mountains Line that stops at Parramatta station en-route to Central Railway Station.
- NSW TrainLink with trains to Dubbo.

The attributes, such as distance from Central Station, number of platforms and tracks and the connecting bus routes for each of the existing railway stations in the project area are given in Table 4.2. Westmead Railway Station is 2.1 kilometres west of Parramatta Railway Station. The average station spacing on the T6 Carlingford Line is 1.2 kilometres which is closer than the average station spacing on the rest of the Sydney Trains network at 2.5 kilometres.

Table 4.1: Attributes of the existing railway stations in the project area

Railway station	Distance from Central Station (kilometres)	Number of platforms	Number of tracks	Connecting bus routes	Comments
Westmead	25.2	4	4	705, 708, 711, T60, T61, T62, T63, T64, T65, T66, N70, N71	Fully accessible station; Bus stops in Alexandra Parade; 200 metres south of the Hospital T-way station in Darcy Road
Parramatta	23.1	4	4	520, 521, 523, 524, 525, 545, 546, 547, 549, 550, 552, 600, 601, 603, 604, 606, 609, 625, 700, 705, 706, 708, 711, 802, 804, 806, 810, 810X, 811, 811X, 829, 906, 907, 909, M52, M54, M60, M91, M92, T60, T61, T62, T63, T64, T65, T66, T80, N60, N70, N71	Major interchange with eight bus stands; Fully accessible station with adjacent bus interchange connecting to the T-way network and pedestrian access to Westfield shopping centre
Clyde	20.7	6	7	N61, N70, N71	Partially accessible station with ramps and station attendant
Rosehill	22.4	2	2	M92, N61	Not fully accessible with ramp to racecourse; bus stops in James Ruse Drive
Camellia	23.0	1	1	N61	Ramp accessible; bus stops in James Ruse Drive
Rydalmere	24.0	1	1	520, 521, 523, 524, 525, M52, N61	Ramp accessible; bus stops in Victoria Road
Dundas	24.8	1	1	513, 545, 550, N61	Ramp accessible; bus stops in Kissing Point Road
Telopea	26.3	1	1	545, 550, N61	Ramp accessible; bus stops in Sturt Street (eastside) and Adderton Road (westside)
Carlingford	27.9	1	1	513, 546, 625, M54, N61	Ramp accessible; bus stops in Lloyds Avenue and Pennant Hills Road

4.1.2 Train services

The existing railway lines and AM peak train services for the stations in the project area are given in Table 4.2. Parramatta Railway Station has the highest frequency of train services in the AM peak hour with an average three-minute headway for trains to Sydney CBD. Westmead Railway Station has an average peak headway of 10 minutes to Sydney CBD and every 30 minutes to Campbelltown.

Table 4.2: Existing train services at railway stations in the project area

Railway station	Existing railway line	Number of AM peak train services [1] (7 am to 8 am, both directions)
Westmead	T1 Western Line, T5 Cumberland Line, Blue Mountains Line (weekends only)	25
Parramatta	T1 Western Line, T5 Cumberland Line, Blue Mountains Line, NSW TrainLink	41
Clyde	T1 Western Line, T6 Carlingford Line	4
Rosehill	T6 Carlingford Line	4
Camellia	T6 Carlingford Line	4
Rydalmere	T6 Carlingford Line	4
Dundas	T6 Carlingford Line	4
Telopea	T6 Carlingford Line	4
Carlingford	T6 Carlingford Line	4

[1] Sydney Trains only

T6 Carlingford Line

The T6 Carlingford Line operates a heavy rail shuttle service between Carlingford and Clyde Railway Stations every 30 minutes in the AM and PM peak periods and hourly during interpeak periods, evenings and on weekends. During each peak period, a total of five train services operate between Carlingford and Clyde. The travel time between Carlingford and Clyde typically ranges from 13 to 15 minutes.

The number of daily services and operating hours for the T6 Carlingford Line are summarised in Table 4.3. A total of 50 shuttle trips operate to and from Clyde Station on weekdays and 42 shuttle trips on weekends. One through trip to Central Railway Station operates in the AM peak period.

Table 4.3: Train services on the T6 Carlingford Line

Time period	Direction	Number of daily services	Operating hours
Monday to Friday	To Clyde	24 services	Departing Carlingford from 4:50 am to 12:20 am
	To Central	6:59 am	Departing from Carlingford with limited stops to Central Station
	To Carlingford	26 services	Departing Clyde from 4:30 am to 12:55 am
Saturdays, Sundays and Public Holidays	To Clyde	21 services	Departing Carlingford from 4:44 am to 1:12 am
	To Carlingford	21 services	Departing Clyde from 4:24 am to 12:43 am

4.1.3 Train patronage

The most recent all-day barrier counts at the Sydney Trains stations were conducted in 2014 before the full implementation of the Opal ticketing system. The AM peak and daily patronage at the railway stations in the project area are given in Table 4.4.

Table 4.4: AM peak and daily patronage at railway stations in the project area

Railway station	2014 AM peak patronage (entries and exits) (6am to 9:30am) [2]	2014 AM peak (6am to 9:30am) passenger entries [2]	2014 AM peak (6am to 9:30am) passenger exits [2]	2014 daily patronage (entries and exits) [2]
Westmead	5,410	2,940	2,470	15,680
Parramatta	19,670	7,798	13,700	59,680
Clyde	470	250	270	1,420
Rosehill	70	60	20	200
Camellia	50	0	50	140
Rydalmere	110	50	130	300
Dundas	150	150	10	380
Telopea	170	260	30	580
Carlingford	290	200	110	740

[2] Source: *Electronic Publication No. E2015-07-Train Statistics 2014-Excel-Product V1.1* (Bureau of Transport Statistics, May 2015), accessed on 11 November 2016.

Opal ticketing data from August 2016 was analysed for the stations on the T6 Carlingford Line for the AM and PM peak periods and peak half-hourly periods. The total passengers boarding and alighting by station are provided in Table 4.5.

Table 4.5: Opal patronage statistics for the AM and PM peak periods on the T6 Carlingford Line

Railway station	AM peak boarding (passengers)		AM peak alighting (passengers)		PM peak boarding (passengers)		AM peak alighting (passengers)	
	Total peak period	Peak 30 minutes	Total peak period	Peak 30 minutes	Total peak period	Peak 30 minutes	Total peak period	Peak 30 minutes
Carlingford	209	63	73	22	112	45	71	23
Telopea	213	54	10	4	111	45	21	4
Dundas	159	31	3	2	64	29	9	2
Rydalmere	25	6	103	29	22	8	94	18
Camellia	5	1	45	18	17	5	47	9
Rosehill	88	31	28	7	43	17	25	8
Total	**699**	**186**	**262**	**82**	**369**	**149**	**267**	**64**

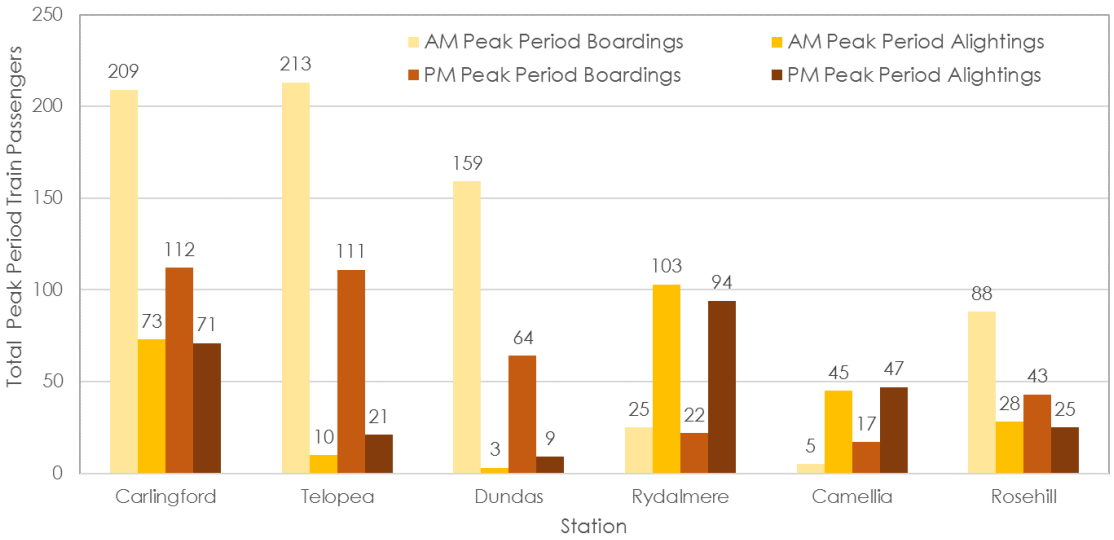
Data source: Opal ticketing data, T6 Line station entries and exits, August 2016.

The AM peak period patronage is higher than the PM peak period activity implying that the T6 Carlingford train customers are either returning home via an alternative train line or they are returning over a longer time period in the late afternoon and early evening. The AM peak period may also be higher as the demand of the school and worker peaks coincide.

The total patronage in the AM and PM peak periods (6:00 am to 9:30 am and 3:00 pm to 6:30 pm) are shown in Figure 4.2. These statistics indicate:

- Carlingford, Telopea and Dundas are the busiest stations in the AM peak period.
- Carlingford, Telopea and Rydalmere are the busiest stations in the PM peak period.

Figure 4.2: Total boarding and alighting passengers in the peak periods on the T6 Carlingford Line



Data source: Opal ticketing data, T6 Line station entries and exits, August 2016.

Key destinations

Opal data from July 2015 to January 2017 for the six stations on the T6 Carlingford Line was used to determine the percentages provided in Table 4.6 which shows the proportion of passengers alighting at the following key destinations:

- Sydney CBD (also included in the east of Clyde destinations data)
- East of Clyde Railway Station towards Strathfield, Burwood, Sydney CBD, the Eastern Suburbs, the North Shore and Macquarie Park
- West of Clyde Railway Station towards Parramatta, Blacktown, Liverpool and Penrith
- Within the T6 Carlingford Line.

Table 4.6: Patronage statistics from origin stations on the T6 Carlingford Line

Origin railway station	Percentage of destinations in Sydney CBD	Percentage of destinations east of Clyde station	Percentage of destinations west of Clyde station	Percentage of destinations along the T6 Carlingford Line
Rosehill	28%	86%	14%	0.9%
Camellia	10%	66%	34%	0.5%
Rydalmere	15%	73%	27%	1.5%
Dundas	38%	93%	7%	1.1%
Telopea	34%	91%	9%	1.7%
Carlingford	31%	87%	13%	2.2%
Total	**29%**	**85%**	**15%**	**7.8%**

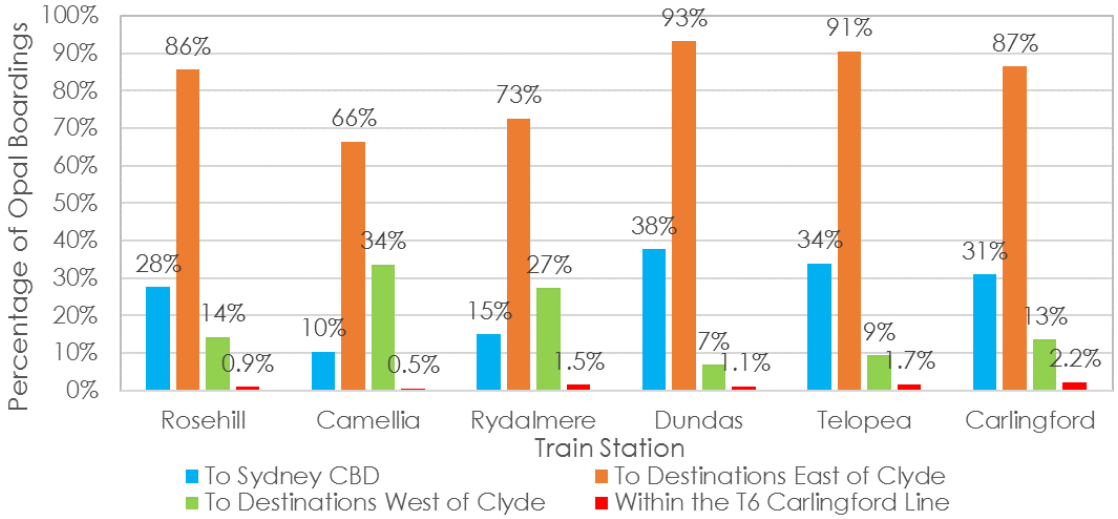
Data source: Opal ticketing data from 2015 to January 2017.

The Opal statistics indicate the following with regards to the T6 Carlingford Line customers:

- 85 per cent of passengers have destinations east of Clyde Railway Station
- 29 per cent of passengers have destinations in the Sydney CBD
- 15 per cent of passengers have destinations west of Clyde Railway Station, including less than two per cent of passengers who travel to Parramatta Station
- Eight per cent of passengers have destinations along the T6 Carlingford Line.

These percentage statistics for the key customer destinations are also shown in Figure 4.3.

Figure 4.3: T6 Carlingford Line Train Customer Destinations

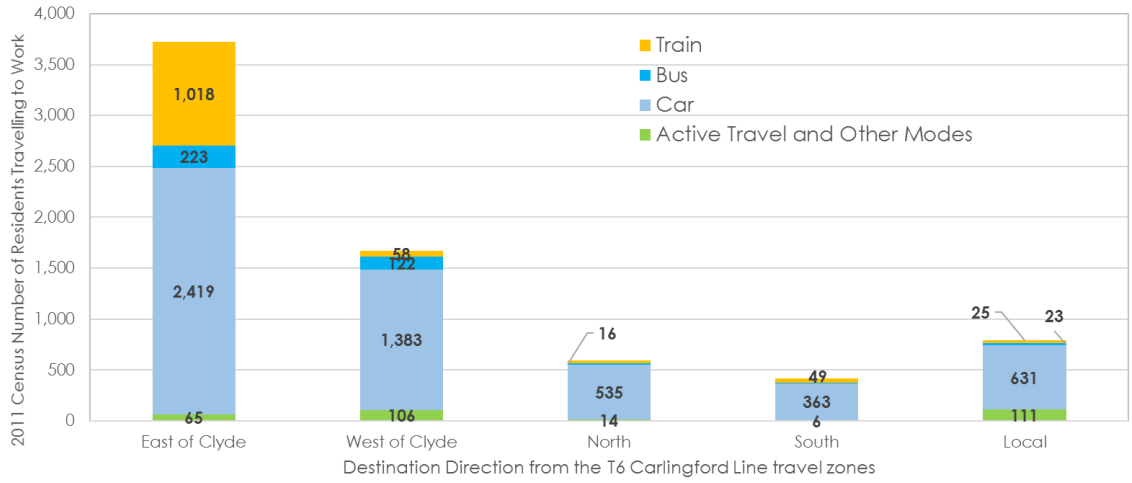


Data source: Opal ticketing data, T6 Line station entries and exits, August 2016.

T6 Carlingford Line corridor journey to work analysis

Based on 2011 Census statistics, the Journey to Work statistics by transport mode share for residents living in travel zones along the T6 Carlingford Line corridor are shown in Figure 4.4 and are given as percentages by destination direction in Table 4.7. Most of the residents in this corridor (almost 4,000 of the total 8,200 population or 50 per cent) work in locations east of Clyde.

Figure 4.4: Journey to work mode share for residents in the T6 Carlingford Line Corridor



Source: 2011 Census statistics from Bureau of Transport Statistics, NSW.

Table 4.7: Journey to work statistics for the T6 Carlingford Line travel zones by travel mode

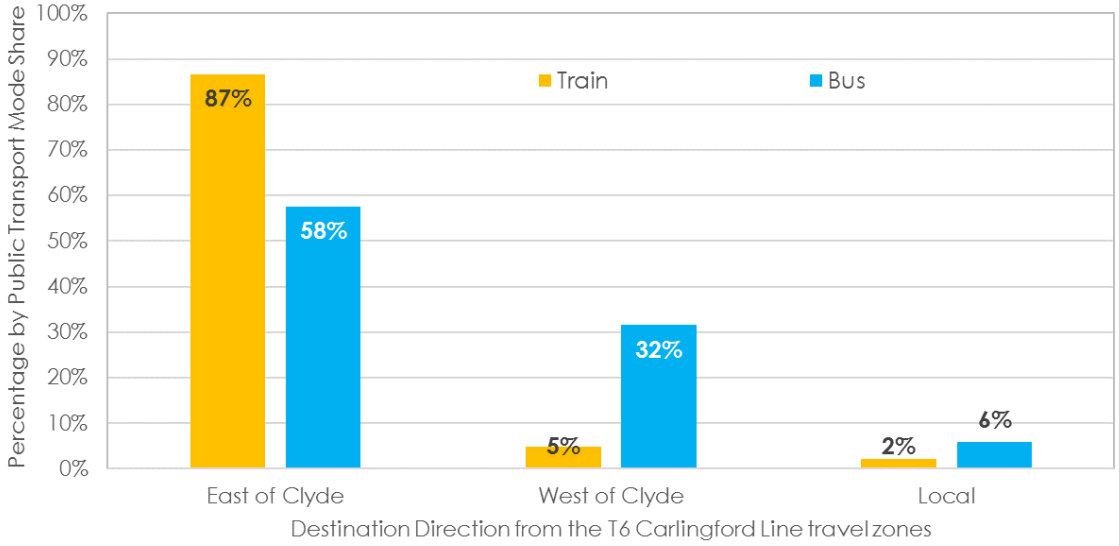
Destination direction	Number of residents travelling to work	Train	Bus	Car driver and car passenger	Active transport and other mode
East of Clyde	4,068	87%	58%	45%	21%
West of Clyde	1,854	5%	32%	26%	35%
North	666	2%	4%	10%	5%
South	442	4%	1%	7%	2%
Local	1,118	2%	6%	12%	37%
Total	**8,158**	**100%**	**100%**	**100%**	**100%**

Source: 2011 Census statistics from Bureau of Transport Statistics, NSW.

The public transport mode shares for train and bus commuters who live in the T6 Carlingford Line corridor are shown by destination direction in Figure 4.5. Eighty-seven per cent of the train commuters are travelling east of Clyde and 32 per cent of the bus commuters are travelling west of Clyde.

About one-third of the T6 Carlingford corridor residents travel by bus to Parramatta CBD and only about one per cent travel by train. This shows that commuters from the T6 Carlingford Line corridor use the bus as the preferred mode for travel to Parramatta CBD and not the train services.

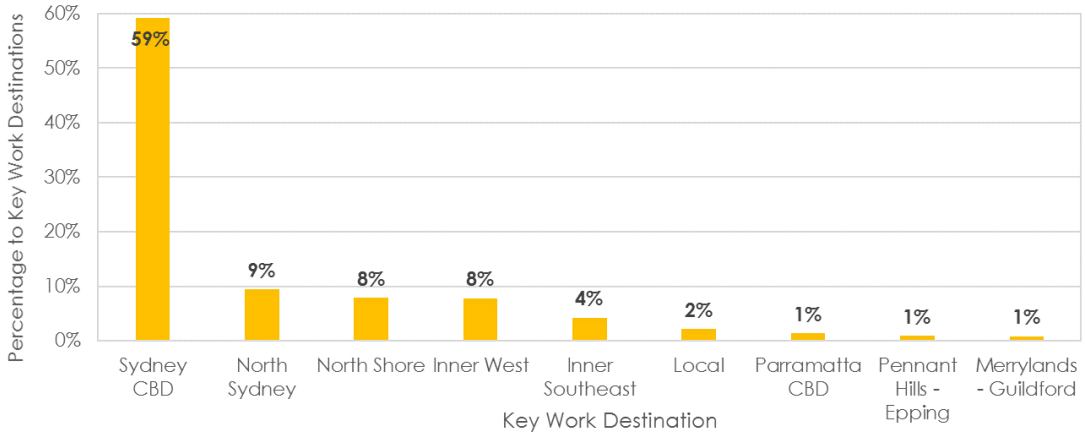
Figure 4.5: Public transport mode shares for residents travelling to work from the T6 Carlingford Line corridor travel zones



Source: 2011 Census statistics from Bureau of Transport Statistics, NSW.

The percentage of train commuters on the T6 Carlingford Line by their key work destinations are shown in Figure 4.6. Almost 60 per cent of these train commuters are travelling to Sydney CBD followed by nine per cent to North Sydney and eight per cent each to the North Shore and Inner West. Only one per cent of the train commuters on the T6 Carlingford Line are travelling to Parramatta CBD for work trips.

Figure 4.6: Key work destinations for T6 Carlingford Line customers



Source: 2011 Census statistics from Bureau of Transport Statistics, NSW.

Analysis of the existing bus patronage from the T6 Carlingford Line corridor

In addition to the T6 Carlingford Line train services, residents along the Carlingford Line corridor have a good selection of direct, frequent bus services to Parramatta CBD and North Parramatta (at least every 15 minutes throughout the day) with the following bus routes:

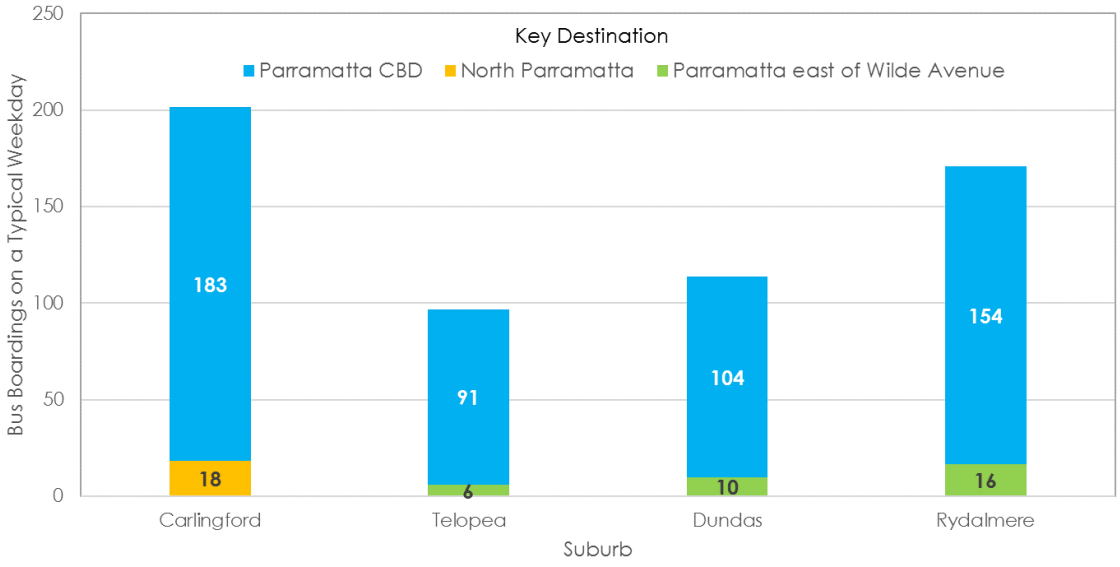
- Routes 625 and M54 at Carlingford in Pennant Hills Road
- Route 545 at Telopea and Dundas to Parramatta via Kissing Point Road
- Routes 521, 523, 524, 525 and M52 at Rydalmere in Victoria Road.

The Opal bus boardings data for five Tuesdays in November 2016 from all of the bus routes in the areas with postcodes 2116 (Rydalmere), 2117 (Dundas and Telopea) and 2118 (Carlingford) were extracted. These statistics were grouped by suburb of origin and key destinations in Parramatta CBD, North Parramatta and along Victoria Road east of Parramatta CBD with the results for an average weekday given in Figure 4.7.

Parramatta is the dominant destination with over 2,800 bus passengers over the five Tuesdays in November 2016 for the 2 hour AM peak period. Bus customers in the Carlingford corridor are mostly travelling to Smith Street and the Parramatta Interchange, to travel to the Westfield shopping centre, the Parramatta CBD precinct or most likely connecting with the trains.

Over 91 per cent of the bus customers are travelling to Parramatta CBD, three per cent to North Parramatta and five per cent to Victoria Road east of Wilde Avenue. Within Parramatta, the transport interchange is the key destination and has 57 per cent of the boarding passengers. These statistics confirm that commuters in the suburbs along the Carlingford line corridor are mostly travelling by bus rather than train to Parramatta CBD; this probably arises because the train services provide an indirect trip to Parramatta requiring a transfer to a westbound train at Clyde Railway Station. The bus services are more direct and convenient for commuters to Parramatta CBD.

Figure 4.7: Existing weekday bus boarding passengers from the Carlingford corridor by suburb



4.2 Bus

4.2.1 Bus infrastructure

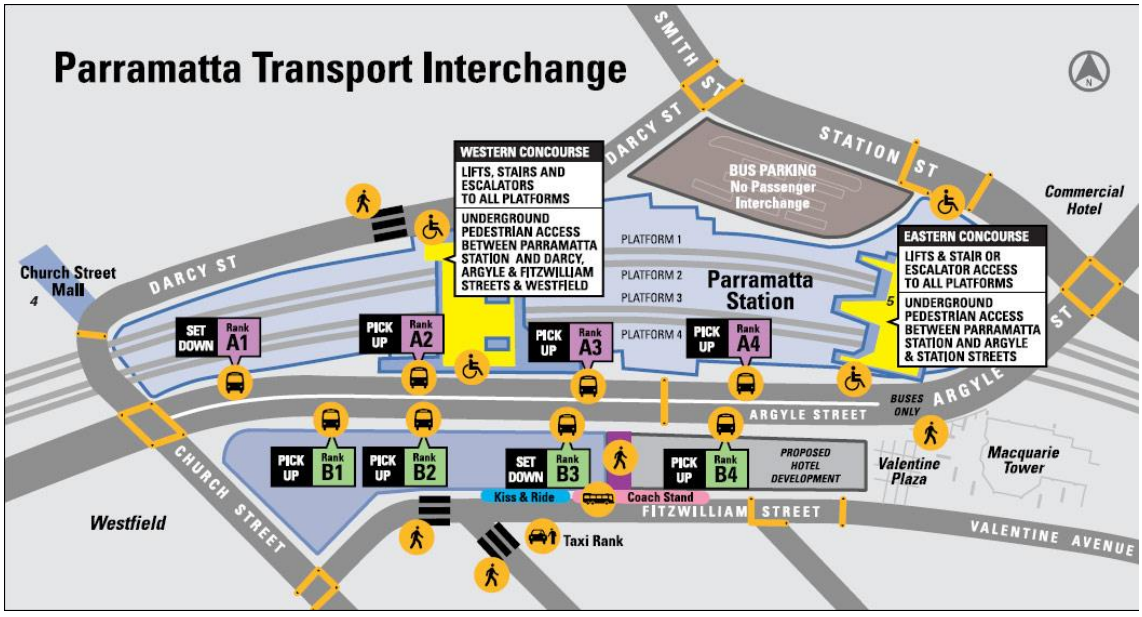
The key bus infrastructure in the project area comprises:

- Key interchanges at:
  - Parramatta with access via Argyle Street, Church Street to the south, Smith Street/Wilde Avenue to the north and Station Street to Parkes Street to the east.
  - Hospital T-way station at Westmead.
- The Liverpool-Parramatta T-way and the North-west T-way via Argyle Street into Parramatta CBD.
- Bus lanes used by Metrobus and T-way routes and local bus services along the main corridors into Parramatta CBD, such as:
  - Church Street north of Victoria Road and south of the Great Western Highway
  - Victoria Road east of Wilde Avenue and Wilde Avenue, Smith Street and Station Street in Parramatta CBD.
  - Park Parade connecting to the North-West T-way at Westmead.
- Bus layover areas at:
  - Along the north side of Argyle Street between Pitt Street and Church Street
  - In Charles Street north of Parkes Street (northbound direction and east side of street)
  - In Market Street west of Church Street on the south side of Prince Alfred Square
  - Off-street of Station Street immediately south of Darcy Street

Parramatta Interchange

Parramatta Interchange in Argyle Street adjacent to Parramatta Railway Station is the key focal point for the bus network in Western Sydney with eight bus stands in an integrated public transport facility with underground pedestrian connections to Parramatta Railway Station, Westfield Parramatta shopping centre and the future Parramatta Square. The allocation of bus routes and operators of the bus stands is given Figure 4.8 and in Table 4.8.

Figure 4.8: Parramatta Interchange



Source: http://www.sydneytrains.info, 2014.

Table 4.8: Existing bus stand allocation at the Parramatta bus interchange

Bus stand	Location and function	Bus operator	Routes
A1	Eastbound arrivals; set down only	All	All arriving services from the west and south
A2	Eastbound and northbound departures; pick-up only	Sydney Buses	546, 549, 552, M54
		Hillsbus	609, 625, N60, N70, N71
		Transdev NSW	M92
		Transit Systems	829 (late night only)
A3	Eastbound and northbound departures; pick-up only	Sydney Buses	520, 521, 523, 524, 525, 545, 547, M52, 550 (school days only) After 7 pm, these routes depart from Stand A2
A4	Eastbound departures; pick-up only	Hillsbus	600, 601, 603, 604, 606, 706, M60 After 7 pm, these routes depart from Stand A2
B1	Westbound and southbound departures; pick-up only	Transdev NSW	906, 907, 909, M91 After 7 pm, these routes depart from Stand B2
B2	Westbound and southbound departures; pick-up only	Transit Systems	802, 804, 806, 810, 810X, 811, 811X, 829 (late night only), T80
		Hillsbus	N60, N70, N71
B3	Westbound arrivals; set down only	All	All arriving services from the east and north
B4	Westbound and southbound departures; pick-up only	Hillsbus	700, 705, 708, 711, T60, T61, T62, T63, T64, T65, T66 After 7 pm, these routes depart from Stand B2
Darcy Street	CBD loop route; set-down and pick-up	Transdev NSW	900 (free CBD loop service)

The existing bus routes and number of AM peak hour services by access street into Parramatta Interchange are given in Table 4.9.

Table 4.9: Existing bus routes at the Parramatta bus interchange by access street

Parramatta Interchange access street	Routes	Number of routes	Number of AM peak hour services
Smith Street	520, 521, 523, 524, 525, 545, 546, 547, 549, 550, 552, 600, 601, 603, 604, 606, 609, 625, 706, 829, M52, M54, M60	23	49
Hassall Street	M92	1	6
Darcy Street	900	1	6
Church Street south	802, 804, 806, 810, 810X, 811, 811X, 906, 907, 909, M91, N60	12	10
Hassall Street/Argyle Street	N70, N71	2	10
Argyle Street	700, 705, 708, 711, T60, T61, T62, T63, T64, T65, T66, T80	12	34
Total		**51**	**115**

Bus lanes

Bus lanes in the Parramatta Light Rail study area exist in both direction along the following corridors:

- Church Street north of Victoria Road to the Windsor Road corridor.
- Pennant Hills Road east of Church Street towards Carlingford.
- Victoria Road east of Church Street to Wilde Avenue and east to Rydalmere and Sydney CBD.
- Park Parade connecting to the North-West T-way at Westmead.
- Church Street south of the Great Western Highway.
- Wilde Avenue, Smith Street and Station Street in Parramatta CBD.

Bus lanes in the T-way network are located in Argyle Street west of the Parramatta Interchange and in Darcy Road at the Hospital T-way station at Westmead as shown in Figure 4.9.

Figure 4.9: T-way bus lanes in Parramatta CBD and Westmead

Kerbside bus lanes in Argyle Street, Parramatta at the Westfield shopping centre as part of the T-way network

Westmead Hospital T-way Station in Darcy Road

Dedicated 24-hour bus lanes exist in Smith Street and Wilde Avenue in Parramatta CBD and in Church Street in North Parramatta as shown in Figure 4.9

Figure 4.10: Bus lanes in Parramatta CBD and North Parramatta

Kerbside bus lanes in Wilde Avenue and Smith Street in Parramatta CBD

Kerbside bus lanes in Church Street north of Pennant Hills Road/ Albert Street, North Parramatta

4.2.2 Bus network

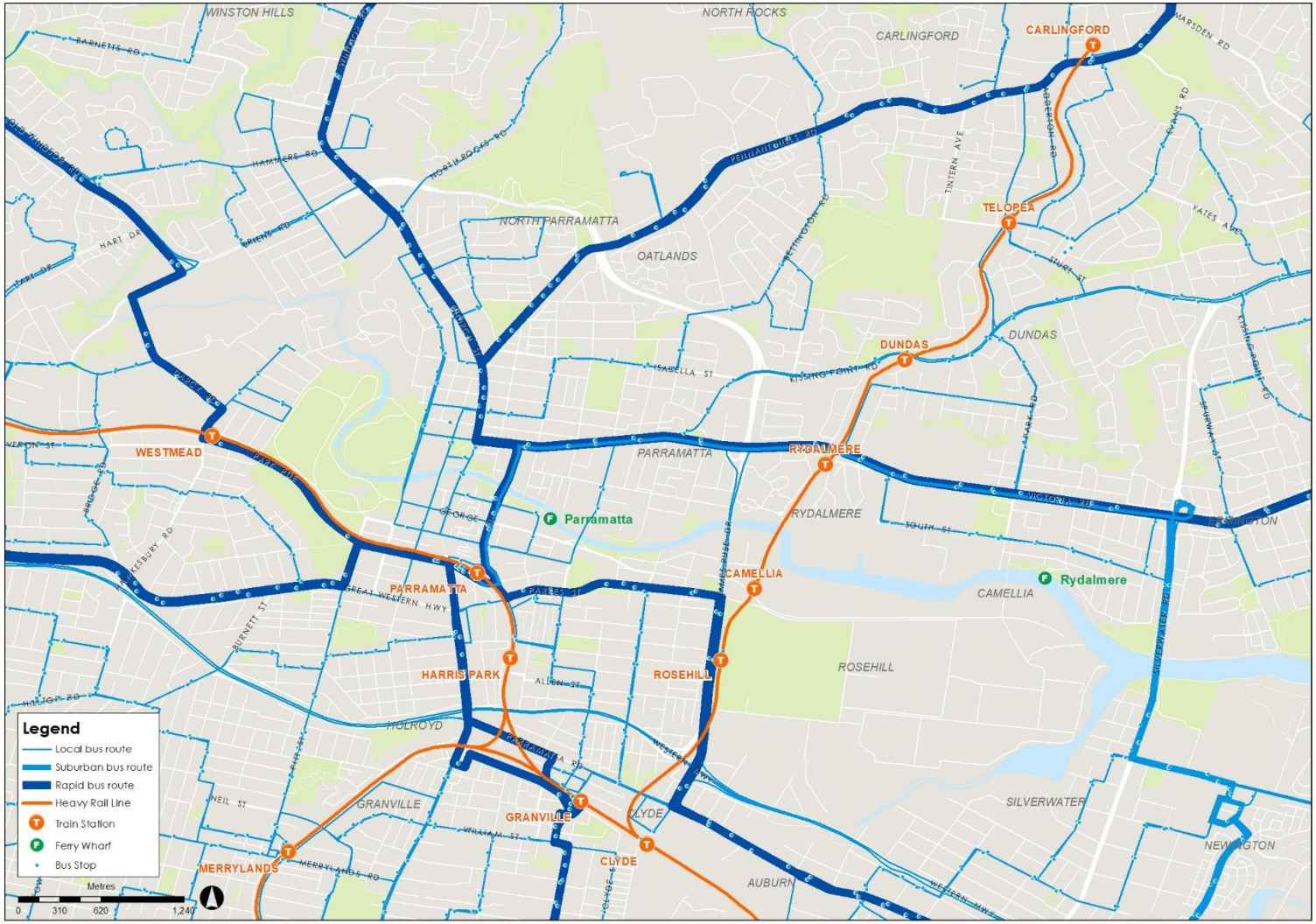
The existing bus network in the project area is shown in Figure 4.11. It has 57 timetabled public bus routes servicing Contract Regions 3, 4, 7 and 13 and with the following bus operators:

- Hillsbus with 25 routes in Contract Region 4, including four NightRide routes and seven North-west T-way routes
- Sydney Buses with 14 routes in Contract Region 7
- Transdev NSW with eight routes in Contract Region 13, including one NightRide routes
- Transit Systems with 10 routes in Contract Region 3 with one route on the Liverpool-Parramatta T-way (Route T80).

Based on the hierarchy in *Sydney's Bus Future* (2013), the bus network comprises:

- Six Rapid routes (M52, M54, M60, M91, T65 and T80)
- One Suburban route with 525 between Parramatta, Olympic Park and Strathfield
- 50 Local routes.

Figure 4.11: Existing bus network in the project study area from Westmead to Carlingford



The streets and stops that are used for buses is the Westmead to Parramatta and Rosehill area are shown in Figure 4.12. The busiest bus stops are in Parramatta CBD and at the Parramatta Interchange. The busiest corridors for buses into Parramatta CBD are:

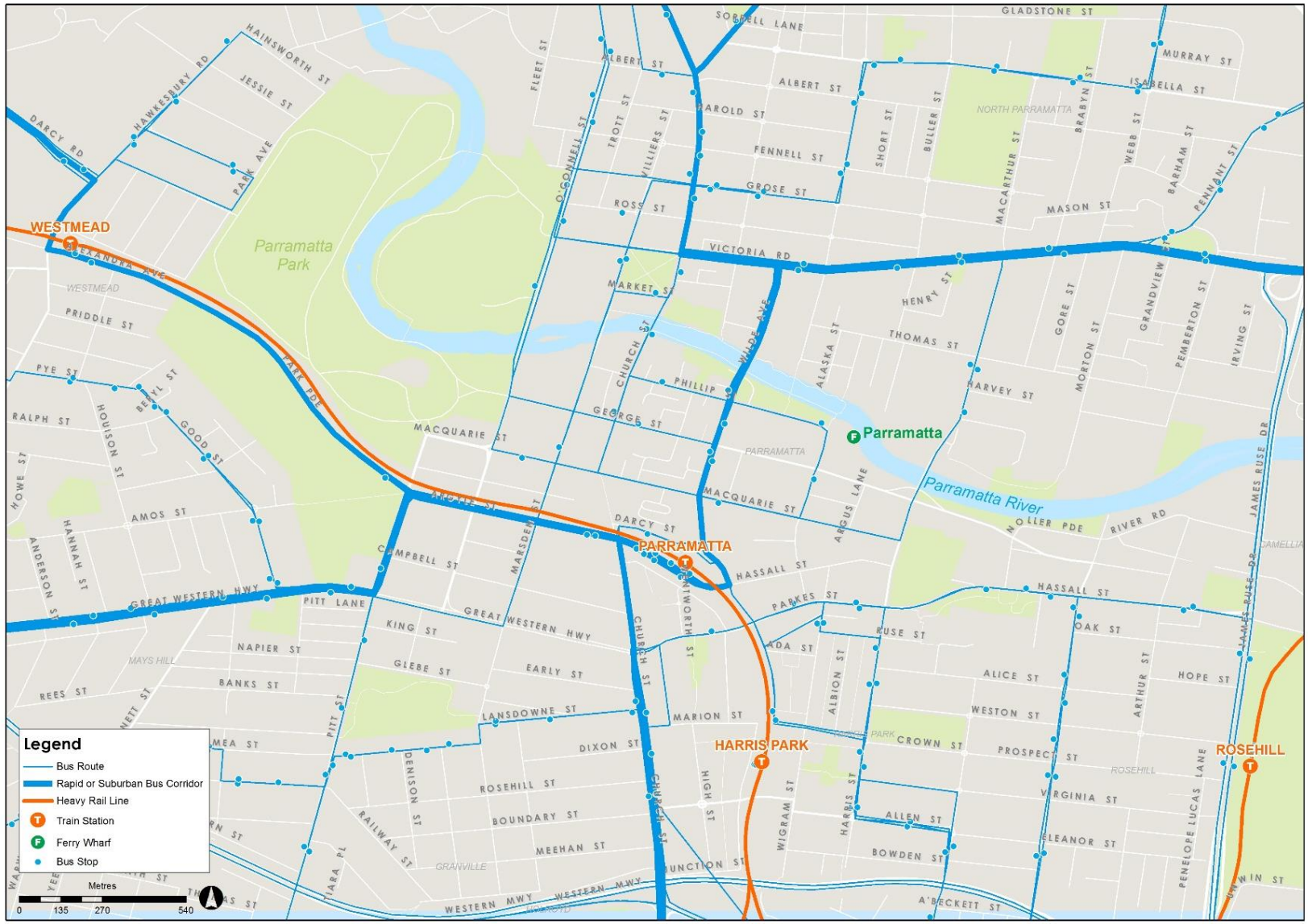
- Windsor Road and Church Street to Victoria Road from the north
- Victoria Road from the east
- Great Western Highway and Park Parade into Argyle Street from the west
- Church Street into the Parramatta Interchange from the south.

A total of 12 locations exist in the project area where buses would potentially connect with the light rail services. The existing bus routes and the number of peak hour services at the bus interchanges and bus stop locations are listed in Table 4.10. A total of 51 of the 57 bus routes or 90 per cent of the bus routes in the study area operate within, to or through Parramatta CBD which shows the importance of Parramatta as a key transport interchange point between connecting buses and trains. This concentration of bus services creates operations issues due to the limited capacity of both the bus stands and the access streets.

Table 4.10: Existing Bus Routes and Peak Services at the Interchanges in the project area

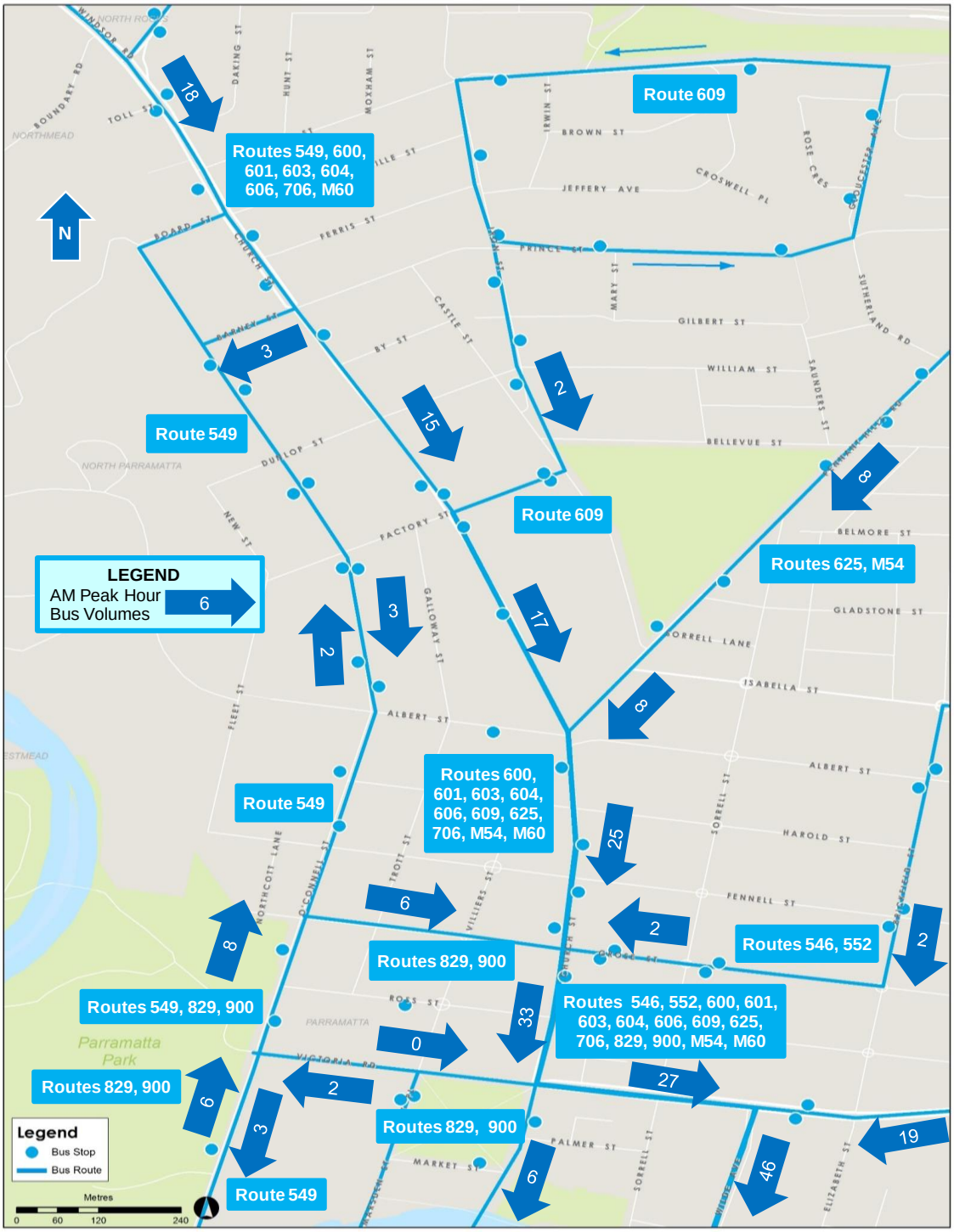
Interchange	Routes	Number of routes	Number of AM peak hour services
Westmead	705, 708, 711, 818, T60, T61, T62, T63, T64, T65, T66, N70, N71	13	30
North Parramatta	549, 600, 601, 603, 604, 606, 609, 706, M60	9	20
Parramatta Interchange	520, 521, 523, 524, 525, 545, 546, 547, 549, 550, 552, 600, 601, 603, 604, 606, 609, 625, 700, 705, 706, 708, 711, 802, 804, 806, 810, 810X, 811, 811X, 829, 900, 906, 907, 909, M52, M54, M60, M91, M92, T60, T61, T62, T63, T64, T65, T66, T80, N60, N70, N71	51	122
Rydalmere	520, 521, 523, 524, 525, M52, N61	7	14
Dundas	545, 550, N61	3	5
Telopea	513, 545, N61	3	7
Carlingford	513, 546, 625, 630, M54, N61	6	14
Interchange	**Routes**	**Number of routes**	**Number of AM peak hour services**
Do not operate to Parramatta CBD	513 and N61 at Carlingford; 818 at Westmead only; N61 at Clyde, Rosehill, Camellia, Rydalmere, Dundas and Telopea	3	3
Parramatta CBD Only	829 late night only, 900 Free Shuttle Bus	2	6
Through	N60, N70, N71	3	0
Terminating in Parramatta CBD	520, 521, 523, 524, 525, 545, 546, 547, 549, 550, 552, 600, 601, 603, 604, 606, 609, 625, 700, 705, 706, 708, 711, 802, 804, 806, 810, 810X, 811, 811X, 906, 907, 909, M52, M54, M60, M91, M92, T60, T61, T62, T63, T64, T65, T66, T80	46	104
Total	**All routes at Parramatta Interchange**	**51**	**110**
	All routes in project area	**54**	**113**

Figure 4.12: Existing bus network in the Westmead to Parramatta area



The existing AM peak hour bus volumes in North Parramatta are shown in Figure 4.13.

Figure 4.13: Existing AM peak hour bus volumes in North Parramatta



The existing bus routes and number of services during the AM peak hour along key corridors in the project area are given in Table 4.11.

Table 4.11: Existing bus routes and AM peak services on key corridors in the project area

Key corridor	Routes	Number of routes	AM peak hour services
Darcy Road, Westmead	705, 708, 711, 818, T60, T61, T62, T63, T64, T65, T66	11	30
Hawkesbury Road south of Darcy Road. Westmead	705, 708, 711, T60, T61, T62, T63, T64, T65, T66	10	29
Hawkesbury Road north of Darcy Road, Westmead	708, 711, 818	3	3
O'Connell Street north of Victoria Road	549, 829, 900	3	9
O'Connell Street north of Grose Street	549	10	25
Church Street north of Victoria Road	546, 552, 600, 601, 603, 604, 606, 609, 625, 706, 829, 900, M54, M60	14	33
Church Street north of Grose Street	600, 601, 603, 604, 606, 609, 625, 706, M54, M60	10	25
Church Street north of Pennant Hills Road	600, 601, 603, 604, 606, 609, 706, M60	8	17
Pennant Hills Road east of Church Street	625, M54	2	8
Church Street north of Factory Street	600, 601, 603, 604, 606, 706, M60	7	15
Church Street south of Lennox Bridge (Parramatta River)	829, 900	2	6
Victoria Road (west of Wilde Avenue)	546, 549 westbound only, 552, 600, 601, 603, 604, 606, 609, 625, 706, M54, M60	13	30
Victoria Road (east of Wilde Avenue)	520, 521, 523, 524, 525, 545, 547, 550, M52	9	19
Wilde Avenue-Smith Street, Parramatta	520, 521, 523, 524, 525, 545, 546, 547, 549, 550, 552, 600, 601, 603, 604, 606, 609, 625, 706, M52, M54, M60	22	49
Macquarie Street. Parramatta	829, 900	2	6
Parkes Street, Parramatta	906, 907, M92	3	9
Argyle Street, Parramatta	700, 705, 708, 711, 802, 804, 806, 810X, 811X, 900, T60, T61, T62, T63, T64, T65, T66, T80	18	55
Park Parade (North west T-Way)	700, 705, 708, 711, T60, T61, T62, T63, T64, T65, T66	11	33
Church Street south of Great Western Highway	810, 811, 829, 907, M91, N60	6	9
Pitt Street south of Great Western Highway	802, 804, 806	3	8
Great Western Highway	810X, 811X, T80	3	8

The highest number of AM peak services exists in Church Street both north of Victoria Road and south of the Great Western Highway, with 33 buses per hour in the AM peak direction (inbound) at both locations.

Most bus services in the project area are operated with 12.5 metre standard buses, however, some of the Metrobus routes (Routes M52 and M54) have 18.0 metre articulated buses and some of the Windsor Road bus routes operated by CBC Hillsbus are 14.5-metre long buses. These long buses have wider turning radii and require more space for turning movements. In particular, changes to the road network as a result of the project would require buses to be trialled on streets with changes to the lane configuration or geometric design to confirm that the turning movements can be made without affecting other traffic movements at intersections.

The NightRide Route N61 provides hourly services every night between Town Hall and Carlingford when the T6 Carlingford Line does not operate (between midnight and 4.30 am). Extra NightRide bus services operate on weekends to allow for the additional demand.

Layover locations in the project area

The existing layover locations for bus routes terminating in Parramatta CBD are listed in Table 4.12.

Table 4.12: Existing bus routes at layover locations in the project area

Layover location	Routes	Number of routes
Hawkesbury Road, Westmead	818	1
Lloyds Avenue, Carlingford	N61	1
Parramatta CBD		
Argyle Street, west of Church Street	520, 521, 523, 524, 525, 545, 546, 547, 549, 550, 552, 600, 601, 603, 604, 606, 609, 625, 706, M52, M54, M60	22
Macquarie Street east of Centenary Square	900	1
Station Street East, south of Darcy Street	705, 706, 708, 711, 906, 907, 909, M91, M92	9
Charles Street (northbound only), south of Hassall Street	802, 804, 806, 810, 810X, 811, 811X, 829, T80	9
Market Street, west of Church Street	T60, T61, T62, T63, T64, T65, T66	7
	Total	**50**

4.2.3 School routes and services

Dedicated school buses operate throughout the project area with direct services to public and private schools. The public and private schools immediately along the project or within 400 metres of the project are listed in Table 4.13.

Table 4.13: Schools and educational campuses in the project area

School	Location
Western Sydney University, Westmead campus	Hawkesbury Road south of Darcy Road, Westmead
Parramatta Marist High School / Catherine McAuley School Westmead	Darcy Road west of Hawkesbury Road, Westmead
North Parramatta Primary School	Albert Street, west of Church Street, North Parramatta
Our Lady of Mercy College (Girls school)	Ross Street, west of Villiers Street, Parramatta
Arthur Phillip High School	Macquarie Street east of Smith Street, Parramatta
Parramatta Primary School	Macquarie Street east of Smith Street, Parramatta
University of Western Sydney Parramatta campus	North and south of Victoria Road, east of James Ruse Drive
Dundas Public School	Southside of Kissing Point Road
Telopea Public School	Eastern side of the existing Carlingford railway line in Sturt Street

School bus services typically have the following characteristics:

- Key stops are at the school destinations and along the residential streets within service catchments
- School buses generally have one trip in the morning before 8 am and one trip in the afternoon around 3 pm
- Services do not coincide with the PM peak period, but can add extra buses on the road network during the AM peak period

- School bus services are generally flexible on the streets they operate and can be changed as long as they have safe pick-up and drop-off stop locations at the schools and avoid stops on busy arterial roads, if possible.

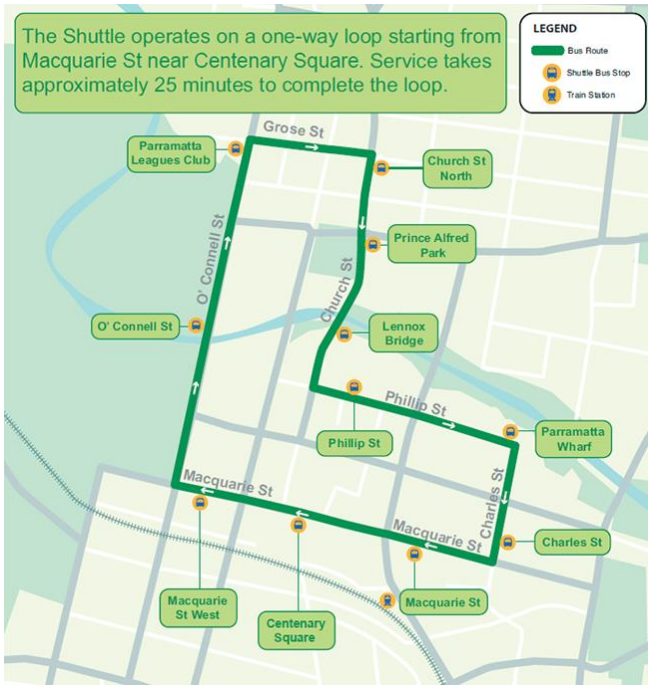
4.2.4 Shuttle bus services

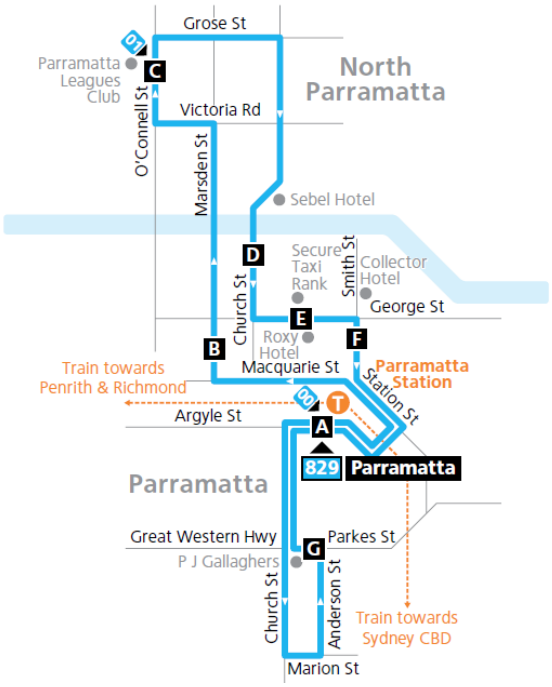
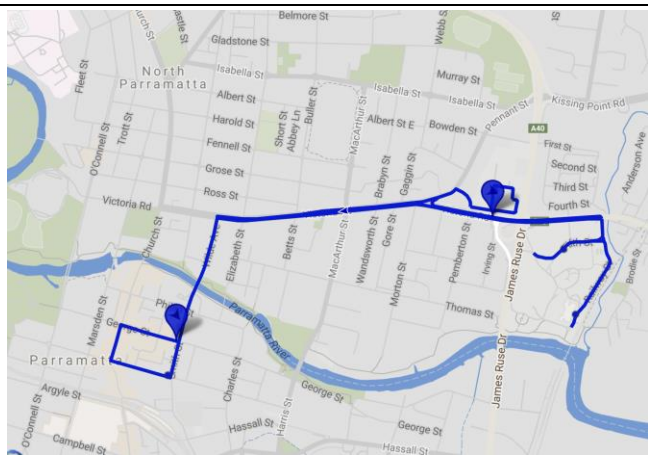
Four shuttle bus services operate within the project area, servicing private clubs, retirement villages, special charter excursions and school tours. The attributes of the four shuttle bus services are summarised in Table 4.14 and include:

- Route 900 free Parramatta shuttle bus service
- Route 829 late night Parramatta bus service
- Western Sydney University (WSU) shuttle bus service
- Parramatta Leagues Club shuttle bus.

The WSU and the Parramatta Leagues Club bus services are privately-funded and operated.

Table 4.14: Shuttle bus services within the project area

Bus service	Description	Route map
Route 900 Free Parramatta shuttle bus service	• Operates in a one-way clockwise loop for 3.62 kilometres with 11 stops. • Connects the Parramatta interchange to the Parramatta Leagues Club stopping at key destinations such as Westfield Shopping Centre, Church Street restaurant precinct ("Eat Street"), Prince Alfred Park and Parramatta ferry wharf. • Operates every 10 minutes from 7 am to 6:30 pm on weekdays and from 8 am to 4 pm on weekends and public holidays. • The round-trip time around the loop is approximately 25 minutes. • Route was modified in February 2017 to avoid Smith Street, Darcy Street and Argyle Street for the construction of Parramatta Square. • The modified route operates via Macquarie Street only with one new bus stop in Macquarie Street east of Centenary Square. • It no longer provides bus stops at the entrance of Parramatta railway station in Darcy Street and at the Westfield shopping centre in Argyle Street.	 Source: Transport NSW info website, February 2017.  The terminus stop for the Route 900 Free Shuttle bus service is in Macquarie Street east of Centenary Square in Parramatta CBD.

Bus service	Description	Route map
Route 829 Late Night Parramatta bus service	○ Operates on Friday and Saturday nights from midnight to 3:30 am ○ Services every 30 minutes from Parramatta Station to the CBD hotels and the Parramatta Leagues Club ○ Operates in coordination with the NightRide services	 Source: Route 829 timetable, 2016.
WSU shuttle bus	○ Operates two routes between the WSU Parramatta campus and Parramatta Interchange and between the WSU Parramatta South and WSU Parramatta North campuses in Rydalmere ○ Services every 10 minutes on weekdays between 6:30 am and 10:30 pm ○ Services on Saturdays between 7:30am and 5:30pm ○ Only available for staff and students of WSU to use ○ Takes approximately 15-20 minutes for a bus to complete one loop depending on traffic conditions.	 Source: http://westernsydney.transloc.com/ Live shuttle bus tracker, 2017.  The WSU shuttle bus stop in Macquarie Street is located west of Smith Street in front of the WSU Parramatta CBD campus.

Bus service	Description	Route map
Parramatta Leagues Club shuttle bus	○ Privately operated by Parramatta Leagues Club ○ Only available to members and their guests living in the local area ○ Operates in the evenings until late for patrons of the club ○ Pick up and drop off points are at place of residence only ○ The courtesy bus service is not provided for any destination other than those affiliated with the Parramatta Leagues Club group.	A map is not applicable because it is not a fixed route service.

4.3 Ferry

Parramatta is served by the F3 Parramatta River ferry route that operates between Parramatta and Circular Quay with mostly hourly services operating between 6:30 am and 7 pm on weekdays and 7:30 am and 7:30 pm on weekends. Ferry operations are affected by the tidal conditions on the western end of the Parramatta River, particularly west of Rydalmere. The Sydney Ferries network showing the F3 Parramatta River route is shown in Figure 4.14.

Figure 4.14: F3 Parramatta River route

Source: https://transportnsw.info/document/1449/sydney-ferries-network-map.pdf accessed 22 June 2017

The ferry wharves in the project area (Stage 1 only) are located at:

- Parramatta Wharf in Phillip Street and Charles Street, Parramatta CBD; and
- Rydalmere Wharf which is 1.9 kilometres east of James Ruse Drive in Rydalmere with access from John Street.

The F3 Parramatta River ferry service is much slower than the alternative transport modes of travel between Parramatta and Sydney CBD with a weekday off-peak travel time of 86 minutes to Circular Quay in Sydney CBD. This compares with 34 minutes on the T1 Western Line train from Parramatta to Wynyard stations and 79 minutes on the Route M52 bus service from Parramatta Interchange to Circular Quay in Sydney CBD via the Victoria Road bus corridor during a similar off-peak time in the mid-morning on a weekday.

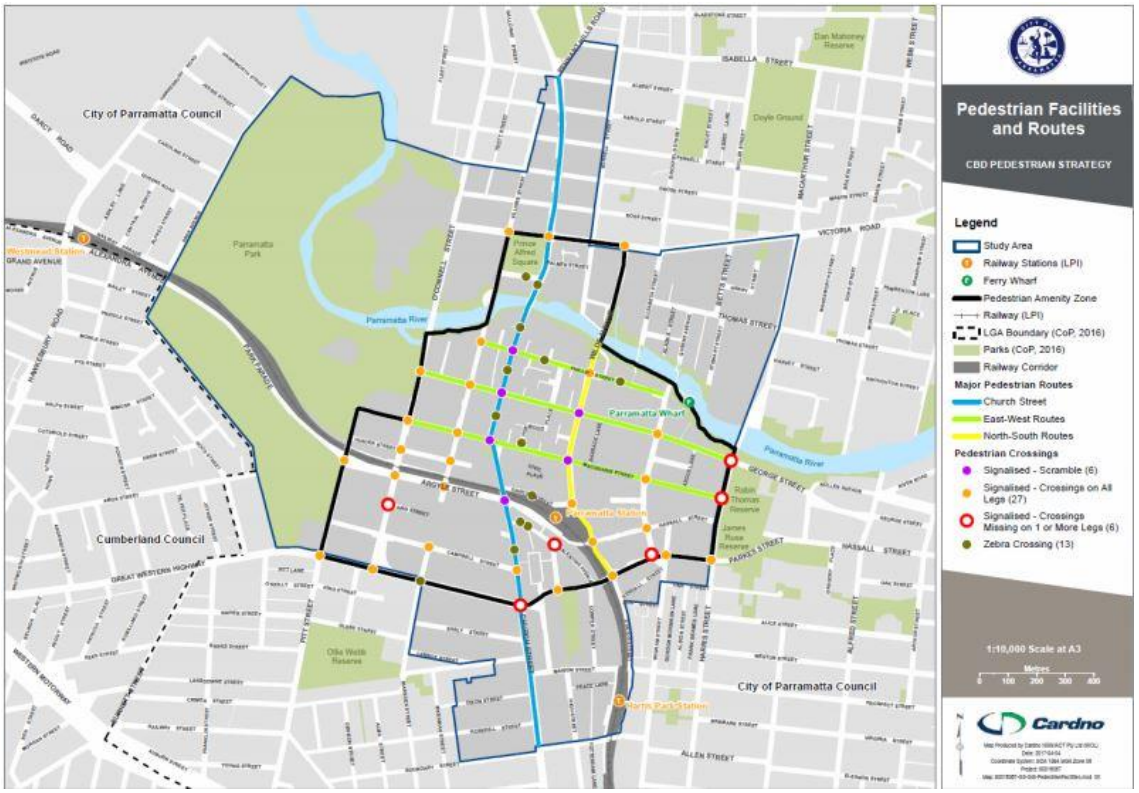
5. Walking and cycling

5.1 Pedestrian network

The pedestrian infrastructure in the project area is generally well established. Parramatta Park provides a key east-west link between Westmead and the Parramatta CBD to the west. A combination of Church Street, O'Connell Street, Marsden Street and MacArthur Street/ Harris Street provide north-south pedestrian connections across Parramatta River to the north of Parramatta CBD and under the existing heavy rail line to the south.

The existing pedestrian network including key routes and crossing facilities is indicatively shown in Figure 5.1. A combination of footpaths and pedestrian and cyclist shared paths are provided along both sides of the Parramatta River, as part of the regional walking and cyclist connection, which are typically used for recreational activities.

Figure 5.1: Parramatta CBD pedestrian facilities and routes



Source: Parramatta CBD Pedestrian Strategy Draft, City of Parramatta, 2017,

The surrounding outer ring road generally acts as a barrier for pedestrian with limited at-grade pedestrian crossings provided. Grade separated pedestrian facilities are provided in key locations along the outer ring road to accommodate pedestrian desire lines generated by key adjacent land uses including at WSU in Rydalmere and Rosehill Gardens Racecourse.

5.2 Cycling network

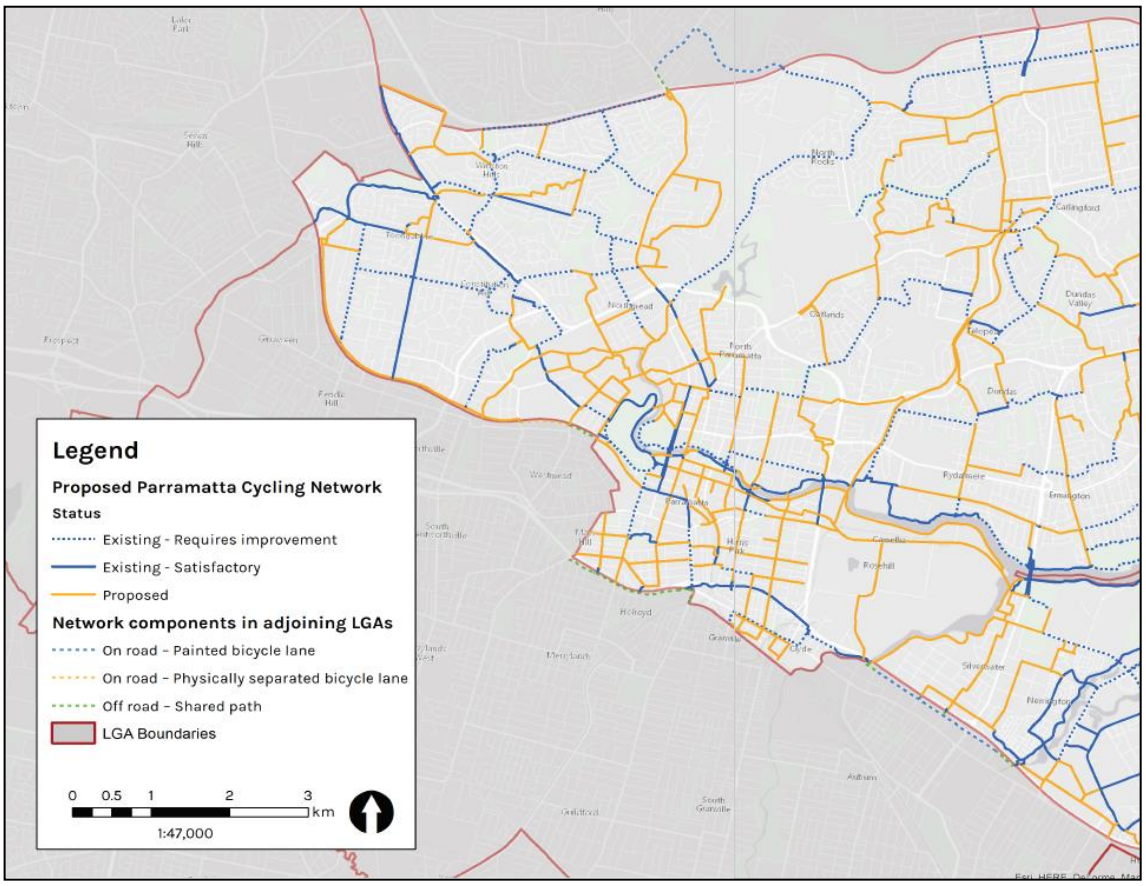
The project area is generally well serviced with east-west and north-south cycling routes via Parramatta Park and along the Parramatta River. Key cycling provisions are provided in the following locations although noting that some have been flagged by Council as requiring improvements:

- Darcy Road in Westmead separated cycle path.
- Parramatta Park cycle loop.
- O'Connell Street shared path.
- Parramatta River shared paths.
- Argyle Street shared path.

The City of Parramatta prepared a draft Parramatta Bike Plan 2017 – 2037 outlining a 20-year plan for the Parramatta LGA. The plan provides a set of routes that would transform the safety and attractiveness of cycling in Parramatta. The proposed cycle routes would provide up to 270 kilometres to the cycling network, made up of 138 kilometres of regional routes and 132 kilometres of local routes.

The existing and proposed Parramatta cycling network is shown in Figure 5.2.

Figure 5.2: Existing and proposed City of Parramatta cycling network



Source: Draft Bike Plan 2017-2037, City of Parramatta, 2017.

5.3 Westmead precinct

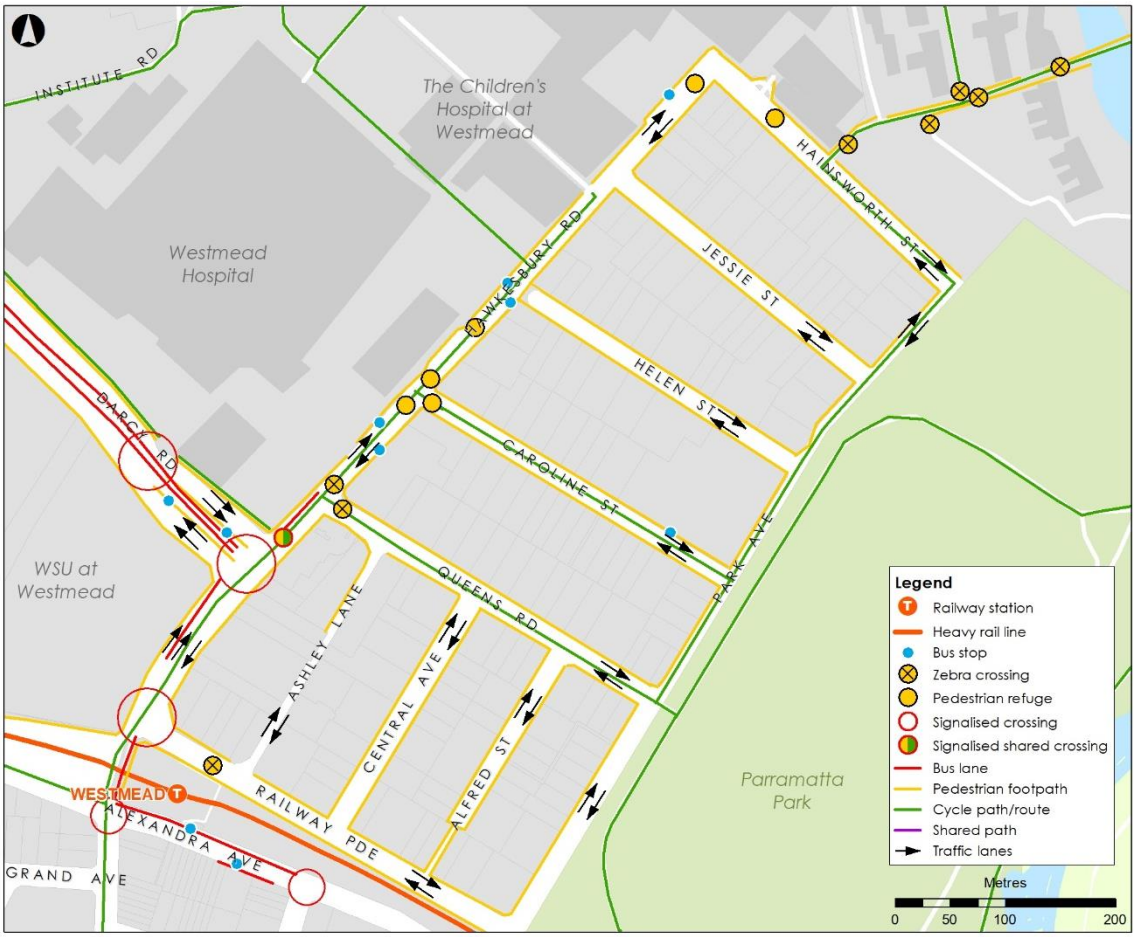
The existing pedestrian and cycling network in the Westmead precinct is shown in Figure 5.3. Hawkesbury Road is the main pedestrian corridor in the precinct connecting Westmead Railway Station with Westmead Hospital and The Children's Hospital at Westmead. Darcy Road provides an important western link parallel to the North-West T-way with a cycleway on the northside of the road towards Mons Road. A cycle route is provided from Hawkesbury Road to Parramatta Park at Park Avenue via on-road cycle lanes along Queens Road.

Figure 5.3: Existing pedestrian and cycling network in the Westmead precinct

Source: Westmead and Parramatta by Bicycle, City of Parramatta Council, 2016.

Existing pedestrian access along the project in Hawkesbury Road is by footpaths, zebra crossings and signalised pedestrian crossings as shown in Figure 5.4. Cyclist routes through the precinct are also shown.

Figure 5.4: Existing pedestrian and cycling facilities in the Westmead precinct

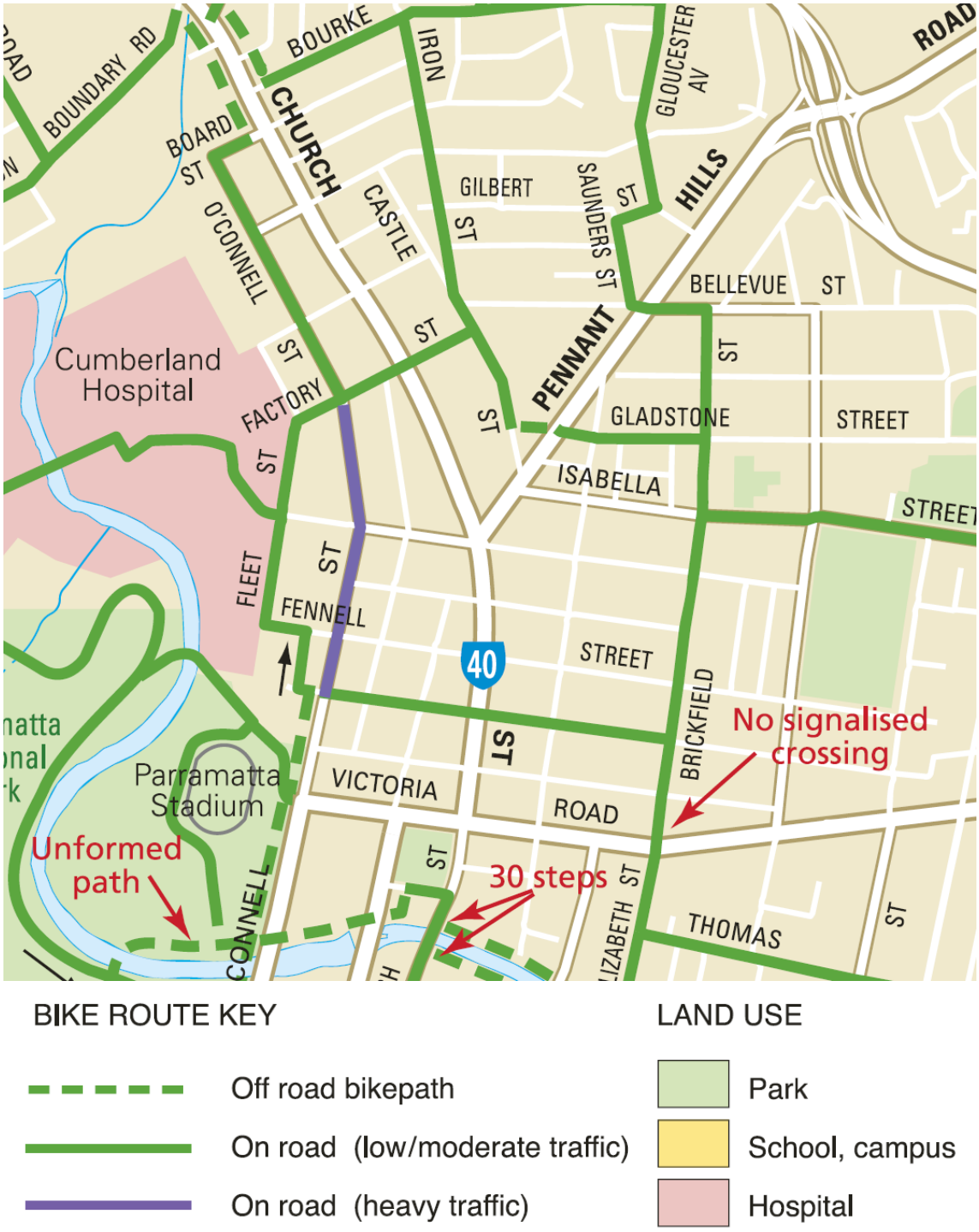


5.4 Parramatta North precinct

The Parramatta North precinct includes the Cumberland Hospital and Factory Street, both of which would undergo significant change as part of the proposed Parramatta North development. Church Street is a main north-south corridor through the precinct which has the Windsor Road and Pennant Hills Road bus routes with pedestrian access to the bus stops via the local side streets.

The existing pedestrian and cyclist network in the Parramatta North precinct is shown in Figure 5.5. The key north-south cycle routes are along the local streets of O'Connell Street to the west and along Iron Street and Castle Street to the east of Church Street. Factory Street, Fleet Street and Grose Street provide alternative cycle routes through the precinct.

Figure 5.5: Existing pedestrian and cycling network in the Parramatta North precinct



Source: Westmead and Parramatta by Bicycle, City of Parramatta Council, 2016.

Existing pedestrian access is provided by footpaths, zebra crossings and signalised pedestrian crossings as shown in Figure 5.6.

The precinct has limited cycling facilities along the project. Most cyclists currently follow the on-road cycle routes. Signalised bicycle crossing opportunities are provided at the intersection of Church Street and Albert Street.

Figure 5.6: Existing pedestrian and cycling facilities in the Parramatta North precinct

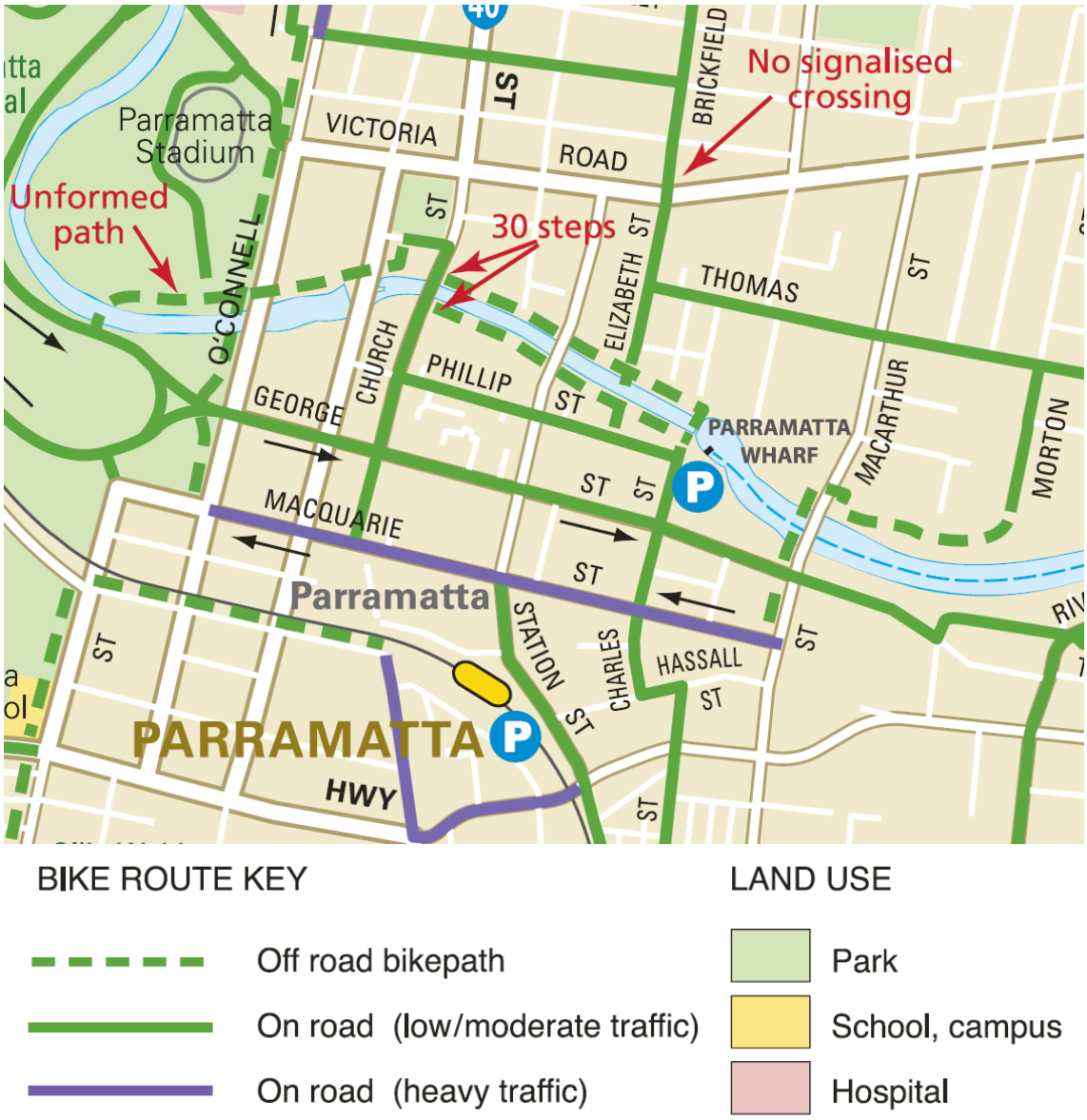
5.5 Parramatta CBD precinct

The Parramatta CBD precinct has a mix of business, commercial, entertainment and retail uses that are conveniently accessed by walking with pedestrian facilities provided throughout the precinct. Church Street is the main north-south pedestrian route with wide footpaths and pedestrian crossing facilities. The footpath along the southern side of Macquarie Street is currently undergoing changes with the development of Parramatta Square.

The existing pedestrian and cycling network in the Parramatta CBD precinct is shown in Figure 5.7. Pedestrian access is provided on the footpaths along both sides of the streets in a grid street network. A 40 km/h High Pedestrian Activity Areas exist along Church Street between Palmer Street and Macquarie Street to slow down traffic for improved pedestrian safety and in Phillip

Street between Marsden Street and Church Street. George Street, Macquarie Street and Hassall Street provide key east-west pedestrian connections linking the Parramatta CBD with Harris Park.

Figure 5.7: Existing pedestrian and cycling facilities Parramatta CBD precinct

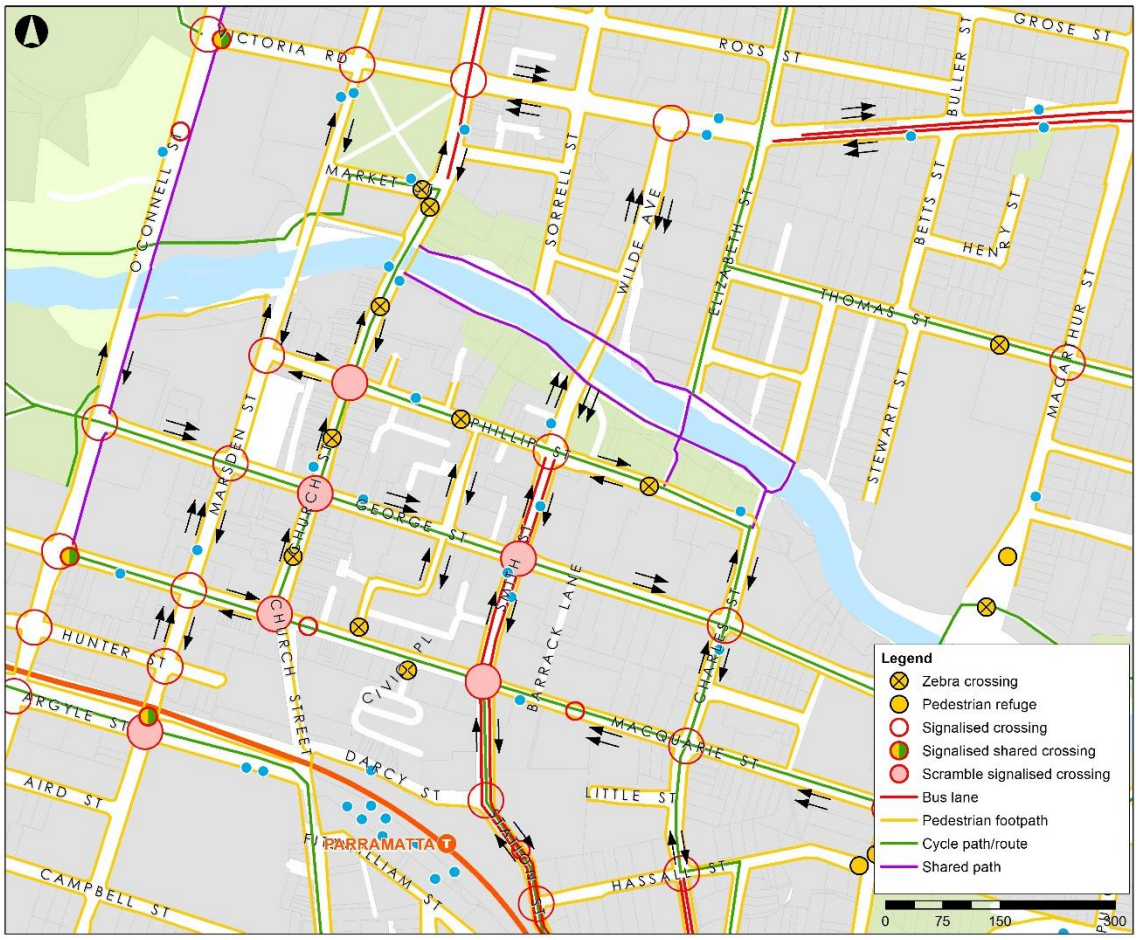


Source: Westmead and Parramatta by Bicycle, City of Parramatta Council, 2016.

Existing pedestrian access is facilitated by footpaths, zebra crossings and signalised pedestrian crossings as shown in Figure 5.8. The precinct has limited cycling facilities along the project and most cycling routes are via on-road paths. Signalised pedestrian crossings are provided at most intersections, with scramble crossings at the busiest pedestrian intersections located at:

- Smith Street at Macquarie Street
- Smith Street at George Street
- Church Street at Argyle Street
- Church Street at Macquarie Street
- Church Street at George Street
- Church Street at Phillip Street.

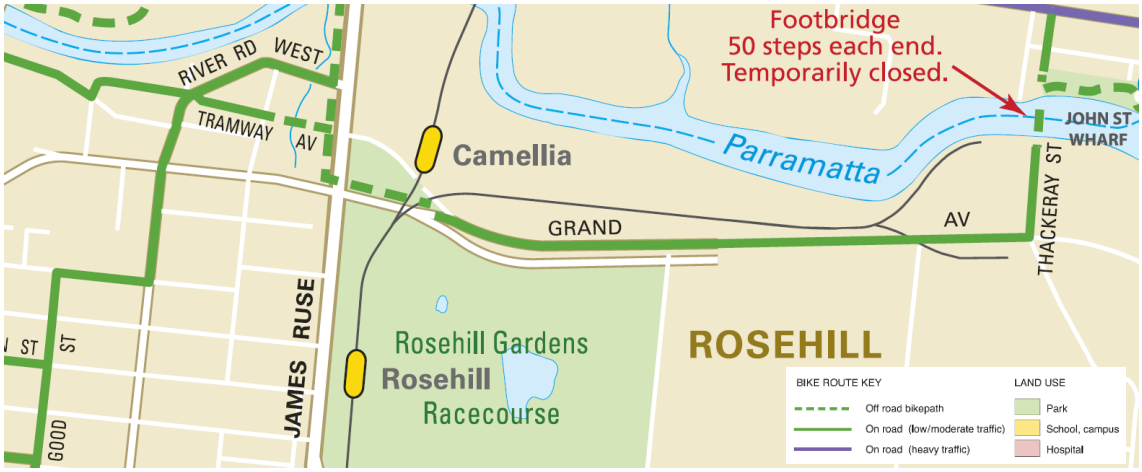
Figure 5.8: Existing pedestrian and cycling facilities in the Parramatta CBD precinct



5.6 Rosehill and Camellia precinct

The Rosehill and Camellia precinct is characterised by multiple land uses including residential around George Street and Alfred Street and industrial around Tramway Avenue and Grand Avenue. The existing pedestrian and cyclist network in this precinct is shown in Figure 5.9. James Ruse Drive and the T6 Carlingford heavy rail line are key barriers for pedestrian and cyclist movements between Tramway Avenue and Grand Avenue.

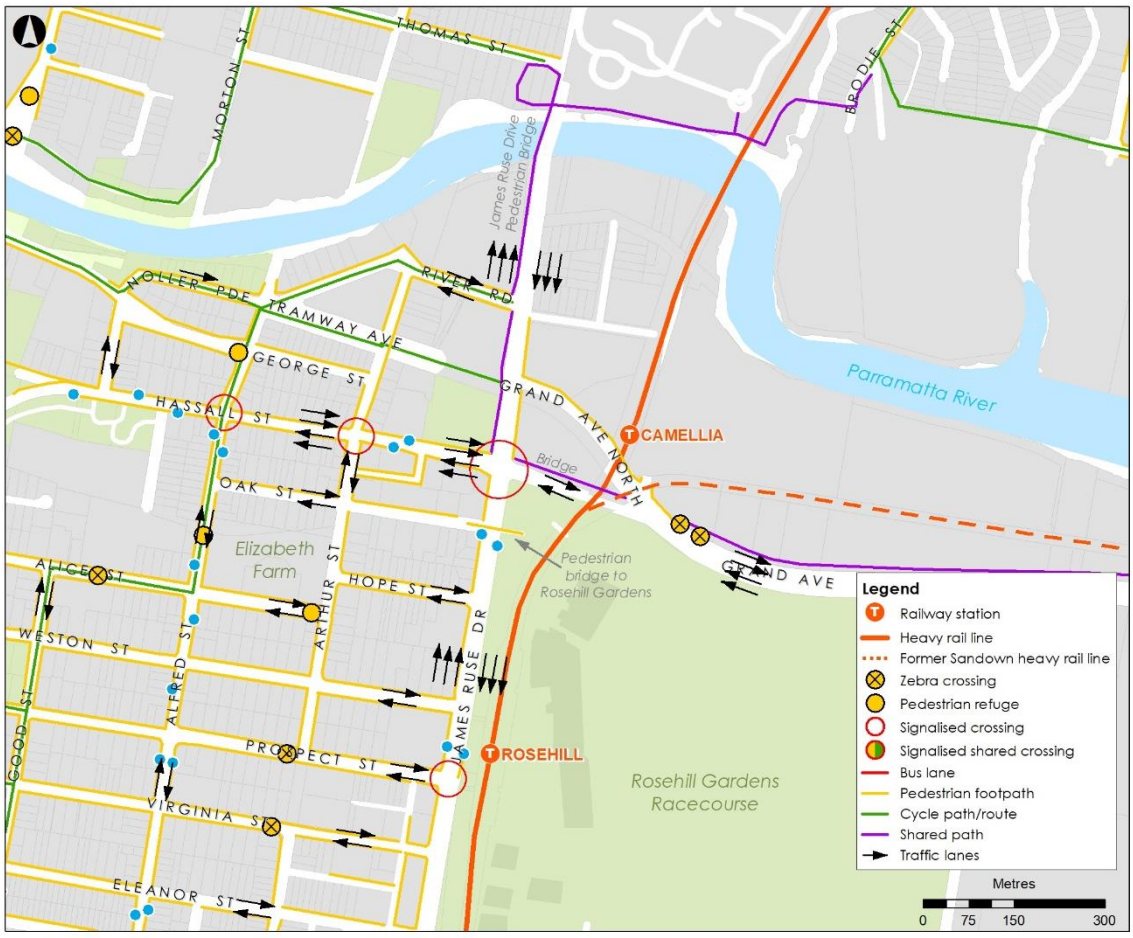
Figure 5.9: Existing pedestrian and cycling network in the Rosehill and Camellia precinct



Source: Westmead and Parramatta by Bicycle, City of Parramatta Council, 2016.

Pedestrian facilities in this precinct are limited to footpaths along the local streets in Rosehill and along the truck routes in Camellia with only two zebra crossings in Grand Avenue to access the northern end of the Rosehill Gardens Racecourse as shown in Figure 5.10.

Figure 5.10: Existing pedestrian and cycling facilities in the Rosehill and Camellia precinct



5.7 Carlingford precinct

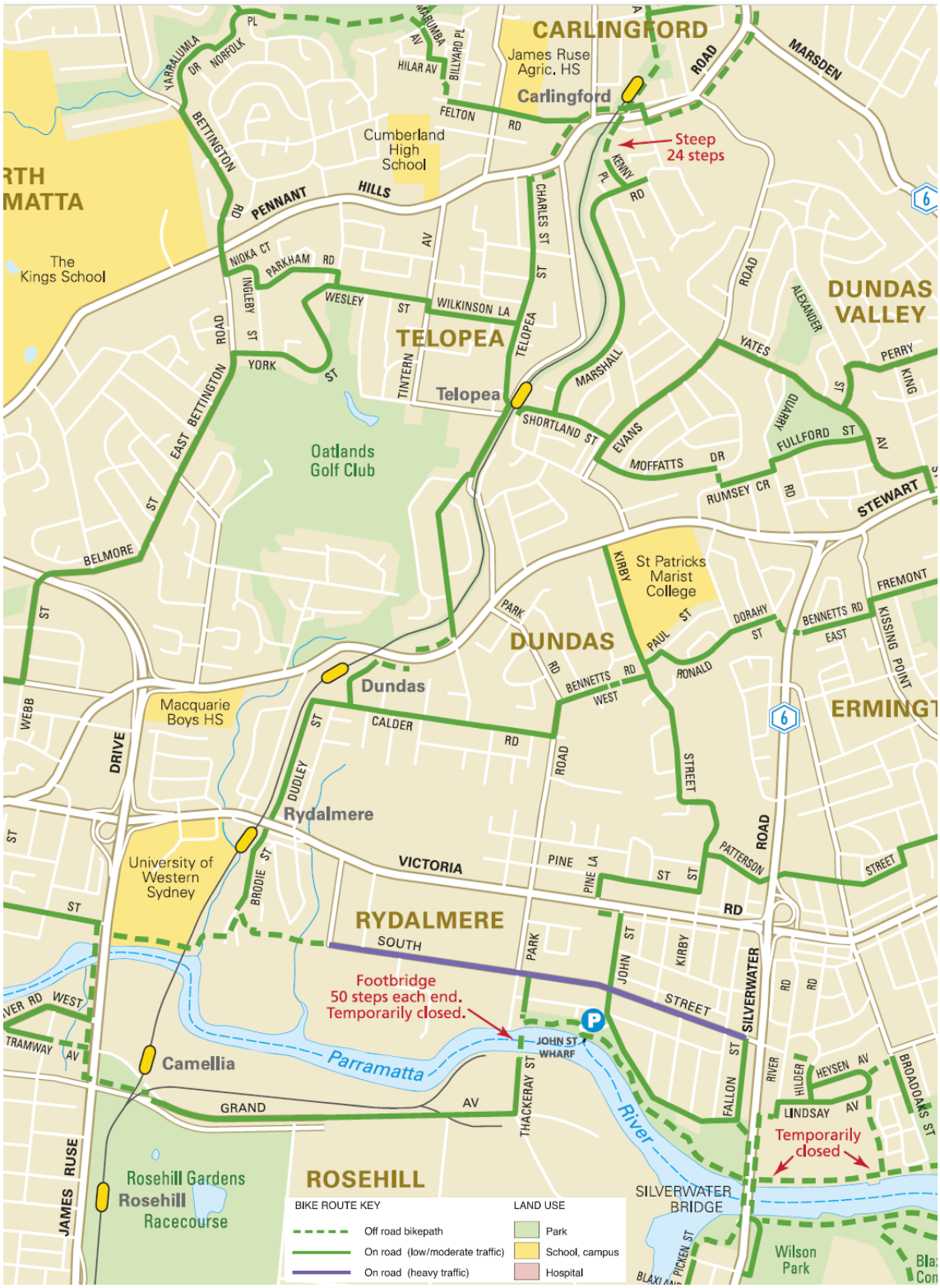
Pedestrian and cycling facilities are limited along the alignment. The existing crossing facilities are shown in Figure 5.11. Each station has dedicated pedestrian facilities to connect the train stations with the suburb. Pedestrian facilities are mostly provided in the form of footpaths and pedestrian crossings.

The Western Sydney University at Rydalmere campus is located adjacent to Rydalmere Railway Station, however, pedestrian links between the station and the campus are indirect and of low standard. A bushland area and the Vineyard Creek separate the campus from the existing railway station. Along the north side of the Parramatta River, a shared pedestrian and cycling path with the Bill Brewer bridge over the Vineyard Creek ravine and drainage system provides an east-west connection between the Gasworks Bridge at MacArthur Street and Brodie Street in Rydalmere which is a light industrial precinct.

Cycling access to Rydalmere Railway Station is unfacilitated via Victoria Road form the north and via the Parramatta Valley Cycleway and Brodie Street from the south.

A few dedicated pedestrian connections exist including a link between Dundas station and a bus stop on Kissing Point Road and links between Carlingford station and the surrounding residential streets.

Figure 5.11: Existing pedestrian and cycling network in the Carlingford precinct

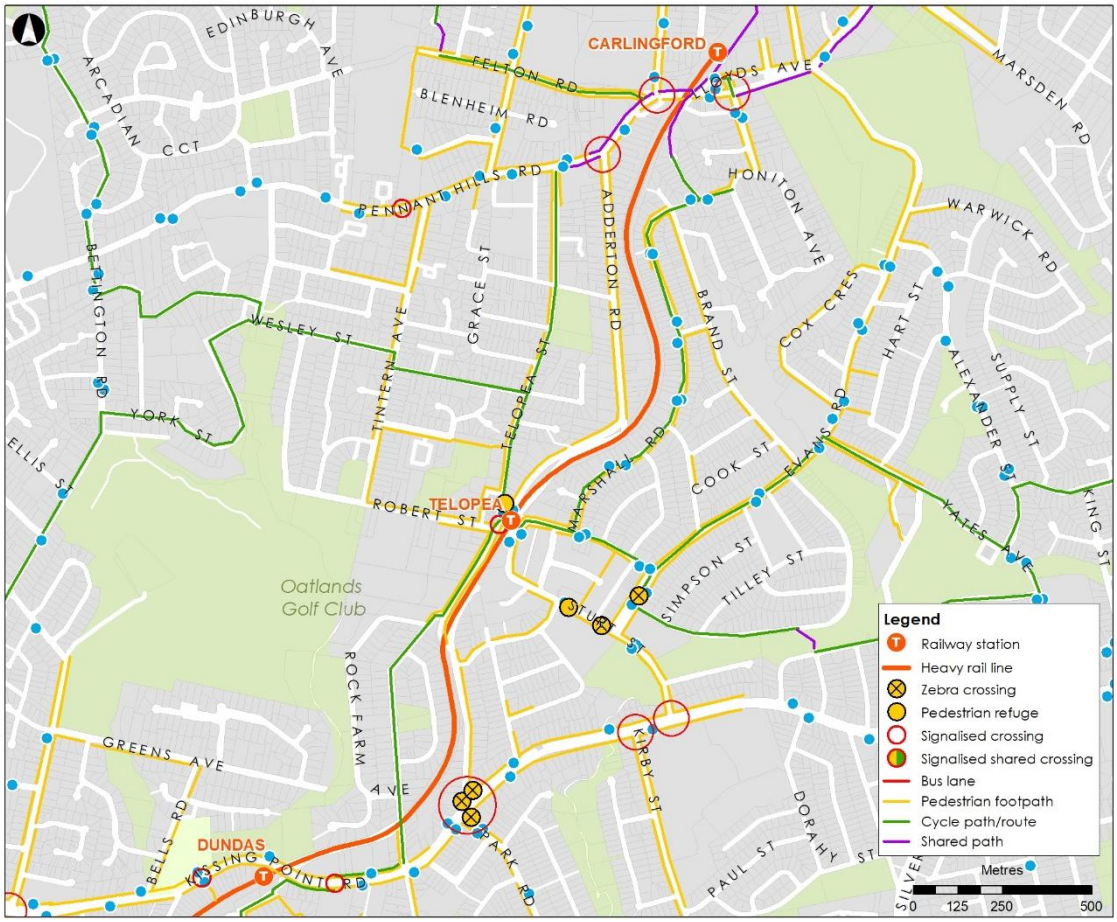


Source: Westmead and Parramatta by Bicycle, City of Parramatta Council, 2016.

The existing pedestrian and cycling faciliteies in the Carlingford precinct are shown on two maps for Rydalmere and Dundas in Figure 5.12 and Telopea and Carlingford in Figure 5.13.

Figure 5.12: Existing pedestrian and cycling facilities in the Carlingford precinct (Rydalmere to Dundas)

Figure 5.13: Existing pedestrian and cycling facilities in the Carlingford precinct (Telopea to Carlingford)



5.7.1 On-corridor pedestrian crossings

Several existing mid-block pedestrian crossings with zebra and signalised treatments are located along the project by precinct as summarised in Table 5.1.

Table 5.1: Existing on-corridor mid-block pedestrian crossings

Precinct	Location	Crossing type	Surrounding land uses
Westmead	Hawkesbury Road between Queens Road and Westmead Hospital Emergency Department access	Zebra	Hospital and health facilities
Parramatta North	None, excludes crossings within the Cumberland Hospital health precinct		
Parramatta CBD	Church Street immediately south of intersection with Market Street	Zebra	Commercial
	Church Street between Market Street and Phillip Street	Zebra	Commercial
	Church Street between Phillip Street and George Street	Zebra	Commercial
	Church Street between George Street and Macquarie Street	Zebra	Commercial
	Macquarie Street between Smith Street and Charles Street	Signalised	School and commercial facilities
Rosehill and Camellia	None		

Precinct	Location	Crossing type	Surrounding land uses
Carlingford	All roads have bridges over the existing railway line. However, existing pedestrian-only or shared path with cyclists crossings of the T6 Carlingford railway line exist at: ○ Along the northside of the Parramatta River with pedestrian access under the railway and elevated pipeline bridges ○ Rydalmere station with pedestrian access from Brodie Street on the eastern side of the station only ○ Dundas station with a pedestrian connection via the station platforms between Station Street and Kissing Point Road ○ Telopea station with a pedestrian connection via the station platforms between Adderton Road and Sturt Street ○ Carlingford station with pedestrian access from Lloyds Avenue on the eastern side of the station only		

6. Road safety

Crash history data was obtained for the five-year period from July 2011 to June 2016. These data were used to review the road safety for each of the precincts and assessed against:

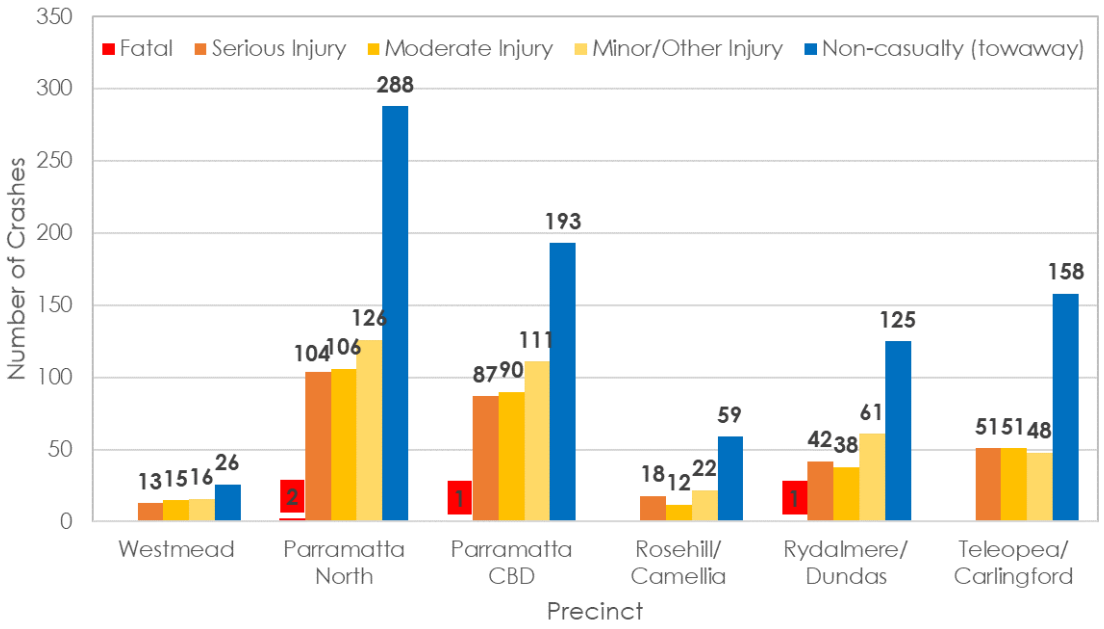
- The crash severity, such as property damage only, Injury or fatality, and
- The type of crash based on Road User Movement (RUM) code groups defined by Roads and Maritime Services and the first impact type, such as head-on, rear end, etc.

Overall, trends in the data show that typically crashes occur at intersections, with a relatively limited number of midblock crashes. A high proportion of the crashes included two vehicles travelling in the same direction which includes the most common low-severity rear-end crash type and collisions occurring during lane changes. These crash types are common across Sydney's roads and are typically associated with short distances between signalised intersections, vehicle queuing and congestion.

No trends in age or time period of the crash occurrences are identified in the statistics.

A summary of the crash severity statistics for the five year period for each precinct is provided in Figure 6.1. The Parramatta North precinct had the highest number of crashes at 626 and the Parramatta CBD precinct with 482 crashes. The Carlingford precinct, that includes Rydalmere, Dundas, Telopea and Carlingford, had 575 crashes when combined. The Westmead precinct, which is the smallest precinct, had the least number of crashes at 70. The most severe crashes, including four fatalities, occurred in Parramatta North in O'Connell Street and along James Ruse Drive, in Parramatta CBD and in Dundas on Kissing Point Road.

Figure 6.1: Five-year crash severity statistics by precinct

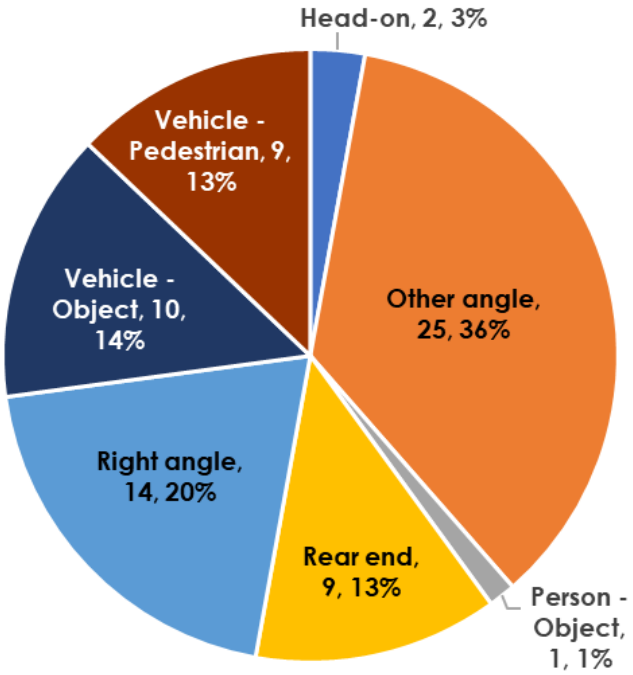


A breakdown of the data of key locations within each precinct is summarised in the following sections.

6.1 Westmead precinct

The crash history analysis in the Westmead precinct included Hawkesbury Road, Railway Parade and Park Avenue. The majority of crashes were located at intersections. A total of 70 crashes were recorded including 26 property damage only crashes and 54 injury crashes. A breakdown of the crash types is provided in Figure 6.2.

Figure 6.2: Crash types in the Westmead precinct



These statistics indicate that 'other angle' and 'right angle' crashes were most prominent, which includes sideswipe crashes and turning vehicle crashes. This is typical of an area with a high proportion of intersection crashes.

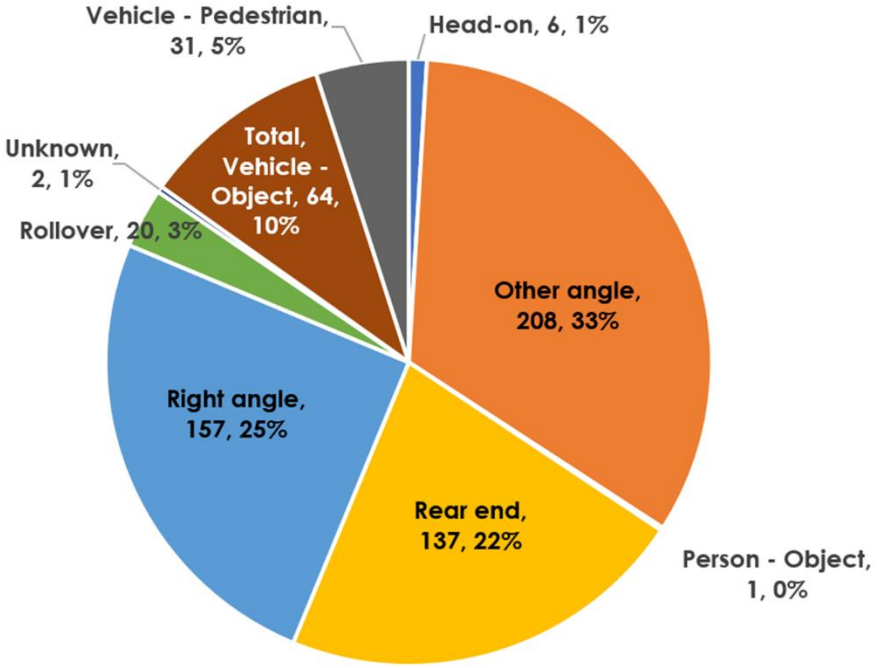
The locations of the crashes in the Westmead precinct are shown in Figure 6.3. Along Hawkesbury Road, the majority of crashes occurred at an intersection. Nine crashes involved a pedestrian of which six occurred in Hawkesbury Road. Three crashes occurred at the intersection of Queens Road near an existing pedestrian crossing. All three of these crashes occurred in 2014 and each time when a pedestrian was crossing the road.

Figure 6.3: Crash statistics in the Westmead precinct

6.2 Parramatta North precinct

The crash history analysis in the Parramatta North precinct addressed Church Street north of Victoria Road, O'Connell Street and Albert Street. A total of 626 crashes were recorded including 288 property damage only crashes, and two fatality crashes, with the remaining 336 as injury crashes. A breakdown of the crash types is provided in Figure 6.4.

Figure 6.4: Crash types in the Parramatta North precinct



These statistics indicate that 'other angle' and 'right angle' crashes were most prominent, which includes sideswipe crashes and turning vehicle crashes. This is typical of an area with a high proportion of intersection crashes. Similarly, the high proportion of 'rear end' crashes is typical of areas with signalised intersections and traffic congestion.

The locations of the crashes in the Parramatta North precinct are shown in Figure 6.5. Church Street shows a high number of pedestrian-related crashes particularly between Pennant Hills Road and Victoria Road.

Figure 6.5: Crash statistics in the Parramatta North precinct

6.3 Parramatta CBD precinct

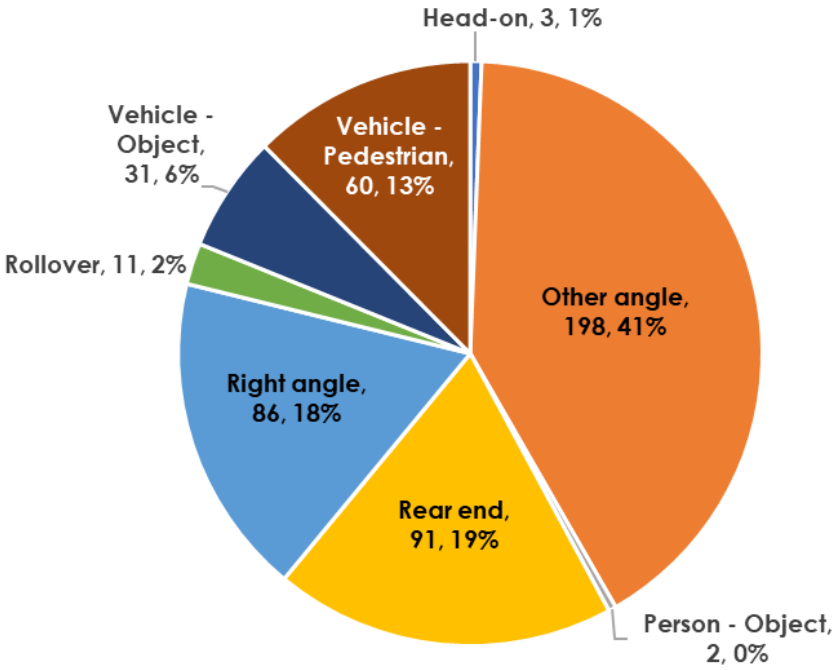
The crash history analysis in the Parramatta CBD precinct included Church Street south of Victoria Road, Macquarie Street, George Street, O'Connell Street, Smith Street and Marsden Street.

A total of 482 crashes were recorded in the Parramatta CBD precinct including 193 property damage only crashes, and one fatality crash, with the remainder being injury crashes. A breakdown of the crash types is provided in Figure 6.4.

These statistics indicate that 'other angle' and 'right angle' crashes were most prominent, which includes sideswipe crashes and turning vehicle crashes. This is typical of an area with a high proportion of intersection crashes. Similarly, the high proportion of 'rear end' crashes is typical of areas with signalised intersections and traffic congestion.

Typically crashes on the CBD streets included collisions between vehicles travelling in the same direction or with vehicles manoeuvring from a stationary position and most collisions occurred at intersections.

Figure 6.6: Crash types in the Parramatta CBD precinct

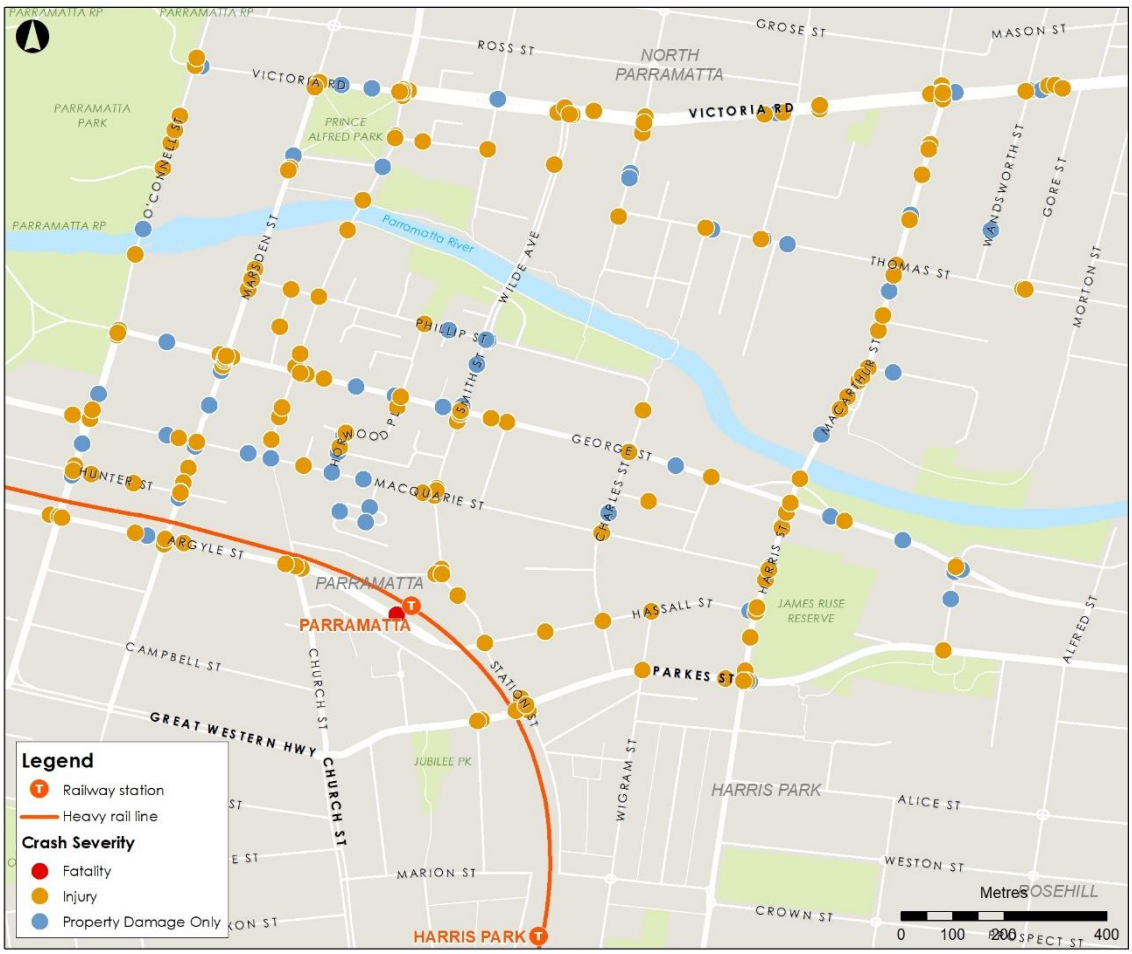


The locations of the crashes in the Parramatta CBD precinct are shown in Figure 6.7. A number pedestrian and vehicle crashes occurred In the CBD which mostly occurred at intersections.

Many of the pedestrian crashes occurred along Church Street which has a high volume of pedestrians and two scramble pedestrian crossings. Several pedestrian crashes were also recorded on Marsden Street near Hunter Street west of Centenary Square and around Prince Alfred Park which also have higher volumes of pedestrian activity.

A significant portion of crashes were located at an intersection with another road. MacArthur Street and Harris Street, which is on the inner ring route, had 106 crashes which is a higher proportion than on other streets.

Figure 6.7: Crash statistics in the Parramatta CBD precinct

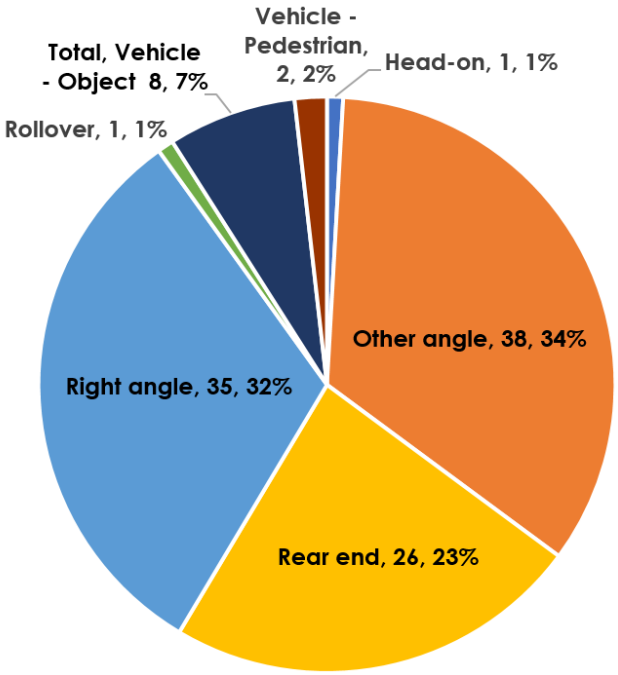


6.4 Rosehill and Camellia precinct

The crash history analysis in the Rosehill land Camellia precinct included River Road West, Hassall Street, James Ruse Drive, Grand Avenue North and Grand Avenue. A total of 111 crashes were recorded in the Rosehill and Camellia precinct including 59 property damage only crashes and 52 injury crashes. A breakdown of the crash types is provided in Figure 6.8.

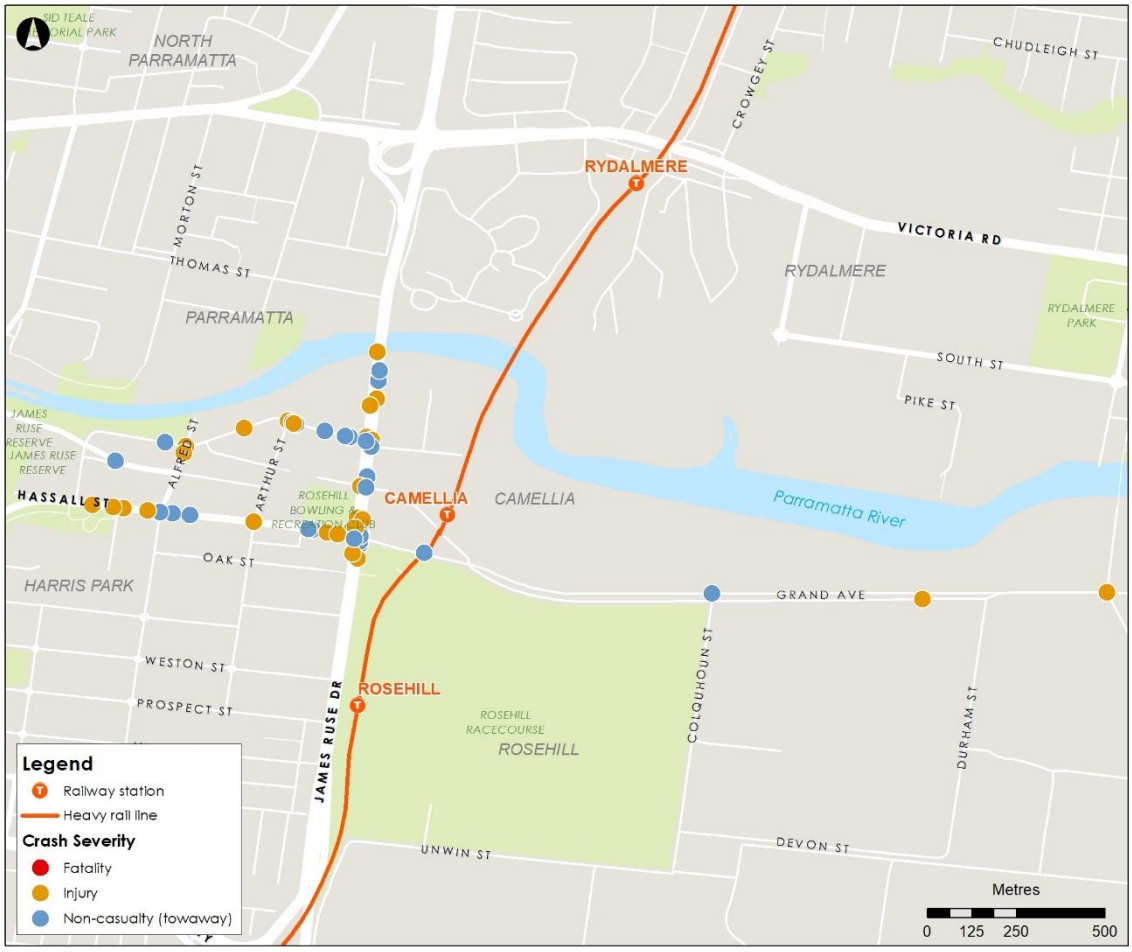
These statistics indicate that 'other angle' and 'right angle' crashes were most prominent, which includes sideswipe crashes and turning vehicle crashes. This is typical of intersection crashes and roads with more than one lane in each direction. Similarly, the high proportion of 'rear end' crashes is typical of areas with signalised intersections and traffic congestion.

Figure 6.8: Crash types in the Rosehill and Camellia precinct



The locations of crashes in the Rosehill and Camellia precinct are shown in Figure 6.9. A significant portion of crashes are located on Hassall Street and James Ruse Drive, which is consistent with their higher order function and thus higher volumes. The Rosehill and Camellia precinct contains a relatively low volume of crashes along the project between Grand Avenue and George Street.

Figure 6.9: Crash statistics in the Rosehill and Camellia precinct



6.5 Carlingford precinct

In the vicinity of the Carlingford alignment, crashes have generally occurred along the arterial roads of Victoria Road, Kissing Point Road and Pennant Hills Road. Adderton Road which provides access to Telopea Railway Station contains a cluster of crashes in the vicinity of the existing station. This is likely to be a result of multiple vehicle activities occurring at the site including vehicles emerging from driveways, presence of a midblock pedestrian crossing and T-intersections on either side of the midblock crossing.

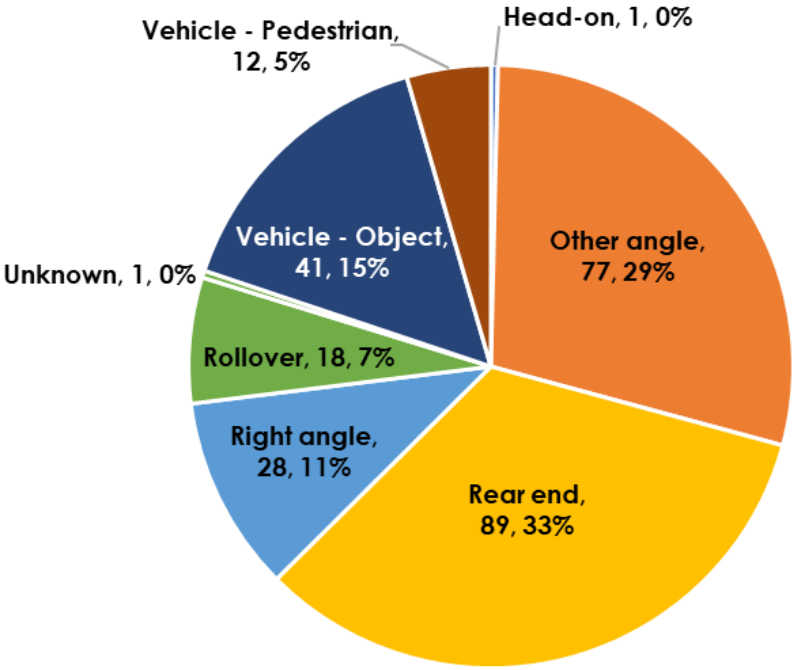
A review of crash data within the Carlingford precinct has been split into two areas for:

- Rydalmere and Dundas.
- Telopea and Carlingford.

The Rydalmere and Dundas area include Victoria Road, Calder Road, Park Road and Kissing Point Road. The Telopea to Carlingford area includes Adderton Road, Pennant Hills Road and Kissing Point Road.

A total of 267 crashes were recorded in the Dundas and Rydalmere area, including 125 property damage only crashes and one fatality crash, with 111 injury crashes. A breakdown of the crash types in the Rydalmere to Dundas areas is provided in Figure 6.10.

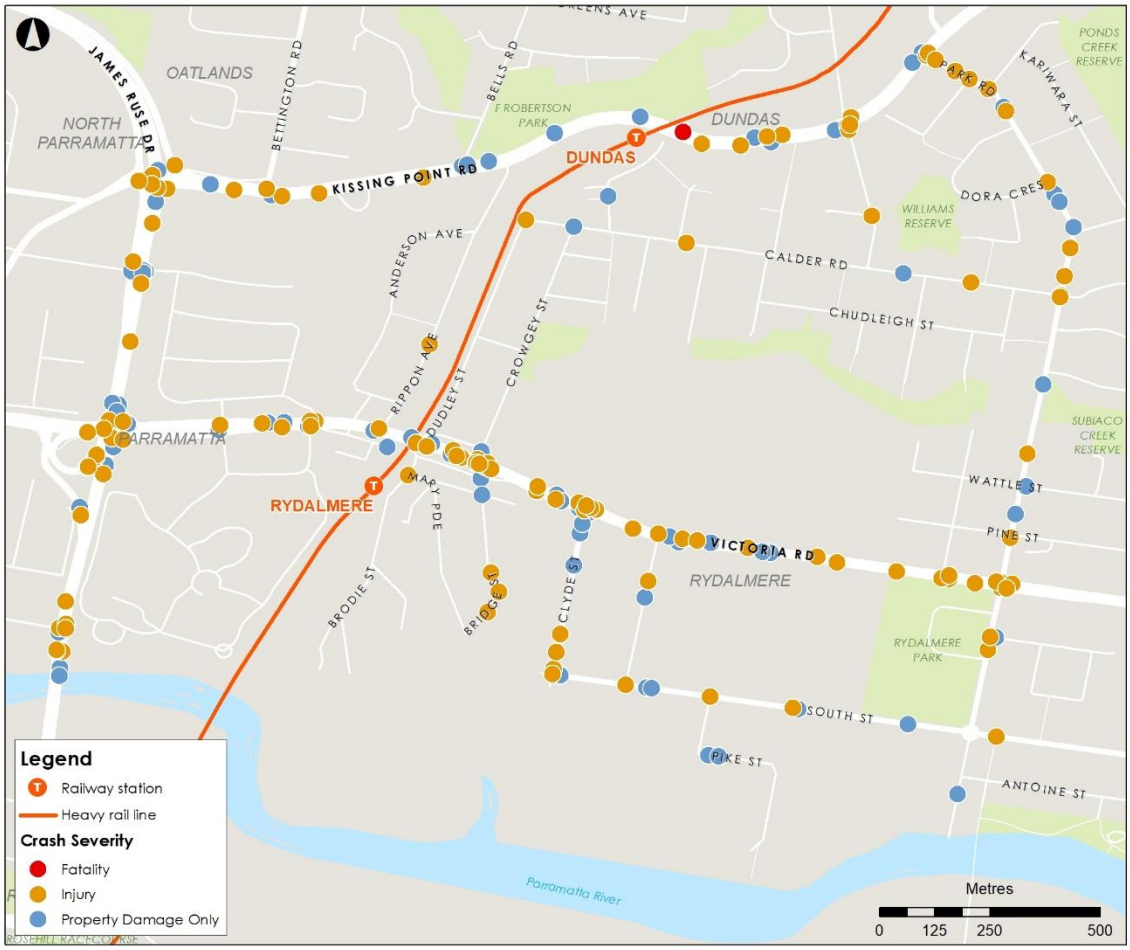
Figure 6.10: Crash types in the Carlingford precinct (Rydalmere to Dundas)



These statistics indicate that 'other angle' and 'right angle' crashes were most prominent, which includes sideswipe crashes and turning vehicle crashes. This is typical of intersection crashes and roads with more than one lane in each direction. Similarly, the high proportion of 'rear end' crashes is typical of areas with signalised intersections and traffic congestion.

The locations of the crashes in the Rydalmere and Dundas area are shown in Figure 6.11. Crashes were clearly clustered on the Victoria Road as the major road, as well as in clusters along James Ruse Drive at intersections with side streets.

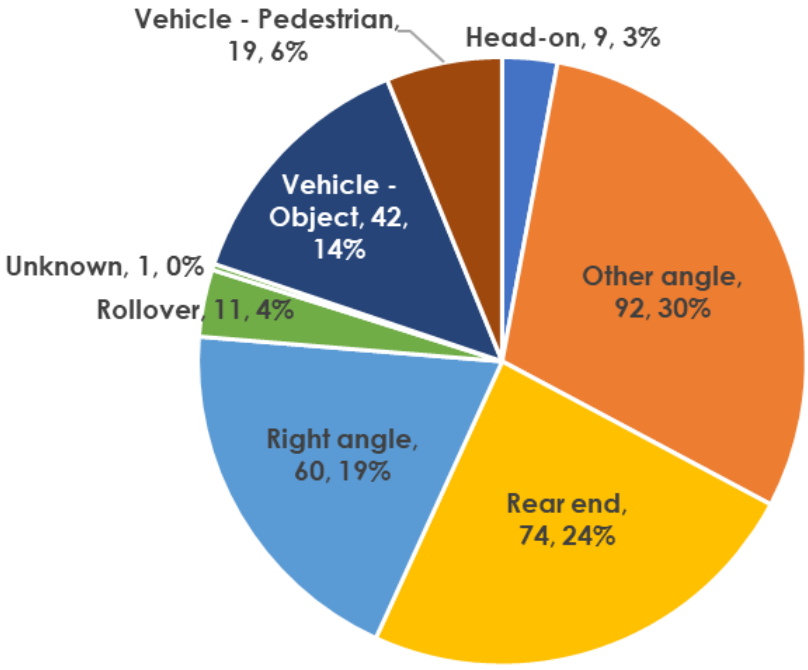
Figure 6.11: Crash statistics in the Carlingford precinct (Rydalmere to Dundas)



A total of 308 crashes were recorded in the Carlingford and Telopea area including 158 property damage only crashes and 150 injury crashes. A breakdown of the crash types in the Carlingford and Telopea area is provided in Figure 6.12.

These statistics indicate that 'other angle' and 'right angle' crashes were most prominent, which includes sideswipe crashes and turning vehicle crashes. This is typical of intersection crashes and roads with more than one lane in each direction. Similarly, the high proportion of 'rear end' crashes is typical of areas with signalised intersections and traffic congestion.

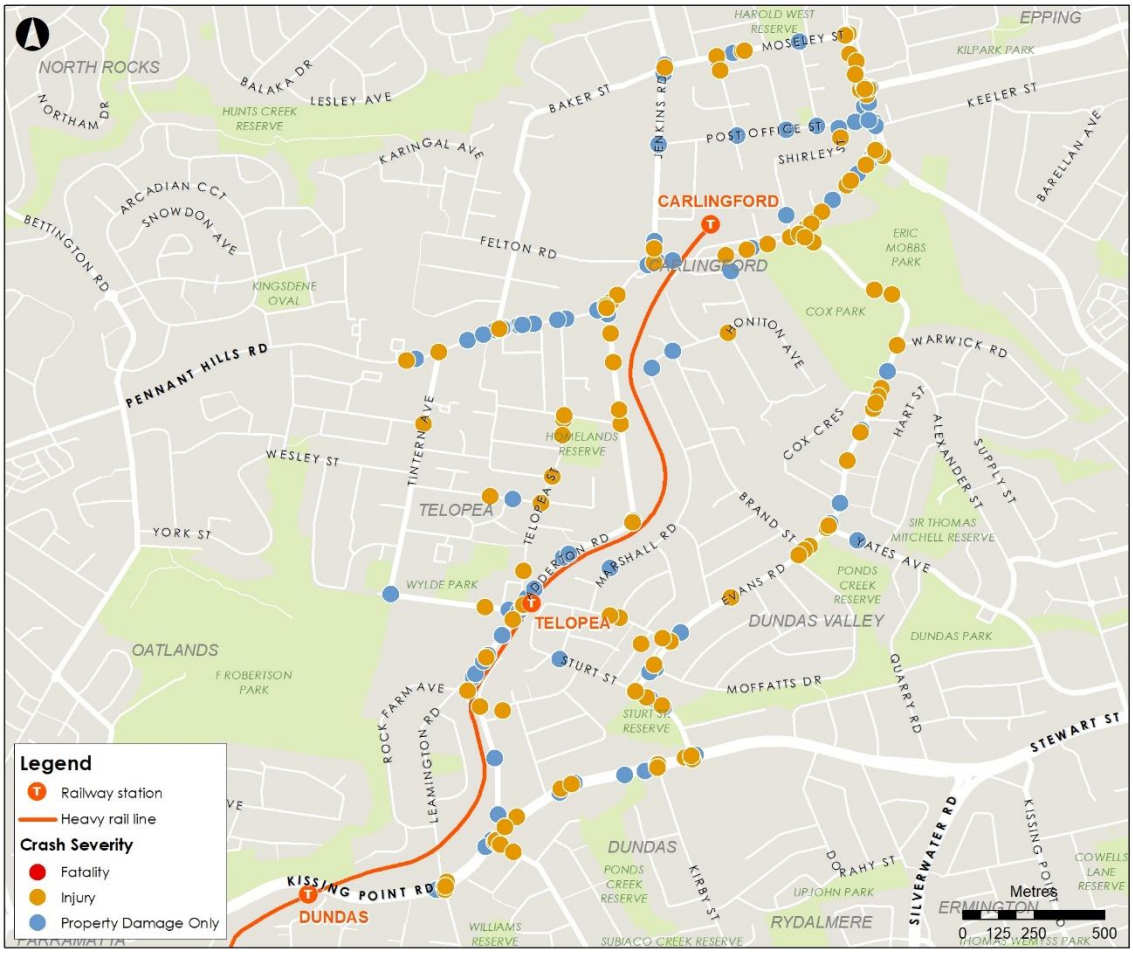
Figure 6.12: Crash types in the Carlingford precinct (Telopea to Carlingford)



The locations of the crashes in the Telopea and Carlingford area are shown in Figure 6.13. Crashes are clearly clustered on the major roads, such as along Pennant Hills Road and Kissing Point Road, which are higher speed roads with greater traffic volumes.

Adderton Road that provides access to the west side of Telopea Railway Station had a cluster of crashes near the station. It is a site where a midblock pedestrian crossing is close to the intersection of Telopea Street and Adderton Road which provides access to a service station, businesses between Telopea Street and Robert Street and the local residential streets.

Figure 6.13: Crash statistics in the Carlingford precinct (Telopea to Carlingford)



7. Parking

7.1 Area of investigation

Car parking surveys of on-street parking were completed along the project and its surrounds to understand the parking impacts along the project, and the ability for the surrounding areas to absorb parking demands being impacted by the projecct.

Car parking surveys were undertaken in October 2016 for the following precincts:

- Westmead precinct
- Parramatta North precinct
- Parramatta CBD precinct
- Rosehill and Camellia precinct.

Car parking surveys were not conducted along the project between Camellia and Carlingford because this section is along the existing heavy rail line with no direct impact on the existing on-street car parking supply.

The extent of on-street parking surveys for each of the precincts is shown in Figure 7.1.

7.2 Parking supply

The parking supply comprises various parking restrictions, which limits the ability of some drivers from using certain spaces. The on-street car parking supply, location and restrictions within each precinct are shown in Figure 7.1. Some of the parking restrictions change at various times across the day.

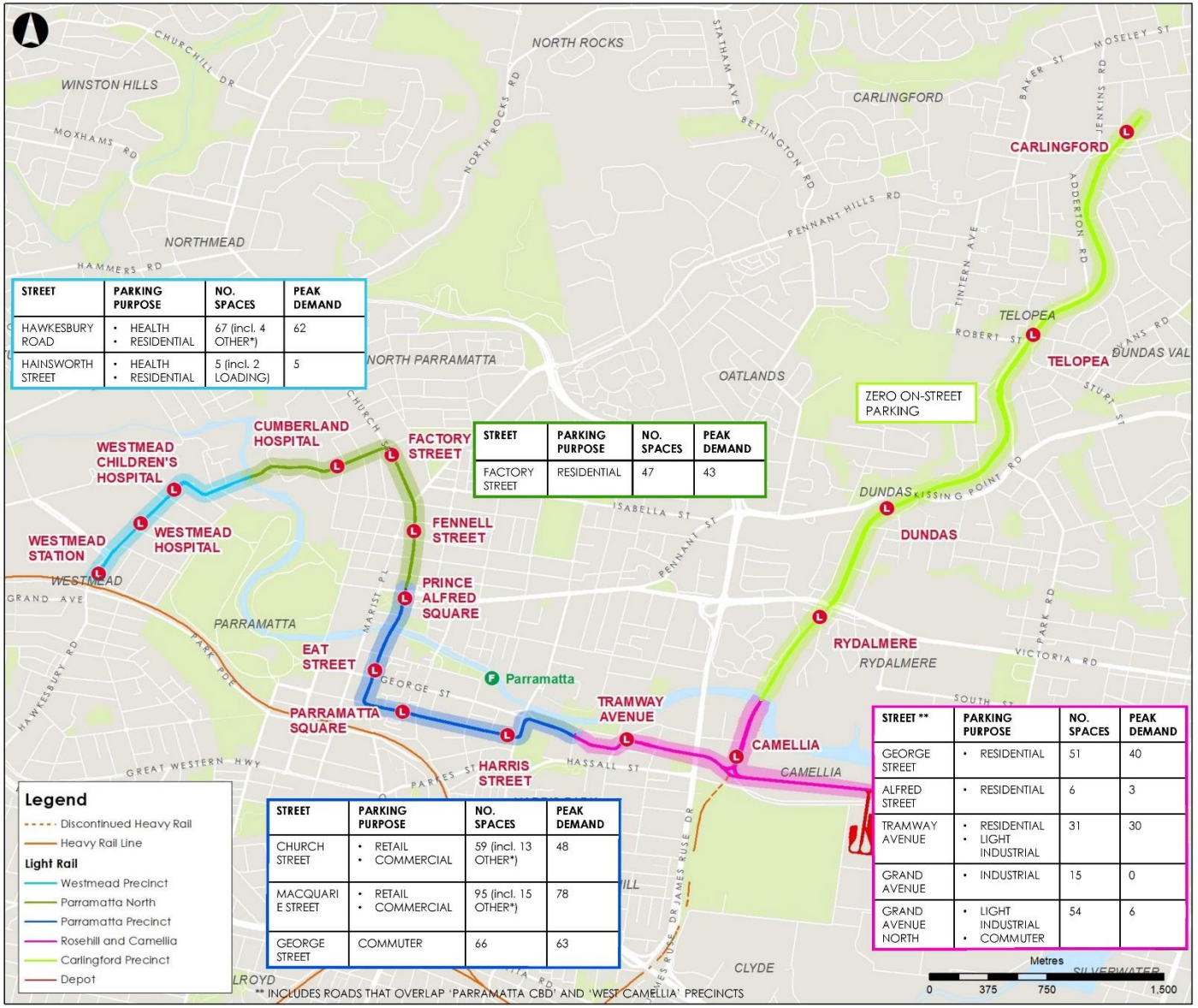
An overview of the number of on-street spaces located on and off the project by precinct is provided in Table 7.1.

Table 7.1: Parking supply summary in the precincts

Precinct	On-corridor parking supply	Off-corridor parking supply	Total
Westmead	72	668	**740**
Parramatta North	47	2,213	**2,260**
Parramatta CBD	224	732	**956**
Rosehill and Camellia	157	416	**573**
Total	**500**	**4,029**	**4,529**

Note: Supply excludes Bus Zones, 24 hour No Parking and No Stopping bays

Figure 7.1: On-street parking estimates along the Parramatta Light Rail corridor



STREET	PARKING PURPOSE	NO. SPACES	PEAK DEMAND
HAWKESBURY ROAD	• HEALTH • RESIDENTIAL	67 (incl. 4 OTHER*)	62
HAINSWORTH STREET	• HEALTH • RESIDENTIAL	5 (incl. 2 LOADING)	5

STREET	PARKING PURPOSE	NO. SPACES	PEAK DEMAND
FACTORY STREET	RESIDENTIAL	47	43

STREET	PARKING PURPOSE	NO. SPACES	PEAK DEMAND
CHURCH STREET	• RETAIL • COMMERCIAL	59 (incl. 13 OTHER*)	48
MACQUARIE STREET	• RETAIL • COMMERCIAL	95 (incl. 15 OTHER*)	78
GEORGE STREET	COMMUTER	66	63

STREET **	PARKING PURPOSE	NO. SPACES	PEAK DEMAND
GEORGE STREET	• RESIDENTIAL	51	40
ALFRED STREET	• RESIDENTIAL	6	3
TRAMWAY AVENUE	• RESIDENTIAL • LIGHT INDUSTRIAL	31	30
GRAND AVENUE	• INDUSTRIAL	15	0
GRAND AVENUE NORTH	• LIGHT INDUSTRIAL • COMMUTER	54	6

A detailed analysis of the parking surveys identified additional spaces that are signposted as "No Stopping" or "No Parking" spaces at certain periods of the day and are available as unrestricted or time restricted parking during alternate periods of the day. A summary of these additional 'restricted spaces' by each precinct and their availability for use during key periods of the day is provided in Table 7.2. These spaces are excluded from the parking supply in Table 7.1. The results show that most of the restricted spaces are restricted for use in the AM and PM peak periods and are available for use during the day.

Table 7.2: Summary of the restricted parking spaces by precinct

Precinct	Parking supply	Availability per hour			
		8 am	12 pm	3 pm	5 pm
Westmead	0	0			
Parramatta North	32	6	32	0	26
Parramatta CBD	21	4	11	4	9
Rosehill and Camellia	71	0	71	0	0
Total	**124**	**10**	**114**	**4**	**35**

7.3 Parking demand surveys

Parking demand surveys were undertaken along the project and in the adjacent streets between 7 am and 7 pm at hourly intervals for two days in each precinct. The days surveyed for each precinct are summarised in Table 7.3.

Table 7.3: On-street parking survey days

Area	Tuesday 8/11/2016	Wednesday 9/11/2016	Thursday 10/11/2016	Tuesday 15/11/2016
Hawkesbury Road	✓		✓	
North Parramatta	✓		✓	
Parramatta	✓		✓	
Parramatta South	✓		✓	
Harris Park		✓		✓
North Parramatta (additional sites)	✓		✓	
Harris Park (additional sites)		✓		✓

Day 1 and Day 2 peak car parking demand results at 12 pm are summarised in Table 7.4 for the overall peak period on each day, excluding the restricted spaces.

Table 7.4: Day 1 and Day 2 parking demand summary

Precinct	Parking supply	Day 1 at 12 pm		Day 2 at 12 pm	
		Peak demand (spaces)	Occupancy (percentage)	Peak demand (spaces)	Occupancy (percentage)
Westmead	740	627	85%	587	79%
Parramatta North	2,260	1,246	55%	1,238	55%
Parramatta CBD	956	659	69%	672	70%
Rosehill and Camellia	573	391	68%	363	63%
Total	**4,529**	**2,923**	**65%**	**2,860**	**63%**

These survey results indicate limited differences between surveyed days across the study area. Therefore, the car parking demand by precinct was analysed only for Day 1 of the survey results.

The peak period results within each precinct are summarised in Table 7.5 to Table 7.12 with the analysis of the car parking supply and demand along the project streets and the surrounding off-corridor streets.

The average length of stay data and number of parking events across the day were analysed. A parking event represents the overall number of vehicles parking across the course of a day. A vehicle parked for three hours in one space, would represent a demand in each hour period counted, would have a duration of stay of three hours, however represents only one parking event.

A car parking occupancy of around 85 per cent is typically considered to represent theoretical capacity, in particular for on-street parking. This occupancy level represents the equilibrium and a good utilisation of car parking, and further given the dynamic nature of parking, provides the ability for drivers arriving to an area to find a car parking without excessive circulation. This does not mean that car parking utilisation higher than 85 per cent does not occur, rather in situations when occupancies exceed 85 per cent that increased circulation and walking distances are often required to find a car parking space.

7.4 Parking demand

Parking demand within each precinct is provided in Figure 7.1. The car parking demand is shown for key time periods throughout day 1 and include the 'restricted' spaces that are available at that time of day. Each precinct is discussed in the following sections.

Westmead

The analysis of the peak parking demand along the project in the Westmead precinct is provided in Table 7.5. The results show very high utilisation of the parking spaces. The exception is taxi and mail zones which were not recorded as being occupied. These four spaces are about five percent of the total spaces.

Table 7.5: Peak on-street parking demand – Westmead precinct (on-corridor)

Street	Restriction Type	Parking supply (spaces)	Peak demand – 9am		Average length of stay (minutes)	Parking events
			Utilisation (spaces)	Occupancy (percentage)		
Hawkesbury Road	Unrestricted	36	36	100%	339	84
	2 Hour	16	15	94%	171	58
	Disabled	11	11	100%	304	30
	Taxi Zone	3	0	0%	0	0
	Mail Zone	1	0	0%	0	0
Hainsworth Street	2 Hour [1]	3	3	100%	360	7
	Loading Zone	2	2	100%	280	5
Total		**72**	**67**	**93%**	**277**	**184**

[1] Permit holders excepted

As shown in Table 7.6, the off-corridor parking in the adjacent areas is operating at or near capacity levels with the average demand exceeding 86 per cent occupancy. Some parking is available with spaces at occupancy below 100 per cent. However, these spaces are not as convenient and require longer walking distances.

Table 7.6: Peak on-street parking demand – Westmead precinct (off-corridor)

Restriction Type	Parking supply	Peak demand – 9am	
		Utilisation (spaces)	Occupancy (percentage)
Unrestricted	297	264	89%
2 Hour	303	264	87%
1 Hour	43	36	84%
15 Minute	7	2	29%
5 Minute	1	1	100%
Disabled	11	10	91%
Loading Zone	3	1	33%
Taxi Zone	2	0	0%
Mail Zone	1	0	0%
Total	**668**	**578**	**86%**

Parramatta North

The parking demand along the project in the Parramatta North precinct are high as indicated in Table 7.7. Based on average duration of stay and turnover, spaces are mostly occupied by long stay drivers. No 'special' parking spaces exist along the alignment that need to be considered.

Table 7.7: Peak on-street parking demand – Parramatta North precinct (on-corridor)

Street	Restriction type	Parking supply (spaces)	Peak demand 10am		Average length of stay (minutes)	Parking events
			Utilisation (spaces)	Occupancy (percentage)		
Factory Street	Unrestricted	47	43	91%	426	65
Total		**47**	**43**	**91%**	**426**	**65**

The peak on-street parking demand analysis for the off-corridor streets is provided in Table 7.8. The parking has available on-street capacity in Parramatta North.

Table 7.8: Peak on-street parking demand – Parramatta North precinct (off-corridor)

Restriction type	Parking supply	Peak demand – 9am	
		Utilisation (spaces)	Occupancy (percentage)
Unrestricted	1,245	721	58%
4 Hour	411	218	53%
4 Hour (ticketed)	188	74	39%
10 Hour (ticketed)	145	80	55%
2 Hour	145	52	36%
15 Minute	15	10	67%
1 Hour	11	3	27%
Disabled	11	2	18%
1 Hour (ticketed)	10	6	60%
5 Minute	8	7	88%
10 Hour	6	6	100%
2 Minute	6	0	16%
Loading Zone	5	2	40%
30 Minute	2	2	100%
Tazi Zone	2	0	0%
10 Minute	2	0	0%

Restriction type	Parking supply	Peak demand – 9am	
		Utilisation (spaces)	Occupancy (percentage)
Mail Zone	1	0	0%
Total	**2,213**	**1,183**	**53%**

Parramatta CBD

Parramatta CBD is characterised by high on-street car parking demand in the time-restricted spaces. A number of specific operational and mobility spaces would be required to replace loading zones, taxi zones, disabled and 15-minute spaces.

The peak on-street parking demand analysis along the project is given in Table 7.9.

Table 7.9: Peak on-street parking demand – Parramatta CBD precinct (on-corridor)

Street	Restriction type	Parking supply (spaces)	Peak demand – 11am		Average length of stay (minutes)	Parking events
			Utilisation (spaces)	Occupancy (percentage)		
Church Street	1 Hour (ticketed)	36	34	94%	102	202
	15 Minutes / ¼Hour	9	5	83%	85	35
	Works Zone	7	4	57%	69	18
	Loading Zone	4	3	75%	77	16
	Taxi Zone	2	1	50%	90	4
	Disabled	1	1	100%	86	7
Macquarie Street	4 Hour (ticketed)	30	26	87%	162	88
	1 Hour (ticketed)	27	19	70%	152	80
	15 Minutes / ¼Hour	18	14	73%	204	38
	Work Zone	10	7	70%	159	23
	Disabled	3	3	100%	245	9
	5 Minute	2	2	100%	140	10
	Loading Zone	2	2	100%	405	3
	Taxi Zone	2	2	100%	113	7
George Street	10 Hour (ticketed)	62	59	95%	507	66
	2 Hour	4	4	100%	570	4
Harris Street	10 Hour (ticketed)	5	5	100%	564	5
Total		**224**	**191**	**85%**	**261**	**615**

Current work zones in Parramatta CBD can be ignored in the parking analysis as they are unlikely to be required in their current locations by the time the project is constructed.

Ticketed parking exists on Church Street, Macquarie Street, George Street and Harris Street. The following concessions are made for drivers with a Mobility Parking Scheme (MPS) permit in the Parramatta CBD:

- When parking in a metered, coupon or ticket parking area, no charge is applied.
- Where parking is limited by a sign to more than 30 minutes, the vehicle can park for an unlimited time.
- Where parking is limited by a sign for 30 minutes, the vehicle can park for 2 hours.

- Where parking is limited by a sign to less than 30 minutes, the vehicle can park for a maximum of 30 minutes [2].

Observations of the demand for vehicle with a MPS permit displayed was completed along the alignment within the Parramatta CBD on 9 November 2016. A summary of the observed demand is provided in Table 7.10. The parking analysis shows that 46 on-street parking spaces of a total of about 182 spaces within the Parramatta CBD were occupied by vehicles with an MPS permit. This equates to approximately 25 per cent of the total parking supply and this is considered higher than the typical MPS demand. Spot check surveys undertaken by City of Parramatta Council and Transport for NSW indicate in excess of 25 per cent of vehicles parked within the Parramatta CBD display the MPS permit.

Table 7.10: Mobility parking in Parramatta CBD

Street	Total parking supply	Total mobility parking supply	Observed mobility parking demand	Mobility parking occupancy
Church Street (south of Victoria Road)	60	1	13	22%
Macquarie Street (Marsden Street to Harris Street)	117	3	33	28%
Total	**177**	**4**	**46**	**Average 25%**

As shown in Table 7.11, some capacity exists with the surrounding short-term parking spaces (one to four-hour) to accommodate displaced parking demands. The demand results show that for loading, disabled and taxi zone spaces in other streets, capacity exists.

Table 7.11: Peak on-street parking demand – Parramatta CBD precinct (off-corridor)

Restriction type	Parking supply	Peak demand – 11am	
		Utilisation (spaces)	Occupancy (percentage)
4 Hour (ticketed)	127	95	75%
1 Hour (ticketed)	155	105	68%
2 Hour (ticketed)	181	135	75%
10 Hour (ticketed)	50	27	54%
5 Minute	38	1	3%
2 Hour	48	28	58%
4 Hour	29	19	66%
Loading Zone	27	19	70%
Taxi Zone	21	8	38%
Disabled	21	5	24%
Works Zone	5	1	20%
Mail Zone	5	1	20%
15 Minute	2	2	100%
Unrestricted	19	16	84%
Total	**728**	**462**	**63%**

[2] http://www.parracity.nsw.gov.au/live/my_home/parking__and__transport/parking, visited 14 November 2016

Rosehill and Camellia

As shown in Table 7.13, the parking spaces in the Rosehill and Camellia precinct have mixed level of utilisation. Parking spaces to the west of James Ruse Drive had high occupancy, while low demand for parking was observed to the east.

Table 7.12: Peak on-street parking demand – Rosehill and Camellia precinct (off-corridor)

Restriction type	Parking supply	Peak demand – 11am	
		Utilisation (spaces)	Occupancy (percentage)
Unrestricted	321	236	74%
4 Hour	60	50	83%
2 Hour	26	17	65%
15 Minute	4	3	75%
Taxi Zone	3	0	0%
Disabled	2	0	0%
Total	**416**	**306**	**74%**

7.5 Loading zones in Parramatta CBD

Commercial vehicle parking can at times occur within both designated loading bay spaces and within short term parking spaces. As such additional car parking surveys were undertaken specifically within North Parramatta and Parramatta CBD to understand the demand for commercial vehicle parking within both designated loading bay spaces and within short term parking spaces. These surveys were undertaken on Tuesday 4 April 2017 and Wednesday 5 April 2017 between the times of 7 am and 6 pm.

The surveys indicated comparable results between the two days and as such the following further discussions are based on the day 1 (Tuesday 4 April 2017) surveys.

The survey results are summarised into parking demands of loading vehicles within both within designated loading bay spaces and within general parking spaces.

The utilisation of the designated loading bay spaces on six streets in Parramatta CBD is shown in Table 7.13. In addition to most streets, loading spaces are rarely fully occupied across the entire course of the day and are occupied more highly during periods when general car parking would be lesser. The typical availability of loading bay spaces could indicate that sufficient loading bay parking is currently provided.

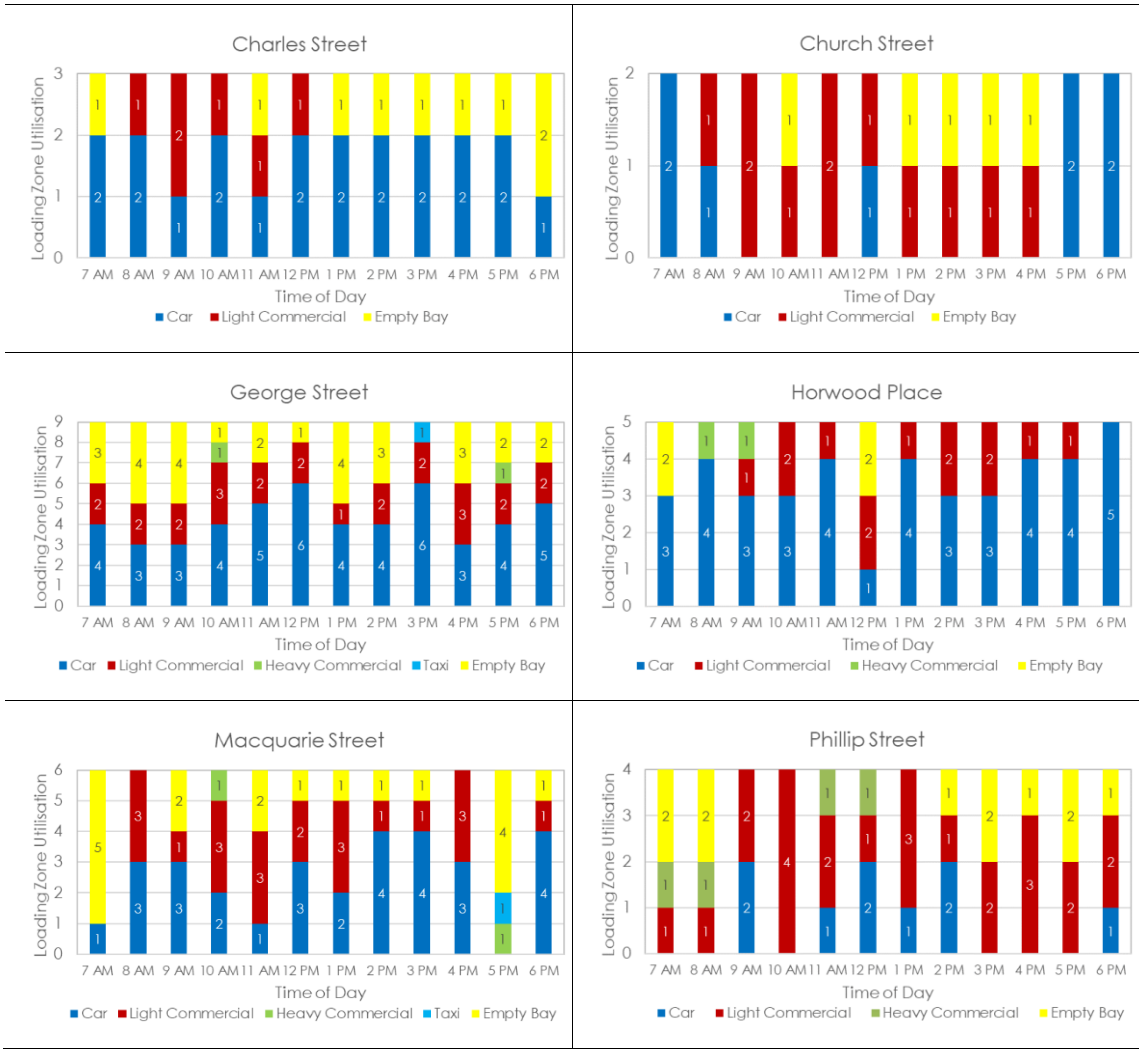
Table 7.13: Peak on-street parking demand – Rosehill and Camellia precinct (on-corridor)

Street	Restriction type	Parking supply (spaces)	Peak demand – 11am		Average length of stay (minutes)	Parking events
			Utilisation (spaces)	Occupancy (percentage)		
George Street	4 Hour [1]	51	47	92%	476	65
Alfred Street	4 Hour	6	3	50%	150	5
Tramway Avenue	4 Hour [1]	17	15	88%	522	18
	Unrestricted	14	13	93%	531	15
Grand Avenue	Unrestricted	15	0	0%	0	0
Grand Avenue North	Unrestricted	54	6	11%	47	11
Total		**157**	**84**	**54%**	**267**	**104**

[1] Permit holders excepted

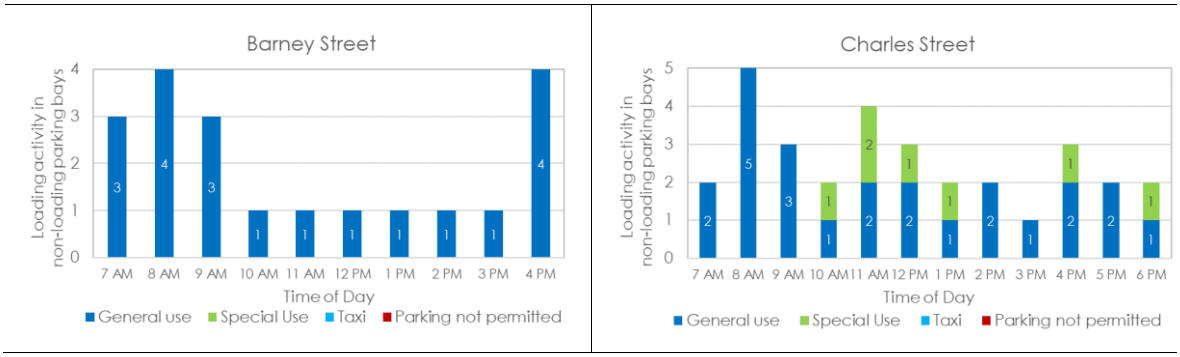
As shown in Table 7.12, available parking capacity exists within the surrounding areas on the streets off the project in the Rosehill and Camellia precinct.

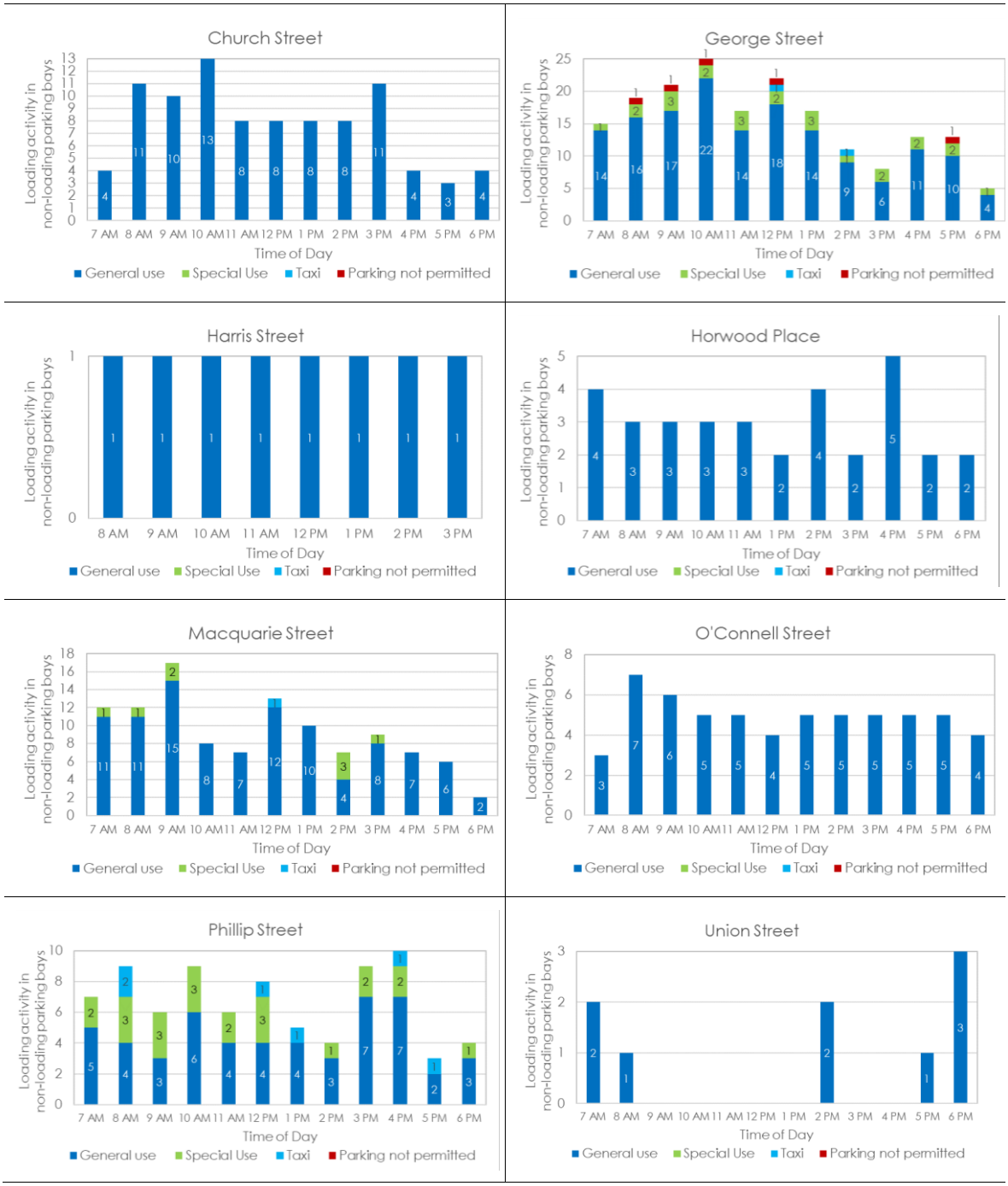
Figure 7.2: Loading zone parking utilisation on key streets in Parramatta CBD



The utilisation of non-loading parking spaces by loading vehicles along the light rail corridor in Parramatta CBD is shown in Figure 7.3. At the peak time, a total of 25 loading vehicles are parked in non-loading parking spaces within George Street. The demand for loading zones is lower in other streets including Macquarie Street and Church Street.

Figure 7.3: Utilisation of non-loading parking bays by loading vehicles on streets in Parramatta CBD





While vacancies exist within designated loading spaces, the demand for loading vehicles in other general spaces would not be accommodated within the designated loading bays. Therefore, the displacement of general parking spaces is likely to have an impact on loading activity and result in some displacement of loading vehicles into surrounding streets.

Appendix A

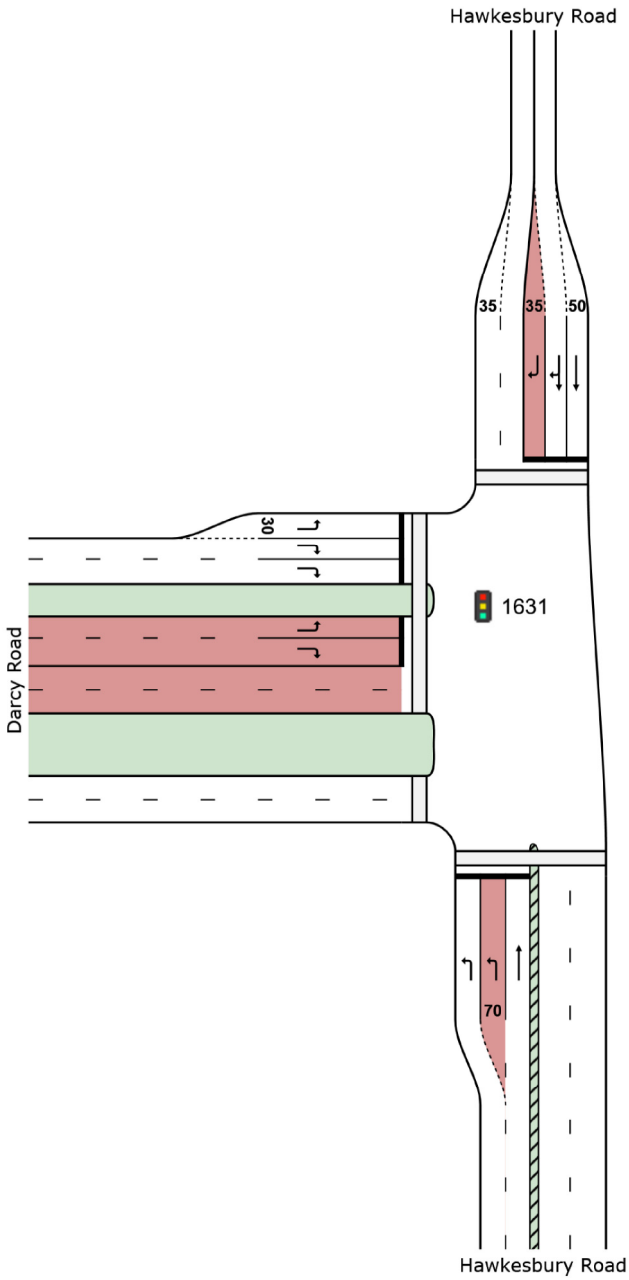
Performance of the Road Network

SIDRA results for key intersections in the Parramatta Light Rail study area

SITE LAYOUT

Site: 1631 [1000_02_Hawkesbury-Darcy_EX_AM]

Hawkesbury Road/ Darcy Road, Westmead
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1631 [1000_02_Hawkesbury-Darcy_EX_AM]

Hawkesbury Road/ Darcy Road, Westmead
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Hawkesbury Road											
4	L2	380	6.4	0.259	10.6	LOS A	7.3	51.1	0.35	0.65	29.2
5	T1	521	0.4	0.642	33.8	LOS C	26.1	183.0	0.86	0.79	20.0
Approach		901	2.9	0.642	24.0	LOS B	26.1	183.0	0.64	0.73	22.3
North: Hawkesbury Road											
11	T1	273	0.8	0.344	27.5	LOS B	11.6	82.0	0.73	0.62	22.9
12	R2	79	4.0	0.234	52.9	LOS D	4.2	29.1	0.90	0.74	13.9
Approach		352	1.5	0.344	33.2	LOS C	11.6	82.0	0.77	0.65	20.2
West: Darcy Road											
1	L2	281	1.1	0.460	33.1	LOS C	12.3	85.9	0.75	0.75	17.9
3	R2	364	7.8	0.551	57.6	LOS E	9.9	69.3	0.96	0.80	11.5
Approach		645	4.9	0.551	46.9	LOS D	12.3	85.9	0.87	0.78	13.8
All Vehicles		1898	3.3	0.642	33.5	LOS C	26.1	183.0	0.74	0.73	18.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

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
P2	South Full Crossing	327	60.0	LOS E	1.2	1.2	0.97	0.97
P4	North Full Crossing	101	54.7	LOS E	0.3	0.3	0.92	0.92
P11	West Stage 1	59	37.0	LOS D	0.2	0.2	0.76	0.76
P12	West Stage 2	59	24.7	LOS C	0.1	0.1	0.62	0.62
All Pedestrians		546	52.7	LOS E			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.

MOVEMENT SUMMARY

Site: 1631 [1000_02_Hawkesbury-Darcy_EX_PM]

Hawkesbury Road/ Darcy Road, Westmead
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Hawkesbury Road											
4	L2	254	10.8	0.296	19.0	LOS B	5.7	40.2	0.70	0.74	22.6
5	T1	177	1.2	0.455	51.2	LOS D	9.9	70.3	0.93	0.78	15.6
Approach		431	6.8	0.455	32.2	LOS C	9.9	70.3	0.80	0.76	18.4
North: Hawkesbury Road											
11	T1	482	0.4	0.797	28.6	LOS C	22.5	158.3	0.75	0.70	22.4
12	R2	351	0.9	0.497	19.8	LOS B	8.9	62.1	0.81	0.77	24.0
Approach		833	0.6	0.797	24.9	LOS B	22.5	158.3	0.78	0.73	23.0
West: Darcy Road											
1	L2	147	2.9	0.134	13.0	LOS A	2.8	19.9	0.51	0.63	27.7
3	R2	299	6.7	0.544	61.6	LOS E	8.5	59.8	0.98	0.79	10.9
Approach		446	5.4	0.544	45.5	LOS D	8.5	59.8	0.82	0.74	14.0
All Vehicles		1709	3.4	0.797	32.1	LOS C	22.5	158.3	0.79	0.74	19.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

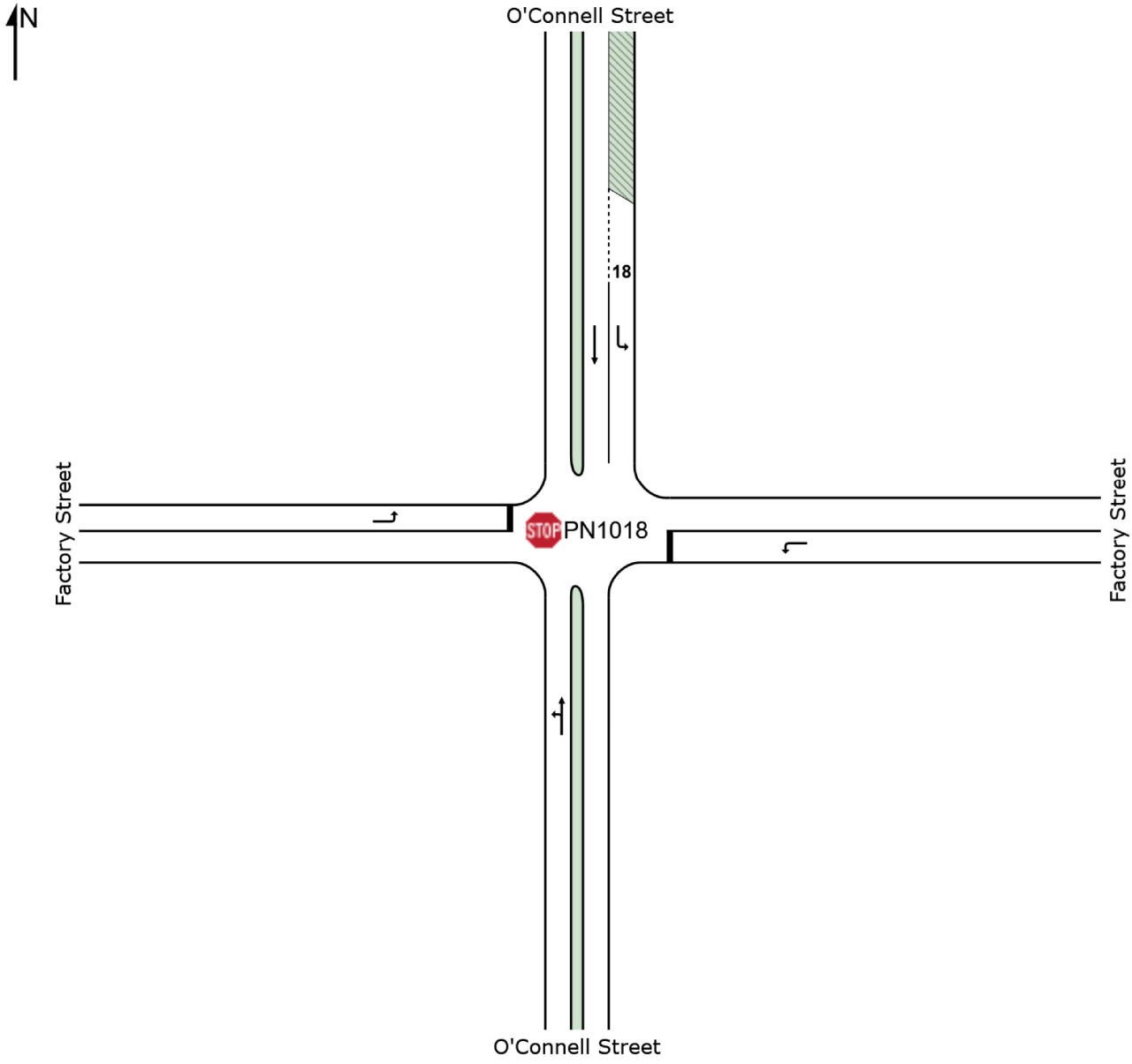
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	South Full Crossing	58	59.3	LOS E	0.2	0.2	0.96	0.96
P4	North Full Crossing	112	59.4	LOS E	0.4	0.4	0.96	0.96
P11	West Stage 1	41	59.2	LOS E	0.1	0.1	0.96	0.96
P12	West Stage 2	41	44.9	LOS E	0.1	0.1	0.83	0.83
All Pedestrians		252	57.0	LOS E			0.94	0.94

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

SITE LAYOUT

Site: PN1018 [1000_13_Factory-O'Connell_EX_AM]

Factory Street/ O'Connell Street, North Parramatta
Stop (Two-Way)



MOVEMENT SUMMARY

Site: PN1018 [1000_13_Factory-O'Connell_EX_AM]

Factory Street/ O'Connell Street, North Parramatta
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total 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: O'Connell Street											
4	L2	12	0.0	0.208	5.5	LOS A	0.0	0.0	0.00	0.02	27.4
5	T1	385	3.3	0.208	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		397	3.2	0.208	0.2	NA	0.0	0.0	0.00	0.02	58.6
East: Factory Street											
7	L2	51	0.0	0.084	12.0	LOS A	0.3	2.1	0.60	0.99	37.1
Approach		51	0.0	0.084	12.0	LOS A	0.3	2.1	0.60	0.99	37.1
North: O'Connell Street											
10	L2	34	0.0	0.018	5.5	LOS A	0.0	0.0	0.00	0.58	48.3
11	T1	700	0.6	0.360	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		734	0.6	0.360	0.3	NA	0.0	0.0	0.00	0.03	59.4
West: Factory Street											
1	L2	63	0.0	0.067	9.3	LOS A	0.3	1.8	0.44	0.89	42.8
Approach		63	0.0	0.067	9.3	LOS A	0.3	1.8	0.44	0.89	42.8
All Vehicles		1244	1.4	0.360	1.2	NA	0.3	2.1	0.05	0.11	57.3

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

MOVEMENT SUMMARY

Site: PN1018 [1000_13_Factory-O'Connell_EX_PM]

Factory Street/ O'Connell Street, North Parramatta
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total 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: O'Connell Street											
4	L2	2	0.0	0.253	5.6	LOS A	0.0	0.0	0.00	0.00	27.5
5	T1	488	0.6	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		491	0.6	0.253	0.0	NA	0.0	0.0	0.00	0.00	59.7
East: Factory Street											
7	L2	53	2.0	0.057	9.5	LOS A	0.2	1.5	0.45	0.89	39.2
Approach		53	2.0	0.057	9.5	LOS A	0.2	1.5	0.45	0.89	39.2
North: O'Connell Street											
10	L2	19	0.0	0.010	5.5	LOS A	0.0	0.0	0.00	0.58	48.3
11	T1	405	1.3	0.210	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		424	1.2	0.210	0.3	NA	0.0	0.0	0.00	0.03	59.4
West: Factory Street											
1	L2	71	0.0	0.085	10.0	LOS A	0.3	2.2	0.50	0.92	42.2
Approach		71	0.0	0.085	10.0	LOS A	0.3	2.2	0.50	0.92	42.2
All Vehicles		1038	0.9	0.253	1.3	NA	0.3	2.2	0.06	0.12	57.4

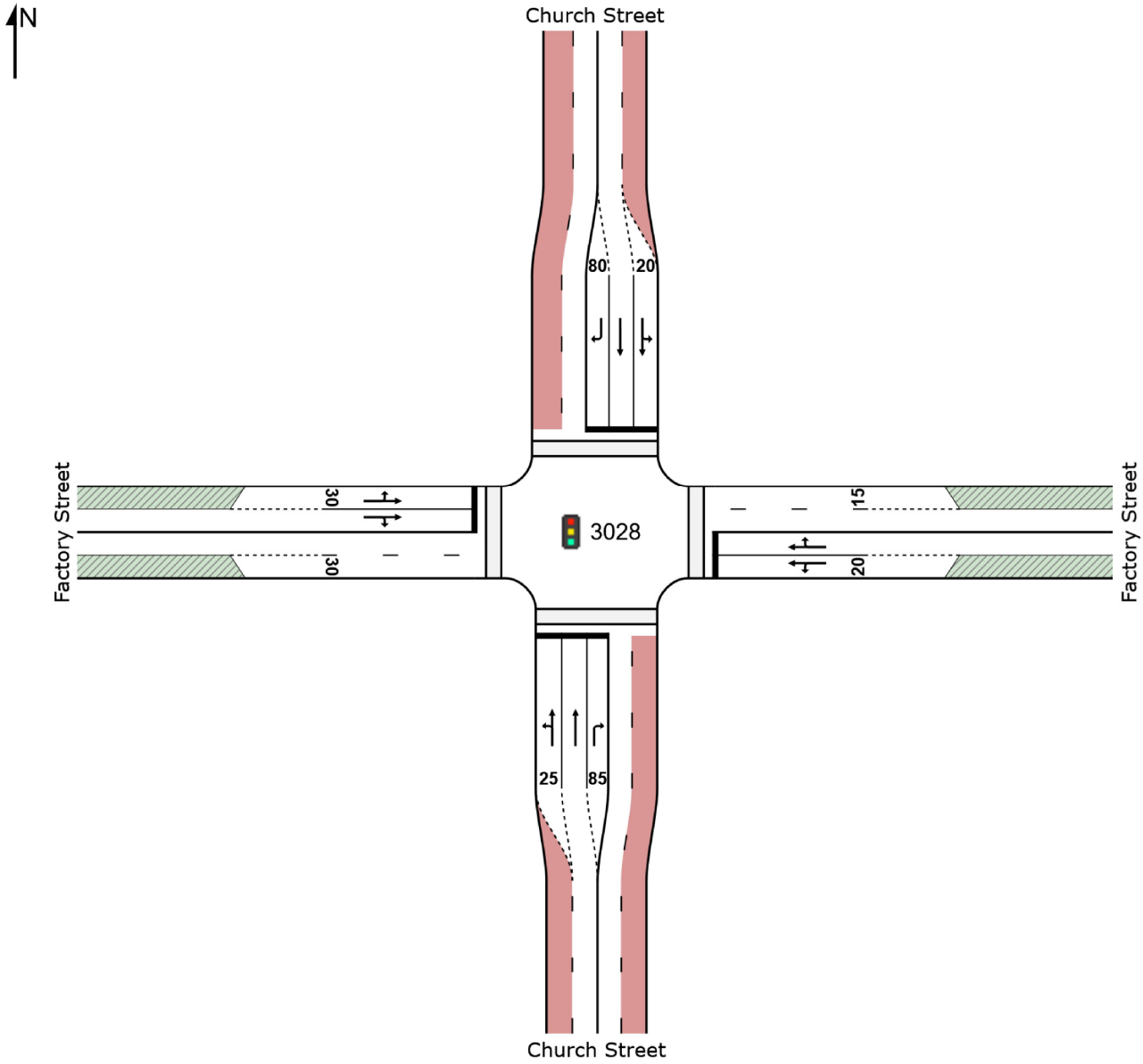
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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.

SITE LAYOUT

Site: 3028 [1000_15_Church-Factory_EX_AM]

Church Street/ Factory Street, North Parramatta

Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 3028 [1000_15_Church-Factory_EX_AM]

Church Street/ Factory Street, North Parramatta

Signals - Fixed Time Isolated Cycle Time = 135 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street											
1	L2	6	0.0	0.025	14.6	LOS B	0.5	5.5	0.38	0.35	41.5
2	T1	396	3.7	0.314	11.1	LOS A	10.8	75.7	0.47	0.42	47.7
3	R2	19	5.6	0.056	21.4	LOS B	0.6	4.3	0.49	0.67	33.3
Approach		421	3.8	0.314	11.5	LOS A	10.8	75.7	0.47	0.43	47.0
East: Factory Street											
4	L2	6	33.3	0.119	65.2	LOS E	1.3	10.0	0.94	0.68	18.8
5	T1	56	3.8	0.456	62.8	LOS E	4.7	33.8	0.97	0.75	11.7
6	R2	33	0.0	0.456	68.3	LOS E	4.7	33.8	0.98	0.77	18.5
Approach		95	4.4	0.456	64.9	LOS E	4.7	33.8	0.97	0.75	14.8
North: Church Street											
7	L2	1	0.0	0.007	8.2	LOS A	0.1	1.1	0.20	0.18	50.5
8	T1	712	1.2	0.456	4.1	LOS A	13.7	96.1	0.33	0.30	54.8
9	R2	66	0.0	0.087	11.5	LOS A	1.3	8.9	0.36	0.66	41.1
Approach		779	1.1	0.456	4.7	LOS A	13.7	96.1	0.33	0.33	53.7
West: Factory Street											
10	L2	46	0.0	0.095	44.2	LOS D	2.3	15.9	0.79	0.71	23.1
11	T1	36	0.0	0.223	61.3	LOS E	2.5	17.8	0.95	0.72	12.1
12	R2	5	0.0	0.223	65.9	LOS E	2.5	17.8	0.95	0.72	18.5
Approach		87	0.0	0.223	52.5	LOS D	2.5	17.8	0.87	0.71	18.2
All Vehicles		1382	2.1	0.456	14.0	LOS A	13.7	96.1	0.45	0.41	43.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	61.7	LOS F	0.1	0.1	0.96	0.96
P2	East Full Crossing	12	4.5	LOS A	0.0	0.0	0.26	0.26
P3	North Full Crossing	11	61.7	LOS F	0.0	0.0	0.96	0.96
P4	West Full Crossing	11	12.0	LOS B	0.0	0.0	0.42	0.42
All Pedestrians		54	39.6	LOS D			0.70	0.70

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

MOVEMENT SUMMARY

Site: 3028 [1000_15_Church-Factory_EX_PM]

Church Street/ Factory Street, North Parramatta

Signals - Fixed Time Isolated Cycle Time = 125 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street											
1	L2	1	0.0	0.020	9.9	LOS A	0.3	3.5	0.27	0.22	48.5
2	T1	763	2.8	0.530	6.9	LOS A	18.5	130.0	0.45	0.41	51.7
3	R2	26	8.0	0.026	10.0	LOS A	0.4	3.0	0.27	0.63	42.3
Approach		791	2.9	0.530	7.0	LOS A	18.5	130.0	0.44	0.42	51.4
East: Factory Street											
4	L2	24	0.0	0.236	68.8	LOS E	1.5	10.5	0.99	0.71	17.5
5	T1	56	0.0	0.504	64.5	LOS E	3.7	26.2	1.00	0.75	11.7
6	R2	4	0.0	0.504	69.0	LOS E	3.7	26.2	1.00	0.75	18.7
Approach		84	0.0	0.504	65.9	LOS E	3.7	26.2	1.00	0.74	14.0
North: Church Street											
7	L2	22	0.0	0.014	7.2	LOS A	0.2	1.5	0.17	0.60	45.7
8	T1	498	0.0	0.309	2.3	LOS A	6.4	44.5	0.23	0.21	57.0
9	R2	95	1.1	0.212	10.8	LOS A	1.4	9.8	0.43	0.68	41.8
Approach		615	0.2	0.309	3.7	LOS A	6.4	44.5	0.26	0.30	54.4
West: Factory Street											
10	L2	139	0.0	0.510	58.0	LOS E	7.9	55.6	0.97	0.80	19.6
11	T1	16	0.0	0.316	65.3	LOS E	1.8	12.5	0.99	0.72	11.3
12	R2	13	0.0	0.316	69.8	LOS E	1.8	12.5	0.99	0.72	17.5
Approach		167	0.0	0.510	59.6	LOS E	7.9	55.6	0.97	0.78	18.7
All Vehicles		1657	1.5	0.530	14.1	LOS A	18.5	130.0	0.46	0.43	43.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

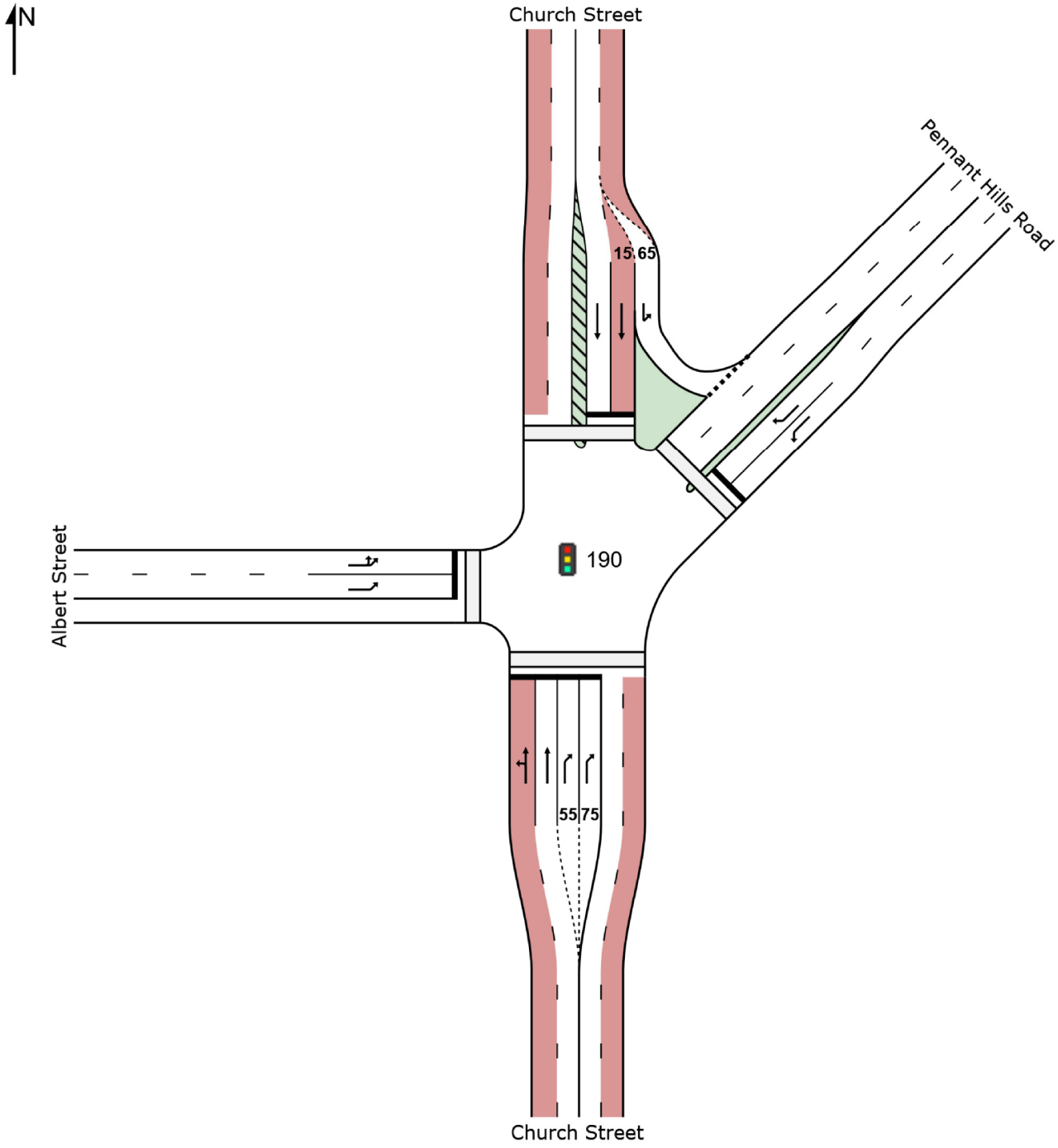
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	56.7	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	7	3.4	LOS A	0.0	0.0	0.23	0.23
P3	North Full Crossing	16	56.7	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	8	6.7	LOS A	0.0	0.0	0.33	0.33
All Pedestrians		42	37.4	LOS D			0.70	0.70

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

SITE LAYOUT

Site: 190 [2000_16_Church-Pennant Hills-Albert_EX_AM]

Church Street/ Pennant Hills Road/ Albert Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 190 [2000_16_Church-Pennant Hills-Albert_EX_AM]

Church Street/ Pennant Hills Road/ Albert Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Church Street											
1	L2	6	0.0	0.033	14.7	LOS B	0.6	7.3	0.39	0.34	42.6
2	T1	441	8.8	0.352	11.4	LOS A	12.2	88.2	0.50	0.44	46.9
3a	R1	157	8.7	0.639	72.1	LOS F	5.2	38.9	1.00	0.80	32.7
Approach		604	8.7	0.639	27.2	LOS B	12.2	88.2	0.63	0.53	39.6
NorthEast: Pennant Hills Road											
24a	L1	336	2.8	0.473	36.6	LOS C	15.9	113.8	0.80	0.80	41.7
26a	R1	336	0.3	0.661	49.9	LOS D	19.0	133.2	0.95	0.84	36.3
Approach		672	1.6	0.661	43.2	LOS D	19.0	133.2	0.88	0.82	38.9
North: Church Street											
7b	L3	69	0.0	0.056	8.6	LOS A	0.7	5.0	0.22	0.64	54.6
8	T1	645	1.6	0.662	23.2	LOS B	28.2	197.8	0.76	0.69	38.4
Approach		715	1.5	0.662	21.8	LOS B	28.2	197.8	0.71	0.68	40.7
West: Albert Street											
10	L2	3	0.0	0.324	45.4	LOS D	8.3	59.4	0.85	0.76	25.1
10a	L1	323	3.3	0.324	43.9	LOS D	8.3	59.5	0.85	0.76	37.8
Approach		326	3.2	0.324	43.9	LOS D	8.3	59.5	0.85	0.76	37.7
All Vehicles		2317	3.6	0.662	32.5	LOS C	28.2	197.8	0.76	0.69	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov 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	South Full Crossing	60	46.7	LOS E	0.2	0.2	0.85	0.85
P6	NorthEast Full Crossing	49	20.5	LOS C	0.1	0.1	0.56	0.56
P3	North Full Crossing	12	44.1	LOS E	0.0	0.0	0.82	0.82
P4	West Full Crossing	39	11.2	LOS B	0.1	0.1	0.42	0.42
All Pedestrians		160	29.8	LOS C			0.65	0.65

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

MOVEMENT SUMMARY

Site: 190 [2000_16_Church-Pennant Hills-Albert_EX_PM]

Church Street/ Pennant Hills Road/ Albert Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Church Street											
1	L2	25	0.0	0.046	11.2	LOS A	0.9	8.7	0.31	0.39	44.3
2	T1	669	3.9	0.560	8.3	LOS A	17.2	120.9	0.46	0.42	49.9
3a	R1	284	3.3	0.558	61.9	LOS E	8.6	62.0	0.98	0.80	34.9
Approach		979	3.7	0.560	23.9	LOS B	17.2	120.9	0.61	0.53	41.5
NorthEast: Pennant Hills Road											
24a	L1	362	0.0	0.510	37.8	LOS C	17.6	123.0	0.83	0.81	41.3
26a	R1	193	4.9	0.548	56.0	LOS D	11.2	81.5	0.95	0.81	34.7
Approach		555	1.7	0.548	44.1	LOS D	17.6	123.0	0.87	0.81	38.9
North: Church Street											
7b	L3	74	0.0	0.058	8.8	LOS A	0.8	5.6	0.23	0.64	54.5
8	T1	553	2.7	0.543	20.7	LOS B	21.7	152.1	0.69	0.62	39.9
Approach		626	2.4	0.543	19.3	LOS B	21.7	152.1	0.64	0.62	42.5
West: Albert Street											
10	L2	14	0.0	0.285	53.1	LOS D	5.6	39.8	0.90	0.76	22.9
10a	L1	194	1.1	0.285	51.6	LOS D	5.7	40.0	0.90	0.75	35.6
Approach		207	1.0	0.285	51.7	LOS D	5.7	40.0	0.90	0.75	35.1
All Vehicles		2367	2.6	0.560	29.9	LOS C	21.7	152.1	0.70	0.64	40.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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

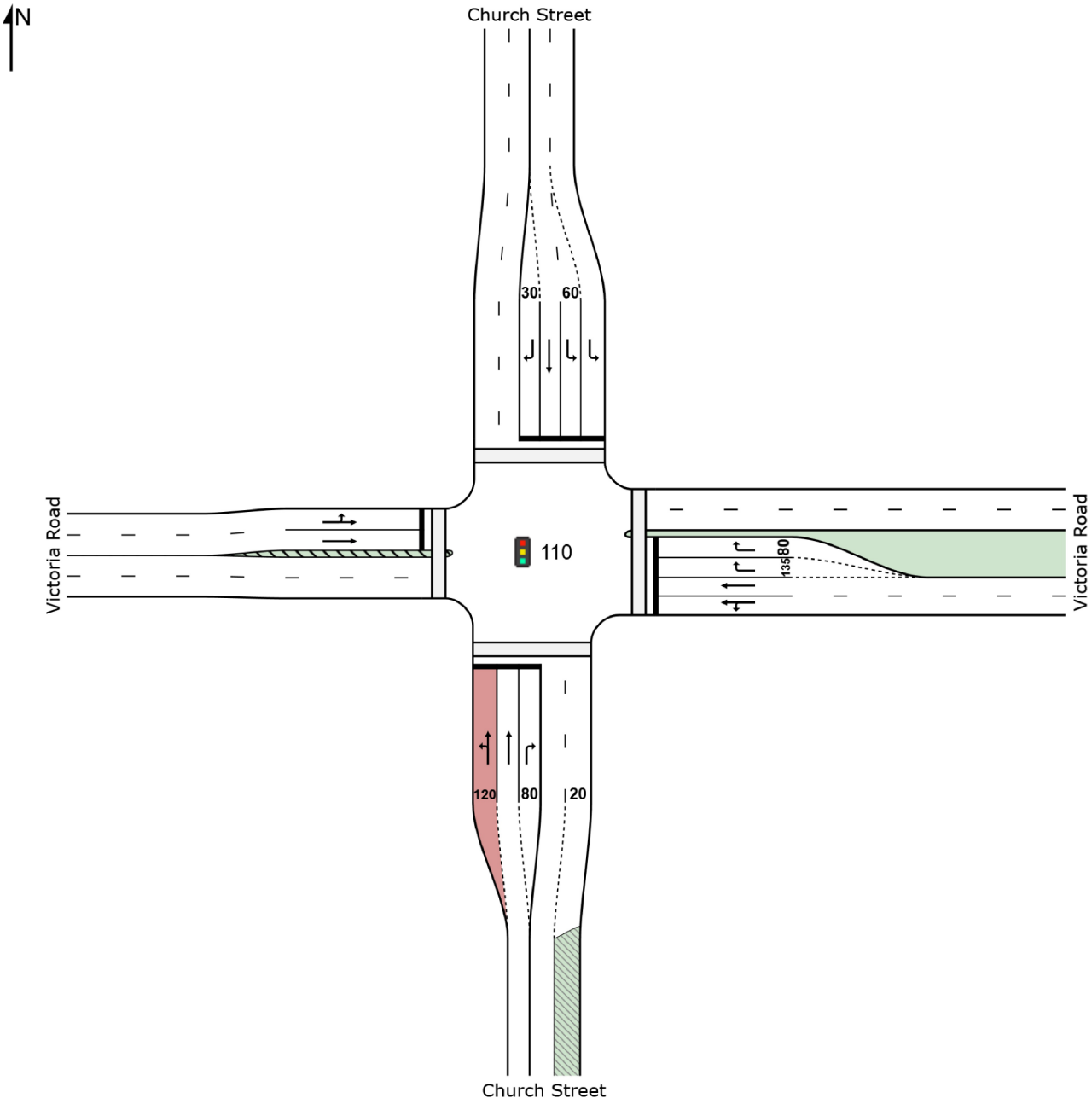
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	46	55.5	LOS E	0.2	0.2	0.92	0.92
P6	NorthEast Full Crossing	56	20.0	LOS B	0.1	0.1	0.56	0.56
P3	North Full Crossing	11	52.7	LOS E	0.0	0.0	0.90	0.90
P4	West Full Crossing	38	7.5	LOS A	0.0	0.0	0.34	0.34
All Pedestrians		151	30.0	LOS D			0.64	0.64

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

SITE LAYOUT

Site: 110 [2000_21_Church-Victoria_EX_AM]

Church Street/ Victoria Road
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 110 [2000_21_Church-Victoria_EX_AM]

Church Street/ Victoria Road
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Church Street											
1	L2	1	0.0	0.086	29.2	LOS C	2.4	17.0	0.65	0.52	33.4
2	T1	134	0.0	0.086	23.6	LOS B	2.4	17.0	0.65	0.51	36.5
3	R2	44	0.0	0.191	32.6	LOS C	1.3	9.2	0.93	0.73	32.1
Approach		179	0.0	0.191	25.9	LOS B	2.4	17.0	0.72	0.57	35.2
East: Victoria Road											
4	L2	206	0.0	0.450	31.7	LOS C	14.4	101.1	0.76	0.75	33.3
5	T1	458	1.4	0.450	28.9	LOS C	14.4	101.1	0.79	0.71	25.2
6	R2	326	7.4	0.665	60.5	LOS E	9.5	70.4	1.00	0.83	18.0
Approach		991	3.1	0.665	39.9	LOS C	14.4	101.1	0.85	0.76	23.9
North: Church Street											
7	L2	499	4.9	0.315	19.3	LOS B	6.8	49.7	0.69	0.76	33.3
8	T1	313	1.3	0.660	37.9	LOS C	15.3	108.6	0.89	0.76	29.5
9	R2	84	0.0	0.614	67.1	LOS E	5.1	35.6	1.00	0.79	12.9
Approach		896	3.2	0.660	30.3	LOS C	15.3	108.6	0.79	0.76	28.9
West: Victoria Road											
10	L2	13	0.0	0.666	57.9	LOS E	13.0	91.0	0.98	0.84	15.7
11	T1	457	0.2	0.666	51.2	LOS D	13.0	91.1	0.98	0.83	17.8
Approach		469	0.2	0.666	51.4	LOS D	13.0	91.1	0.98	0.83	17.8
All Vehicles		2535	2.4	0.666	37.6	LOS C	15.3	108.6	0.84	0.76	25.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	26	33.0	LOS D	0.1	0.1	0.74	0.74
P2	East Full Crossing	179	40.3	LOS E	0.5	0.5	0.82	0.82
P3	North Full Crossing	107	53.4	LOS E	0.3	0.3	0.95	0.95
P4	West Full Crossing	89	28.1	LOS C	0.2	0.2	0.69	0.69
All Pedestrians		402	40.6	LOS E			0.82	0.82

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

MOVEMENT SUMMARY

Site: 110 [2000_21_Church-Victoria_EX_PM]

Church Street/ Victoria Road
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street											
1	L2	20	0.0	0.209	36.8	LOS C	5.6	39.0	0.76	0.64	29.1
2	T1	244	0.0	0.209	31.3	LOS C	5.6	39.0	0.76	0.63	32.2
3	R2	122	0.9	0.665	39.3	LOS C	4.9	34.5	1.00	0.81	29.5
Approach		386	0.3	0.665	34.1	LOS C	5.6	39.0	0.84	0.69	31.1
East: Victoria Road											
4	L2	88	0.0	0.330	25.2	LOS B	10.5	74.0	0.65	0.62	37.8
5	T1	506	0.8	0.330	20.3	LOS B	10.6	74.6	0.66	0.59	30.5
6	R2	463	7.0	0.696	56.1	LOS D	13.1	97.3	0.99	0.85	18.9
Approach		1058	3.5	0.696	36.4	LOS C	13.1	97.3	0.80	0.71	24.3
North: Church Street											
7	L2	402	6.0	0.272	21.2	LOS B	5.9	43.6	0.70	0.75	32.0
8	T1	269	2.7	0.686	46.0	LOS D	14.5	103.8	0.96	0.82	26.6
9	R2	31	0.0	0.334	69.0	LOS E	1.8	12.9	1.00	0.72	12.7
Approach		702	4.5	0.686	32.8	LOS C	14.5	103.8	0.81	0.78	28.1
West: Victoria Road											
10	L2	147	0.0	0.660	46.3	LOS D	14.8	103.9	0.96	0.87	17.9
11	T1	456	0.0	0.660	43.7	LOS D	15.8	110.9	0.96	0.84	19.6
Approach		603	0.0	0.660	44.3	LOS D	15.8	110.9	0.96	0.85	19.2
All Vehicles		2749	2.5	0.696	36.9	LOS C	15.8	110.9	0.84	0.75	25.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	12	24.7	LOS C	0.0	0.0	0.64	0.64
P2	East Full Crossing	226	48.2	LOS E	0.7	0.7	0.90	0.90
P3	North Full Crossing	125	48.0	LOS E	0.4	0.4	0.90	0.90
P4	West Full Crossing	128	34.7	LOS D	0.3	0.3	0.76	0.76
All Pedestrians		492	44.0	LOS E			0.86	0.86

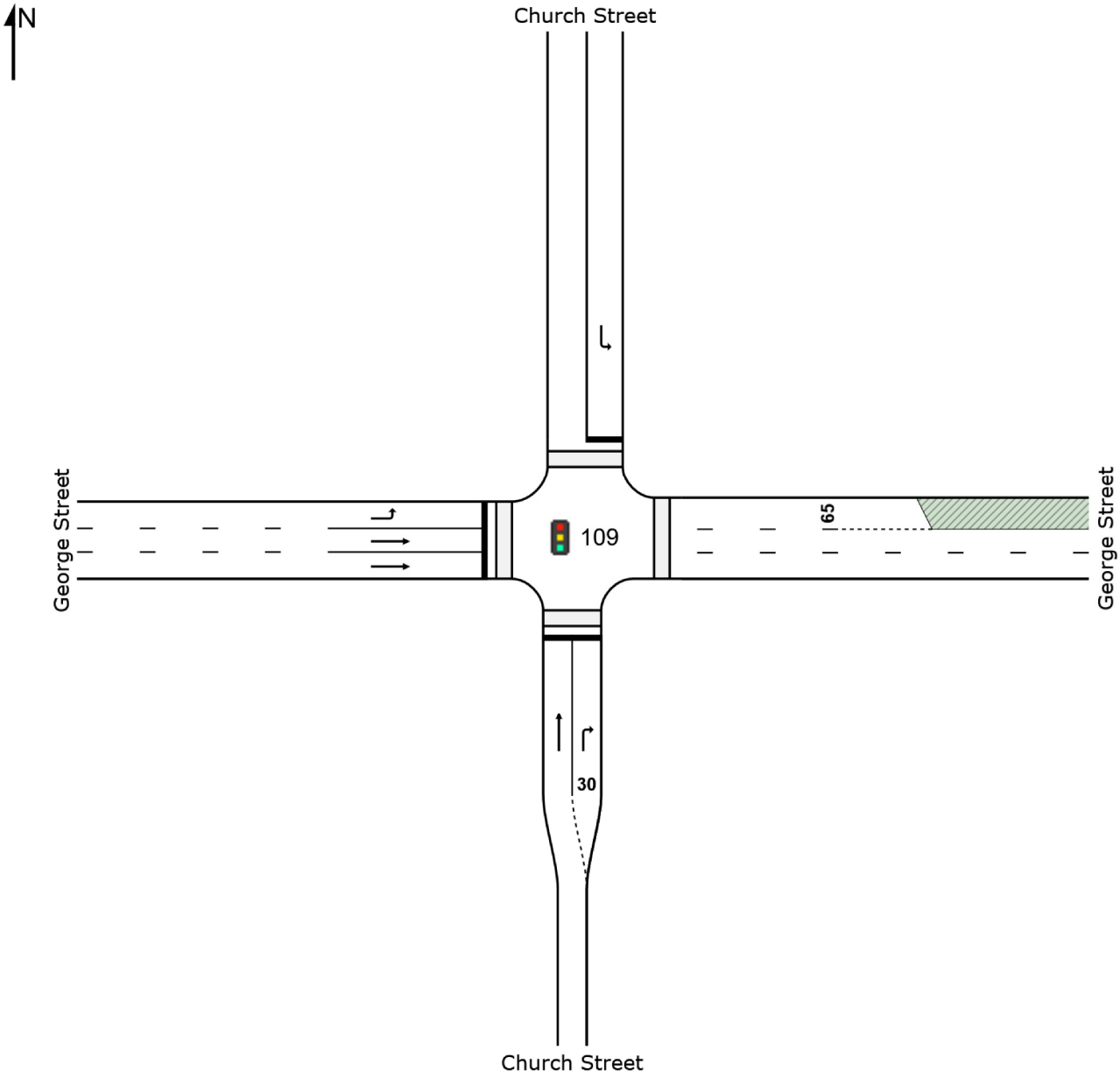
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 109 [3000_25_Church-George_EX_AM]

Church Street/ George Street, Parramatta

Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 109 [3000_25_Church-George_EX_AM]

Church Street/ George Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Church Street											
2	T1	19	0.0	0.127	39.3	LOS C	0.7	5.1	0.96	0.67	15.7
3	R2	20	0.0	0.141	43.4	LOS D	0.8	5.4	0.96	0.70	18.2
Approach		39	0.0	0.141	41.4	LOS C	0.8	5.4	0.96	0.68	17.2
North: Church Street											
7	L2	99	0.0	0.444	41.0	LOS C	3.8	26.6	0.98	0.77	18.7
Approach		99	0.0	0.444	41.0	LOS C	3.8	26.6	0.98	0.77	18.7
West: George Street											
10	L2	119	0.0	0.146	11.3	LOS A	1.8	12.4	0.63	0.67	26.2
11	T1	555	0.4	0.441	23.1	LOS B	8.7	61.2	0.84	0.71	23.3
Approach		674	0.3	0.441	21.1	LOS B	8.7	61.2	0.80	0.70	23.6
All Vehicles		812	0.3	0.444	24.5	LOS B	8.7	61.2	0.83	0.71	22.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

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	South Full Crossing	226	30.9	LOS D	0.5	0.5	0.88	0.88
P2	East Full Crossing	161	33.5	LOS D	0.3	0.3	0.92	0.92
P3	North Full Crossing	75	32.5	LOS D	0.2	0.2	0.90	0.90
P4	West Full Crossing	509	33.1	LOS D	1.1	1.1	0.92	0.92
All Pedestrians		972	32.6	LOS D			0.91	0.91

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

MOVEMENT SUMMARY

Site: 109 [3000_25_Church-George_EX_PM]

Church Street/ George Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Church Street											
2	T1	53	0.0	0.353	40.5	LOS C	2.1	14.6	0.99	0.73	15.5
3	R2	47	0.0	0.333	44.5	LOS D	1.9	13.2	0.98	0.73	18.0
Approach		100	0.0	0.353	42.4	LOS C	2.1	14.6	0.99	0.73	16.8
North: Church Street											
7	L2	114	0.0	0.328	35.4	LOS C	4.0	28.0	0.92	0.76	20.2
Approach		114	0.0	0.328	35.4	LOS C	4.0	28.0	0.92	0.76	20.2
West: George Street											
10	L2	271	0.0	0.351	12.9	LOS A	4.7	32.7	0.73	0.73	24.9
11	T1	359	0.6	0.391	28.2	LOS B	6.1	42.7	0.89	0.72	21.3
Approach		629	0.3	0.391	21.6	LOS B	6.1	42.7	0.82	0.73	22.4
All Vehicles		843	0.2	0.391	25.9	LOS B	6.1	42.7	0.85	0.73	21.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov 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	South Full Crossing	225	29.2	LOS C	0.4	0.4	0.86	0.86
P2	East Full Crossing	300	31.9	LOS D	0.6	0.6	0.90	0.90
P3	North Full Crossing	42	30.7	LOS D	0.1	0.1	0.88	0.88
P4	West Full Crossing	569	31.4	LOS D	1.2	1.2	0.90	0.90
All Pedestrians		1137	31.1	LOS D			0.89	0.89

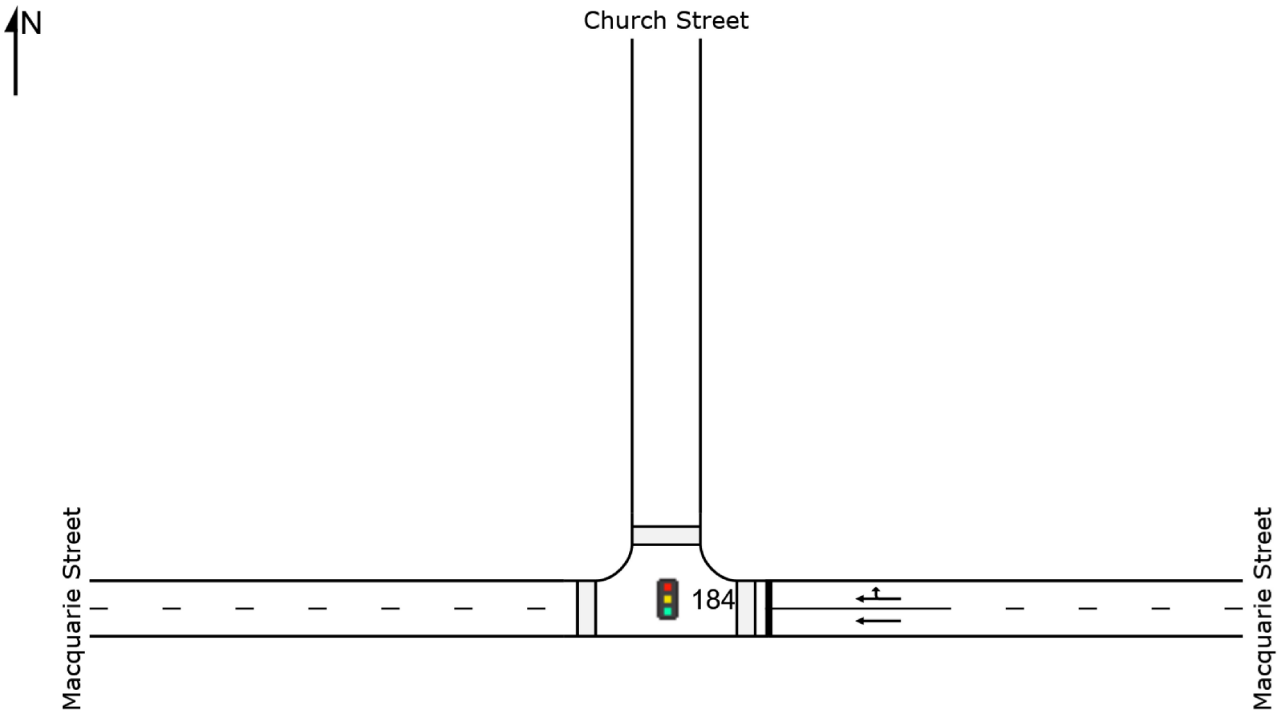
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 184 [3000_26_Church-Macquarie_EX_AM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated



Organisation: GTA CONSULTANTS | Created: Tuesday, 15 August 2017 11:09:44 AM
Project: \\gta.com.au\projectfiles\ProjectFilesSyd\N10200-10299\N102531 Parramatta Light Rail Stage 3\Modelling\SIDRA\1 2016 base \170721sid_Existing_2016_AM.sip7

MOVEMENT SUMMARY

Site: 184 [3000_26_Church-Macquarie_EX_AM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street											
5	T1	273	0.0	0.229	17.1	LOS B	4.5	31.8	0.70	0.60	35.4
6	R2	76	0.0	0.229	21.8	LOS B	4.4	31.1	0.70	0.66	33.8
Approach		348	0.0	0.229	18.1	LOS B	4.5	31.8	0.70	0.62	35.0
All Vehicles		348	0.0	0.229	18.1	LOS B	4.5	31.8	0.70	0.62	35.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	208	14.5	LOS B	0.3	0.3	0.61	0.61
P3	North Full Crossing	44	15.0	LOS B	0.1	0.1	0.61	0.61
P4	West Full Crossing	1107	15.1	LOS B	1.6	1.6	0.63	0.63
All Pedestrians		1360	15.0	LOS B			0.62	0.62

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

MOVEMENT SUMMARY

Site: 184 [3000_26_Church-Macquarie_EX_PM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street											
5	T1	756	0.0	0.362	8.7	LOS A	8.3	57.8	0.55	0.50	41.3
6	R2	75	0.0	0.362	13.5	LOS A	8.2	57.3	0.55	0.53	39.3
Approach		831	0.0	0.362	9.2	LOS A	8.3	57.8	0.55	0.50	41.1
All Vehicles		831	0.0	0.362	9.2	LOS A	8.3	57.8	0.55	0.50	41.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

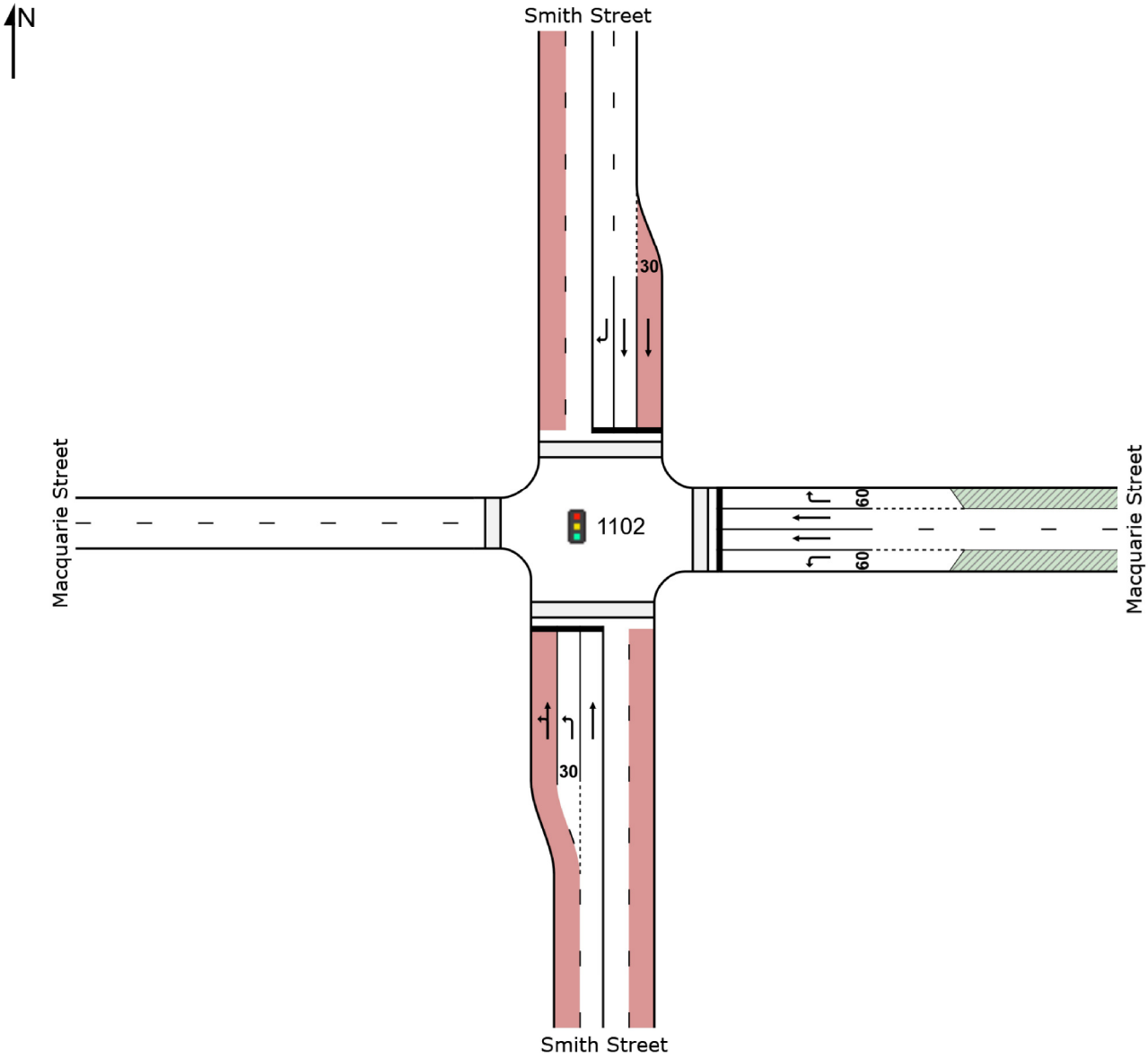
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	605	26.3	LOS C	1.1	1.1	0.82	0.82
P3	North Full Crossing	163	26.6	LOS C	0.3	0.3	0.82	0.82
P4	West Full Crossing	832	26.5	LOS C	1.6	1.6	0.83	0.83
All Pedestrians		1600	26.4	LOS C			0.82	0.82

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

SITE LAYOUT

Site: 1102 [3000_30_Macquarie-Smith_EX_AM]

Macquarie Street/ Smith Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1102 [3000_30_Macquarie-Smith_EX_AM]

Macquarie Street/ Smith Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 115 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Smith Street											
1	L2	98	0.0	0.474	57.9	LOS E	5.3	37.4	0.98	0.78	16.5
2	T1	291	17.0	0.593	42.9	LOS D	11.6	81.4	0.92	0.76	15.7
Approach		388	12.7	0.593	46.7	LOS D	11.6	81.4	0.94	0.76	15.9
East: Macquarie Street											
4	L2	14	38.5	0.101	58.1	LOS E	0.7	6.8	0.94	0.69	11.2
5	T1	213	0.0	0.588	56.2	LOS D	6.0	41.9	1.00	0.79	16.2
6	R2	99	0.0	0.572	60.7	LOS E	5.6	39.0	1.00	0.79	10.9
Approach		325	1.6	0.588	57.6	LOS E	6.0	41.9	1.00	0.79	14.5
North: Smith Street											
8	T1	338	12.1	0.366	21.4	LOS B	10.7	74.6	0.68	0.58	23.8
9	R2	163	0.0	0.610	55.4	LOS D	8.8	61.8	0.99	0.81	16.9
Approach		501	8.2	0.610	32.5	LOS C	10.7	74.6	0.78	0.65	20.3
All Vehicles		1215	7.9	0.610	43.8	LOS D	11.6	81.4	0.89	0.72	16.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	467	38.4	LOS D	1.3	1.3	0.82	0.82
P2	East Full Crossing	206	34.0	LOS D	0.5	0.5	0.77	0.77
P3	North Full Crossing	80	36.9	LOS D	0.2	0.2	0.80	0.80
P4	West Full Crossing	271	34.1	LOS D	0.7	0.7	0.77	0.77
PD	Diagonal Crossing	897	45.2	LOS E	1.3	0.0	0.90	0.90
All Pedestrians		1921	40.4	LOS E			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.

MOVEMENT SUMMARY

Site: 1102 [3000_30_Macquarie-Smith_EX_PM]

Macquarie Street/ Smith Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 115 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Smith Street											
1	L2	175	0.0	0.633	51.3	LOS D	9.1	63.4	0.95	0.81	17.8
2	T1	242	22.2	0.650	39.7	LOS C	8.1	56.9	0.86	0.71	17.0
Approach		417	12.9	0.650	44.5	LOS D	9.1	63.4	0.90	0.75	17.1
East: Macquarie Street											
4	L2	26	20.0	0.147	55.8	LOS D	1.4	11.3	0.94	0.72	11.5
5	T1	235	0.0	0.550	53.8	LOS D	6.5	45.2	0.99	0.79	16.7
6	R2	133	0.0	0.649	59.8	LOS E	7.5	52.4	1.00	0.82	11.0
Approach		394	1.3	0.649	56.0	LOS D	7.5	52.4	0.99	0.79	14.5
North: Smith Street											
8	T1	199	24.9	0.172	19.7	LOS B	4.9	34.3	0.62	0.51	24.8
9	R2	106	0.0	0.614	61.3	LOS E	6.0	42.3	1.00	0.80	15.8
Approach		305	16.2	0.614	34.2	LOS C	6.0	42.3	0.75	0.61	19.8
All Vehicles		1116	9.7	0.650	45.7	LOS D	9.1	63.4	0.89	0.73	16.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

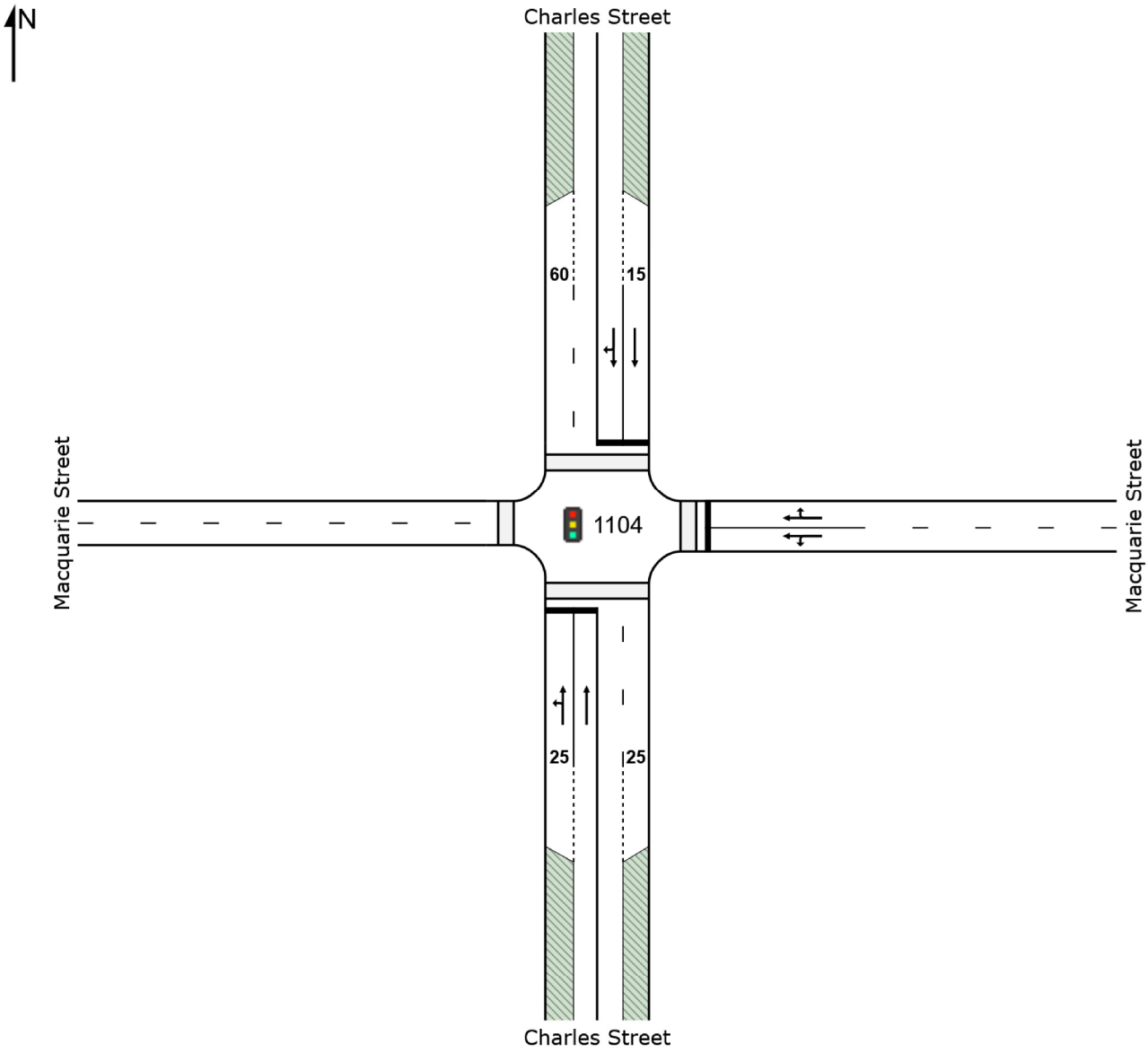
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	221	39.6	LOS D	0.6	0.6	0.83	0.83
P2	East Full Crossing	127	35.4	LOS D	0.3	0.3	0.79	0.79
P3	North Full Crossing	114	38.6	LOS D	0.3	0.3	0.82	0.82
P4	West Full Crossing	271	35.6	LOS D	0.7	0.7	0.79	0.79
PD	Diagonal Crossing	897	47.0	LOS E	1.3	0.0	0.92	0.92
All Pedestrians		1629	42.6	LOS E			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.

SITE LAYOUT

Site: 1104 [3000_33_Macquarie-Charles_EX_AM]

Macquarie Street/ Charles Street, Parramatta
Signals - Fixed Time Isolated



Organisation: GTA CONSULTANTS | Created: Tuesday, 15 August 2017 11:09:46 AM
Project: \\gta.com.au\projectfiles\ProjectFilesSyd\N10200-10299\N102531 Parramatta Light Rail Stage 3\Modelling\SIDRA\1 2016 base \170721sid_Existing_2016_AM.sip7

MOVEMENT SUMMARY

Site: 1104 [3000_33_Macquarie-Charles_EX_AM]

Macquarie Street/ Charles Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 55 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Charles Street											
1	L2	94	0.0	0.248	25.4	LOS B	2.2	15.5	0.88	0.75	26.9
2	T1	229	0.0	0.470	19.4	LOS B	5.4	37.9	0.89	0.74	26.7
Approach		323	0.0	0.470	21.1	LOS B	5.4	37.9	0.89	0.74	26.8
East: Macquarie Street											
4	L2	159	0.0	0.493	14.2	LOS A	8.2	57.4	0.70	0.67	35.9
5	T1	331	0.0	0.493	9.8	LOS A	8.2	57.4	0.70	0.68	38.1
6	R2	393	0.0	0.493	15.5	LOS B	7.9	55.6	0.73	0.77	32.0
Approach		882	0.0	0.493	13.1	LOS A	8.2	57.4	0.72	0.72	35.1
North: Charles Street											
8	T1	117	0.0	0.461	20.2	LOS B	3.5	25.3	0.87	0.70	25.5
9	R2	71	7.5	0.461	26.9	LOS B	3.5	25.3	0.93	0.77	26.6
Approach		187	2.8	0.461	22.7	LOS B	3.5	25.3	0.89	0.72	26.0
All Vehicles		1393	0.4	0.493	16.3	LOS B	8.2	57.4	0.78	0.72	31.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	158	11.2	LOS B	0.2	0.2	0.64	0.64
P2	East Full Crossing	151	17.7	LOS B	0.2	0.2	0.81	0.81
P3	North Full Crossing	137	11.2	LOS B	0.1	0.1	0.64	0.64
P4	West Full Crossing	246	17.8	LOS B	0.3	0.3	0.81	0.81
All Pedestrians		692	15.0	LOS B			0.74	0.74

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

MOVEMENT SUMMARY

Site: 1104 [3000_33_Macquarie-Charles_EX_PM]

Macquarie Street/ Charles Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 55 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Charles Street											
1	L2	94	0.0	0.130	16.6	LOS B	1.7	11.6	0.68	0.71	31.8
2	T1	142	0.0	0.163	9.6	LOS A	2.3	15.8	0.62	0.50	35.0
Approach		236	0.0	0.163	12.4	LOS A	2.3	15.8	0.65	0.58	33.4
East: Macquarie Street											
4	L2	144	0.0	0.360	21.0	LOS B	4.3	30.3	0.82	0.74	29.9
5	T1	152	0.0	0.360	16.4	LOS B	4.3	30.4	0.82	0.74	33.0
6	R2	107	0.0	0.360	21.0	LOS B	4.3	30.4	0.82	0.73	29.7
Approach		403	0.0	0.360	19.2	LOS B	4.3	30.4	0.82	0.74	31.1
North: Charles Street											
8	T1	219	0.0	0.374	11.2	LOS A	4.4	31.3	0.68	0.60	32.3
9	R2	83	6.3	0.374	16.7	LOS B	4.4	31.3	0.73	0.67	33.0
Approach		302	1.7	0.374	12.7	LOS A	4.4	31.3	0.70	0.62	32.5
All Vehicles		941	0.6	0.374	15.4	LOS B	4.4	31.3	0.74	0.66	32.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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

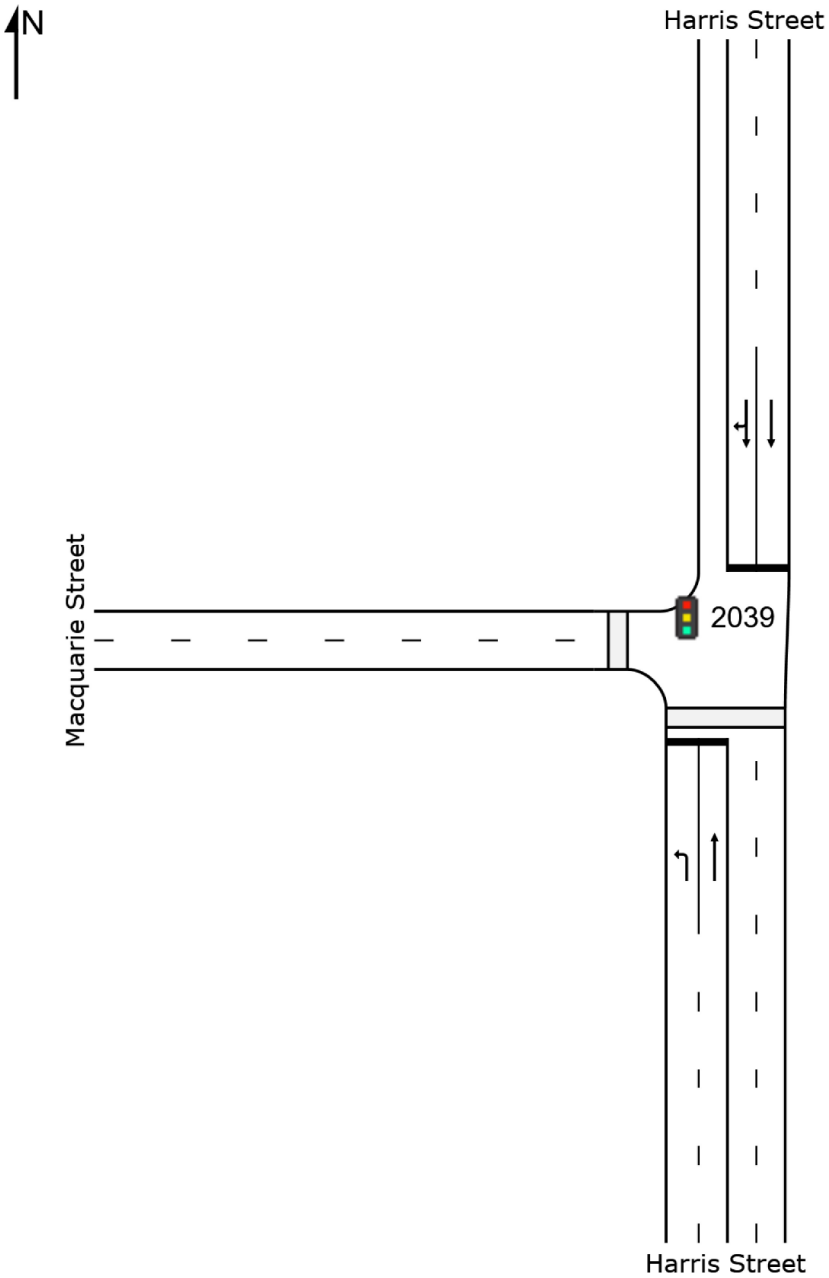
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	74	19.3	LOS B	0.1	0.1	0.84	0.84
P2	East Full Crossing	142	10.0	LOS A	0.1	0.1	0.60	0.60
P3	North Full Crossing	97	19.3	LOS B	0.1	0.1	0.84	0.84
P4	West Full Crossing	235	10.0	LOS A	0.2	0.2	0.61	0.61
All Pedestrians		547	12.9	LOS B			0.68	0.68

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

SITE LAYOUT

Site: 2039 [3000_34_Macquarie-Harris_EX_AM]

Macquarie Street/ Harris Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 2039 [3000_34_Macquarie-Harris_EX_AM]

Macquarie Street/ Harris Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 75 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Harris Street											
1	L2	608	0.0	0.556	15.8	LOS B	13.6	95.4	0.66	0.79	35.4
2	T1	601	0.0	0.511	8.7	LOS A	12.3	86.3	0.61	0.54	41.4
Approach		1209	0.0	0.556	12.3	LOS A	13.6	95.4	0.63	0.67	37.6
North: Harris Street											
8	T1	435	1.0	0.289	2.6	LOS A	4.6	32.3	0.31	0.28	52.9
9	R2	354	0.0	0.564	17.6	LOS B	9.9	69.0	0.87	0.89	30.2
Approach		788	0.5	0.564	9.3	LOS A	9.9	69.0	0.56	0.55	38.7
All Vehicles		1998	0.2	0.564	11.1	LOS A	13.6	95.4	0.61	0.62	38.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	34	31.8	LOS D	0.1	0.1	0.92	0.92
P4	West Full Crossing	82	6.9	LOS A	0.1	0.1	0.43	0.43
All Pedestrians		116	14.1	LOS B			0.57	0.57

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

MOVEMENT SUMMARY

Site: 2039 [3000_34_Macquarie-Harris_EX_PM]

Macquarie Street/ Harris Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 75 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Harris Street											
1	L2	141	0.0	0.135	13.9	LOS A	2.4	17.0	0.50	0.70	36.8
2	T1	791	0.5	0.721	12.5	LOS A	21.0	148.0	0.79	0.71	36.5
Approach		932	0.5	0.721	12.7	LOS A	21.0	148.0	0.74	0.71	36.6
North: Harris Street											
8	T1	1051	0.1	0.629	6.2	LOS A	15.9	111.7	0.56	0.52	44.8
9	R2	215	0.0	0.629	21.3	LOS B	10.3	72.3	0.89	0.81	29.1
Approach		1265	0.1	0.629	8.7	LOS A	15.9	111.7	0.62	0.57	40.6
All Vehicles		2197	0.2	0.721	10.4	LOS A	21.0	148.0	0.67	0.63	38.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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	South Full Crossing	44	31.8	LOS D	0.1	0.1	0.92	0.92
P4	West Full Crossing	35	8.2	LOS A	0.0	0.0	0.47	0.47
All Pedestrians		79	21.4	LOS C			0.72	0.72

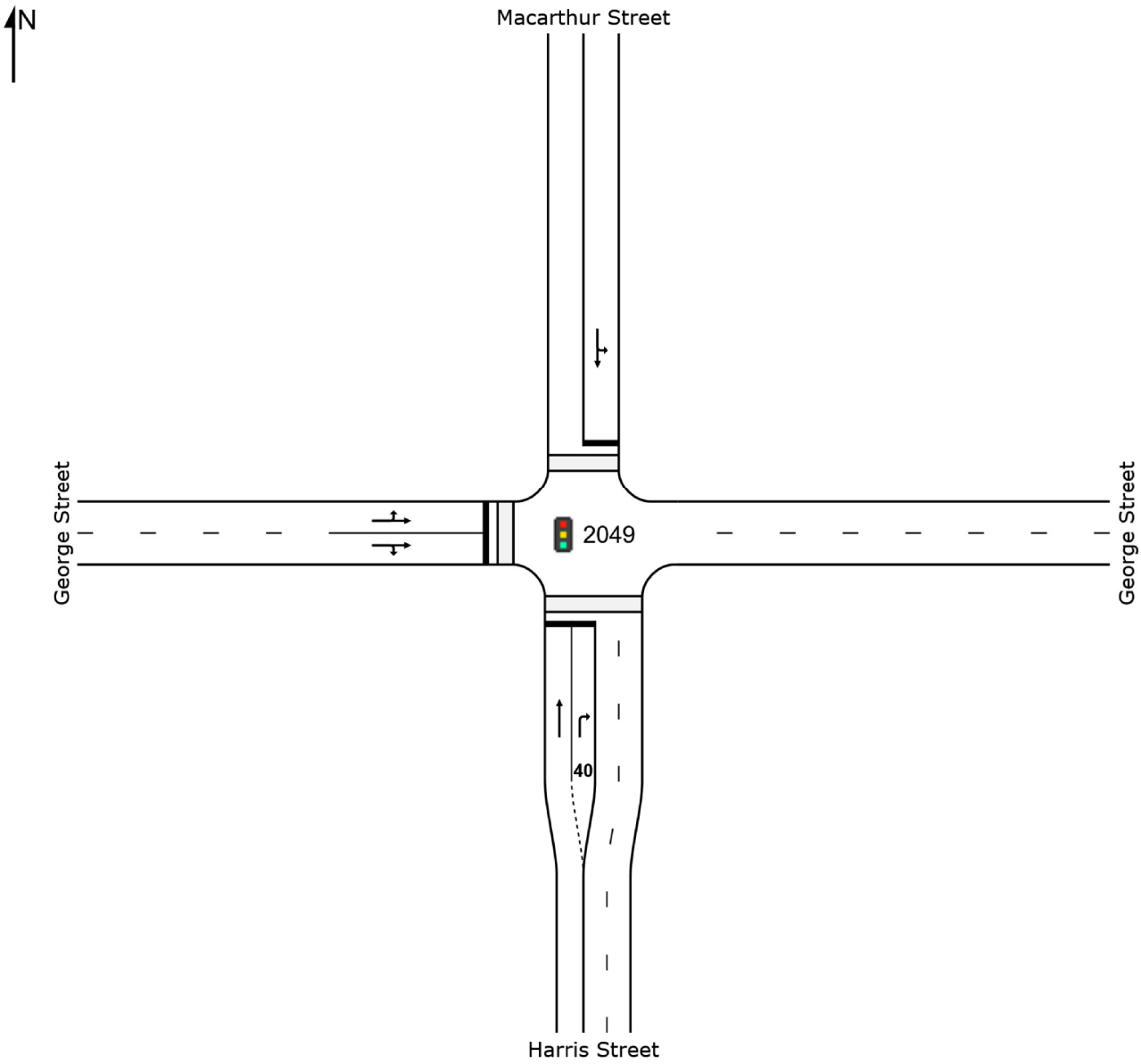
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 2049 [3000_35_Harris-George-Macarthur_EX_AM]

Harris Street/ George Street/ Macarthur Street, Parramatta

Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 2049 [3000_35_Harris-George-Macarthur_EX_AM]

Harris Street/ George Street/ Macarthur Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street											
2	T1	568	0.7	0.369	3.8	LOS A	10.3	72.3	0.29	0.27	54.2
3	R2	27	0.0	0.111	16.9	LOS B	0.8	5.3	0.42	0.68	31.1
Approach		596	0.7	0.369	4.4	LOS A	10.3	72.3	0.30	0.29	53.0
North: Macarthur Street											
7	L2	253	0.0	0.607	10.9	LOS A	25.2	176.5	0.41	0.48	48.5
8	T1	751	0.0	0.607	5.3	LOS A	25.2	176.5	0.41	0.48	50.5
Approach		1003	0.0	0.607	6.7	LOS A	25.2	176.5	0.41	0.48	49.9
West: George Street											
10	L2	48	0.0	0.602	70.6	LOS F	8.4	58.8	1.00	0.80	22.2
11	T1	160	0.0	0.602	66.0	LOS E	8.4	58.8	1.00	0.80	17.2
12	R2	42	2.5	0.602	70.6	LOS F	8.4	59.2	1.00	0.80	13.5
Approach		251	0.4	0.602	67.7	LOS E	8.4	59.2	1.00	0.80	17.8
All Vehicles		1849	0.3	0.607	14.3	LOS A	25.2	176.5	0.46	0.46	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	27	64.2	LOS F	0.1	0.1	0.96	0.96
P3	North Full Crossing	12	62.3	LOS F	0.0	0.0	0.94	0.94
P4	West Full Crossing	153	3.9	LOS A	0.1	0.1	0.24	0.24
All Pedestrians		192	16.1	LOS B			0.38	0.38

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

MOVEMENT SUMMARY

Site: 2049 [3000_35_Harris-George-Macarthur_EX_PM]

Harris Street/ George Street/ Macarthur Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 75 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street											
2	T1	711	0.6	0.603	8.8	LOS A	15.2	106.9	0.63	0.57	48.2
3	R2	72	0.0	0.698	48.8	LOS D	2.9	20.2	1.00	0.79	18.0
Approach		782	0.5	0.698	12.5	LOS A	15.2	106.9	0.67	0.59	43.7
North: Macarthur Street											
7	L2	234	0.0	0.989	62.6	LOS E	77.9	545.3	1.00	1.34	25.0
8	T1	1039	0.0	0.989	57.0	LOS E	77.9	545.3	1.00	1.34	22.9
Approach		1273	0.0	0.989	58.1	LOS E	77.9	545.3	1.00	1.34	23.3
West: George Street											
10	L2	164	0.0	0.928	53.1	LOS D	18.5	130.6	1.00	1.21	26.2
11	T1	366	1.1	0.928	48.7	LOS D	18.5	130.6	1.00	1.19	20.6
12	R2	233	0.5	0.928	53.5	LOS D	17.8	125.7	1.00	1.16	16.2
Approach		763	0.7	0.928	51.1	LOS D	18.5	130.6	1.00	1.19	20.7
All Vehicles		2818	0.3	0.989	43.5	LOS D	77.9	545.3	0.91	1.09	25.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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

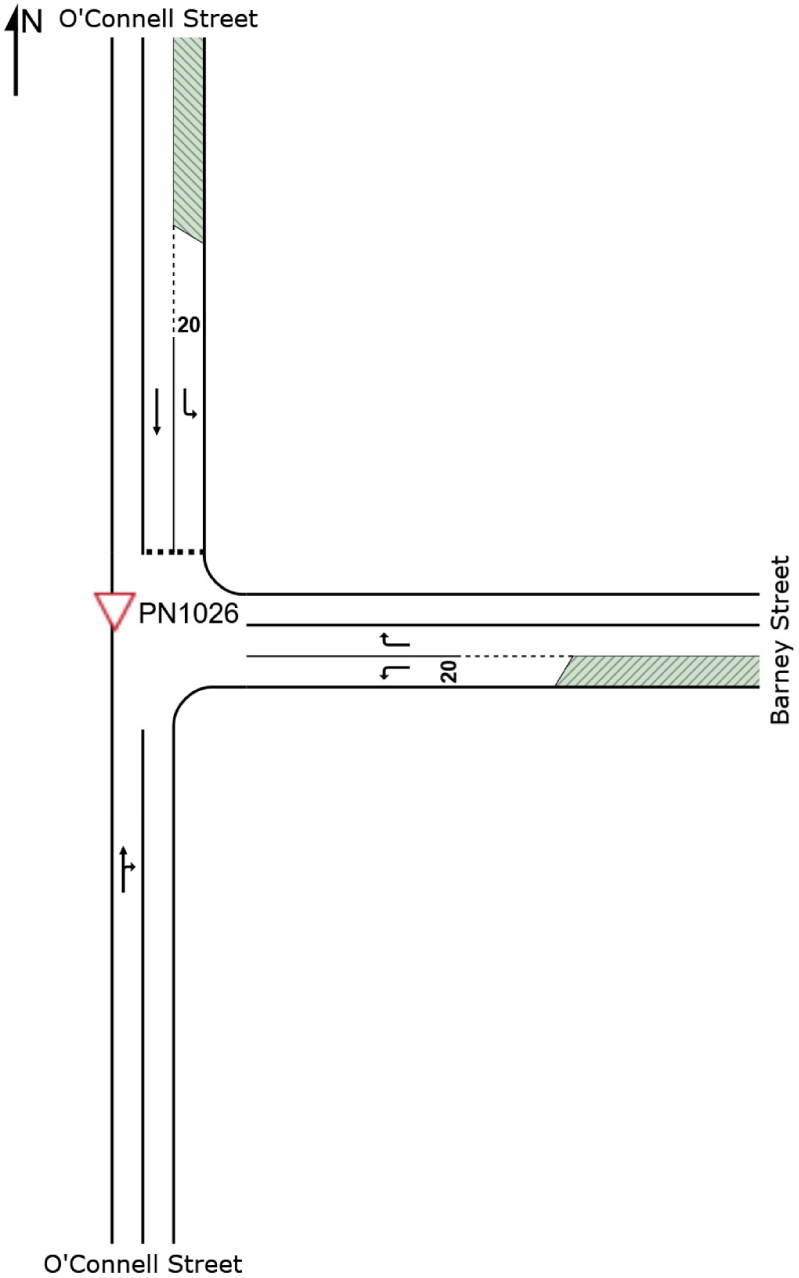
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	43	30.9	LOS D	0.1	0.1	0.91	0.91
P3	North Full Crossing	8	29.1	LOS C	0.0	0.0	0.88	0.88
P4	West Full Crossing	56	7.7	LOS A	0.1	0.1	0.45	0.45
All Pedestrians		107	18.7	LOS B			0.67	0.67

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

SITE LAYOUT

Site: PN1026 [A2_O'Connell-Barney_EX_AM]

O'Connell Street/ Barney Street, North Parramatta
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: PN1026 [A2_O'Connell-Barney_EX_AM]

O'Connell Street/ Barney Street, North Parramatta
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total 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: O'Connell Street											
2	T1	566	2.4	0.300	0.0	LOS A	0.1	0.5	0.00	0.01	59.8
3	R2	9	0.0	0.300	5.6	LOS A	0.1	0.5	0.00	0.01	53.1
Approach		576	2.4	0.300	0.1	NA	0.1	0.5	0.00	0.01	59.7
East: Barney Street											
4	L2	752	0.6	0.406	4.6	LOS A	0.0	0.0	0.00	0.53	40.3
6	R2	13	0.0	0.013	6.8	LOS A	0.1	0.4	0.53	0.62	41.9
Approach		764	0.6	0.406	4.6	NA	0.1	0.4	0.01	0.53	40.3
North: O'Connell Street											
7	L2	5	0.0	0.003	5.6	LOS A	0.0	0.1	0.05	0.56	45.4
8	T1	15	0.0	0.062	19.2	LOS B	0.2	1.5	0.82	0.91	35.1
Approach		20	0.0	0.062	15.6	LOS B	0.2	1.5	0.61	0.82	37.0
All Vehicles		1360	1.3	0.406	2.9	NA	0.2	1.5	0.02	0.31	48.6

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

MOVEMENT SUMMARY

Site: PN1026 [A2_O'Connell-Barney_EX_PM]

O'Connell Street/ Barney Street, North Parramatta
Giveway / Yield (Two-Way)

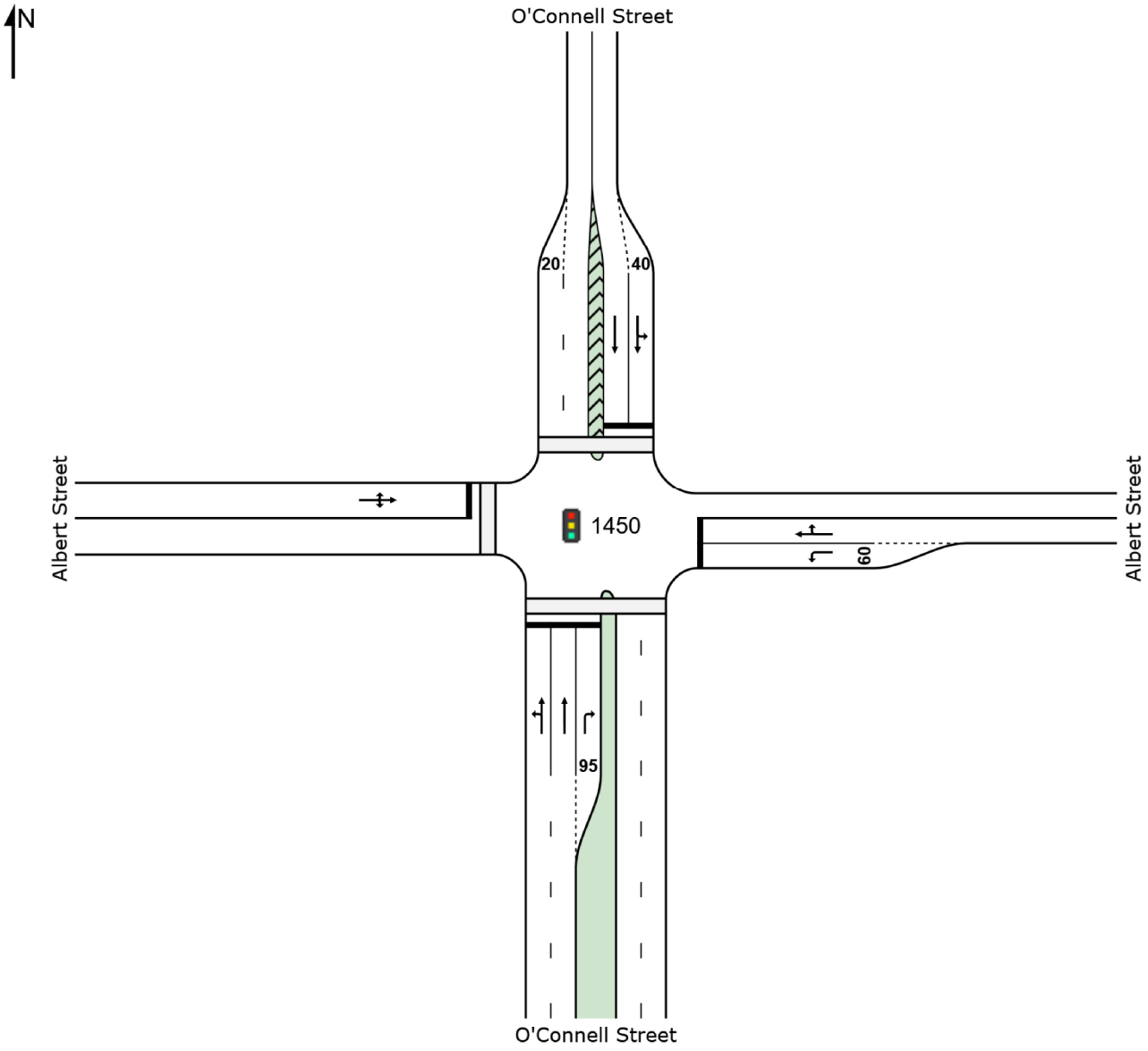
Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
2	T1	566	2.4	0.301	0.0	LOS A	0.1	0.5	0.00	0.01	59.8
3	R2	9	0.0	0.301	5.6	LOS A	0.1	0.5	0.00	0.01	53.1
Approach		576	2.4	0.301	0.1	NA	0.1	0.5	0.00	0.01	59.7
East: Barney Street											
4	L2	436	1.2	0.237	4.6	LOS A	0.0	0.0	0.00	0.53	40.3
6	R2	21	0.0	0.021	6.8	LOS A	0.1	0.6	0.53	0.64	41.9
Approach		457	1.2	0.237	4.7	NA	0.1	0.6	0.02	0.53	40.4
North: O'Connell Street											
7	L2	24	0.0	0.015	5.6	LOS A	0.1	0.4	0.05	0.56	45.4
8	T1	12	0.0	0.026	11.2	LOS A	0.1	0.7	0.65	0.76	41.9
Approach		36	0.0	0.026	7.4	LOS A	0.1	0.7	0.24	0.62	44.0
All Vehicles		1068	1.8	0.301	2.3	NA	0.1	0.7	0.02	0.25	51.1

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

SITE LAYOUT

Site: 1450 [A4_O'Connell-Albert_EX_AM]

O'Connell Street/ Albert Street, North Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1450 [A4_O'Connell-Albert_EX_AM]

O'Connell Street/ Albert Street, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
1	L2	12	0.0	0.038	9.4	LOS A	0.7	5.3	0.28	0.31	47.3
2	T1	305	4.1	0.186	4.3	LOS A	4.1	29.5	0.31	0.28	54.6
3	R2	311	3.4	0.457	22.5	LOS B	12.1	86.9	0.80	0.82	33.7
Approach		627	3.7	0.457	13.4	LOS A	12.1	86.9	0.55	0.55	43.2
East: Albert Street											
4	L2	316	0.3	0.375	25.6	LOS B	11.0	77.5	0.70	0.76	31.5
5	T1	5	0.0	0.475	50.1	LOS D	4.8	33.4	0.97	0.78	14.7
6	R2	86	0.0	0.475	54.7	LOS D	4.8	33.4	0.97	0.78	23.6
Approach		407	0.3	0.475	32.1	LOS C	11.0	77.5	0.76	0.77	29.0
North: O'Connell Street											
7	L2	31	0.0	0.661	29.0	LOS C	15.0	105.3	0.76	0.67	35.1
8	T1	764	0.6	0.661	23.4	LOS B	15.0	105.5	0.76	0.66	39.3
Approach		795	0.5	0.661	23.7	LOS B	15.0	105.5	0.76	0.66	39.1
West: Albert Street											
10	L2	9	0.0	0.119	51.6	LOS D	1.2	8.3	0.92	0.71	21.7
11	T1	1	0.0	0.119	47.0	LOS D	1.2	8.3	0.92	0.71	15.4
12	R2	14	0.0	0.119	51.6	LOS D	1.2	8.3	0.92	0.71	19.3
Approach		24	0.0	0.119	51.4	LOS D	1.2	8.3	0.92	0.71	20.1
All Vehicles		1854	1.5	0.661	22.4	LOS B	15.0	105.5	0.69	0.65	37.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	5.6	LOS A	0.1	0.1	0.32	0.32
All Pedestrians		158	34.7	LOS D			0.74	0.74

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

MOVEMENT SUMMARY

Site: 1450 [A4_O'Connell-Albert_EX_PM]

O'Connell Street/ Albert Street, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 65 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
1	L2	1	0.0	0.083	9.7	LOS A	1.2	8.4	0.38	0.31	48.6
2	T1	621	0.8	0.402	5.2	LOS A	7.5	53.0	0.47	0.42	53.7
3	R2	200	1.1	0.282	14.9	LOS B	3.7	25.8	0.68	0.75	38.7
Approach		822	0.9	0.402	7.6	LOS A	7.5	53.0	0.52	0.50	50.0
East: Albert Street											
4	L2	49	0.0	0.054	13.8	LOS A	0.8	5.7	0.54	0.66	38.8
5	T1	1	0.0	0.052	27.3	LOS B	0.3	2.3	0.89	0.67	20.9
6	R2	11	0.0	0.052	31.8	LOS C	0.3	2.3	0.89	0.67	30.9
Approach		61	0.0	0.054	17.1	LOS B	0.8	5.7	0.61	0.66	36.7
North: O'Connell Street											
7	L2	36	0.0	0.428	24.5	LOS B	6.8	47.7	0.83	0.71	37.5
8	T1	500	0.6	0.428	19.0	LOS B	6.8	48.0	0.83	0.70	42.0
Approach		536	0.6	0.428	19.3	LOS B	6.8	48.0	0.83	0.71	41.7
West: Albert Street											
10	L2	2	0.0	0.017	31.3	LOS C	0.1	0.8	0.88	0.62	28.9
11	T1	1	0.0	0.017	26.7	LOS B	0.1	0.8	0.88	0.62	21.6
12	R2	1	0.0	0.017	31.3	LOS C	0.1	0.8	0.88	0.62	26.3
Approach		4	0.0	0.017	30.1	LOS C	0.1	0.8	0.88	0.62	26.7
All Vehicles		1423	0.7	0.428	12.5	LOS A	7.5	53.0	0.65	0.58	45.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

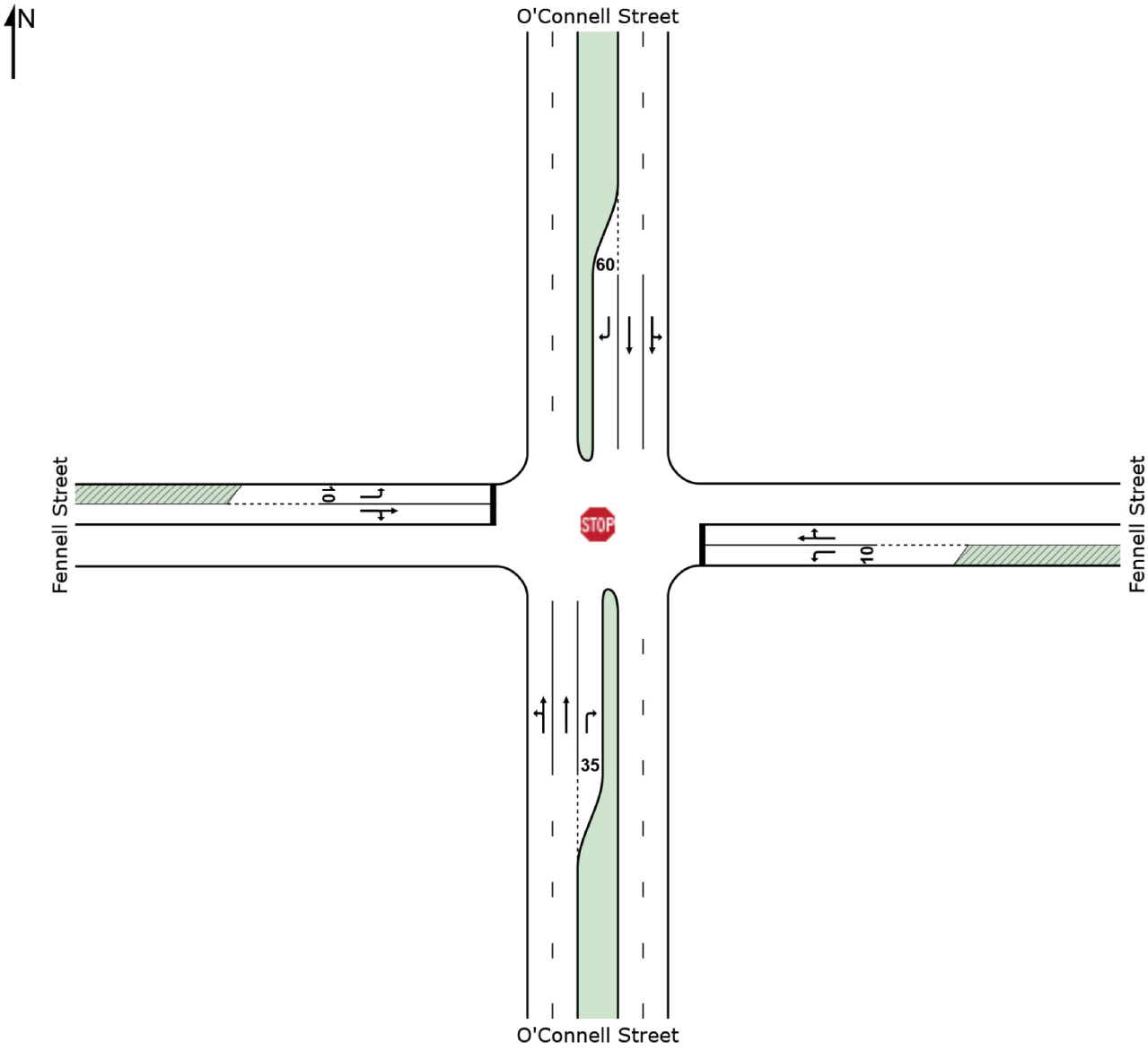
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91
P3	North Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91
P4	West Full Crossing	53	6.5	LOS A	0.0	0.0	0.45	0.45
All Pedestrians		158	20.1	LOS C			0.76	0.76

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

SITE LAYOUT

Site: [A5_O'Connell-Fennell_EX_AM]

O'Connell Street/ Fennell Street, North Parramatta
Stop (Two-Way)



MOVEMENT SUMMARY

Site: [A5_O'Connell-Fennell_EX_AM]

O'Connell Street/ Fennell Street, North Parramatta
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total 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: O'Connell Street											
1	L2	373	0.0	0.262	5.5	LOS A	0.0	0.0	0.00	0.45	51.6
2	T1	615	3.8	0.262	0.0	LOS A	0.0	0.0	0.00	0.08	57.6
3	R2	3	0.0	0.007	12.6	LOS A	0.0	0.2	0.70	0.75	32.5
Approach		991	2.3	0.262	2.1	NA	0.0	0.2	0.00	0.22	54.1
East: Fennell Street											
4	L2	20	0.0	0.028	10.3	LOS A	0.1	0.7	0.48	0.88	33.6
5	T1	224	0.0	1.000	44.6	LOS D	6.9	48.4	1.00	1.74	26.9
6	R2	1	0.0	1.000	263.0	LOS F	6.9	48.4	1.00	1.74	20.8
Approach		245	0.0	1.000	42.8	LOS D	6.9	48.4	0.96	1.67	27.0
North: O'Connell Street											
7	L2	74	0.0	0.292	5.6	LOS A	0.0	0.0	0.00	0.08	54.6
8	T1	1057	0.6	0.292	0.0	LOS A	0.0	0.0	0.00	0.04	58.9
9	R2	67	0.0	0.125	11.4	LOS A	0.4	2.9	0.66	0.85	42.5
Approach		1198	0.5	0.292	1.0	NA	0.4	2.9	0.04	0.08	56.1
West: Fennell Street											
10	L2	13	0.0	0.012	7.9	LOS A	0.0	0.3	0.21	0.87	44.3
11	T1	32	0.0	1.000	220.5	LOS F	12.7	88.9	1.00	1.71	18.2
12	R2	191	0.0	1.000	69.6	LOS E	12.7	88.9	1.00	1.71	16.6
Approach		235	0.0	1.000	86.5	LOS F	12.7	88.9	0.96	1.66	17.5
All Vehicles		2668	1.1	1.000	12.8	NA	12.7	88.9	0.19	0.42	38.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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.

MOVEMENT SUMMARY

Site: [A5_O'Connell-Fennell_EX_PM]

O'Connell Street/ Fennell Street, North Parramatta
Stop (Two-Way)

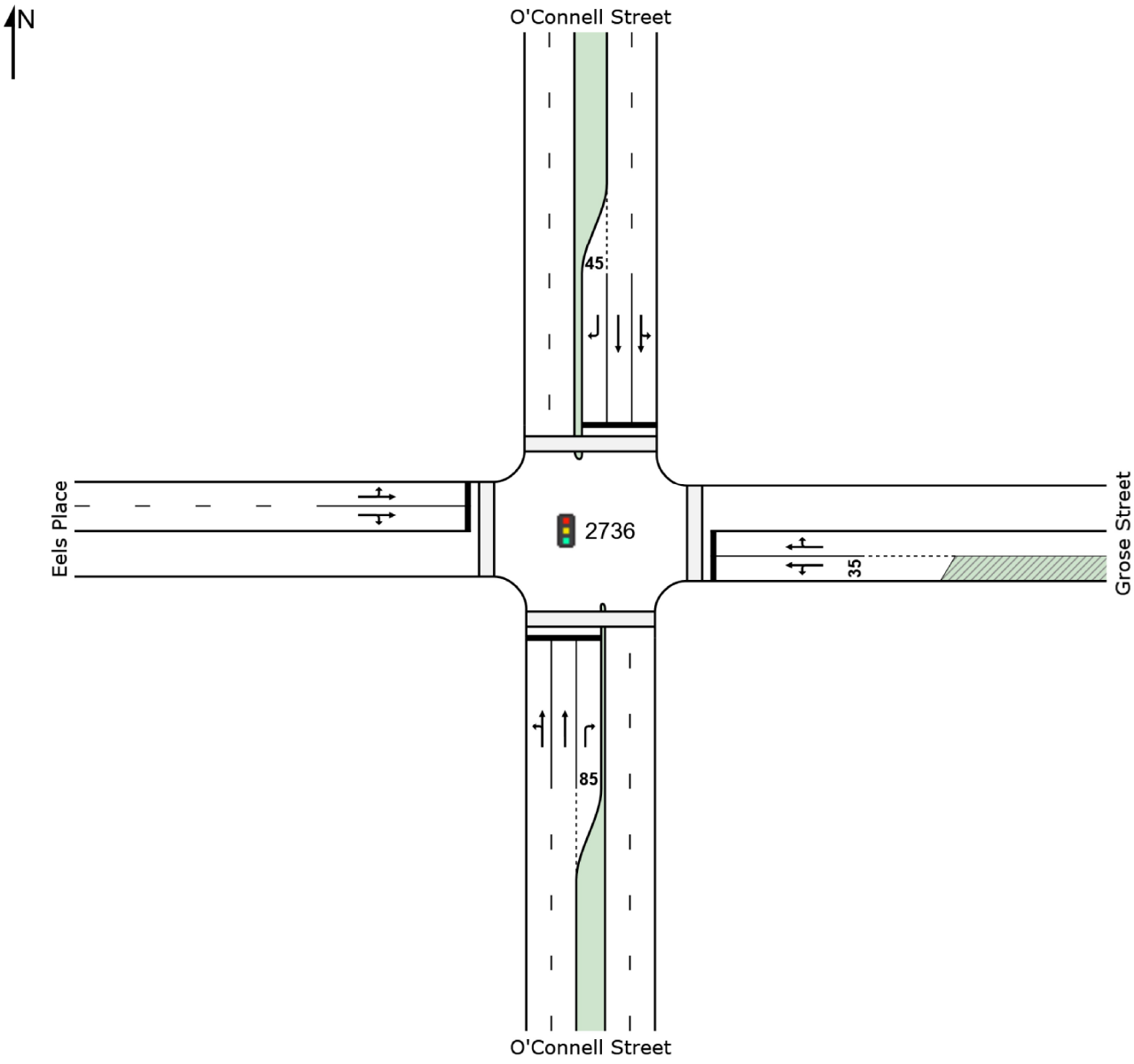
Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
1	L2	167	0.0	0.252	5.5	LOS A	0.0	0.0	0.00	0.21	54.6
2	T1	803	0.9	0.252	0.0	LOS A	0.0	0.0	0.00	0.08	57.7
3	R2	13	0.0	0.018	9.2	LOS A	0.1	0.4	0.53	0.68	36.2
Approach		983	0.7	0.252	1.1	NA	0.1	0.4	0.01	0.11	56.4
East: Fennell Street											
4	L2	186	0.0	0.214	9.4	LOS A	0.9	6.4	0.44	0.90	34.5
5	T1	64	0.0	1.000	185.9	LOS F	6.2	43.1	1.00	1.48	10.8
6	R2	1	0.0	1.000	229.3	LOS F	6.2	43.1	1.00	1.48	7.1
Approach		252	0.0	1.000	55.4	LOS D	6.2	43.1	0.58	1.05	17.4
North: O'Connell Street											
7	L2	63	0.0	0.197	5.5	LOS A	0.0	0.0	0.00	0.10	54.2
8	T1	700	0.5	0.197	0.0	LOS A	0.0	0.0	0.00	0.04	58.7
9	R2	13	0.0	0.023	10.7	LOS A	0.1	0.5	0.62	0.75	42.9
Approach		776	0.4	0.197	0.6	NA	0.1	0.5	0.01	0.06	57.5
West: Fennell Street											
10	L2	8	0.0	0.010	8.9	LOS A	0.0	0.3	0.38	0.83	43.8
11	T1	27	0.0	1.000	210.7	LOS F	9.2	64.4	1.00	1.49	11.2
12	R2	66	0.0	1.000	166.2	LOS F	9.2	64.4	1.00	1.49	10.0
Approach		102	0.0	1.000	165.2	LOS F	9.2	64.4	0.95	1.44	11.1
All Vehicles		2113	0.5	1.000	15.3	NA	9.2	64.4	0.12	0.27	34.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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.

SITE LAYOUT

Site: 2736 [A6_O'Connell-Grose_EX_AM]

O'Connell Street/ Grose Street/ Eels Place, North Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 2736 [A6_O'Connell-Grose_EX_AM]

O'Connell Street/ Grose Street/ Eels Place, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: O'Connell Street											
1	L2	34	0.0	0.516	30.9	LOS C	16.2	116.0	0.79	0.71	15.9
2	T1	788	2.9	0.516	25.4	LOS B	16.3	117.2	0.79	0.70	33.4
3	R2	7	71.4	0.082	60.7	LOS E	0.4	4.4	0.96	0.67	16.5
Approach		829	3.4	0.516	25.9	LOS B	16.3	117.2	0.80	0.70	32.4
East: Grose Street											
4	L2	12	0.0	0.084	48.0	LOS D	1.0	7.2	0.89	0.67	19.4
5	T1	46	0.0	0.420	48.2	LOS D	4.3	30.0	0.95	0.74	13.8
6	R2	47	0.0	0.420	54.2	LOS D	4.3	30.0	0.96	0.77	21.5
Approach		105	0.0	0.420	50.9	LOS D	4.3	30.0	0.95	0.75	18.2
North: O'Connell Street											
7	L2	7	0.0	0.506	17.9	LOS B	17.6	123.9	0.60	0.54	40.1
8	T1	1039	0.6	0.506	11.6	LOS A	17.6	123.9	0.57	0.51	44.1
9	R2	222	0.0	0.526	29.2	LOS C	7.4	51.5	0.93	0.80	26.1
Approach		1268	0.5	0.526	14.7	LOS B	17.6	123.9	0.63	0.56	40.2
West: Eels Place											
10	L2	155	0.0	0.176	22.2	LOS B	4.7	32.9	0.61	0.71	29.6
11	T1	16	0.0	0.284	49.5	LOS D	2.7	19.1	0.95	0.74	13.5
12	R2	38	0.0	0.284	54.0	LOS D	2.7	19.1	0.95	0.74	14.4
Approach		208	0.0	0.284	30.1	LOS C	4.7	32.9	0.70	0.72	24.4
All Vehicles		2412	1.4	0.526	21.5	LOS B	17.6	123.9	0.71	0.63	34.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov 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	South Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	11.8	LOS B	0.1	0.1	0.46	0.46
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	24.9	LOS C	0.1	0.1	0.67	0.67
All Pedestrians		211	33.8	LOS D			0.76	0.76

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

MOVEMENT SUMMARY

Site: 2736 [A6_O'Connell-Grose_EX_PM]

O'Connell Street/ Grose Street/ Eels Place, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 65 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: O'Connell Street											
1	L2	74	0.0	0.563	20.7	LOS B	11.2	78.6	0.80	0.72	18.7
2	T1	859	0.9	0.563	15.2	LOS B	11.4	80.1	0.80	0.71	40.4
3	R2	21	25.0	0.096	33.5	LOS C	0.6	5.2	0.90	0.70	23.9
Approach		954	1.3	0.563	16.0	LOS B	11.4	80.1	0.81	0.71	38.1
East: Grose Street											
4	L2	6	0.0	0.108	30.0	LOS C	0.9	6.3	0.88	0.66	26.4
5	T1	161	0.0	0.540	28.3	LOS B	4.7	32.7	0.95	0.76	20.1
6	R2	16	0.0	0.540	33.4	LOS C	4.7	32.7	0.97	0.78	29.2
Approach		183	0.0	0.540	28.8	LOS C	4.7	32.7	0.95	0.76	21.3
North: O'Connell Street											
7	L2	4	0.0	0.490	20.1	LOS B	9.5	66.7	0.77	0.67	38.4
8	T1	817	0.4	0.490	14.5	LOS B	9.5	66.7	0.77	0.67	41.3
9	R2	135	0.0	0.524	35.3	LOS C	4.2	29.5	0.97	0.79	23.6
Approach		956	0.3	0.524	17.5	LOS B	9.5	66.7	0.80	0.68	38.1
West: Eels Place											
10	L2	119	0.0	0.181	20.3	LOS B	2.6	18.4	0.73	0.73	30.8
11	T1	12	0.0	0.102	28.7	LOS C	0.6	4.4	0.92	0.67	19.4
12	R2	9	0.0	0.102	33.2	LOS C	0.6	4.4	0.92	0.67	20.7
Approach		140	0.0	0.181	21.9	LOS B	2.6	18.4	0.75	0.72	29.1
All Vehicles		2233	0.7	0.563	18.1	LOS B	11.4	80.1	0.81	0.70	36.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

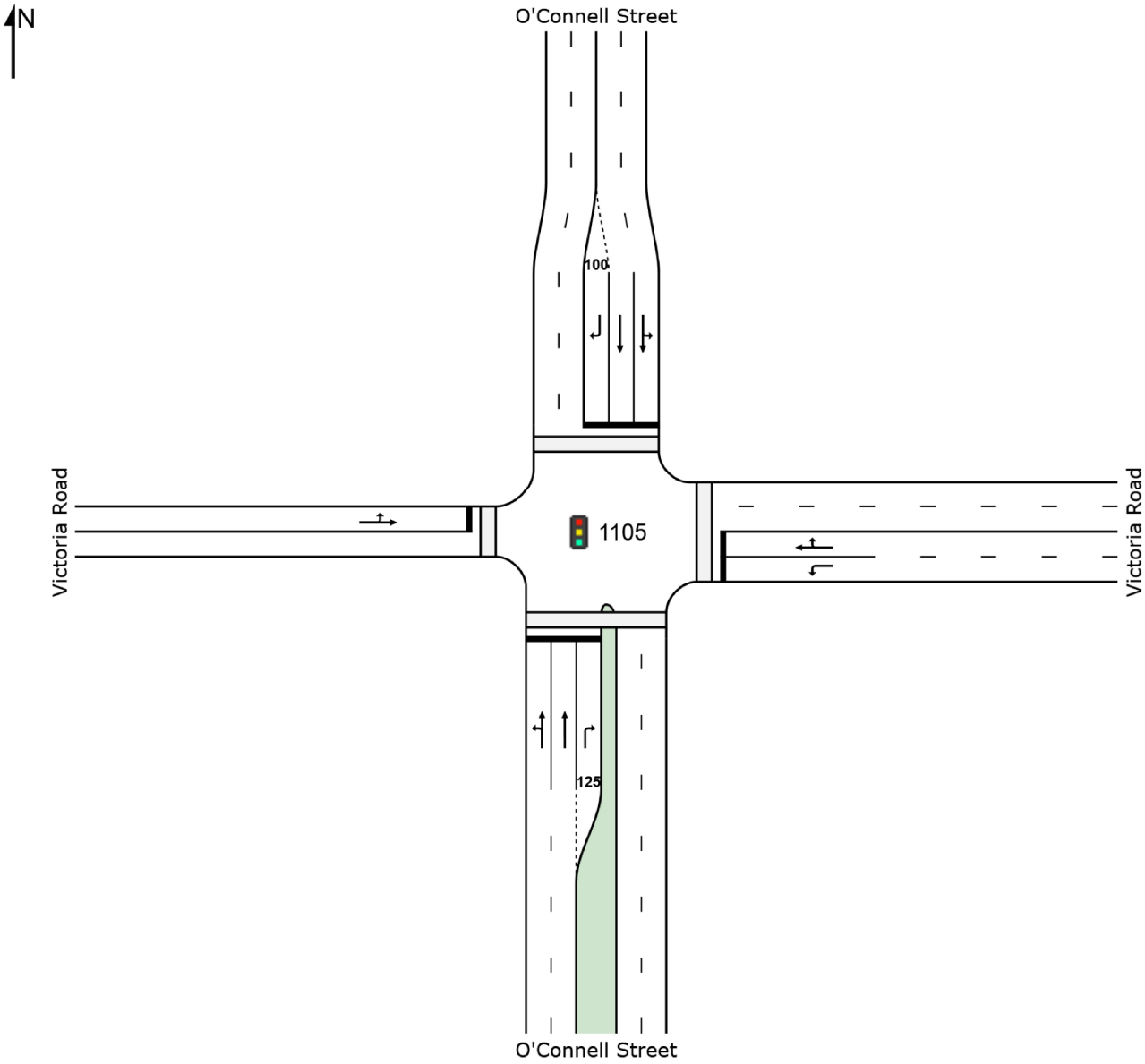
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91
P2	East Full Crossing	53	17.0	LOS B	0.1	0.1	0.72	0.72
P3	North Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91
P4	West Full Crossing	53	17.0	LOS B	0.1	0.1	0.72	0.72
All Pedestrians		211	21.9	LOS C			0.82	0.82

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

SITE LAYOUT

Site: 1105 [A7_O'Connell-Victoria_EX_AM]

O'Connell Street/ Victoria Street, North Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1105 [A7_O'Connell-Victoria_EX_AM]

O'Connell Street/ Victoria Street, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 115 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
1	L2	60	0.0	0.286	13.5	LOS A	7.0	49.9	0.33	0.41	23.7
2	T1	761	3.5	0.286	4.6	LOS A	7.0	50.6	0.33	0.35	53.5
3	R2	504	0.2	0.701	37.8	LOS C	19.6	137.3	0.90	1.01	30.6
Approach		1325	2.1	0.701	17.6	LOS B	19.6	137.3	0.55	0.60	40.1
East: Victoria Road											
4	L2	417	0.0	0.430	23.6	LOS B	14.2	99.6	0.66	0.78	37.2
5	T1	28	0.0	0.693	66.1	LOS E	7.5	53.3	1.00	0.84	9.6
6	R2	102	2.1	0.693	61.5	LOS E	7.5	53.3	1.00	0.84	16.0
Approach		547	0.4	0.693	32.8	LOS C	14.2	99.6	0.74	0.79	29.7
North: O'Connell Street											
7	L2	26	0.0	0.757	39.5	LOS C	26.8	188.6	0.94	0.84	23.5
8	T1	1063	0.6	0.757	33.9	LOS C	26.8	188.6	0.94	0.84	33.5
9	R2	29	0.0	0.132	39.5	LOS C	1.2	8.5	0.75	0.78	12.0
Approach		1119	0.6	0.757	34.2	LOS C	26.8	188.6	0.93	0.83	32.4
West: Victoria Road											
10	L2	1	0.0	0.021	46.1	LOS D	0.3	1.8	0.89	0.59	10.8
11	T1	4	0.0	0.021	46.1	LOS D	0.3	1.8	0.89	0.59	10.2
Approach		5	0.0	0.021	46.1	LOS D	0.3	1.8	0.89	0.59	10.3
All Vehicles		2997	1.2	0.757	26.6	LOS B	26.8	188.6	0.73	0.72	34.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	29.3	LOS C	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	4.7	LOS A	0.0	0.0	0.29	0.29
All Pedestrians		211	34.4	LOS D			0.73	0.73

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

MOVEMENT SUMMARY

Site: 1105 [A7_O'Connell-Victoria_EX_PM]

O'Connell Street/ Victoria Street, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 115 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
1	L2	1	0.0	0.285	15.5	LOS B	7.9	55.7	0.40	0.35	23.5
2	T1	775	1.4	0.285	6.6	LOS A	7.9	55.7	0.40	0.35	52.0
3	R2	373	0.0	0.532	33.4	LOS C	14.7	103.0	0.83	0.94	32.4
Approach		1148	0.9	0.532	15.3	LOS B	14.7	103.0	0.54	0.54	43.6
East: Victoria Road											
4	L2	664	0.2	0.654	25.0	LOS B	25.9	181.8	0.76	0.83	36.4
5	T1	4	0.0	0.616	60.0	LOS E	8.0	56.6	0.98	0.82	10.1
6	R2	143	1.5	0.616	55.5	LOS D	8.0	56.6	0.98	0.82	17.4
Approach		812	0.4	0.654	30.6	LOS C	25.9	181.8	0.80	0.83	32.3
North: O'Connell Street											
7	L2	26	0.0	0.654	39.6	LOS C	20.7	145.6	0.90	0.79	23.5
8	T1	855	0.4	0.654	34.0	LOS C	20.9	146.9	0.90	0.79	33.4
9	R2	3	0.0	0.015	40.9	LOS C	0.1	0.9	0.75	0.70	11.8
Approach		884	0.4	0.654	34.2	LOS C	20.9	146.9	0.90	0.79	33.1
West: Victoria Road											
10	L2	52	0.0	0.257	44.8	LOS D	4.1	29.0	0.91	0.71	10.9
11	T1	33	0.0	0.257	44.8	LOS D	4.1	29.0	0.91	0.71	10.3
Approach		84	0.0	0.257	44.8	LOS D	4.1	29.0	0.91	0.71	10.7
All Vehicles		2928	0.6	0.654	26.1	LOS B	25.9	181.8	0.73	0.70	35.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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

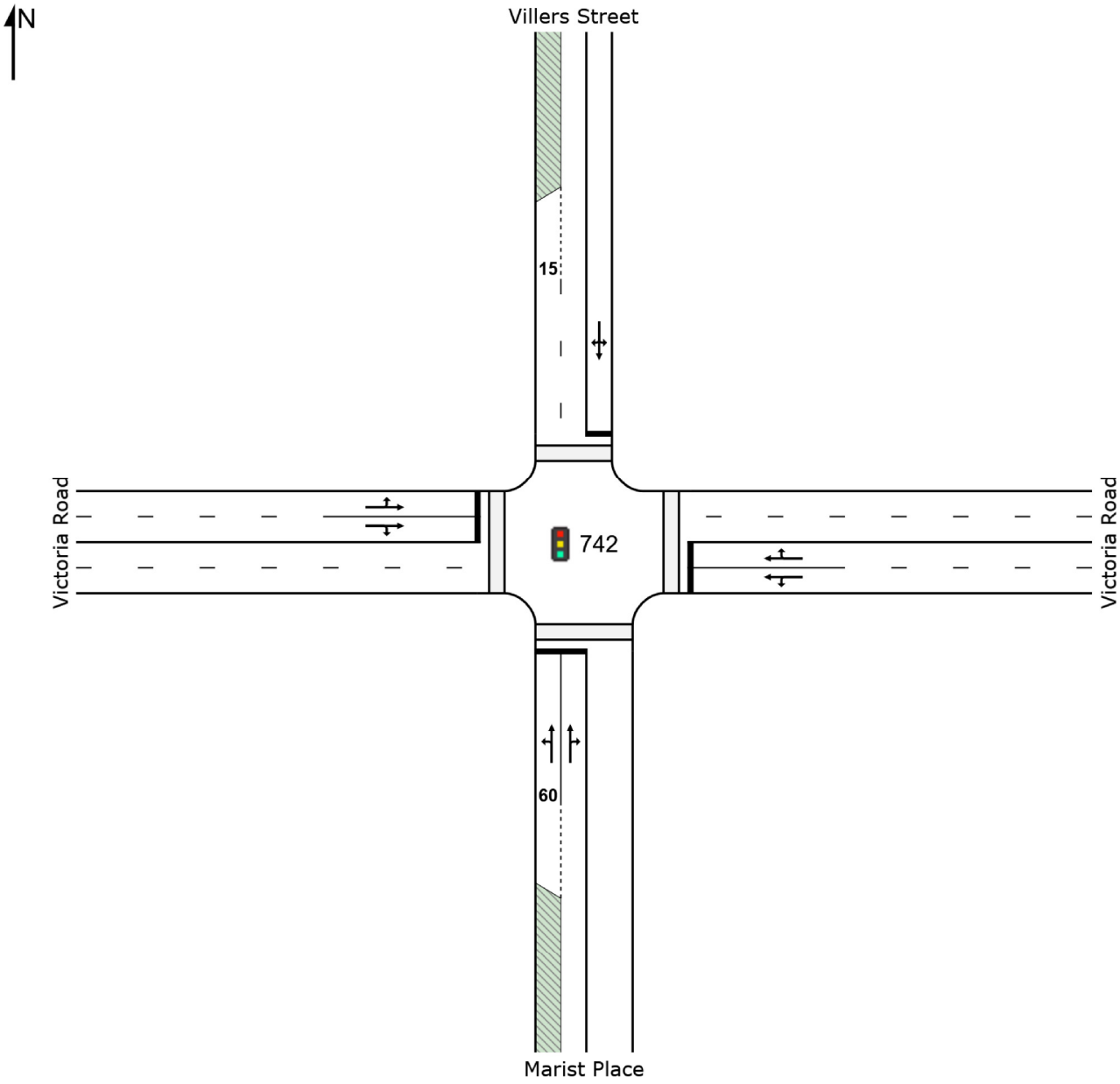
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	50.8	LOS E	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	31.5	LOS D	0.1	0.1	0.74	0.74
P3	North Full Crossing	53	49.0	LOS E	0.2	0.2	0.92	0.92
P4	West Full Crossing	53	6.6	LOS A	0.1	0.1	0.34	0.34
All Pedestrians		211	34.5	LOS D			0.74	0.74

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

SITE LAYOUT

Site: 742 [A11_Victoria-Marist-Villiers_EX_AM]

Victoria Road/ Marist Place/ Villiers Street, North Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 742 [A11_Victoria-Marist-Villiers_EX_AM]

Victoria Road/ Marist Place/ Villiers Street, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marist Place											
1	L2	15	0.0	0.086	34.4	LOS C	2.1	15.0	0.73	0.60	28.3
2	T1	248	0.0	0.423	32.7	LOS C	12.3	86.0	0.81	0.70	25.2
3	R2	62	0.0	0.423	37.8	LOS C	12.3	86.0	0.83	0.72	25.5
Approach		325	0.0	0.423	33.8	LOS C	12.3	86.0	0.81	0.70	25.4
East: Victoria Road											
4	L2	42	10.0	0.390	36.3	LOS C	11.4	81.2	0.79	0.70	26.8
5	T1	489	0.4	0.390	30.7	LOS C	11.7	82.1	0.79	0.69	21.8
6	R2	1	0.0	0.390	36.2	LOS C	11.7	82.1	0.79	0.68	17.0
Approach		533	1.2	0.390	31.1	LOS C	11.7	82.1	0.79	0.69	22.3
North: Villers Street											
7	L2	4	0.0	0.420	52.7	LOS D	7.4	51.9	0.94	0.77	11.8
8	T1	91	0.0	0.420	48.1	LOS D	7.4	51.9	0.94	0.77	20.4
9	R2	45	0.0	0.420	52.7	LOS D	7.4	51.9	0.94	0.77	14.3
Approach		140	0.0	0.420	49.8	LOS D	7.4	51.9	0.94	0.77	18.5
West: Victoria Road											
10	L2	85	0.0	0.418	37.3	LOS C	12.4	87.1	0.81	0.73	19.2
11	T1	386	0.3	0.418	33.3	LOS C	12.4	87.1	0.82	0.72	20.4
12	R2	33	0.0	0.418	40.4	LOS C	10.3	72.5	0.84	0.72	27.1
Approach		504	0.2	0.418	34.4	LOS C	12.4	87.1	0.82	0.72	20.8
All Vehicles		1502	0.5	0.423	34.5	LOS C	12.4	87.1	0.82	0.71	22.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	31.6	LOS D	0.1	0.1	0.73	0.73
P2	East Full Crossing	53	49.6	LOS E	0.2	0.2	0.91	0.91
P3	North Full Crossing	53	29.5	LOS C	0.1	0.1	0.70	0.70
P4	West Full Crossing	53	33.8	LOS D	0.1	0.1	0.75	0.75
All Pedestrians		211	36.1	LOS D			0.77	0.77

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

MOVEMENT SUMMARY

Site: 742 [A11_Victoria-Marist-Villiers_EX_PM]

Victoria Road/ Marist Place/ Villiers Street, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marist Place											
1	L2	156	0.0	0.240	34.1	LOS C	6.4	44.9	0.75	0.75	27.1
2	T1	231	0.5	0.464	30.3	LOS C	14.7	103.0	0.81	0.73	26.0
3	R2	103	0.0	0.464	34.9	LOS C	14.7	103.0	0.81	0.73	26.4
Approach		489	0.2	0.464	32.5	LOS C	14.7	103.0	0.79	0.74	26.5
East: Victoria Road											
4	L2	14	7.7	0.451	36.4	LOS C	14.1	99.2	0.81	0.70	27.0
5	T1	500	0.6	0.451	33.1	LOS C	14.1	99.2	0.83	0.72	20.7
6	R2	35	0.0	0.451	42.2	LOS C	10.9	76.8	0.86	0.74	14.7
Approach		548	0.8	0.451	33.8	LOS C	14.1	99.2	0.83	0.72	20.6
North: Villers Street											
7	L2	24	0.0	0.451	58.6	LOS E	5.6	39.6	0.97	0.77	10.7
8	T1	43	2.4	0.451	54.1	LOS D	5.6	39.6	0.97	0.77	18.8
9	R2	33	0.0	0.451	58.6	LOS E	5.6	39.6	0.97	0.77	13.0
Approach		100	1.1	0.451	56.7	LOS E	5.6	39.6	0.97	0.77	15.3
West: Victoria Road											
10	L2	101	0.0	0.460	37.2	LOS C	14.1	98.7	0.82	0.74	19.2
11	T1	329	0.0	0.460	34.9	LOS C	14.1	98.7	0.84	0.75	19.6
12	R2	57	0.0	0.460	46.5	LOS D	8.6	60.2	0.89	0.76	24.7
Approach		487	0.0	0.460	36.7	LOS C	14.1	98.7	0.84	0.75	20.4
All Vehicles		1625	0.4	0.464	35.7	LOS C	14.7	103.0	0.83	0.74	22.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

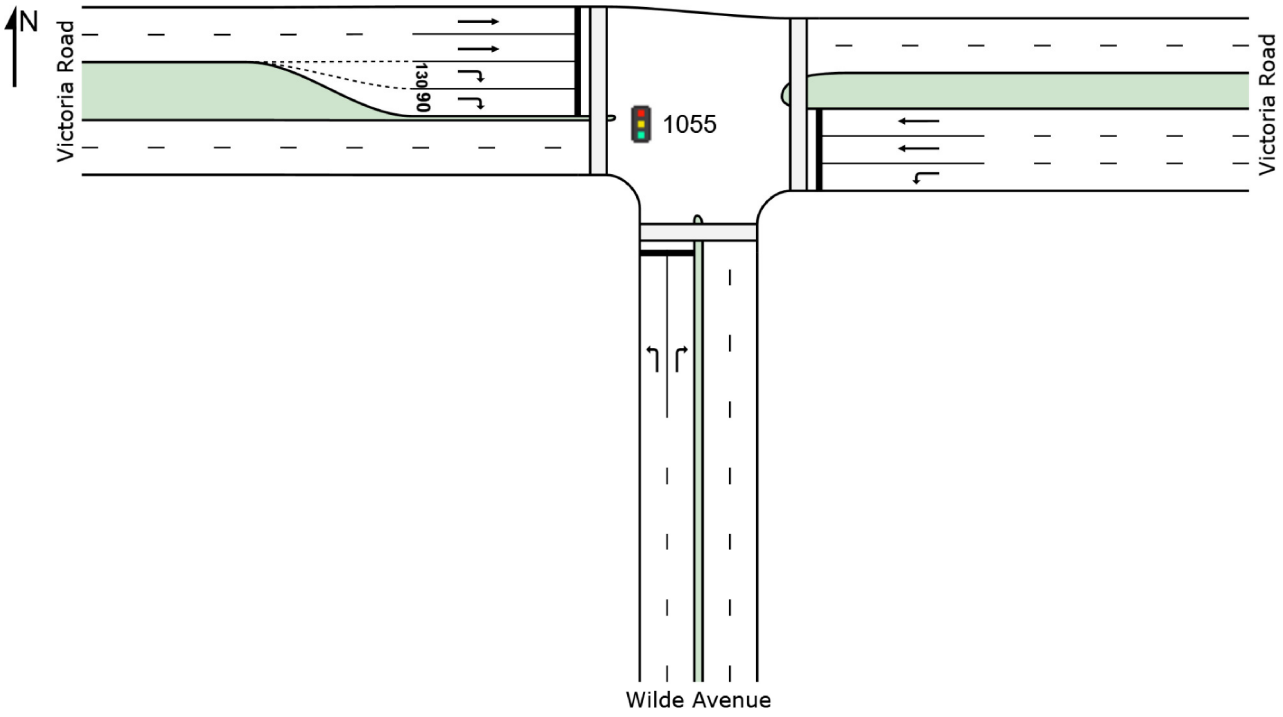
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	30.9	LOS D	0.1	0.1	0.72	0.72
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	28.8	LOS C	0.1	0.1	0.69	0.69
P4	West Full Crossing	53	30.2	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		211	36.0	LOS D			0.77	0.77

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

SITE LAYOUT

Site: 1055 [A12_Victoria-Wilde_EX_AM]

Victoria Road/ Wilde Avenue, North Parramatta
Signals - Fixed Time Isolated



Organisation: GTA CONSULTANTS | Created: Tuesday, 15 August 2017 11:09:53 AM
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MOVEMENT SUMMARY

Site: 1055 [A12_Victoria-Wilde_EX_AM]

Victoria Road/ Wilde Avenue, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wilde Avenue											
1	L2	138	21.4	0.139	14.9	LOS B	3.3	27.5	0.44	0.66	38.9
3	R2	274	7.3	0.716	53.2	LOS D	15.3	114.0	0.98	0.86	30.3
Approach		412	12.0	0.716	40.3	LOS C	15.3	114.0	0.80	0.79	32.1
East: Victoria Road											
4	L2	353	5.4	0.343	19.9	LOS B	10.7	78.7	0.57	0.75	42.2
5	T1	771	0.0	0.697	41.4	LOS C	20.2	141.4	0.95	0.83	32.5
Approach		1123	1.7	0.697	34.7	LOS C	20.2	141.4	0.83	0.80	35.5
West: Victoria Road											
11	T1	628	0.3	0.245	8.8	LOS A	7.3	51.4	0.44	0.38	50.9
12	R2	838	2.5	0.707	43.8	LOS D	21.5	153.9	0.94	0.86	27.0
Approach		1466	1.6	0.707	28.8	LOS C	21.5	153.9	0.72	0.65	34.7
All Vehicles		3001	3.1	0.716	32.6	LOS C	21.5	153.9	0.77	0.73	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.81	0.81
P2	East Full Crossing	53	47.8	LOS E	0.2	0.2	0.89	0.89
P4	West Full Crossing	53	47.8	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		158	45.0	LOS E			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.

MOVEMENT SUMMARY

Site: 1055 [A12_Victoria-Wilde_EX_PM]

Victoria Road/ Wilde Avenue, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wilde Avenue											
1	L2	317	11.6	0.288	14.6	LOS B	8.0	61.6	0.47	0.69	39.1
3	R2	685	2.9	0.807	35.3	LOS C	35.0	251.1	0.92	0.89	35.5
Approach		1002	5.7	0.807	28.8	LOS C	35.0	251.1	0.78	0.83	36.3
East: Victoria Road											
4	L2	307	6.5	0.216	8.7	LOS A	4.2	31.3	0.26	0.65	48.5
5	T1	824	0.1	0.819	49.6	LOS D	24.3	170.5	1.00	0.95	29.8
Approach		1132	1.9	0.819	38.5	LOS C	24.3	170.5	0.80	0.87	33.9
West: Victoria Road											
11	T1	873	0.0	0.548	28.9	LOS C	19.3	135.1	0.82	0.72	37.8
12	R2	271	9.7	0.779	68.2	LOS E	8.4	63.9	1.00	0.88	21.2
Approach		1143	2.3	0.779	38.2	LOS C	19.3	135.1	0.86	0.76	32.6
All Vehicles		3277	3.2	0.819	35.4	LOS C	35.0	251.1	0.81	0.82	34.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

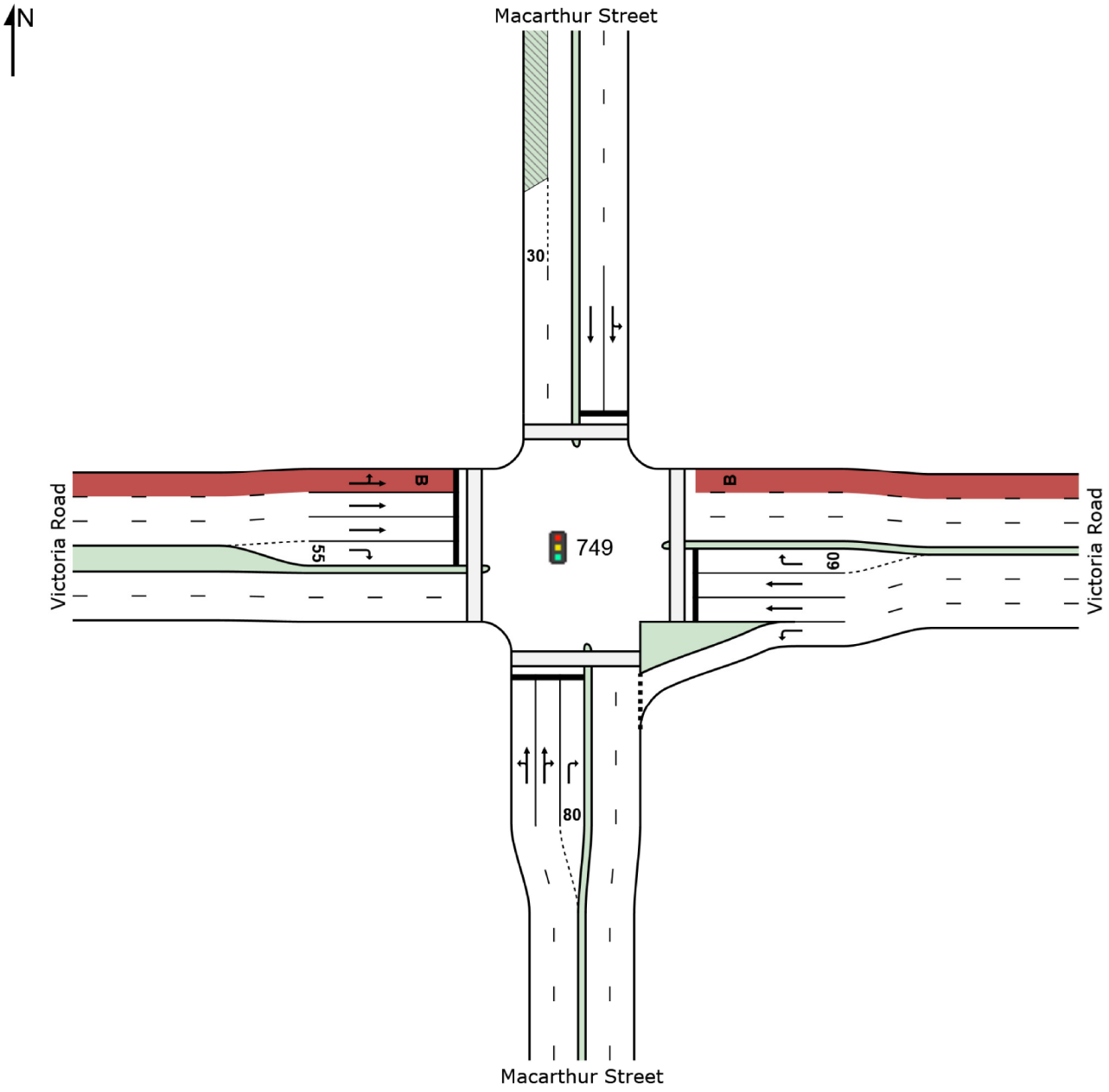
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	41.8	LOS E	0.1	0.1	0.84	0.84
P2	East Full Crossing	53	24.8	LOS C	0.1	0.1	0.64	0.64
P4	West Full Crossing	53	24.8	LOS C	0.1	0.1	0.64	0.64
All Pedestrians		158	30.4	LOS D			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.

SITE LAYOUT

Site: 749 [A13_Victoria-Macarthur_EX_AM]

Victoria Road/ Macarthur Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 749 [A13_Victoria-Macarthur_EX_AM]

Victoria Road/ Macarthur Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Macarthur Street											
1	L2	66	0.0	0.153	34.0	LOS C	3.9	27.6	0.72	0.71	36.7
2	T1	178	0.0	0.534	45.4	LOS D	10.3	72.2	0.91	0.78	23.1
3	R2	188	0.0	0.534	57.1	LOS E	10.3	72.2	0.97	0.80	25.0
Approach		433	0.0	0.534	48.8	LOS D	10.3	72.2	0.91	0.78	26.1
East: Victoria Road											
4	L2	435	0.5	0.299	7.4	LOS A	4.2	29.5	0.28	0.64	49.9
5	T1	885	2.1	0.524	24.3	LOS B	19.0	135.8	0.76	0.67	41.9
6	R2	81	1.3	0.252	52.1	LOS D	4.1	29.3	0.90	0.76	22.4
Approach		1401	1.6	0.524	20.7	LOS B	19.0	135.8	0.62	0.66	42.2
North: Macarthur Street											
7	L2	38	0.0	0.430	47.3	LOS D	5.4	38.0	0.96	0.79	24.3
8	T1	196	0.0	0.430	48.2	LOS D	6.5	45.4	0.96	0.77	22.8
Approach		234	0.0	0.430	48.1	LOS D	6.5	45.4	0.96	0.77	23.1
West: Victoria Road											
10	L2	19	0.0	0.083	34.9	LOS C	1.6	15.7	0.72	0.60	34.1
11	T1	687	3.1	0.528	33.5	LOS C	16.5	115.3	0.84	0.73	37.6
12	R2	56	0.0	0.515	68.6	LOS E	3.4	23.7	1.00	0.75	26.1
Approach		762	2.8	0.528	36.1	LOS C	16.5	115.3	0.85	0.72	36.4
All Vehicles		2829	1.5	0.534	31.4	LOS C	19.0	135.8	0.75	0.71	36.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov 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	South Full Crossing	53	26.1	LOS C	0.1	0.1	0.66	0.66
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	33.8	LOS D	0.1	0.1	0.75	0.75
P4	West Full Crossing	53	38.5	LOS D	0.1	0.1	0.80	0.80
All Pedestrians		211	38.2	LOS D			0.79	0.79

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

MOVEMENT SUMMARY

Site: 749 [A13_Victoria-Macarthur_EX_PM]

Victoria Road/ Macarthur Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Macarthur Street											
1	L2	67	0.0	0.235	33.6	LOS C	6.4	44.9	0.73	0.70	37.3
2	T1	544	0.0	0.823	41.2	LOS C	24.9	174.0	0.90	0.87	24.7
3	R2	211	0.0	0.800	64.8	LOS E	12.9	90.5	1.00	0.90	23.0
Approach		822	0.0	0.823	46.6	LOS D	24.9	174.0	0.91	0.86	25.2
East: Victoria Road											
4	L2	348	0.6	0.257	8.3	LOS A	4.2	29.7	0.32	0.65	49.0
5	T1	783	2.4	0.605	32.4	LOS C	20.2	144.4	0.85	0.74	38.1
6	R2	196	0.5	0.794	65.2	LOS E	12.0	84.6	1.00	0.89	19.5
Approach		1327	1.7	0.794	30.9	LOS C	20.2	144.4	0.74	0.74	36.5
North: Macarthur Street											
7	L2	11	0.0	0.609	59.7	LOS E	9.3	64.9	0.99	0.82	21.4
8	T1	324	0.0	0.609	54.2	LOS D	9.5	66.4	0.99	0.81	21.4
Approach		335	0.0	0.609	54.4	LOS D	9.5	66.4	0.99	0.81	21.4
West: Victoria Road											
10	L2	5	0.0	0.048	30.3	LOS C	0.8	9.8	0.65	0.52	36.8
11	T1	1158	1.6	0.814	37.5	LOS C	33.1	232.2	0.94	0.87	36.0
12	R2	113	0.0	0.606	36.1	LOS C	3.6	25.1	1.00	0.79	35.4
Approach		1276	1.5	0.814	37.3	LOS C	33.1	232.2	0.94	0.86	36.0
All Vehicles		3760	1.1	0.823	38.6	LOS C	33.1	232.2	0.87	0.82	32.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

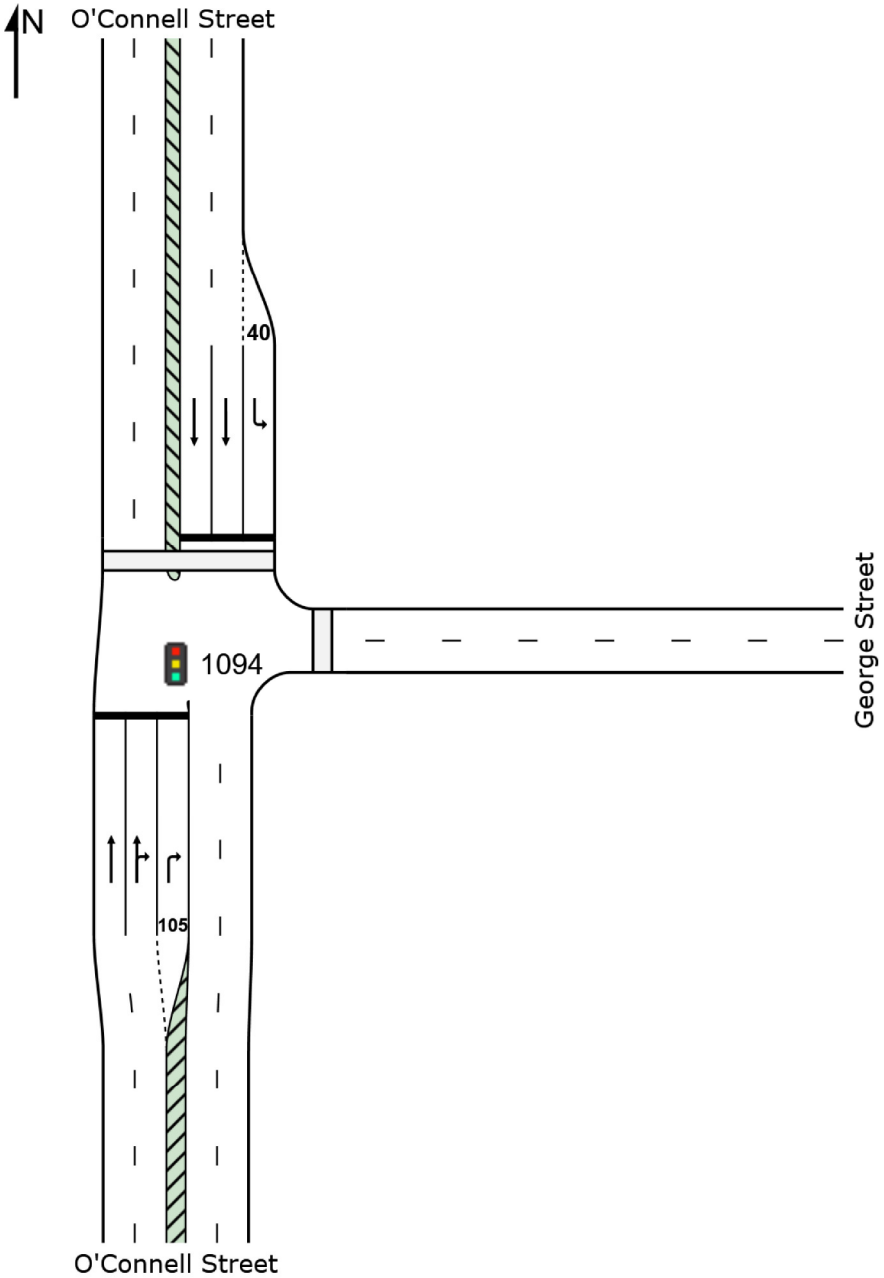
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	33.8	LOS D	0.1	0.1	0.75	0.75
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	30.2	LOS D	0.1	0.1	0.71	0.71
P4	West Full Crossing	53	38.5	LOS D	0.1	0.1	0.80	0.80
All Pedestrians		211	39.2	LOS D			0.80	0.80

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

SITE LAYOUT

Site: 1094 [A15_O'Connell-George_EX_AM]

O'Connell Street/ George Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1094 [A15_O'Connell-George_EX_AM]

O'Connell Street/ George Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
2	T1	1581	1.6	0.650	6.6	LOS A	18.7	132.8	0.56	0.51	49.8
3	R2	452	0.0	0.648	27.9	LOS B	14.7	103.0	0.88	0.84	31.8
Approach		2033	1.2	0.650	11.3	LOS A	18.7	132.8	0.63	0.58	43.5
North: O'Connell Street											
7	L2	132	1.6	0.151	18.3	LOS B	2.9	20.5	0.60	0.72	41.0
8	T1	1141	0.4	0.646	16.8	LOS B	17.7	124.2	0.80	0.71	39.5
Approach		1273	0.5	0.646	17.0	LOS B	17.7	124.2	0.78	0.71	39.7
All Vehicles		3305	1.0	0.650	13.5	LOS A	18.7	132.8	0.69	0.63	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	13.8	LOS B	0.1	0.1	0.59	0.59
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		105	24.1	LOS C			0.76	0.76

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

MOVEMENT SUMMARY

Site: 1094 [A15_O'Connell-George_EX_PM]

O'Connell Street/ George Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Street											
2	T1	1185	0.9	0.495	6.7	LOS A	12.1	85.2	0.51	0.45	49.8
3	R2	152	0.0	0.495	39.2	LOS C	9.4	66.6	0.95	0.79	27.7
Approach		1337	0.8	0.495	10.3	LOS A	12.1	85.2	0.56	0.49	44.9
North: O'Connell Street											
7	L2	183	1.1	0.145	10.2	LOS A	2.4	17.3	0.37	0.67	45.7
8	T1	1316	0.1	0.503	6.3	LOS A	12.4	87.1	0.51	0.46	50.2
Approach		1499	0.2	0.503	6.8	LOS A	12.4	87.1	0.49	0.49	49.3
All Vehicles		2836	0.5	0.503	8.5	LOS A	12.4	87.1	0.52	0.49	47.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

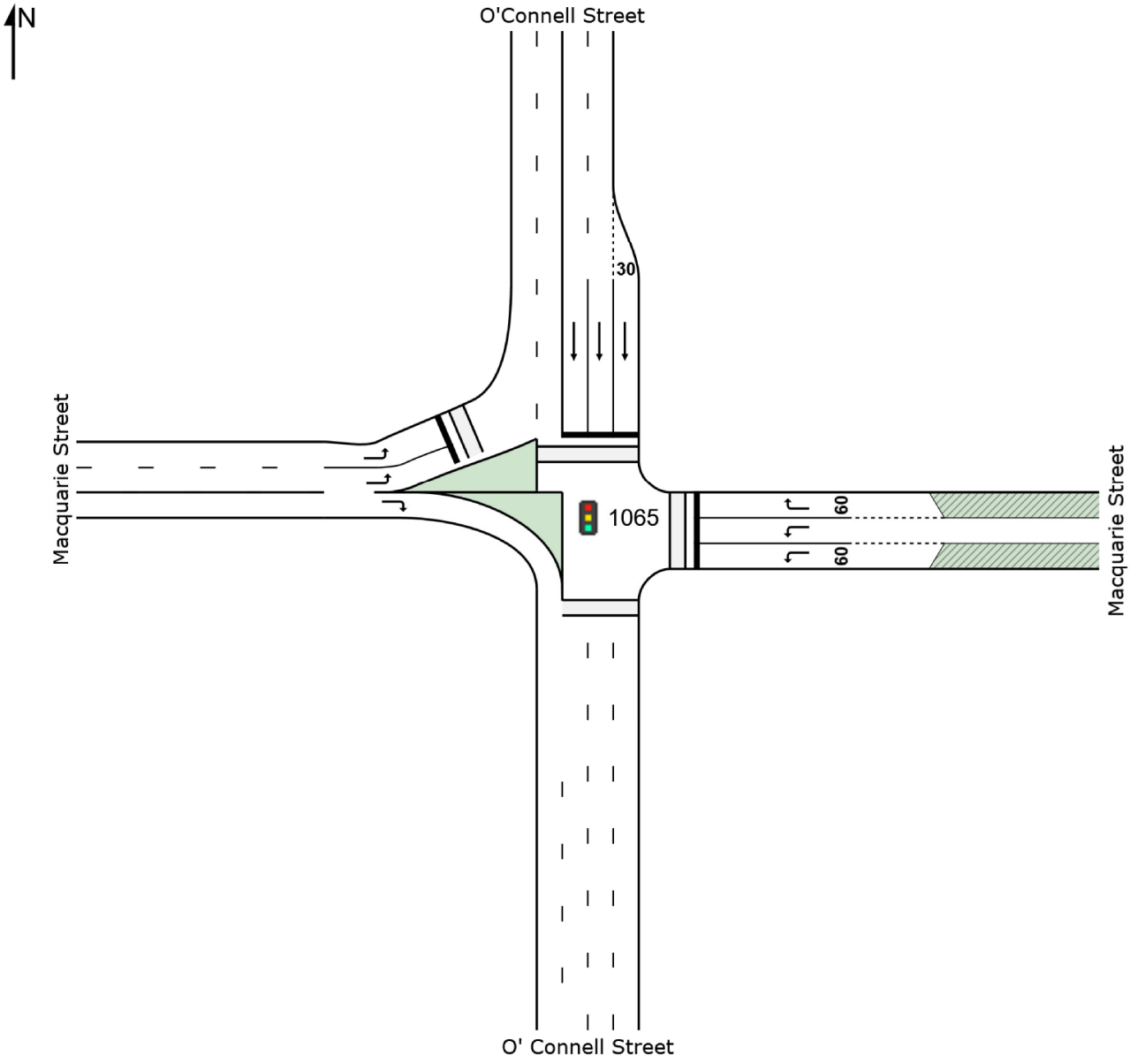
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	5.6	LOS A	0.0	0.0	0.38	0.38
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		105	20.0	LOS B			0.65	0.65

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

SITE LAYOUT

Site: 1065 [A16_O'Connell-Macquarie_EX_AM]

O'Connell Street/ Macquarie Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1065 [A16_O'Connell-Macquarie_EX_AM]

O'Connell Street/ Macquarie Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street											
4	L2	155	0.0	0.303	39.4	LOS C	2.8	19.8	0.94	0.76	28.9
6	R2	135	3.9	0.663	44.4	LOS D	5.5	39.5	1.00	0.84	16.9
Approach		289	1.8	0.663	41.7	LOS C	5.5	39.5	0.97	0.80	23.9
North: O'Connell Street											
8	T1	1135	0.4	0.398	12.0	LOS A	9.5	66.7	0.63	0.55	46.1
Approach		1135	0.4	0.398	12.0	LOS A	9.5	66.7	0.63	0.55	46.1
West: Macquarie Street											
10	L2	1908	1.0	0.702	11.7	LOS A	20.1	142.1	0.59	0.76	38.0
12	R2	377	0.0	0.219	6.0	LOS A	1.4	9.5	0.10	0.66	49.4
Approach		2285	0.9	0.702	10.8	LOS A	20.1	142.1	0.51	0.75	40.6
All Vehicles		3709	0.8	0.702	13.6	LOS A	20.1	142.1	0.58	0.69	40.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	12.7	LOS B	0.1	0.1	0.56	0.56
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4S	West Slip/Bypass Lane Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	28.9	LOS C			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.

MOVEMENT SUMMARY

Site: 1065 [A16_O'Connell-Macquarie_EX_PM]

O'Connell Street/ Macquarie Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
East: Macquarie Street											
4	L2	439	0.0	0.556	35.8	LOS C	7.9	55.2	0.94	0.81	30.2
6	R2	244	2.2	0.628	36.5	LOS C	9.0	64.0	0.96	0.83	19.2
Approach		683	0.8	0.628	36.0	LOS C	9.0	64.0	0.95	0.82	27.0
North: O'Connell Street											
8	T1	1316	0.1	0.648	18.6	LOS B	16.7	117.0	0.80	0.70	40.9
Approach		1316	0.1	0.648	18.6	LOS B	16.7	117.0	0.80	0.70	40.9
West: Macquarie Street											
10	L2	1097	0.5	0.465	13.6	LOS A	11.0	77.0	0.55	0.73	35.9
12	R2	238	0.4	0.139	6.0	LOS A	0.8	5.5	0.09	0.65	49.4
Approach		1335	0.5	0.465	12.2	LOS A	11.0	77.0	0.47	0.72	39.1
All Vehicles		3334	0.4	0.648	19.6	LOS B	16.7	117.0	0.70	0.73	36.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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

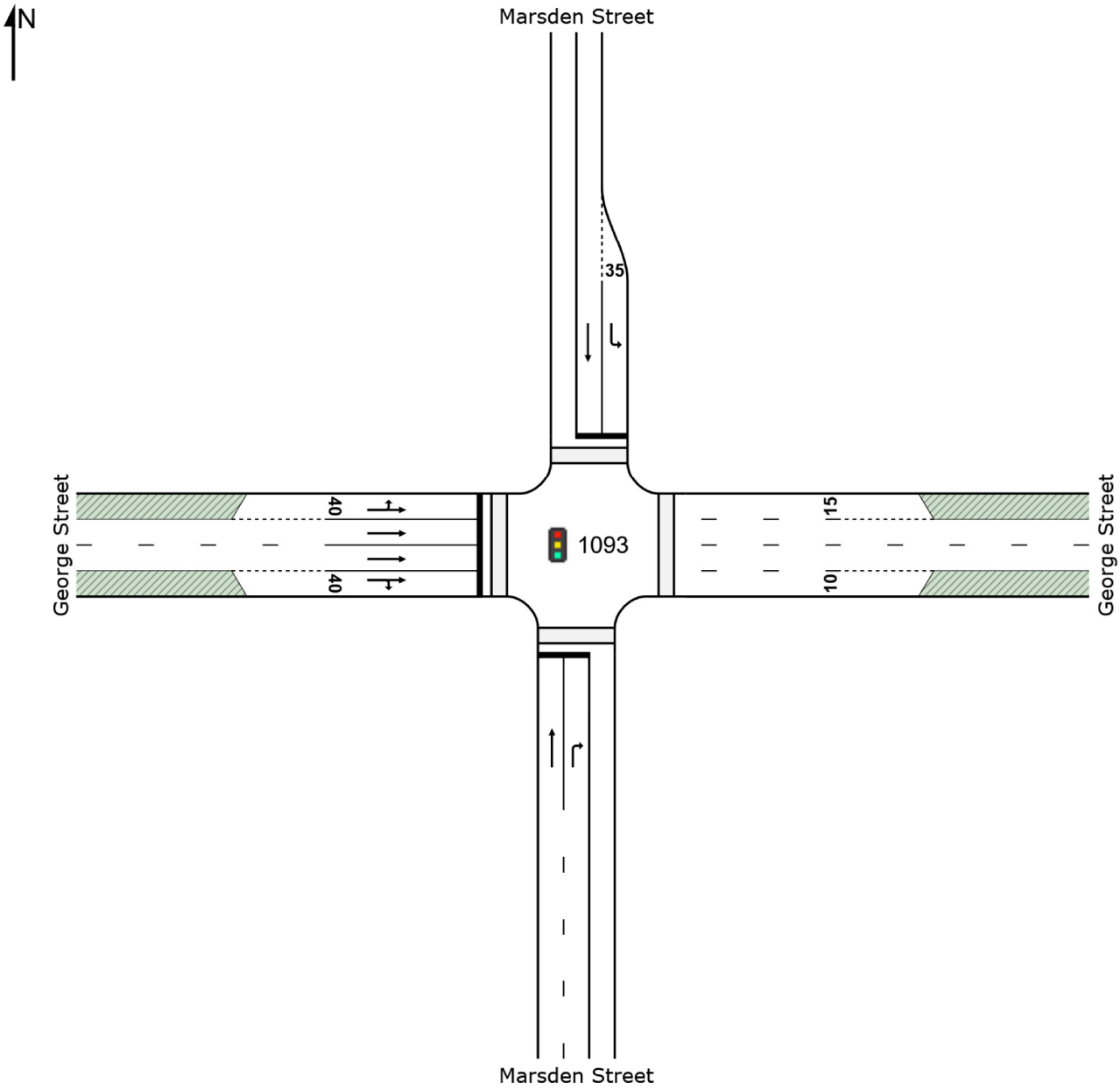
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	17.6	LOS B	0.1	0.1	0.66	0.66
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4S	West Slip/Bypass Lane Crossing	53	28.1	LOS C	0.1	0.1	0.84	0.84
All Pedestrians		211	28.6	LOS C			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.

SITE LAYOUT

Site: 1093 [A18_George-Marsden_EX_AM]

George Street/ Marsden Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1093 [A18_George-Marsden_EX_AM]

George Street/ Marsden Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street											
2	T1	484	0.4	0.383	7.0	LOS A	8.7	61.3	0.50	0.44	37.7
3	R2	256	0.0	0.402	13.8	LOS A	4.2	29.5	0.72	0.77	37.8
Approach		740	0.3	0.402	9.3	LOS A	8.7	61.3	0.58	0.56	37.8
North: Marsden Street											
7	L2	31	0.0	0.045	22.2	LOS B	0.8	5.4	0.67	0.67	33.4
8	T1	371	0.0	0.499	20.1	LOS B	11.0	77.0	0.81	0.69	25.8
Approach		401	0.0	0.499	20.2	LOS B	11.0	77.0	0.80	0.69	26.7
West: George Street											
10	L2	68	0.0	0.211	35.9	LOS C	2.4	16.5	0.89	0.74	18.4
11	T1	384	0.5	0.494	31.5	LOS C	6.9	48.2	0.94	0.77	30.2
12	R2	64	0.0	0.198	35.8	LOS C	2.2	15.4	0.89	0.74	19.2
Approach		517	0.4	0.494	32.6	LOS C	6.9	48.2	0.93	0.76	27.9
All Vehicles		1658	0.3	0.499	19.2	LOS B	11.0	77.0	0.74	0.65	31.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	31.6	LOS D	0.1	0.1	0.89	0.89
P2	East Full Crossing	53	21.8	LOS C	0.1	0.1	0.74	0.74
P3	North Full Crossing	53	31.6	LOS D	0.1	0.1	0.89	0.89
P4	West Full Crossing	53	9.0	LOS A	0.1	0.1	0.48	0.48
All Pedestrians		211	23.5	LOS C			0.75	0.75

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

MOVEMENT SUMMARY

Site: 1093 [A18_George-Marsden_EX_PM]

George Street/ Marsden Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street											
2	T1	444	0.2	0.315	4.2	LOS A	6.1	42.7	0.38	0.34	41.8
3	R2	372	0.0	0.577	14.0	LOS A	6.3	44.2	0.80	0.81	37.7
Approach		816	0.1	0.577	8.6	LOS A	6.3	44.2	0.57	0.55	39.0
North: Marsden Street											
7	L2	15	0.0	0.019	18.7	LOS B	0.3	2.3	0.60	0.64	35.2
8	T1	503	0.0	0.581	17.6	LOS B	14.6	102.2	0.79	0.70	27.4
Approach		518	0.0	0.581	17.6	LOS B	14.6	102.2	0.79	0.70	27.8
West: George Street											
10	L2	64	0.0	0.346	42.8	LOS D	2.5	17.3	0.97	0.75	16.4
11	T1	235	0.9	0.484	36.8	LOS C	4.5	31.6	0.98	0.77	28.3
12	R2	98	0.0	0.527	43.8	LOS D	3.9	27.1	0.99	0.77	17.0
Approach		397	0.5	0.527	39.5	LOS C	4.5	31.6	0.98	0.77	24.2
All Vehicles		1731	0.2	0.581	18.4	LOS B	14.6	102.2	0.73	0.65	31.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

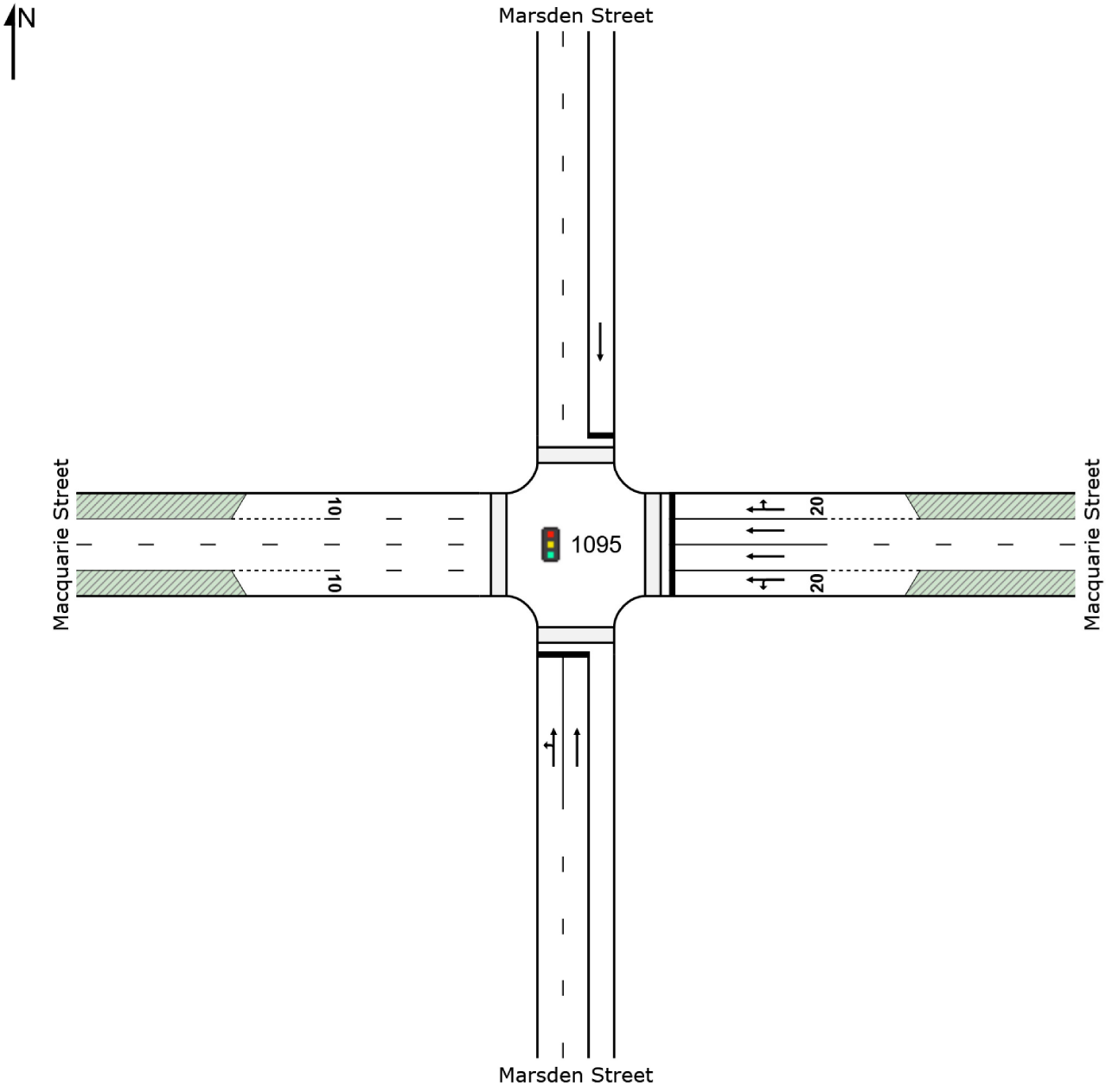
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	18.3	LOS B	0.1	0.1	0.68	0.68
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	6.4	LOS A	0.0	0.0	0.40	0.40
All Pedestrians		211	23.3	LOS C			0.73	0.73

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

SITE LAYOUT

Site: 1095 [A19_Macquarie-Marsden_EX_AM]

Macquarie Street/ Marsden Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1095 [A19_Macquarie-Marsden_EX_AM]

Macquarie Street/ Marsden Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street											
1	L2	108	4.9	0.402	10.3	LOS A	4.8	34.1	0.62	0.59	42.5
2	T1	741	0.0	0.402	5.7	LOS A	5.0	34.8	0.62	0.55	37.2
Approach		849	0.6	0.402	6.3	LOS A	5.0	34.8	0.62	0.56	38.5
East: Macquarie Street											
4	L2	51	0.0	0.218	23.0	LOS B	1.0	6.8	0.93	0.72	18.0
5	T1	205	0.0	0.351	17.8	LOS B	1.9	13.6	0.94	0.72	35.5
6	R2	19	11.1	0.088	23.0	LOS B	0.4	2.7	0.91	0.69	21.3
Approach		275	0.8	0.351	19.1	LOS B	1.9	13.6	0.93	0.72	32.6
North: Marsden Street											
8	T1	435	0.0	0.405	5.7	LOS A	5.0	35.1	0.62	0.53	38.0
Approach		435	0.0	0.405	5.7	LOS A	5.0	35.1	0.62	0.53	38.0
All Vehicles		1559	0.5	0.405	8.4	LOS A	5.0	35.1	0.67	0.58	36.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P2	East Full Crossing	53	9.8	LOS A	0.0	0.0	0.70	0.70
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	9.8	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		211	12.2	LOS B			0.78	0.78

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

MOVEMENT SUMMARY

Site: 1095 [A19_Macquarie-Marsden_EX_PM]

Macquarie Street/ Marsden Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 35 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street											
1	L2	102	5.2	0.523	12.9	LOS A	5.6	39.3	0.78	0.70	40.5
2	T1	758	0.1	0.523	8.3	LOS A	5.7	40.1	0.78	0.68	33.8
Approach		860	0.7	0.523	8.8	LOS A	5.7	40.1	0.78	0.69	35.2
East: Macquarie Street											
4	L2	260	0.0	0.700	21.0	LOS B	4.7	33.2	0.98	0.91	19.0
5	T1	484	0.0	0.507	13.5	LOS A	3.6	25.3	0.91	0.74	38.1
6	R2	12	0.0	0.101	17.0	LOS B	0.6	4.3	0.82	0.64	27.6
Approach		756	0.0	0.700	16.1	LOS B	4.7	33.2	0.93	0.80	33.3
North: Marsden Street											
8	T1	626	0.0	0.749	11.5	LOS A	10.5	73.3	0.90	0.89	30.6
Approach		626	0.0	0.749	11.5	LOS A	10.5	73.3	0.90	0.89	30.6
All Vehicles		2242	0.3	0.749	12.0	LOS A	10.5	73.3	0.87	0.78	33.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

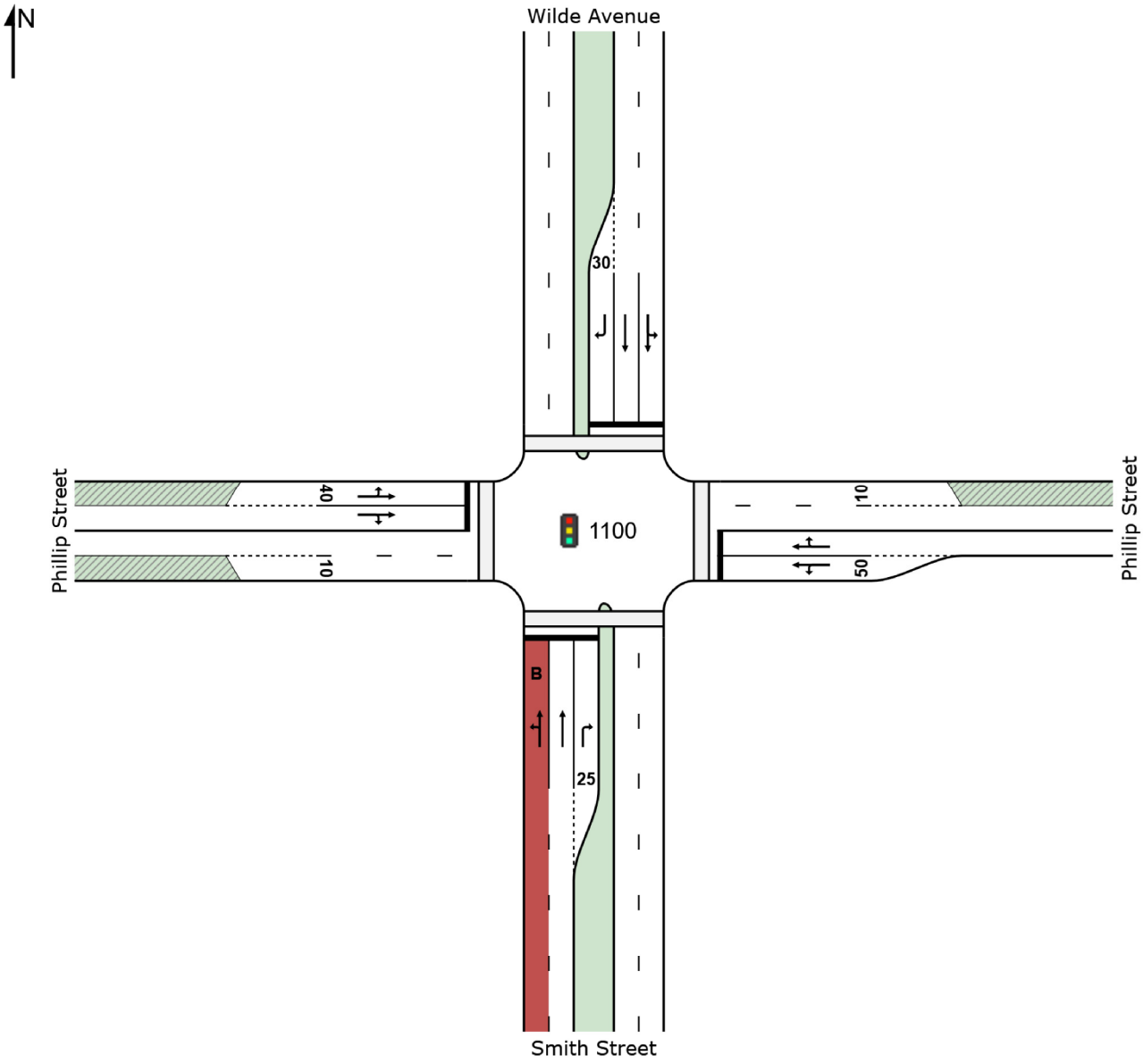
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	12.0	LOS B	0.0	0.0	0.83	0.83
P2	East Full Crossing	53	12.0	LOS B	0.0	0.0	0.83	0.83
P3	North Full Crossing	53	12.0	LOS B	0.0	0.0	0.83	0.83
P4	West Full Crossing	53	12.0	LOS B	0.0	0.0	0.83	0.83
All Pedestrians		211	12.0	LOS B			0.83	0.83

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

SITE LAYOUT

Site: 1100 [A20_Phillip-Smith_EX_AM]

Phillip Street/ Smith Street/ Wilde Avenue, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1100 [A20_Phillip-Smith_EX_AM]

Phillip Street/ Smith Street/ Wilde Avenue, Parramatta
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Smith Street											
1	L2	23	0.0	0.498	45.4	LOS D	3.0	33.8	0.98	0.76	18.8
2	T1	214	23.2	0.718	42.1	LOS C	7.1	49.7	1.00	0.85	24.7
3	R2	7	0.0	0.026	20.9	LOS B	0.2	1.1	0.84	0.65	28.9
Approach		244	20.3	0.718	41.6	LOS C	7.1	49.7	0.99	0.84	24.3
East: Phillip Street											
4	L2	23	0.0	0.120	38.8	LOS C	1.1	8.0	0.91	0.69	22.6
5	T1	65	0.0	0.601	38.3	LOS C	6.4	44.9	0.98	0.80	23.8
6	R2	99	0.0	0.601	42.1	LOS C	6.4	44.9	0.99	0.81	27.9
Approach		187	0.0	0.601	40.4	LOS C	6.4	44.9	0.97	0.79	26.0
North: Wilde Avenue											
7	L2	467	0.0	0.793	33.3	LOS C	21.6	152.8	0.95	0.91	30.4
8	T1	532	7.5	0.793	27.3	LOS B	21.6	152.8	0.88	0.86	29.9
9	R2	176	0.0	0.241	16.9	LOS B	3.8	26.7	0.71	0.73	35.3
Approach		1175	3.4	0.793	28.1	LOS B	21.6	152.8	0.88	0.86	30.8
West: Phillip Street											
10	L2	100	0.0	0.257	11.0	LOS A	1.3	9.1	0.61	0.65	37.7
11	T1	147	3.6	0.832	47.3	LOS D	7.8	55.8	1.00	1.02	22.3
12	R2	20	0.0	0.832	50.6	LOS D	7.8	55.8	1.00	1.02	17.4
Approach		267	2.0	0.832	34.0	LOS C	7.8	55.8	0.86	0.88	26.3
All Vehicles		1874	5.1	0.832	32.0	LOS C	21.6	152.8	0.90	0.85	28.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	22.7	LOS C	0.1	0.1	0.73	0.73
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	33.3	LOS D			0.88	0.88

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

MOVEMENT SUMMARY

Site: 1100 [A20_Phillip-Smith_EX_PM]

Phillip Street/ Smith Street/ Wilde Avenue, Parramatta
Signals - Fixed Time Isolated Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Smith Street											
1	L2	14	0.0	0.182	25.7	LOS B	1.9	22.7	0.77	0.62	25.9
2	T1	491	11.4	0.873	34.2	LOS C	17.7	123.9	0.93	1.00	27.5
3	R2	83	0.0	0.197	18.7	LOS B	1.8	12.6	0.78	0.72	29.9
Approach		587	9.5	0.873	31.7	LOS C	17.7	123.9	0.91	0.95	27.7
East: Phillip Street											
4	L2	83	0.0	0.240	32.2	LOS C	2.7	18.7	0.89	0.74	24.2
5	T1	48	0.0	0.887	43.1	LOS D	13.9	97.8	1.00	1.11	22.6
6	R2	267	0.4	0.887	46.5	LOS D	13.9	97.8	1.00	1.11	26.6
Approach		399	0.3	0.887	43.1	LOS D	13.9	97.8	0.98	1.04	25.8
North: Wilde Avenue											
7	L2	239	0.0	0.417	14.5	LOS A	4.7	33.8	0.78	0.75	37.4
8	T1	246	18.8	0.417	21.7	LOS B	6.2	50.4	0.85	0.72	32.5
9	R2	89	0.0	0.291	21.0	LOS B	2.0	13.9	0.88	0.74	33.5
Approach		575	8.1	0.417	18.6	LOS B	6.2	50.4	0.82	0.74	34.9
West: Phillip Street											
10	L2	245	0.0	0.825	26.5	LOS B	6.2	43.1	1.00	0.97	30.7
11	T1	101	4.2	0.779	42.0	LOS C	4.8	34.6	1.00	0.95	23.4
12	R2	17	0.0	0.779	45.3	LOS D	4.8	34.6	1.00	0.95	18.6
Approach		363	1.2	0.825	31.7	LOS C	6.2	43.1	1.00	0.96	27.9
All Vehicles		1924	5.6	0.887	30.2	LOS C	17.7	123.9	0.91	0.91	29.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

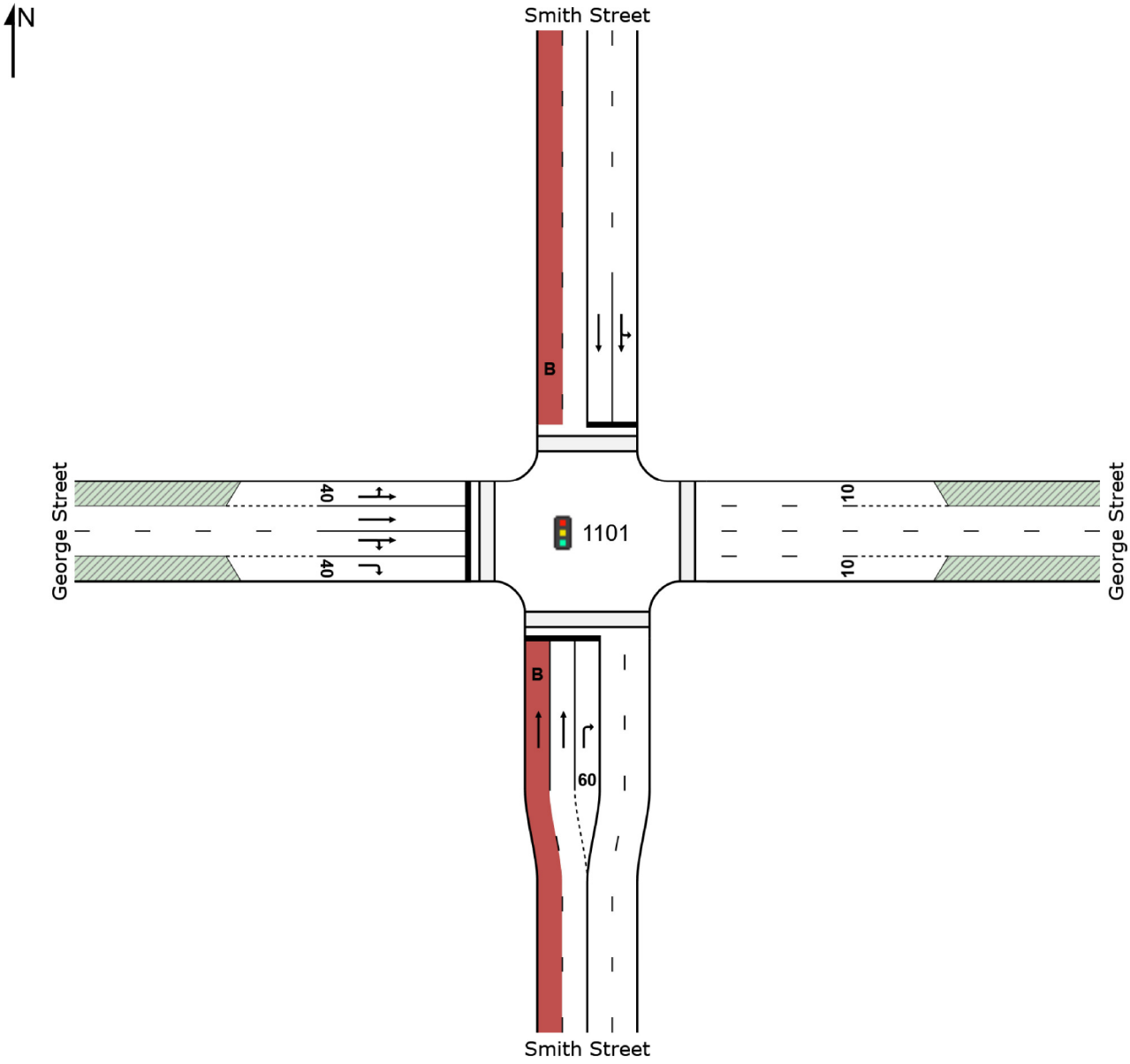
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	31.8	LOS D	0.1	0.1	0.92	0.92
P2	East Full Crossing	53	27.4	LOS C	0.1	0.1	0.86	0.86
P3	North Full Crossing	53	31.8	LOS D	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	25.7	LOS C	0.1	0.1	0.83	0.83
All Pedestrians		211	29.2	LOS C			0.88	0.88

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

SITE LAYOUT

Site: 1101 [A21_George-Smith_EX_AM]

George Street/ Smith Street - Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1101 [A21_George-Smith_EX_AM]

George Street/ Smith Street - Parramatta
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Smith Street											
2	T1	213	23.3	0.177	17.5	LOS B	5.0	34.7	0.60	0.49	26.4
3	R2	160	0.0	0.450	26.1	LOS B	5.3	37.2	0.82	0.76	31.5
Approach		373	13.3	0.450	21.2	LOS B	5.3	37.2	0.70	0.61	29.4
North: Smith Street											
7	L2	131	0.0	0.449	34.5	LOS C	11.9	86.8	0.82	0.75	29.1
8	T1	442	8.8	0.449	30.0	LOS C	11.9	86.8	0.82	0.72	19.4
Approach		573	6.8	0.449	31.0	LOS C	11.9	89.4	0.82	0.73	22.5
West: George Street											
10	L2	34	0.0	0.095	44.2	LOS D	1.5	10.5	0.86	0.71	19.3
11	T1	323	0.0	0.434	42.9	LOS D	7.8	54.4	0.93	0.76	28.3
12	R2	60	3.5	0.173	45.1	LOS D	2.7	19.6	0.87	0.74	19.4
Approach		417	0.5	0.434	43.3	LOS D	7.8	54.4	0.92	0.75	26.7
All Vehicles		1362	6.6	0.450	32.1	LOS C	11.9	89.4	0.82	0.70	25.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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	South Full Crossing	53	48.3	LOS E	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	45.6	LOS E	0.1	0.1	0.91	0.91
P3	North Full Crossing	53	45.6	LOS E	0.1	0.1	0.91	0.91
P4	West Full Crossing	53	45.6	LOS E	0.1	0.1	0.91	0.91
PD	Diagonal Crossing	53	49.3	LOS E	0.1	0.0	0.95	0.95
All Pedestrians		263	46.9	LOS E			0.92	0.92

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

MOVEMENT SUMMARY

Site: 1101 [A21_George-Smith_EX_PM]

George Street/ Smith Street - Parramatta
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Smith Street											
2	T1	353	15.5	0.358	22.3	LOS B	10.7	74.9	0.71	0.60	23.4
3	R2	118	0.0	0.297	31.1	LOS C	4.5	31.7	0.75	0.76	29.5
Approach		471	11.6	0.358	24.5	LOS B	10.7	74.9	0.72	0.64	25.7
North: Smith Street											
7	L2	116	0.0	0.231	25.9	LOS B	6.0	44.7	0.67	0.68	32.2
8	T1	233	20.4	0.231	21.3	LOS B	6.0	44.7	0.67	0.59	23.4
Approach		348	13.6	0.231	22.9	LOS B	6.0	47.3	0.67	0.62	27.5
West: George Street											
10	L2	159	0.0	0.362	42.6	LOS D	7.2	50.3	0.88	0.78	19.7
11	T1	307	0.0	0.333	37.7	LOS C	6.9	48.1	0.87	0.71	29.8
12	R2	74	2.9	0.171	40.7	LOS C	3.2	22.6	0.83	0.74	20.6
Approach		540	0.4	0.362	39.6	LOS C	7.2	50.3	0.87	0.74	26.2
All Vehicles		1359	7.7	0.362	30.1	LOS C	10.7	74.9	0.77	0.67	26.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

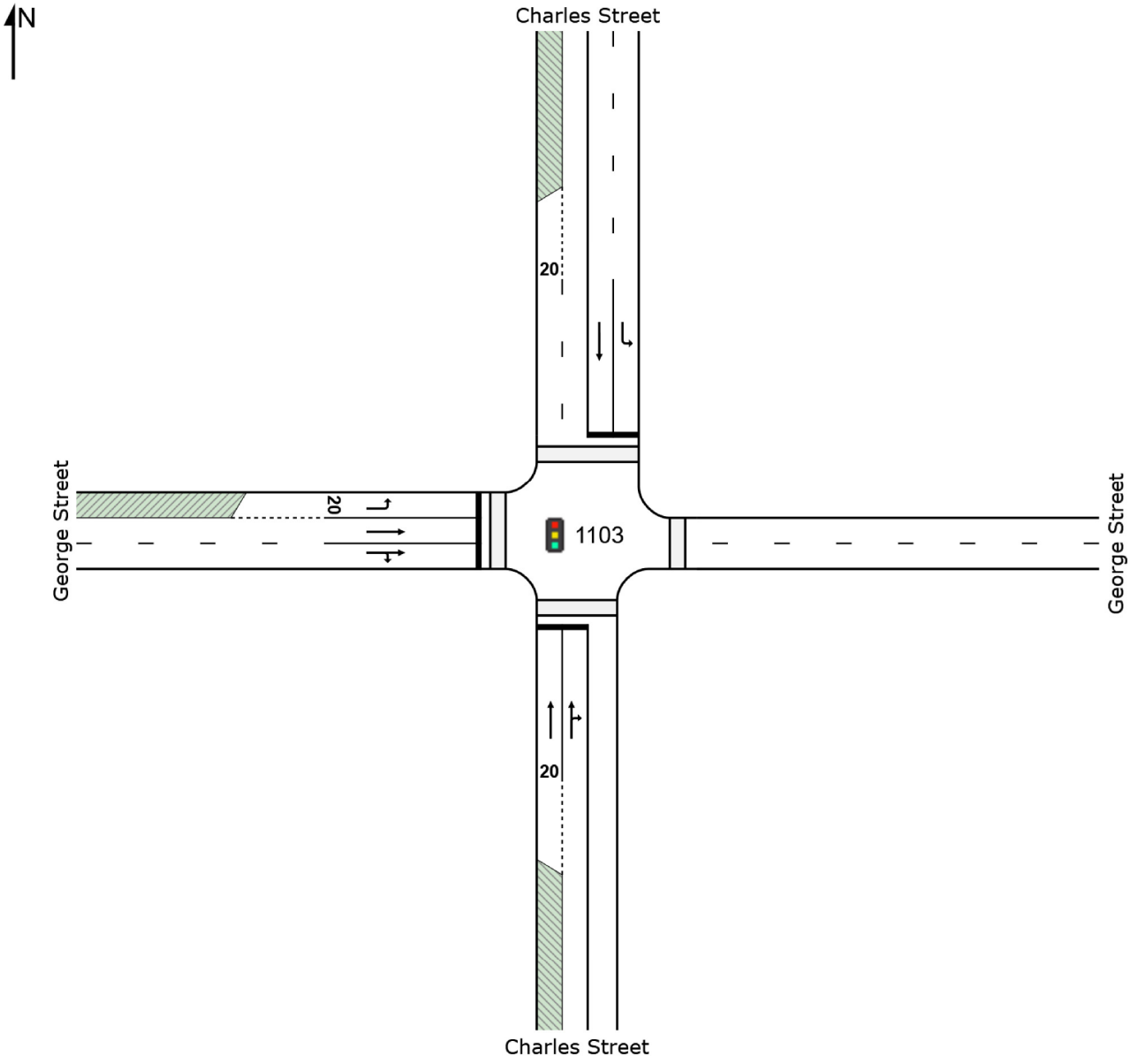
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	48.3	LOS E	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	45.6	LOS E	0.1	0.1	0.91	0.91
P3	North Full Crossing	53	45.6	LOS E	0.1	0.1	0.91	0.91
P4	West Full Crossing	53	45.6	LOS E	0.1	0.1	0.91	0.91
PD	Diagonal Crossing	53	49.3	LOS E	0.1	0.0	0.95	0.95
All Pedestrians		263	46.9	LOS E			0.92	0.92

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

SITE LAYOUT

Site: 1103 [A22_George-Charles_EX_AM]

George Street/ Charles Street, Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1103 [A22_George-Charles_EX_AM]

George Street/ Charles Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 45 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Charles Street											
2	T1	384	0.0	0.443	7.9	LOS A	5.3	36.8	0.62	0.63	35.8
3	R2	93	0.0	0.443	11.8	LOS A	5.3	36.8	0.65	0.67	40.8
Approach		477	0.0	0.443	8.7	LOS A	5.3	36.8	0.62	0.64	36.8
North: Charles Street											
7	L2	119	0.9	0.126	9.7	LOS A	1.4	9.7	0.55	0.65	39.3
8	T1	172	3.1	0.168	5.9	LOS A	2.0	14.0	0.54	0.44	38.0
Approach		291	2.2	0.168	7.4	LOS A	2.0	14.0	0.54	0.53	38.7
West: George Street											
10	L2	44	0.0	0.134	22.3	LOS B	0.9	6.0	0.87	0.71	30.9
11	T1	182	1.2	0.395	17.9	LOS B	3.1	21.9	0.91	0.73	37.5
12	R2	107	0.0	0.395	22.5	LOS B	2.8	19.5	0.91	0.76	28.1
Approach		334	0.6	0.395	19.9	LOS B	3.1	21.9	0.91	0.74	34.2
All Vehicles		1101	0.8	0.443	11.8	LOS A	5.3	36.8	0.69	0.64	36.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	16.9	LOS B	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	7.5	LOS A	0.0	0.0	0.58	0.58
P3	North Full Crossing	53	16.9	LOS B	0.1	0.1	0.87	0.87
P4	West Full Crossing	53	8.7	LOS A	0.0	0.0	0.62	0.62
All Pedestrians		211	12.5	LOS B			0.73	0.73

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

MOVEMENT SUMMARY

Site: 1103 [A22_George-Charles_EX_PM]

George Street/ Charles Street, Parramatta
Signals - Fixed Time Isolated Cycle Time = 50 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Charles Street											
2	T1	137	0.0	0.396	16.1	LOS B	3.3	23.5	0.80	0.69	31.0
3	R2	78	1.4	0.396	21.2	LOS B	3.3	23.5	0.85	0.76	34.6
Approach		215	0.5	0.396	17.9	LOS B	3.3	23.5	0.82	0.72	32.4
North: Charles Street											
7	L2	226	0.0	0.381	18.1	LOS B	4.4	30.9	0.82	0.76	35.7
8	T1	179	2.9	0.275	13.3	LOS A	3.3	23.4	0.77	0.63	33.2
Approach		405	1.3	0.381	15.9	LOS B	4.4	30.9	0.80	0.70	34.9
West: George Street											
10	L2	54	0.0	0.072	14.6	LOS B	0.8	5.7	0.64	0.68	34.4
11	T1	477	0.0	0.393	11.1	LOS A	5.5	38.4	0.74	0.65	41.2
12	R2	149	0.0	0.393	15.7	LOS B	5.3	37.4	0.74	0.70	33.5
Approach		680	0.0	0.393	12.4	LOS A	5.5	38.4	0.73	0.66	39.4
All Vehicles		1300	0.5	0.396	14.4	LOS A	5.5	38.4	0.76	0.68	36.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

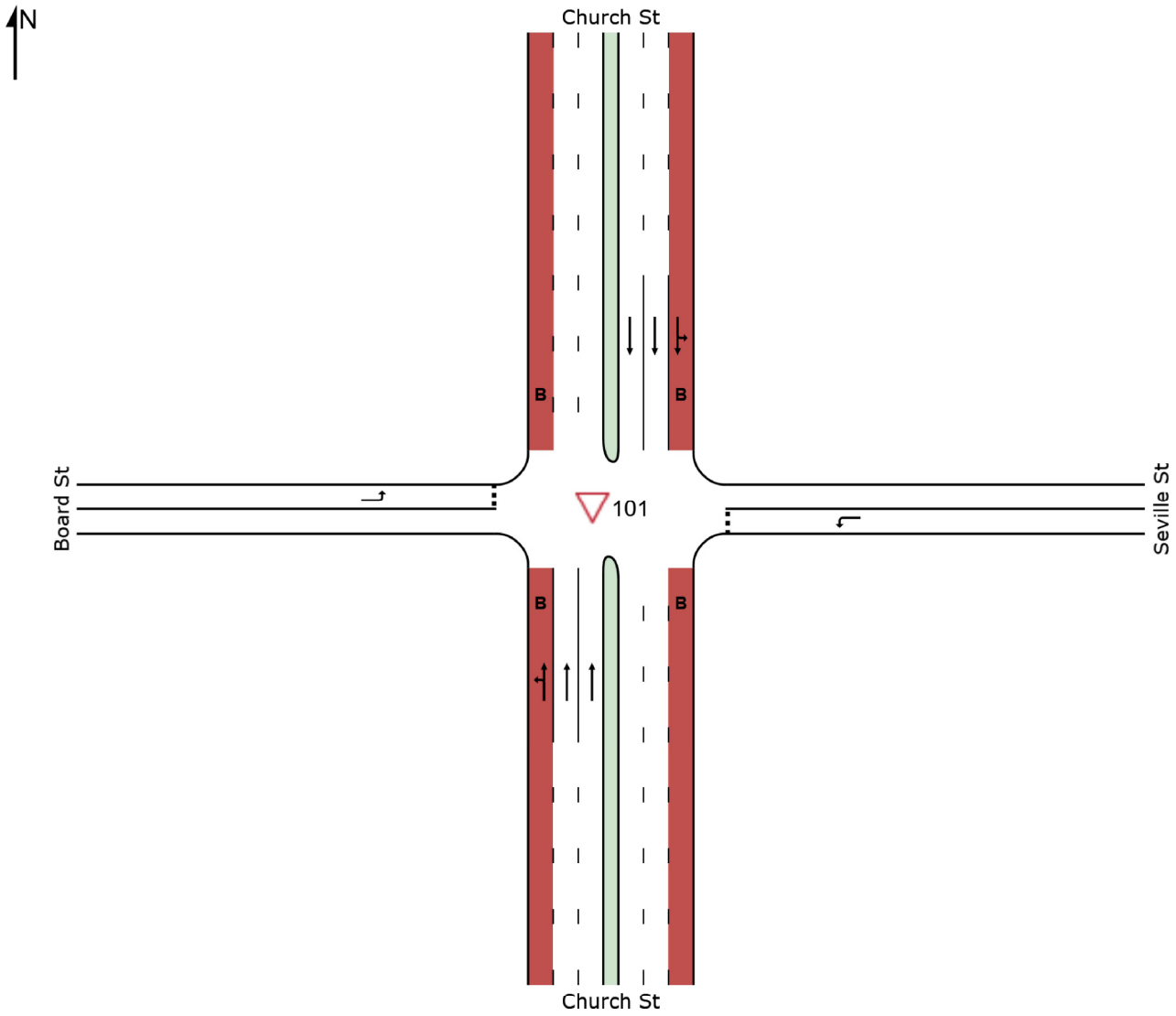
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	13.7	LOS B	0.1	0.1	0.74	0.74
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.76	0.76
P3	North Full Crossing	53	15.2	LOS B	0.1	0.1	0.78	0.78
P4	West Full Crossing	53	16.0	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		211	14.9	LOS B			0.77	0.77

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

SITE LAYOUT

Site: 101 [A28_Church-Board_EX_AM]

Church St/ Board St, North Parramatta
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [A28_Church-Board_EX_AM]

Church St/ Board St, North Parramatta
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total 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: Church St											
1	L2	3	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.06	39.6
2	T1	684	2.9	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		687	2.9	0.173	0.0	NA	0.0	0.0	0.00	0.00	59.7
East: Seville St											
4	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.06	0.51	41.5
Approach		1	0.0	0.001	4.6	LOS A	0.0	0.0	0.06	0.51	41.5
North: Church St											
7	L2	1	0.0	0.009	5.1	LOS A	0.0	0.0	0.00	0.03	51.6
8	T1	1560	0.6	0.398	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1561	0.6	0.398	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Board St											
10	L2	596	2.3	0.461	5.7	LOS A	2.7	19.6	0.13	0.54	34.4
Approach		596	2.3	0.461	5.7	LOS A	2.7	19.6	0.13	0.54	34.4
All Vehicles		2845	1.5	0.461	1.2	NA	2.7	19.6	0.03	0.11	53.1

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

MOVEMENT SUMMARY

Site: 101 [A28_Church-Board_EX_PM]

Church St/ Board St, North Parramatta
Giveway / Yield (Two-Way)

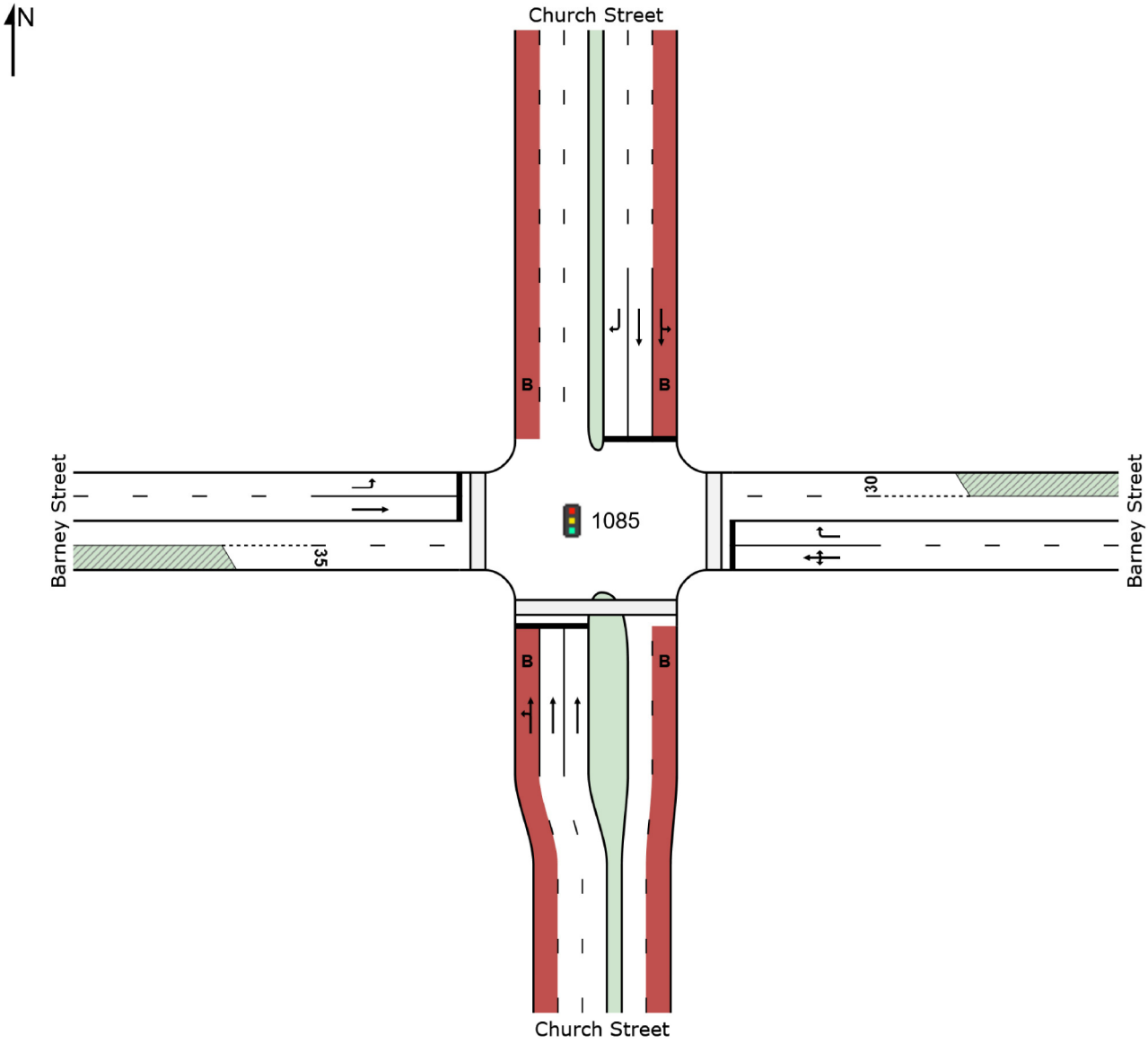
Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St											
1	L2	99	0.0	0.057	5.5	LOS A	0.0	0.0	0.00	0.53	33.9
2	T1	1375	1.8	0.355	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1474	1.6	0.355	0.4	NA	0.0	0.0	0.00	0.04	56.7
East: Seville St											
4	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.02	0.52	41.8
Approach		1	0.0	0.001	4.6	LOS A	0.0	0.0	0.02	0.52	41.8
North: Church St											
7	L2	1	0.0	0.001	5.1	LOS A	0.0	0.0	0.00	0.20	45.7
8	T1	1148	1.6	0.297	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1149	1.6	0.297	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Board St											
10	L2	480	1.1	0.364	5.6	LOS A	1.9	13.4	0.05	0.55	35.0
Approach		480	1.1	0.364	5.6	LOS A	1.9	13.4	0.05	0.55	35.0
All Vehicles		3104	1.5	0.364	1.1	NA	1.9	13.4	0.01	0.10	53.6

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

SITE LAYOUT

Site: 1085 [A29_Church-Barney_EX_AM]

Church Street/Barney St, North Parramatta
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1085 [A29_Church-Barney_EX_AM]

Church Street/Barney St, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street											
1	L2	1	0.0	0.099	44.2	LOS D	0.6	8.1	0.91	0.65	25.2
2	T1	425	3.5	0.789	45.4	LOS D	9.6	67.3	1.00	0.91	32.0
Approach		426	3.5	0.789	45.4	LOS D	9.6	67.3	1.00	0.91	32.0
East: Barney Street											
4	L2	3	0.0	0.821	55.1	LOS D	6.4	44.9	1.00	0.96	20.6
5	T1	19	0.0	0.821	50.6	LOS D	6.4	44.9	1.00	0.96	14.0
6	R2	227	0.0	0.821	55.5	LOS D	6.4	44.9	1.00	0.95	24.1
Approach		249	0.0	0.821	55.1	LOS D	6.4	44.9	1.00	0.95	23.5
North: Church Street											
7	L2	26	0.0	0.031	9.6	LOS A	0.5	3.9	0.31	0.47	48.0
8	T1	754	1.3	0.582	9.1	LOS A	18.0	126.0	0.60	0.55	51.0
9	R2	762	0.0	0.817	25.8	LOS B	26.7	187.0	0.91	0.92	34.9
Approach		1542	0.6	0.817	17.3	LOS B	26.7	187.0	0.75	0.73	42.7
West: Barney Street											
10	L2	27	0.0	0.028	11.4	LOS A	0.3	2.4	0.50	0.65	44.7
11	T1	9	44.4	0.094	46.8	LOS D	0.4	4.0	0.97	0.66	15.6
Approach		37	11.4	0.094	20.5	LOS B	0.4	4.0	0.62	0.65	35.9
All Vehicles		2255	1.3	0.821	26.9	LOS B	26.7	187.0	0.82	0.79	37.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	9.4	LOS A	0.1	0.1	0.46	0.46
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		158	29.3	LOS C			0.78	0.78

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

MOVEMENT SUMMARY

Site: 1085 [A29_Church-Barney_EX_PM]

Church Street/Barney St, North Parramatta
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street											
1	L2	9	0.0	0.073	29.3	LOS C	0.9	10.2	0.73	0.58	31.2
2	T1	944	2.6	0.764	32.2	LOS C	19.3	135.8	0.96	0.88	37.0
Approach		954	2.5	0.764	32.2	LOS C	19.3	135.8	0.96	0.88	37.0
East: Barney Street											
4	L2	8	0.0	0.702	49.7	LOS D	6.6	45.9	1.00	0.87	21.9
5	T1	22	0.0	0.702	45.1	LOS D	6.6	45.9	1.00	0.87	15.1
6	R2	243	0.0	0.702	50.2	LOS D	6.6	45.9	1.00	0.86	25.5
Approach		274	0.0	0.702	49.7	LOS D	6.6	45.9	1.00	0.86	24.8
North: Church Street											
7	L2	26	0.0	0.039	10.6	LOS A	0.6	5.4	0.35	0.45	47.5
8	T1	665	2.2	0.527	9.6	LOS A	15.5	108.8	0.59	0.53	50.6
9	R2	457	0.7	0.775	29.6	LOS C	14.4	101.3	0.97	0.94	33.0
Approach		1148	1.6	0.775	17.5	LOS B	15.5	108.8	0.73	0.69	43.0
West: Barney Street											
10	L2	286	0.0	0.478	23.3	LOS B	7.1	49.7	0.85	0.82	36.3
11	T1	14	15.4	0.116	46.4	LOS D	0.6	4.8	0.97	0.67	15.7
Approach		300	0.7	0.478	24.4	LOS B	7.1	49.7	0.85	0.82	35.4
All Vehicles		2676	1.7	0.775	26.8	LOS B	19.3	135.8	0.85	0.79	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	10.3	LOS B	0.1	0.1	0.48	0.48
P4	West Full Crossing	53	28.9	LOS C	0.1	0.1	0.80	0.80
All Pedestrians		158	26.1	LOS C			0.74	0.74

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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