Health Infrastructure

Blacktown Mount Druitt Hospital

Stage 2 Main Build - Transport Accessibility Study

Rev A | 13 July 2016

Job number 221031

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Contents

1 Introduction

1.1 Project Background

This report has been prepared following adoption of two stages of redevelopment for the Blacktown Hospital campus. Stage 1 for Blacktown Hospital has recently been opened and the second stage of development will now commence as occupation of Stage 1 occurs.

Stage 1 of Blacktown Hospital expansion consisted of four components; a partial refurbishment of the existing main hospital, a new hospital facility, a multistorey car park and a new one storey mental health unit. Stage 2 of the expansion includes a new Acute Services building and refurbishment of the existing main building.

A new multi storey car park will also be constructed which will be the subject of a concurrent application, submitted to Council, and a new entry which will be the subject of a separate REF.

1.2 Scope of Study

This Transport and Accessibility Study has been prepared in accordance with relevant authorities guidelines including Blacktown Council and RTA Guidelines for Traffic Generating Developments. The following chapters include:

- Existing Conditions
- Proposed Development
- Transport and Accessibility Impacts
- Conclusions

The study considered within its terms of reference the Secretary's Environmental Assessment Requirements for the Environmental Assessment of the proposed development. The latest SEARs regarding the study areas for the traffic and transport impact of the project are outlined in Section 1.3 of this report.

1.3 Project SEARs

The NSW Department of Planning and Environment issued the SEARs for the Blacktown and Mount Druitt Hospital Project (Application Number SSD7058) on 9 June 2015. The Transport & Accessibility Study must address the relevant planning provisions, goals and strategic planning objectives in the following:

- NSW 2021;
- A Plan for Growing Sydney;
- NSW Bike Plan;
- Planning Guidelines for Walking and Cycling;
- Integrating Land Use and Transport Policy Package; and
- Healthy Urban Development Checklist, NSW Health.

The SEARs are outlined in Table 1.

Table 1 SEARs Requirements

Description	Relevant Section of Report
Main Construction Works (Hospital building) - Transport and Accessibility	
The Traffic and Transport Assessment for the main construction works should address, but is not limited to, the following:	
- existing daily and peak vehicle movements, public transport services, and parking arrangements on the road network located adjacent to the proposed development.	3.0
- existing and proposed pedestrian and cycle movements within the vicinity of the site as well as the provision of bicycle parking and end of trip facilities (showers, change rooms, lockers etc.);	3.7 & 4.3.5
- estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and cycle trips;	4.3.2 and 4.7
- the adequacy of public transport to meet the likely future demand of the proposed development;	4.3.2
- measures to promote travel choices that support the achievement of State targets, such as a location-specific sustainable travel plan;	6.0
- daily and peak vehicle movements impact on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works (if required);	4.8
- proposed access arrangements during operation, including emergency vehicle access;	4.3.4
- measures to improve pedestrian, cyclist and vehicle safety and to mitigate any traffic impacts identified on road, public transport, pedestrian and cycle networks;	5.0
- proposed car parking provisions for staff and visitors, including consideration of the availability of public transport and the requirements of the relevant parking codes and Australian Standards, and operational details for management of on-site car parking to ensure on-street parking congestion impacts are mitigated; and	4.3
- service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).	4.9
- Detail access arrangements at all stages of construction and measures to mitigate any associated pedestrian, cycleway or traffic impacts, including the displacement of visitor and patient car parking. Alternative off-site arrangements should be made for staff and construction workers.	7.0
Plans and Documents	
- Preliminary Construction Management Plan, inclusive of a Preliminary Construction Traffic Management Plan that includes vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures during each stage of construction.	7.0

1.4 Consultation

Consultation has occurred with RMS, Blacktown Council and Transport for NSW.

1.4.1 RMS

Jana Jegathesan, Land Use Planner Network Management/ Journey Management (02 8849 2313) was contacted on 25 September 2015 to confirm the extent of traffic modelling.

1.4.2 Blacktown Council

Nadeem Shaikh, Co-ordinator Traffic Management, Blacktown City Council (9839 6017) was met on-site on 16 September 2015 to discuss the construction process and parking arrangements. He reiterated Council's concern about overflow car parking on-street. The project intends to provide adequate parking on the site for all staff and visitor, however, the hospital is unable to stop staff and visitors who choose to avoid the parking fee from parking on-street.

A further meeting occurred on site with Nadeem Shaikh on 10 May 2016 to discuss the proposed new site entry on Panorama Parade, which is the subject of a separate REF. Feedback has been provided on the location and treatment of the proposed intersection in relation to the adjacent intersections. Agreement has been reached in principal for a new roundabout to be constructed between Lismore Street and Craiglea Street to support the new entry.

1.4.3 Transport for NSW

Para Sangar, Senior Transport Planner (8202 2672) was contacted on 24 September 2015 to discuss the travel initiatives being proposed as part of the site travel plan and the public transport accessibility of the site. Para requested that the car parking proposals and fees be discussed in the report. It was confirmed that staff, patients and visitors will all pay for car parking on the site.

2 NSW Government Strategies and Policies'

This report has been prepared in accordance with the following NSW Government Strategies and Policies:

- NSW 2021;
- A Plan for Growing Sydney;
- NSW Bike Plan;
- Integrated Land Use and Transport Policy Package 2001;
- NSW Planning Guidelines for Walking and Cycling;
- RTA's Guide to Traffic Generating Development;
- Healthy Urban Development Checklist 2010.

The development of the Blacktown Hospital will contribute to the achievement of transport objectives contained in the various NSW Government strategies. A summary of these strategies and policies is provided below.

2.1 NSW 2021

NSW 2021: A Plan to Make NSW Number One sets the Government's agenda for change in NSW. It provides the direction for the public sector for the next ten years. The goals, targets and actions in this plan will be integrated into the machinery of government, setting the priorities for funding, guiding decisions and focusing the day to day work of the public sector. The following summarises the contents of the Plan which are relevant to the Blacktown hospital development proposal.

Goal 8 - Grow patronage on public transport by making it a more attractive choice

- Increase the share of commuter trips made by public transport.
- Increase the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016.
- Increase walking and cycling.

Goal 12 - Provide world class clinical services with timely access and effective infrastructure

- We will provide timely access to world class health care through increased investment in infrastructure, making more beds available, and providing more nurses.

Commentary

The State Plan's priorities align with developing transport strategies that guide sustainable outcomes. Transport infrastructure improvements identified by the State Plan support increased transport modal choices to allow for more journeys to be undertaken using more sustainable forms of transport. The State Plan's priorities guide the Blacktown Hospital redevelopment proposal towards encouraging active transport choices among hospital staff and visitors, to facilitate healthy lifestyles and to reduce carbon dioxide emissions.

2.2 A Plan for Growing Sydney

A Plan for Growing Sydney is the Government's plan to achieve the following goals:

- make it easier for Sydney's residents to move between their homes, their jobs, the centres where they shop and use local services, and their open spaces;
- make a wider variety of housing available to suit the changing make-up of the population – more than one million people will be over the age of 65 years and almost the same number under the age of 15 years by 2031;
- deliver new infrastructure which supports our community as it grows, and strategic infrastructure that also strengthens the economy; and
- recognise our highly prized environment – the harbour, the coast, our mountains, parks and open spaces – and how to safeguard these places.

It's an action plan focused on bringing all stakeholders together with a common purpose – to develop a competitive economy with world-class services and transport; to deliver greater housing choice to meet our changing needs and lifestyles; to create communities that have a strong sense of wellbeing; and to safeguard our natural environment.

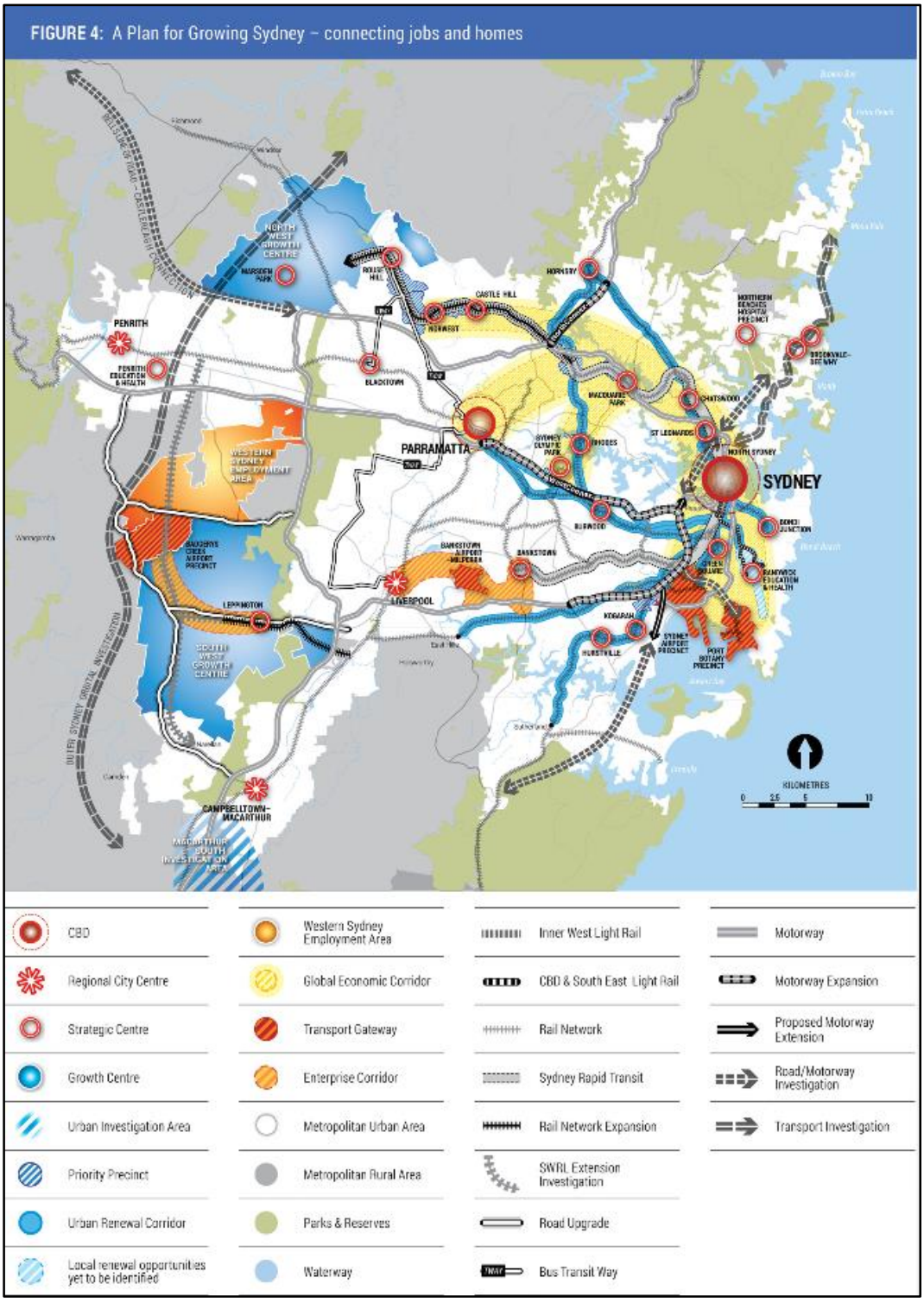
Goal 1: A competitive economy with world-class services and transport

- Plan for expansion of health facilities to service Sydney's growing population.
- Preserve future transport and road corridors to support future growth

Goal 4: A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources

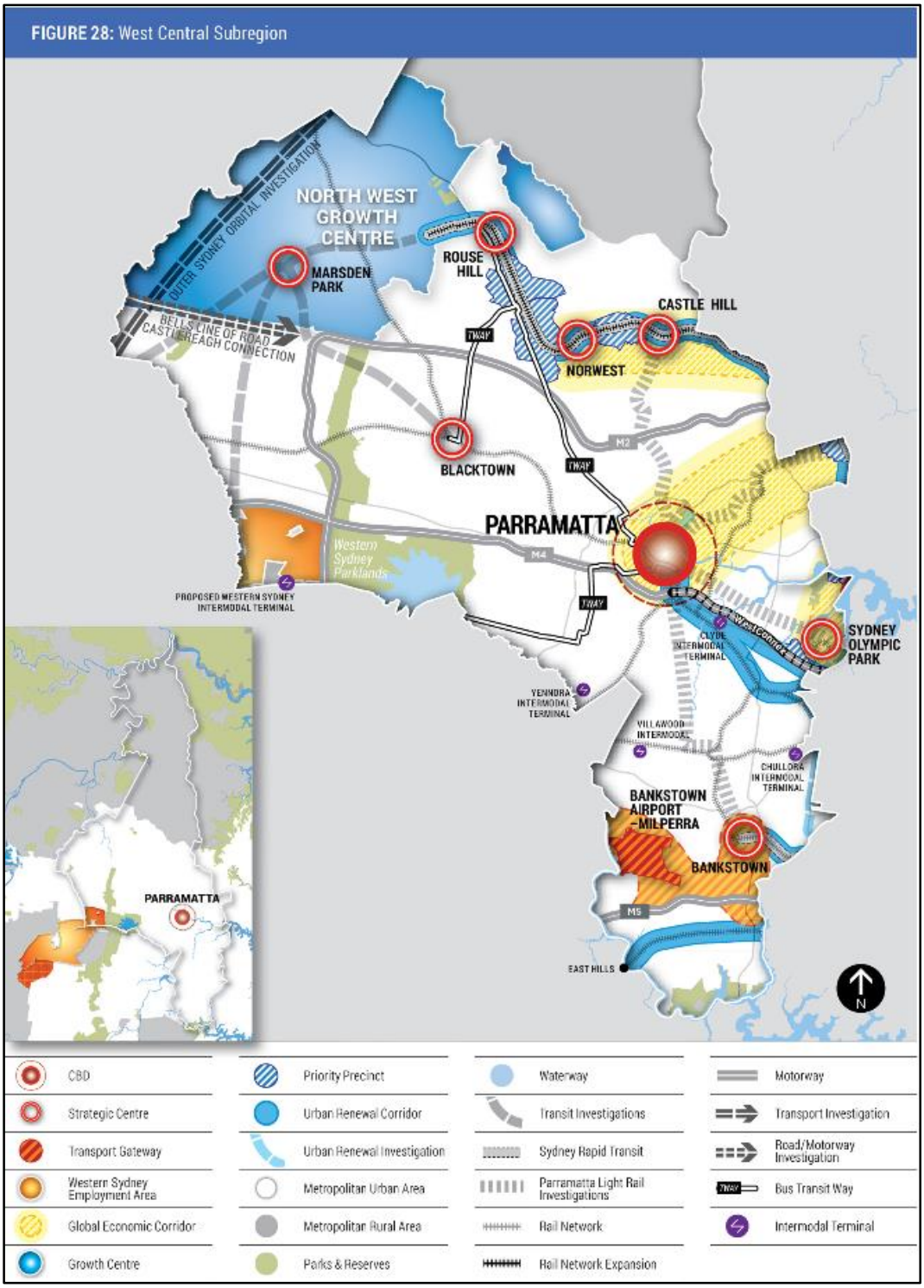
Principle 3: Connecting centres with a networked transport system

- The public transport network connects people to centres. In doing this, it connects people to jobs, education facilities, health centres and hospitals, and sporting, cultural and entertainment facilities.
- Centres rely on efficient transport to serve their customers, support their growing business and freight functions, and to connect to the global economy.
- Efficient links within centres improves convenience for customers, and efficient links into centres and between centres helps people to get to jobs, schools, universities, shops and leisure activities.
- Making it easy to get to centres and offering a range of services at centres makes them a focal point for the community and increases prospects for economic growth and job creation.



West Central Subregion Plan

The West Central subregion will be a significant focus for infrastructure investment and intensive growth over the next 20 years. For Blacktown, the plan will support hospital-related land uses and infrastructure around Blacktown Hospital.



Commentary

A Plan for Growing Sydney underscores the importance of the Western Sydney region to the future growth of the city. This is reflected in the dwelling and employment targets. The Blacktown Hospital redevelopment project is consistent with the objectives and policy settings and represents a necessary improvement of critical health infrastructure in Western Sydney to cater for the future demands in the region.

2.3 NSW BikePlan

The NSW Bike plan recognises a growth of people riding a bike in NSW, with many finding it an affordable, practical and healthy option for everyday personal travel. The NSW Bike Plan aims to build investments and initiatives that have encouraged cycling in NSW by outlining a 10-year bicycle infrastructure plan, including:

- Construction of over 4,000 kilometres of cycle facilities in NSW
- Delivery of extensive cycleways as an integrated component of major road upgrades
- Support for major events like the Sydney Spring Cycle and investment in programs to promote safe bike-riding in schools and as part of major urban development and
- Report cycling success stories from all parts of NSW as case studies.

The Plan also establishes the Metro Sydney Bike Network, a regional network of high-quality cycle routes that connect the city's Major Centres and Regional Cities. The following missing links to the existing Metro Sydney Bike Network have been identified as items of priority:

- Prospect to Blacktown
- Blacktown to Parramatta

Commentary

Blacktown Hospital is located in close proximity to existing facilities. An opportunity to encourage active transport modes such as cycling is recognised for the Blacktown Hospital redevelopment. Specifically, bicycle facilities for hospital staff and visitors are to be provided, including bicycle storage facilities, showers, lockers and change rooms. Bicycle end of trip facilities are included in the new Multi Storey Car Park which is the subject of a separate application. This is consistent with the NSW Bikeplan, in that it will encourage residents, hospital staff and visitors to an active travel mode.

2.4 Integrated Land Use and Transport Policy Package

The *Integrated Land Use and Transport Package* (DUAP, 2001) provides guidance to local councils in implementing the objective of 'promoting attractive and convenient places to live and work.' This Package emphasises the need for urban structures, building forms, land use location, development designs, subdivisions and street layouts to achieve sustainable transport objectives. The Package introduces the following concepts to be considered when planning for transport choice:

Convenience — the transport mode needs to be easy to find and use, and to transfer from one mode to another.

Information — reliable information at accessible locations is essential to encourage use of various travel alternatives.

Proximity — transport facilities and services, such as cycle paths and bus services, need to be in close, convenient and obvious locations to people's trip origins and destinations.

Destination choice — the more destinations that can be linked on a public transport route, the more attractive it will be.

Directness — routes should take the shortest and least deviating course, with priority to achieve fast travel times for walking, cycling and public transport (e.g. pedestrian links, dedicated bus lanes, and bikeways).

Security — the environment for walking and waiting needs to be comfortable and safe from personal attack or conflicts with traffic (e.g. waiting areas sheltered from the elements, natural surveillance, good lighting, bike lanes on major roads).

Commentary

The *Integrated Land use and Transport Package* highlights the key role that planning has in facilitating sustainable transport as well as the risks of inhibiting transport choice. The Package recognises that transport planning concepts need to be considered at all stages of land use planning to result in successful urban communities. The Blacktown Hospital redevelopment proposal has been designed with consideration to the key concepts outlined in the *Integrated Land Use and Transport Package.*

2.5 NSW Planning Guidelines for Walking and Cycling

This document was prepared by the NSW Department of Infrastructure, Planning and Natural Resources (DIPNR) in 2004, outlining guidelines to assist land-use planners and related professionals to improve consideration of walking and cycling in strategic planning and development assessment. The guidelines have been designed to provide a walking and cycling focus to the NSW Government's *Integrating Land Use and Transport Planning Policy Package*.

The guidelines encourage the preparation of Transport Management and Accessibility Plans (TMAPs) as part of master planning and development approvals process for larger developments. TMAPs promote a mode shift away from motor vehicle use toward walking, cycling and use of public transport.

TMAPs generally comprise a background study, an action plan and an agreement between council, the proponent (developer, building owner/manager or tenant) and other relevant stakeholders, aimed at:

- Managing transport impacts of developments;
- Maximising the use of public transport, walking and cycling;
- Reducing VKT (Vehicle Kilometres Travelled) growth by cars and commercial vehicles generated by the development
- Reducing car reliance; and
- Minimising the impacts of freight, whilst allowing for efficient freight movement.

The guidelines also recommend the preparation of Transport Access Guides as part of a development approval. TAGs are concise presentations of how to reach a site or venue by public transport, walking and cycling. The objective is to make the choice of travel by these modes easier. TAGs are to be prepared in accordance with the RTA/SEDA brochure, *Producing & Using Transport Access Guides*.

The *NSW Planning Guidelines for Walking and Cycling* suggest the following rates for the bicycle parking provision, shower and locker provision as applied to a hospital development, and these are summarised in Table 2 and Table 3.

Table 2 Bicycle Parking Provision Rates

Land use type	Resident/staff (long-term use)	Customer/visitor (short-term use)
Hospitals	5 – 10% of staff or 10 – 15% of beds	5 – 10% of staff

Table 3 End of Journey Bicycle Facilities

Staff	Lockers	Showers	Change rooms
0-12	1 per 3 racks	1	-
13-49	1 per 3 racks	2 (1 male and 1 female)	2 (1 male and 1 female)
50-149	1 per 3 racks	4 (2 male and 2 female)	2 (1 male and 1 female)
150-299	1 per 3 racks	6 (3 male and 3 female)	2 (1 male and 1 female)
300-500	1 per 3 racks	8 (4 male and 4 female)	2 (1 male and 1 female)

The guidelines provide the following design principles for bicycle parking facilities:

1. Open and attractive facilities in easily supervised places that feel safe and non-threatening, with good passive surveillance to deter acts of vandalism and theft
2. As close as possible to building entrances (preferably within 25m)
3. Relates to the travel requirements of the user (e.g. lockers for commuters and racks for short-term use)

Commentary

The project has considered the guideline rates for provision of end of trip facilities as they relate to the hospital campus.

2.6 RTA's Guide to Traffic Generating Development

This document was prepared by the NSW Roads and Traffic Authority in 2002, outlining all aspects of traffic generation considerations relating to developments. It provides the basis of which the RTA reviews development applications subject to SEPP 11 (which has been subsequently superseded by SEPP Infrastructure). Specifically, the guide outlines traffic generation rates and parking requirements for specific land uses, as well as cost impacts of traffic generated by developments.

Traffic and parking rates are only provided for private hospital developments. Public Hospitals need to be considered on a case by case arrangement given the complex and varied nature of the facilities provided.

Commentary

A project specific model has been developed to consider car parking demand, traffic generation and non-car modes of travel.

2.7 Healthy Urban Development Checklist 2010

The NSW Department of Health and Sydney South West Area Health Service has prepared the *Healthy Urban Development Checklist* (2010) to address the growing concern about the link between the built environment and 'lifestyle diseases and risk factors' including overweight and obesity, diabetes mellitus type 2, and heart disease. Specifically, the checklist aims to:

- Provide a standardised tool to guide and inform feedback and advice to local government and developers on urban development policies and plans
- Evaluate the health aspects of urban developments
- Support engagement between urban planners and developers and health professionals
- Inform others (planners, developers, policy makers) about the range of factors that need to be considered in healthy urban developments

The publication comprises of 10 checklist chapters, each based on a key characteristic of healthy urban development. These chapters include sections covering the relevance of the issue to NSW, evidence and leading practice, key summary questions, specific questions related to each key question, and sources of further information.

A summary assessment of the Blacktown Hospital proposal and its response to the checklist questions relating to issues of Transport and Physical Connectivity is provided below (Chapter 10).

Code	Question	Response
TC1: Improve public transport services		
TC1.1	Does the policy, plan or development proposal identify the provision of public transport as a priority?	Regular bus services are provided between the Blacktown Hospital site and Blacktown Train Station. Blacktown Train Station is located on the Western Rail Line, and receives regular good service.
TC1.2	Does the policy, plan or development proposal make provision for public transport routes/services to link the proposed development to the wider area?	The redevelopment proposal will include a traffic management and access plan to help encourage public transport use. The hospital site is located in close proximity to Blacktown train station, which is situated along the Main Western Rail Line.

Code	Question	Response
TC1.3	Does the policy, plan or development proposal identify public transport routes that address the needs of different groups in the population (e.g. travel to education, shopping, recreation and employment areas)?	Shuttle services are available for different users groups.
TC1.4	Does the policy, plan or development proposal encourage alternative transport system development such as car share programs, electric taxis, walking/cycling "bus" programs and/or community bike hire schemes?	The redevelopment proposal promotes active transport modes by providing cycling facilities.
TC1.5	Are public transport stops located in comfortable walking distance (approximately 400-500m for bus stops and 800m for train stations) of housing, employment and other local destinations?	The hospital site is located within 400-500m of bus stops connecting the hospitals to Blacktown train station.
TC1.6	Are public transport systems and nodes designed to be universally accessible?	Bus stops in and around the hospital site is to be designed to be universally accessible and consistent with the Disability Discrimination Act 1992.
TC1.7	Are public transport nodes safe and easy to approach on foot and bicycle (are they clearly signed and well-lit with direct routes and safe and convenient crossing points)?	The bus stops are located within the hospital campus providing direct access.
TC1.8	Do public transport nodes include places to park and/or rent bicycles? Can bicycles be taken onto trains and/or buses?	Appropriate bicycle parking facilities will be provided at Blacktown Hospital site.
TC1.9	Do public transport nodes include amenities such as: shelter, seating, proper lighting, transport user information, wayfinding guidance, washrooms, refreshments, bicycle parking, power outlets and internet service, as well as information about the surrounding area and transport options (including walking or cycling) for the onward journey?	Yes
TC1.10	Is the policy, plan or proposal located near an existing transport node and, if so, does this require upgrading to ensure that it can meet the needs of the future population?	No upgrade required
TC2: Reduce car dependency and encourage active transport		
TC2.1	Is a stated goal of the policy, plan or proposal to reduce car dependency and car use and encourage more active forms of transport?	A Green Travel Plan is proposed
TC2.2	Does the policy, plan or proposal propose measures to encourage walking and cycling such as vehicle speed limits, restrictions on vehicle access, parking requirements etc.?	Yes

Code	Question	Response
TC2.3	Does the policy, plan or proposal encourage car pooling or car sharing, including through designated parking spaces for car share programs?	Car pooling will be included as an initiative in the green travel plan. Designated spaces would be made available for participants of the program.
TC2.4	Does the policy, plan or proposal include incentives to encourage bicycle use such as 'park and bike' measures, shared bicycle schemes etc.?	NA
TC2.5	Does the policy, plan or proposal encourage the reduction of car parking spaces in urban areas (particularly where there is good public transport available) including the reallocation of car parking spaces for bicycle parking and cycling routes?	Future car parking demand has been modelled with an increased public transport mode share.
TC2.6	Does the plan, policy or proposal provide a well connected street pattern?	Yes with new connections for vehicles, cyclist and pedestrians.
TC2.7	Are there particular features that present potential safety hazards, such as busy roadways separating schools from residential areas, level crossings of rail lines etc.?	New pedestrian crossing facilities will be incorporated into the design of the facility.
TC2.8	Are there areas with both high pedestrian and bicycle activity, and high vehicle traffic that could benefit from additional safety measures?	Cycling within the campus will occur on local roads where vehicle speeds are low. Pedestrian crossings will be installed on key desire lines.
TC2.9	Do trees border streets where walking and cycling is desired (as a means for improving amenity and helping to reduce traffic speeds)?	A landscape plan has been developed for the site.
TC2.10	Are walking and cycling entrances to buildings prioritised and safe (avoiding conflict with cars)?	Yes
TC2.11	Are walking and cycling routes through parking areas clearly marked and safe (avoiding conflict with cars)? Is bicycle parking prioritised?	Yes
TC2.12	Where traffic 'squeeze points' are introduced (to slow traffic speeds and provide safer pedestrian crossings) are there provisions for cyclists to pass through unobstructed?	Cyclists will travel with the traffic on slow roads.
TC2.13	Are pedestrian areas (such as public plazas, squares, pathways, trails, shopping areas, etc.) designed to be universally accessible?	Yes
TC3: Encourage infill development and/or integration of new development with existing development		
TC3.1	Does the policy, plan or proposal encourage the integration of new development with existing development and key destinations?	Yes

Code	Question	Response
TC3.2	Does the street network (including bicycle and walking pathways) build from and add new connections to an existing street network?	New connections are proposed to the external road network at Blacktown to improve permeability.
TC3.3	Are block sizes conducive to walking and cycling, and do they integrate with existing blocks?	NA

Commentary

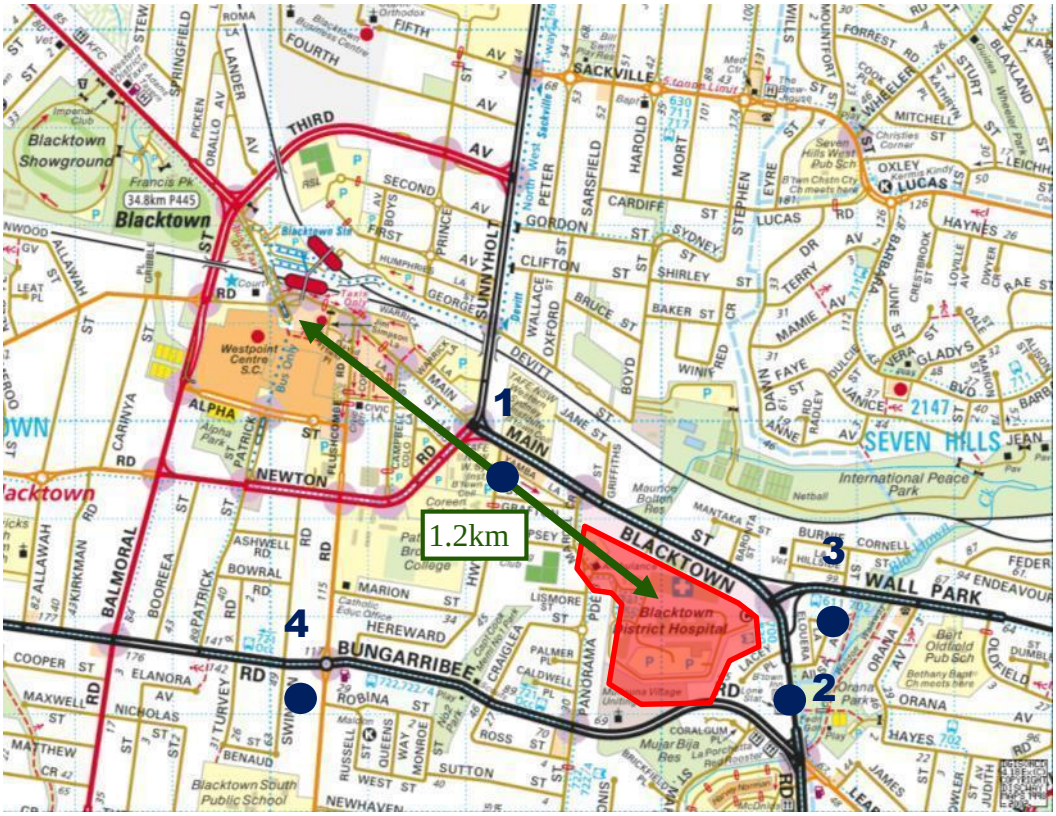
The Blacktown Hospital redevelopment is generally consistent with the transport and physical connectivity questions in the *Healthy Urban Development Checklist 2010*.

3 Existing Conditions

3.1 Site Location

The hospital campus is approximately 1.2km from Blacktown Railway Station and the Blacktown city centre as shown in Figure 1.

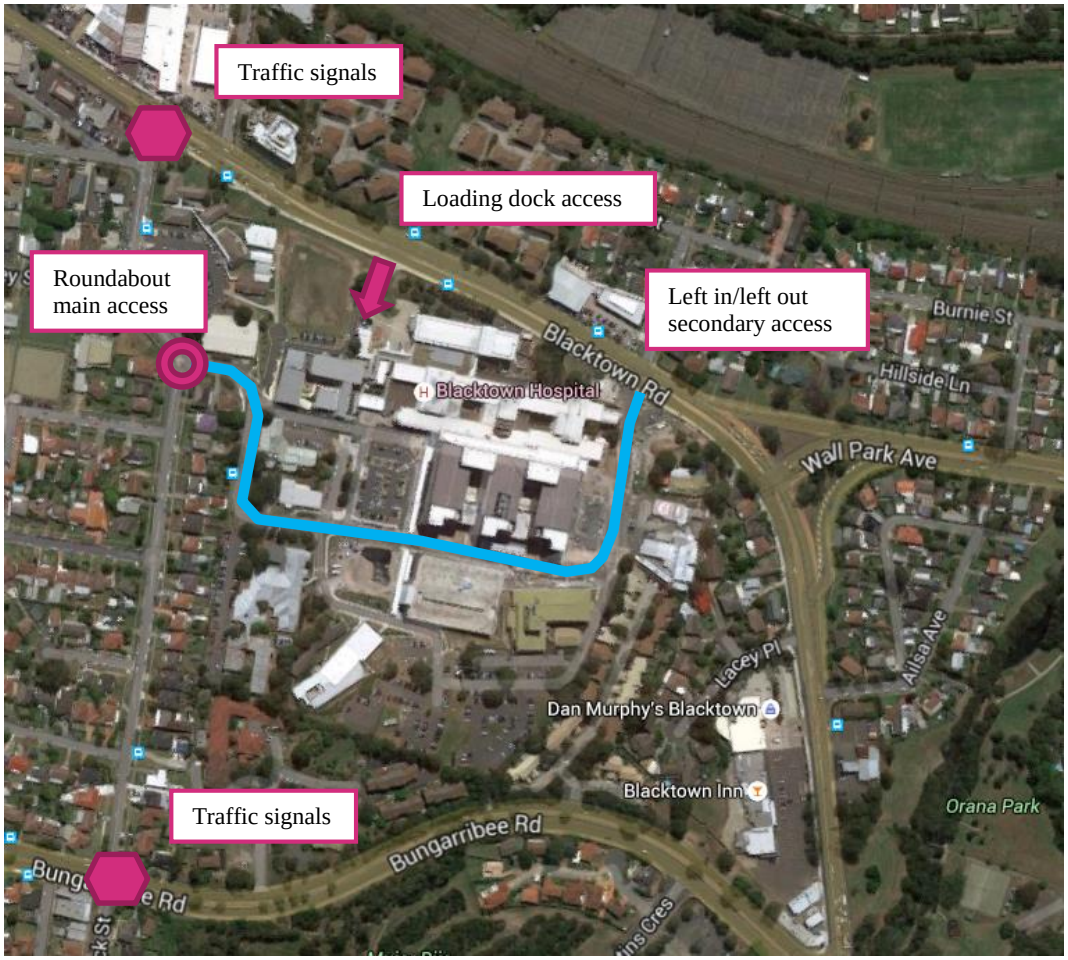
Figure 1 Site location



3.2 Road network configuration and traffic conditions

The Blacktown Hospital site is generally bounded by Blacktown Road to the north and Bungarribee Road to the south, both RTA State Roads carrying main road traffic flows. The primary access to the hospital is from Panorama Parade - Marcel Crescent which is part of the local street system under the control of Blacktown Council. Traffic signal control at the local street interface with the main arterial roads provides for hospital traffic access. At the Panorama Parade hospital access road a single lane roundabout provides control as shown in Figure 2.

Figure 2 Existing access arrangements and intersection control



Blacktown Road is configured with two through traffic lanes in each direction and additional turning lanes at intersections. It is heavily trafficked with significant peak hour traffic flows. A main access roadway occurred onto the site from Blacktown Road prior to construction of the main hospital building, which is now a service access driveway which operates as a priority intersection due to the low usage. A new left turn in / left turn out intersection has been constructed as part of Stage 1 onto Blacktown Road opposite Baronta Street which will provide a through site traffic link for improved access.

Panorama Parade is a local street configured with a single traffic lane in each direction and parking permitted generally on both sides of the road. A number of traffic calming devices are located along Panorama Parade to control vehicle speeds. This route is used by non-local traffic connecting between Bungarribee Road and Blacktown Road and connects further south on Lock Street which feeds a large residential precinct. Recent traffic surveys show a daily two way traffic flow of 4,500 vehicles which is in excess of local street traffic volumes usually up to 3,000 vpd. This indicates Panorama Parade is operating as a high order local street closer to a collector road function.

A local service access driveway is located on Blacktown Road as shown in Figure 3 which is configured for all movements with a right turn bay in the central median and a short right turn storage area for vehicles re-entering Blacktown Road to travel east. This arrangement is suitable for the low turnover of the

loading docks which occurs throughout the day and does not necessarily impact on the traffic peak hours.

Figure 3 Service road access on Blacktown Road and Ambulance Station

3.3 Ambulance station

A purpose built Ambulance Station which is about thirty years of age is located adjacent to the main access road from Panorama Parade as shown in Figure 3. It currently accommodates appliances and staff for the region. A new facility is being constructed on Bungarribee Road next to St Martins Crescent which will enable this building to be decommissioned in early 2017.

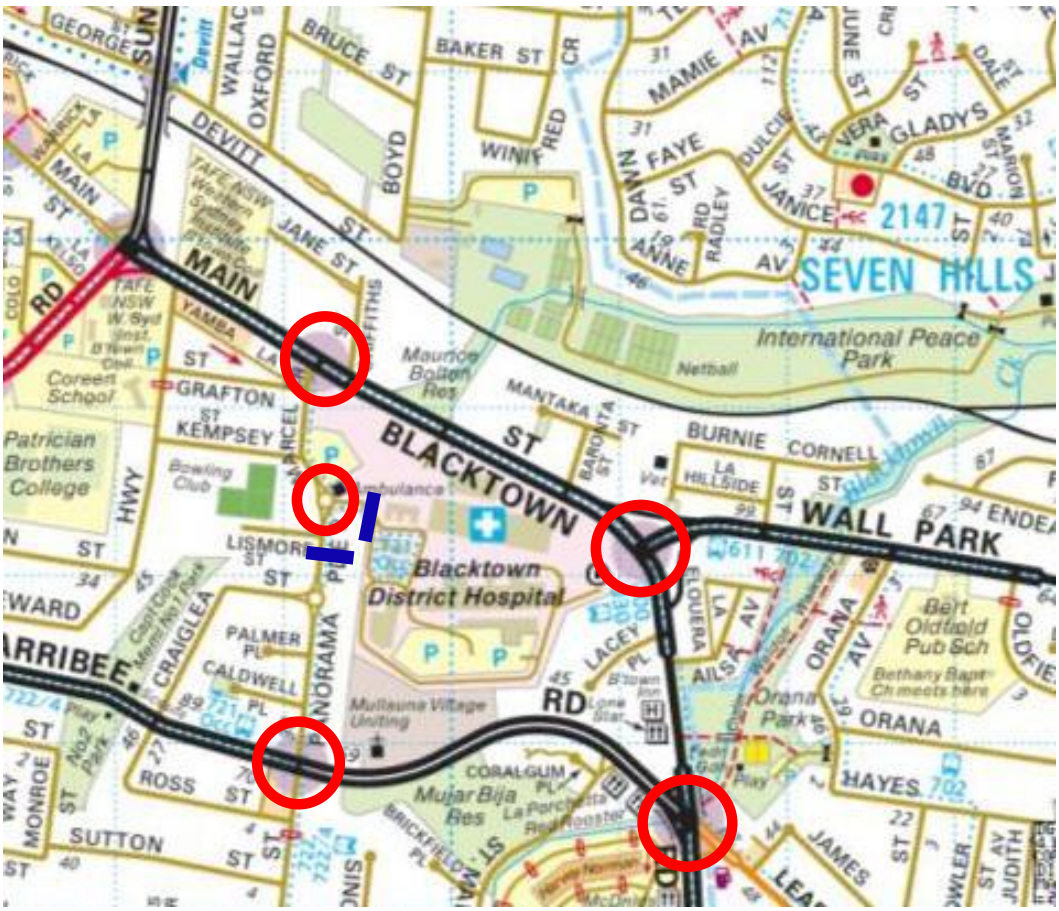
3.4 Traffic flow data

3.4.1 External road system

Traffic surveys were undertaken on Tuesday 15 September, 2015 in the AM (7.30am-9.30am) and PM (4.30pm-6.30pm) peak periods at the locations shown in Figure 4. Light and heavy vehicle classification data was collected. Vehicle turning counts occurred at the following intersections:

- Blacktown Road / Marcell Crescent – traffic signals
- Blacktown Road / Wall Park Avenue – traffic signals
- Blacktown Road / Bungaribee Road / Leabons Lane – traffic signals
- Bungarribee Road / Panorama Parade – traffic signals
- Panorama Parade / Marcel Cres / hospital access - roundabout

Figure 4 Traffic Survey Locations



The vehicle turning count data is included in Appendix A.

The peak hour approach and departure flows for each intersection are shown in Figure 5 and Figure 6.

Figure 5 Morning peak traffic flows (8.00-9.00am)

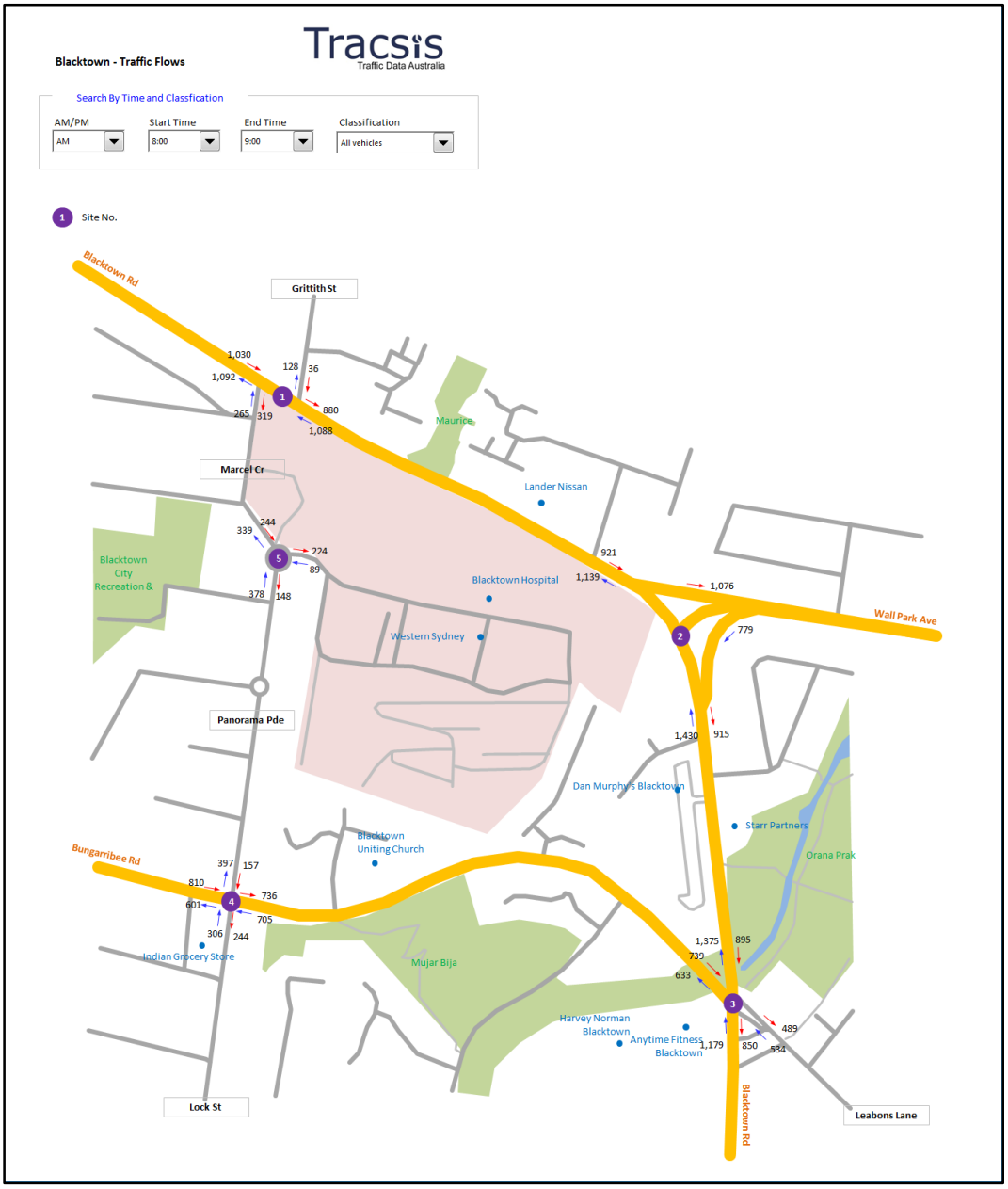
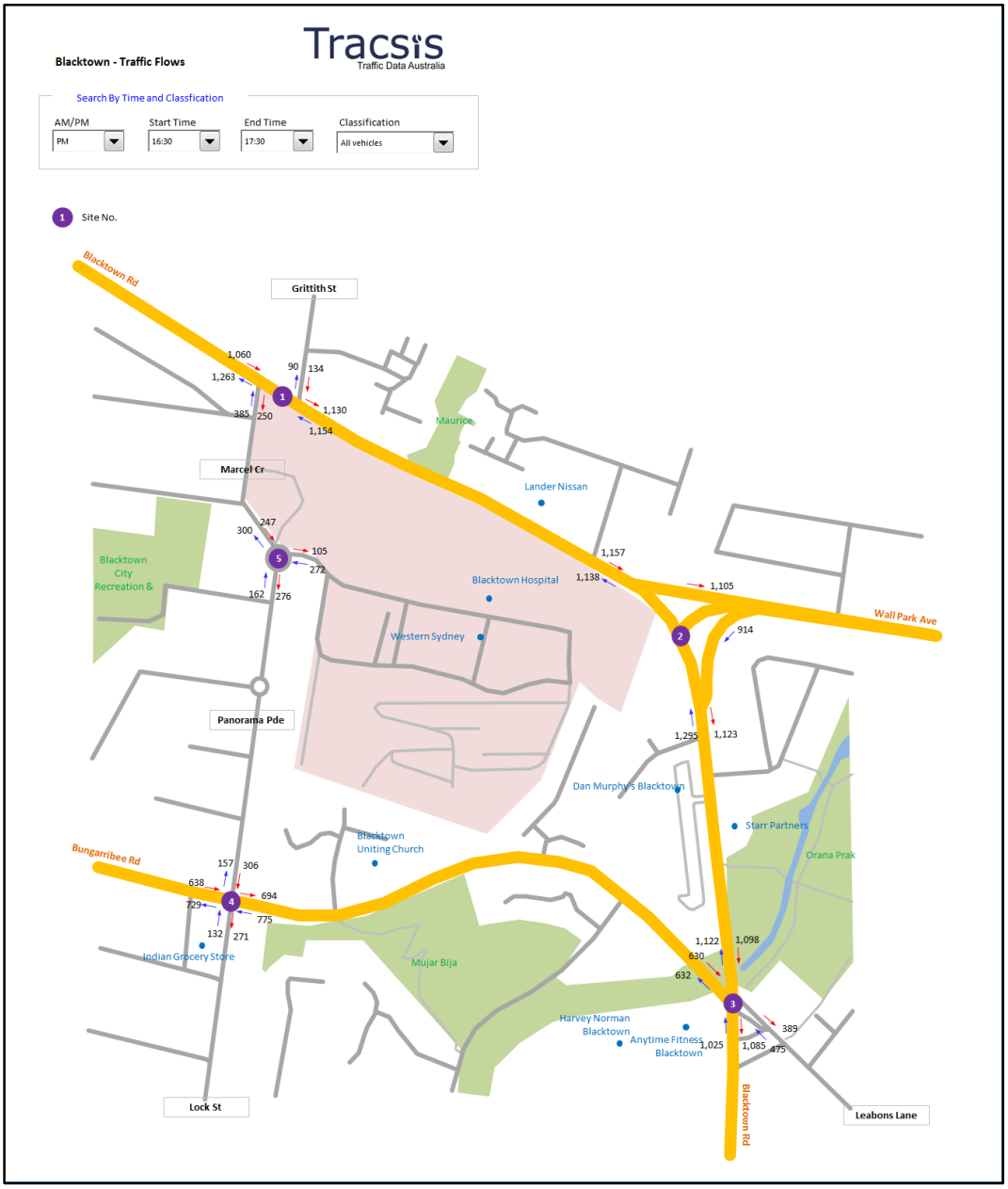


Figure 6 Afternoon peak traffic flows (4.30-5.30pm)



A comparison of the 2015 data with the 2010 data is shown in Table 4. Traffic has reduced on Blacktown Road at both the Marcell Crescent and Wall Park Avenue intersections is both peak periods. Generally there has been a decrease in traffic on the main road network and no change on the local street network.

Table 4 Comparison of 2010 and 2015 traffic at each intersection

Intersection	October 2010	September 2015
Total traffic entry volume AM Peak (8.00-9.00)		
Blacktown Road / Marcell Crescent	2,683	2,419
Blacktown Road / Wall Park Avenue	3,380	3,130
Blacktown Road / Bungaribee Road / Leabons Lane	-	3,347
Bungarribee Road / Panorama Parade	1,963	1,978
Panorama Parade / Marcel Cres / hospital access	729	711
Total traffic entry volume PM Peak (4.30-5.30)		
Blacktown Road / Marcell Crescent	3,032	2,419
Blacktown Road / Wall Park Avenue	3,943	3,366
Blacktown Road / Bungaribee Road / Leabons Lane	-	3,219
Bungarribee Road / Panorama Parade	1,953	1,851
Panorama Parade / Marcel Cres / hospital access	668	681

3.4.2 Hospital Entrance

Seven day classified tube count data was collected on Panorama Parade and on the Hospital Entrance Road in 2010. These were not updated in 2015, however peak hour counts were taken at the Panorama Parade / Marcel Cres / hospital access intersection which enables a comparison to be made between years. Table 5 shows that there has been very little change in the level of activity at the hospital during the Stage 1 construction works between 2010 and 2015.

Table 5 Comparison of 2010 and 2015 hospital main entrance traffic

Road Peak	2010			2015		
	In	Out	Total	In	Out	Total
AM Peak (8.00-9.00am)	279	70	349	224	89	313
PM Peak (4.30-5.30pm)	118	254	372	105	272	377

The 2010 weekly tube count data is plotted below in Figure 7 and Figure 8 to represent the typical daily profile of activity. The Hospital Entry Road carries up to 200 vehicles per hour each way with peak entry at 7-8am and again at 1-2pm which coincides with staff shift times and peak exit is at 4-5pm. Daily traffic flow is approximately 4,000 vehicles two-way. Panorama Parade has a pronounced northbound flow in the morning up to 300 vehicles per hour. It has a daily two-way traffic flow of 4,500 vehicles.

Figure 7 Hospital Entry Road

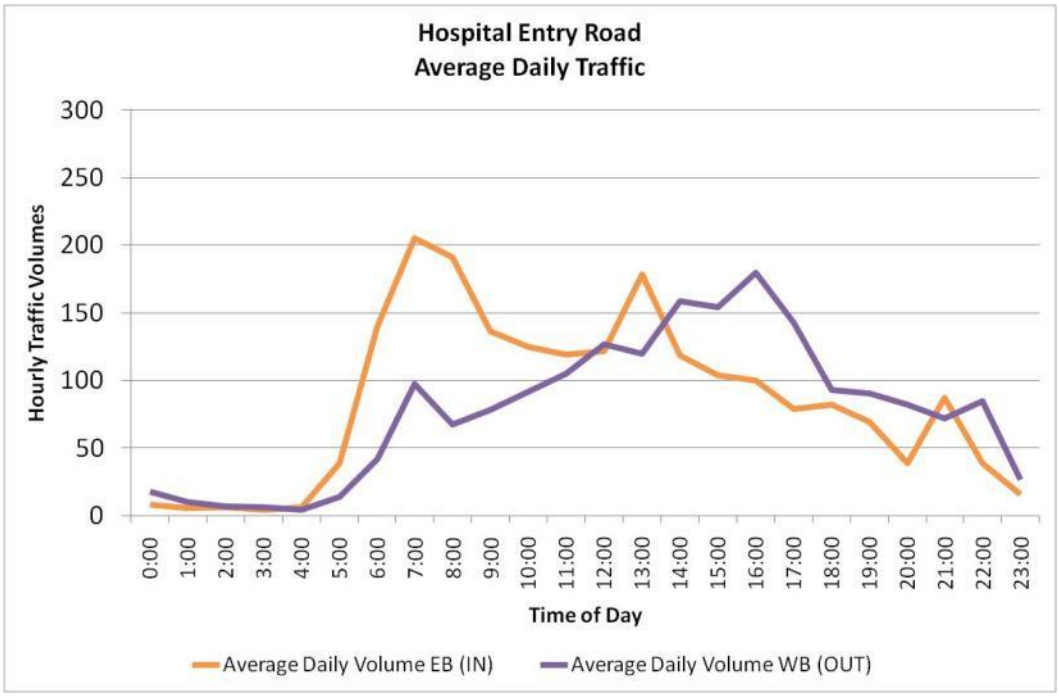
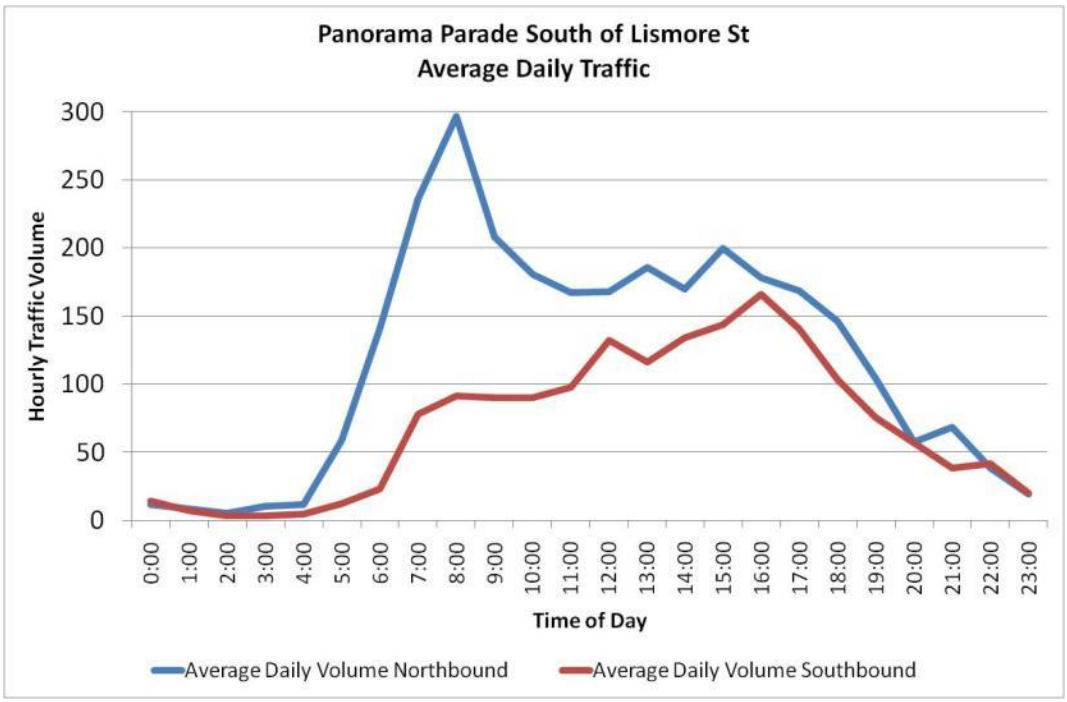


Figure 8 Panorama Parade south of Lismore Street



3.5 Intersection operations

For the purposes of this investigation, an individual intersection traffic control model, SIDRA, has been used to assess the performance of the surrounding road network.

The existing intersection performance is assessed in this report in terms of the following four factors for each intersection.

- Degree of Saturation
- Average Delay (seconds per vehicle)
- Level of Service
- Length and direction of peak traffic queue (95th percentile traffic queue)

In urban areas, the performance of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LOS), which is an index of the operational performance of traffic at an intersection and is based on the average delay per vehicle. LOS ranges from A = very good to F = highly congested travel conditions, as shown in Table 6.

Table 6 Level of Service Definitions

Description	Level of Service (RTA Definition)	Average Delay per Vehicle (s)
Very Good	A	< 14.5
Good	B	14.5 ≤ 28.5
Satisfactory	C	28.5 ≤ 42.5
Near Capacity	D	42.5 ≤ 56.5
At Capacity	E	56.5 ≤ 70.5
Over Capacity	F	≥ 70.5

Generally it is desirable to aim at achieving a Level of Service of C or better at all major road intersections. However, in practice, it is reasonable for some intersections to operate at Level of Service D at peak times. Another common measure of intersection performance is the degree of saturation (DOS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DOS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum degree of saturation for an intersection with traffic signals is 0.9.

The performance of the five key intersections is shown in Table 7 for the AM Peak and Table 8 for the PM Peak. The Wall Park Ave and Blacktown Road intersection is operating at LOS C in the morning peak and LOS B in the afternoon peak. The Blacktown Road, Bungaribee Road and Leabons Lane intersection is operating at LOS D in both peak periods. The Blacktown Road, Marcel Crescent and Griffiths Street intersection is operating at LOS B with a DOS of around 0.8 if Griffiths Street is not included. When Griffiths Street is include the reported operation deteriorates due to the delay for the right turn movement from Griffiths Street which is not signalised. The two Panorama Parade intersections operate satisfactorily.

Table 7 AM Peak Existing Intersection Performance

Intersection AM Peak	Degree of Saturation	Average Delay (seconds)	Worst Movement (in terms of delay)	Level of Service
Blacktown Rd, Marcel Cres and Griffiths St	0.64	19	Blacktown Rd E	B
Blacktown Rd and Griffiths St	0.30	42	Right turn from Griffiths St	C
Wall Park Ave and Blacktown Rd	0.88	29	Right turn from Wall Park Avenue	C
Blacktown Rd, Bungaribee Rd and Leabons Lane	0.97	54	Through on Blacktown Rd S	D
Panorama Pde and Hospital Access Rd	0.32	10	Panorama Pde S	A
Bungarribee Rd and Panorama Pde	0.58	29	Left/through on Bungarribee Rd W	C

Table 8 PM Peak Existing Intersection Performance

Intersection PM Peak	Degree of Saturation	Average Delay (seconds)	Worst Movement (in terms of delay)	Level of Service
Blacktown Rd, Marcel Cres and Griffiths St	0.64	20	Blacktown Rd E	B
Blacktown Rd and Griffiths St	0.60	76	Right turn from Griffiths St	F
Wall Park Ave and Blacktown Rd	0.79	24	Right turn from Blacktown Rd S	B
Blacktown Rd, Bungaribee Rd and Leabons Lane	0.91	44	Right turn from Bungarribee Road	D
Panorama Pde and Hospital Access Rd	0.26	10	Hospital Rd	A
Bungarribee Rd and Panorama Pde	0.50	24	Left/through on Bungarribee Rd E	B

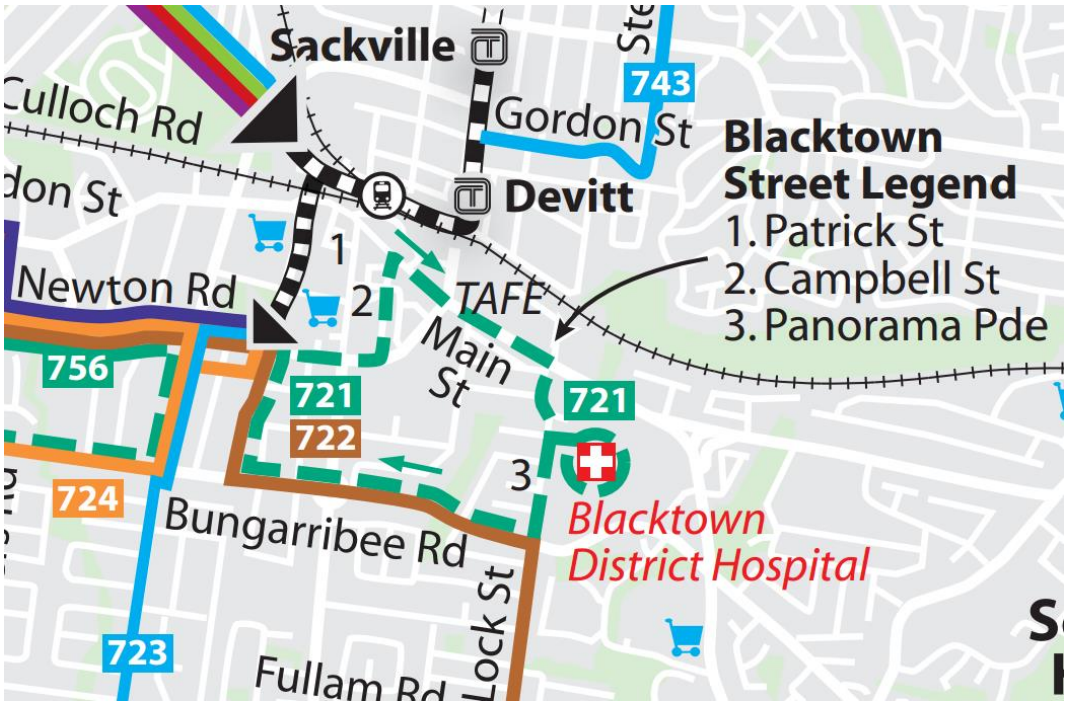
3.6 Public transport availability

The hospital is approximately 1.2km from Blacktown Railway Station which is outside the normal walk distance and hence staff and visitors rely on bus connections. Figure 9 shows the bus network map for the private bus company Busways that services the Blacktown area.

Busways operates a hospital service Route 721 which operates 8 services on weekdays between 8.56am and 5.34 pm between Blacktown Station and the hospital. Three of the 722 services are diverted in the mornings between 6.42 and

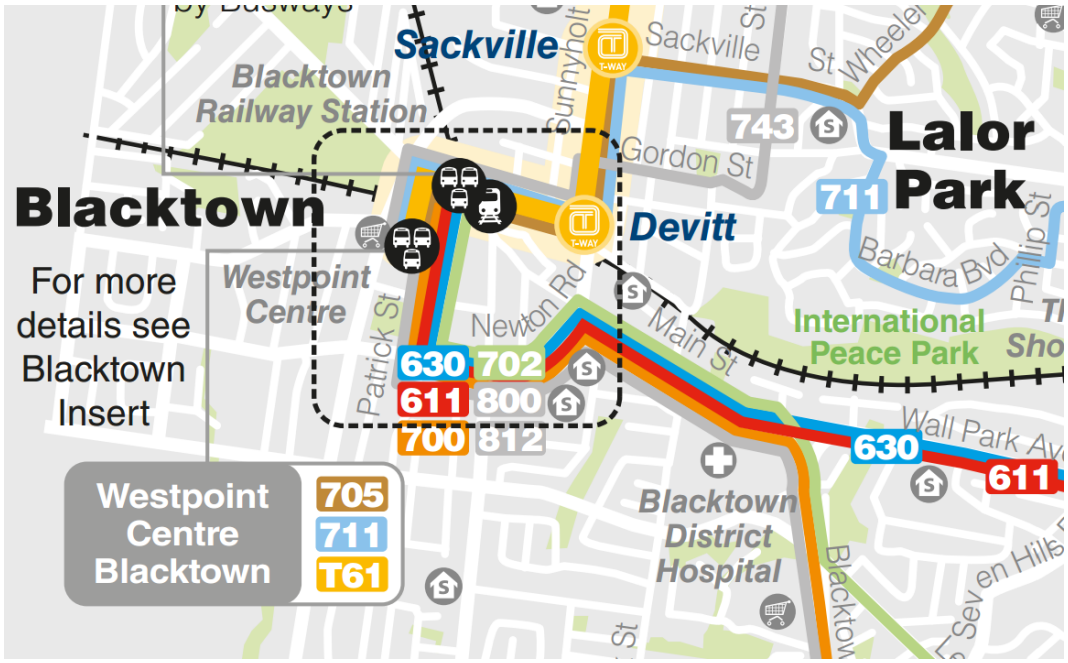
7.35am to provide access to the hospital. A similar number of services operate on weekend days.

Figure 9 Busways 721 map



Hillsbus operate regular services along Blacktown Road which provide access to the hospital including Routes 630, 611, 700, 702, and 812 as shown in Figure 10.

Figure 10 Hillsbus bus network map



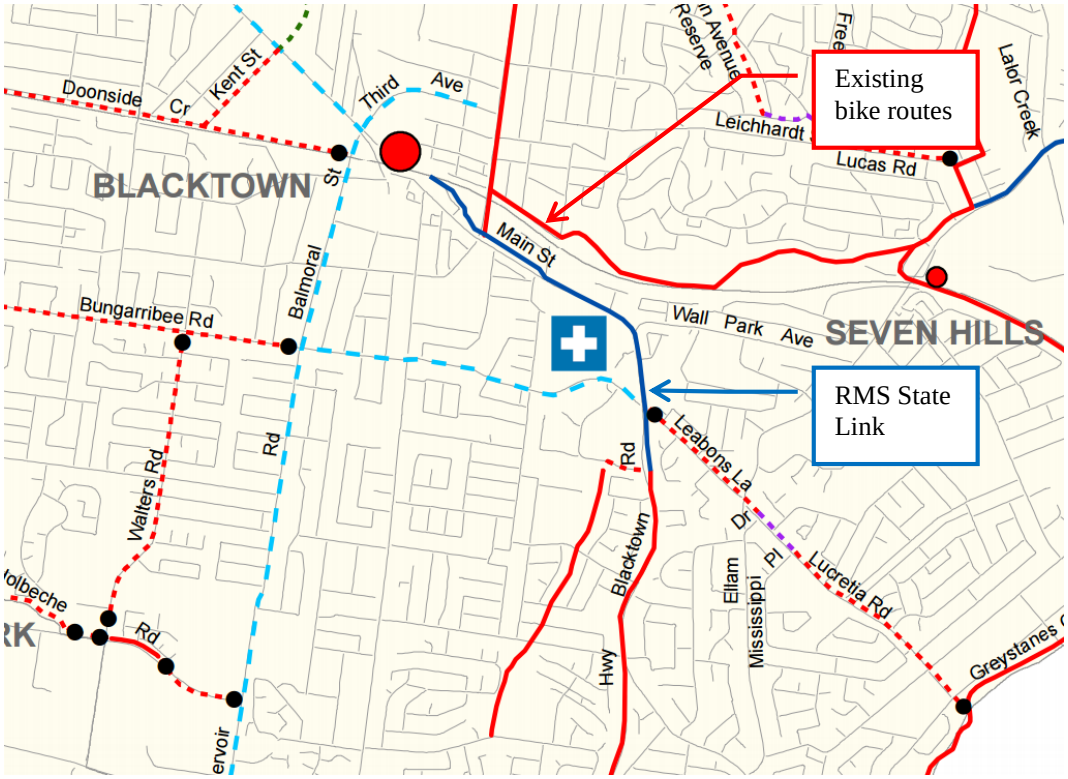
3.7 Pedestrian and cycle facilities and conditions

An existing off-road bicycle facility provides connection between Blacktown Railway Station and Seven Hills Railway Station running along International Peace Park to the north of the railway line as shown on Figure 11. Unfortunately there are no pedestrian or bicycle connections across the railway between these two stations.

The RMS State bicycle link runs along Blacktown Road which has recently been completed as a shared path facility. This provides a direct connection between the hospital and the city centre as well as linking to other local routes.

Footpaths generally occur on both sides of all roads in the vicinity of the hospital. The Marcel Road/ Blacktown Road traffic signal controlled intersection has pedestrian crossings on all legs. The intersection of Blacktown Road and Wall Park Road is controlled by traffic signals but there are no pedestrian crossing facilities which means that access from the east to the hospital is poor.

Figure 11 Blacktown City Council Bike Plan

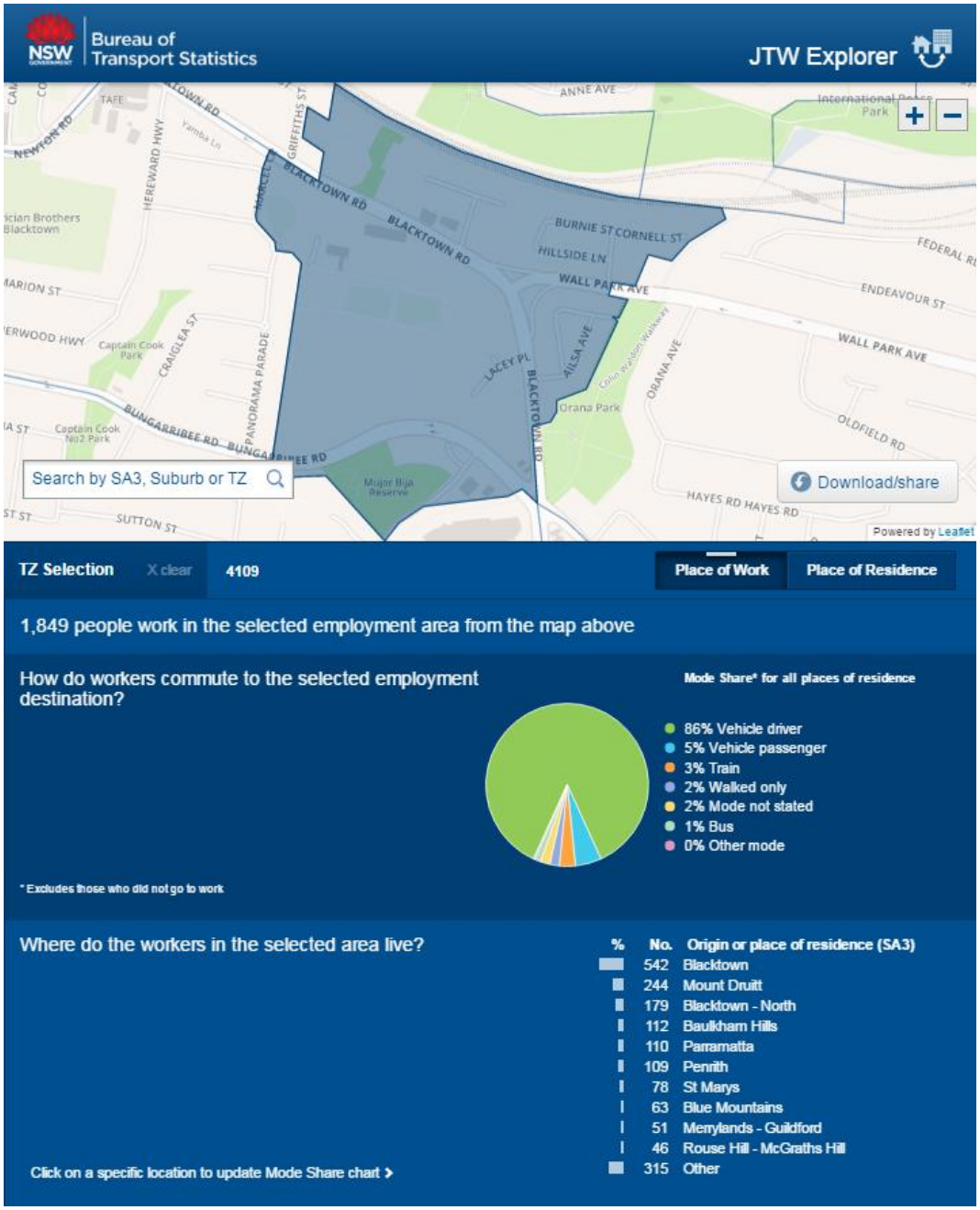


3.8 Travel Patterns

3.8.1 Mode split

The existing 2011 ABS Journey to Work data for the travel zone 4109 including Blacktown Hospital (see Figure 12) has been analysed for this study.

Figure 12 Travel Zone Including Blacktown Hospital



Source: Bureau of Transport Statistics (2011)

The mode split of workers travelling to this precinct is indicated in Table 9.

Table 9 Journey to Work Existing Mode Split

Mode	Total Trips	Proportion of Total Trips (%)
Car as driver	1362	86%
Car as passenger	82	5%
Train	50	3%
Bus	19	1%
Other mode	4	0%
Walked only	30	2%
Not Stated	30	2%
TOTAL	1849	100%

The analysis indicates that 91% of people travel by car to work in this precinct. Public transport currently accounts for only 4% of work related trips and walking 2%.

3.8.2 Home location of workers

The home location of all workers travelling to this travel zone, based on 2011 Journey to Work data, is presented in Table 10. Just over 50% of all workers in this travel zone live in Blacktown/Mount Druitt. This indicates that walk, cycle and bus modes could be viable travel options for many workers at Blacktown Hospital. In addition, train is a viable travel option for many of the high ranking home locations.

Table 10 Home LGA of Workers

Home LGA	Total Trips	Proportion of Total Trips
Blacktown	542	29%
Mount Druitt	244	13%
Blacktown North	179	10%
Baulkham Hills	112	6%
Parramatta	110	6%
Penrith	109	6%
St Marys	78	4%
Blue Mountains	63	3%
Merrylands/Guidlford	51	3%
Rouse Hill	46	2%
Other	315	17%
Total	1,849	100%

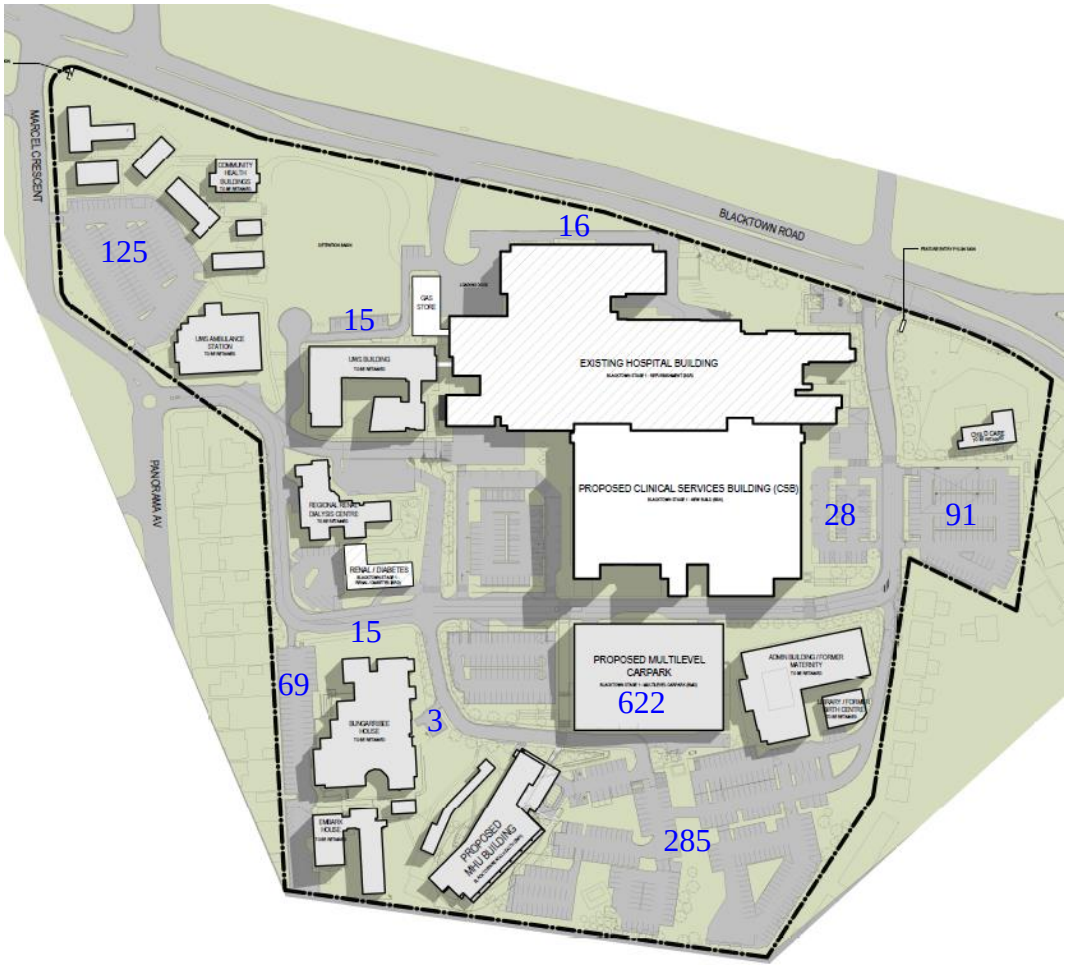
3.9 On and off-site parking arrangements

Car parking is currently spread across the site in at-grade car parks and in the recently constructed multi-storey car park. A breakdown of hospital parking currently available is provided in Figure 13. There are approximately 647 at-grade spaces and 622 spaces in the multi-storey car park providing a total of 1,269 car parking spaces across the campus which adequately services current demand. All parking on the site is controlled by swipe access control for staff or pay control for visitors. The mid-level car park has an area that is sectioned off at 7am so that it is available for the afternoon shift arrivals from 12pm onwards for about 50 staff cars.

On-street car parking is limited in the vicinity of the site with time limits imposed on the majority of parking. This limits all day parking by staff but allows for resident parking and permits hospital visitors to park within the time limit.

On-street parking is available for some 200 vehicles within 400m of the site.

Figure 13 Existing Car Parking



3.10 On and off-site parking utilisation

The current demand for staff and visitor car parking at the Blacktown Campus is catered for by the 1,269 car parking spaces available on the site and visitors who choose to park on street where time limited parking is free.

4 Proposed Development

4.1 Description of development

The Stage 2 works of the hospital development include a new acute services building to the west of Stage 1 and a new drop-off road between Stage 1 and Stage 2. The following works are the subject of separate planning applications:

- a new entry road from Panorama Parade on the alignment of the main east west road
- a future at-grade car park located between the Stage 2 building and Panorama Parade
- a new multi storey car park to the west of the existing multi storey car park

These are shown in Figure 14.

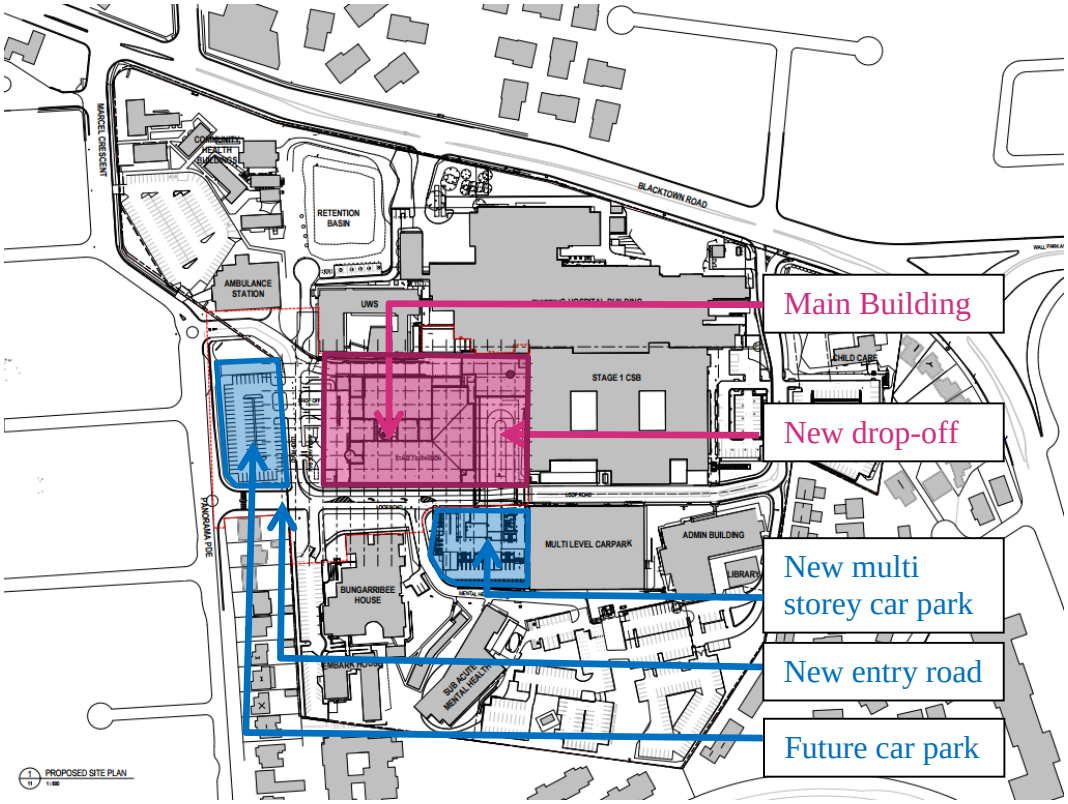


Figure 14: Stage 2 Main Building works and site access

4.2 Future levels of activity

The existing and future Stages 1 and 2 staffing, patient and visitor levels of activity have been determined as shown in Table 11. The following years of activity have been tested:

- 2019 – Stage 1 full operation
- 2019 – Stage 2 opening year
- 2027 – Stage 2 full operation

Table 11 Staff, Patient and Visitor Activity

	Base 2015	**Stage 1 full operation**	**Stage 2 opening year**	**Stage 2 full operation**
	2015	2019	2019	2027
1. Staff Attendance staff/weekday				
Nursing	929	1137	1246	1413
Corporate Administration	171	202	217	259
Health Support Services	240	321	362	404
Allied Health	156	294	322	391
Medical	354	428	484	597
Hospital employees + trades	40	43	46	50
TOTAL daily attendance	1890	2425	2677	3114
2. Staff Vehicle Trip Characteristics				
Mode Split				
700-1100 (Day)	93%	88%	83%	83%
1130-630 (Night)	98%	98%	98%	98%
Car Occupancy				
700-1100 (Day)	1.18	1.25	1.25	1.25
1130-630 (Night)	1.05	1.05	1.05	1.05
3. Visitor/Patient Attendance				
Patients	people/p.a.	people/p.a.	people/p.a.	people/p.a.
Outpatients	220000	330000	334000	334000
Inpatients	36047	43724	47494	46641
Casualty	72000	83000	87000	97000
Renal Dialysis	7000	7000	7000	7000
Beds	334	449	555	555
Assumed occupancy rate	0.85	0.85	0.85	0.85
4. Visitor/Patient Vehicle Trip Characteristics				
Mode Split (%)	80%	80%	80%	80%
Vehicle Occupancy	1.65	1.65	1.65	1.65
Visitor Car Bed Trips / Day	2.00	2.00	2.00	2.00

4.3 Car Parking

4.3.1 Base car parking demand model

A traffic and parking model has been developed based on estimated daily staff, patient and visitor activity on the campus. The base model was developed using existing levels of activity prior to commencement of Stage 1 construction works which results in a peak parking demand of 1,018 spaces at 2.30pm. This correlates well with the on-site and on-street parking survey undertaken at that time in December 2010 which indicated just over 1,000 cars parked associated with the hospital.

The modelling is based on a 93% mode split to car with a car occupancy of 1.18 by staff and 80% for patients and visitors with a car occupancy of 1.65. Staff car mode at night is 98% with 1.05 car occupancy.

The activity for 2015 has been modelled based on recent staffing and patient numbers. The modelling calculate a peak demand of 1,360 spaces at 2.30pm. The current supply of 1,269 spaces correlates well with this demand when on-street car parking is allowed for.

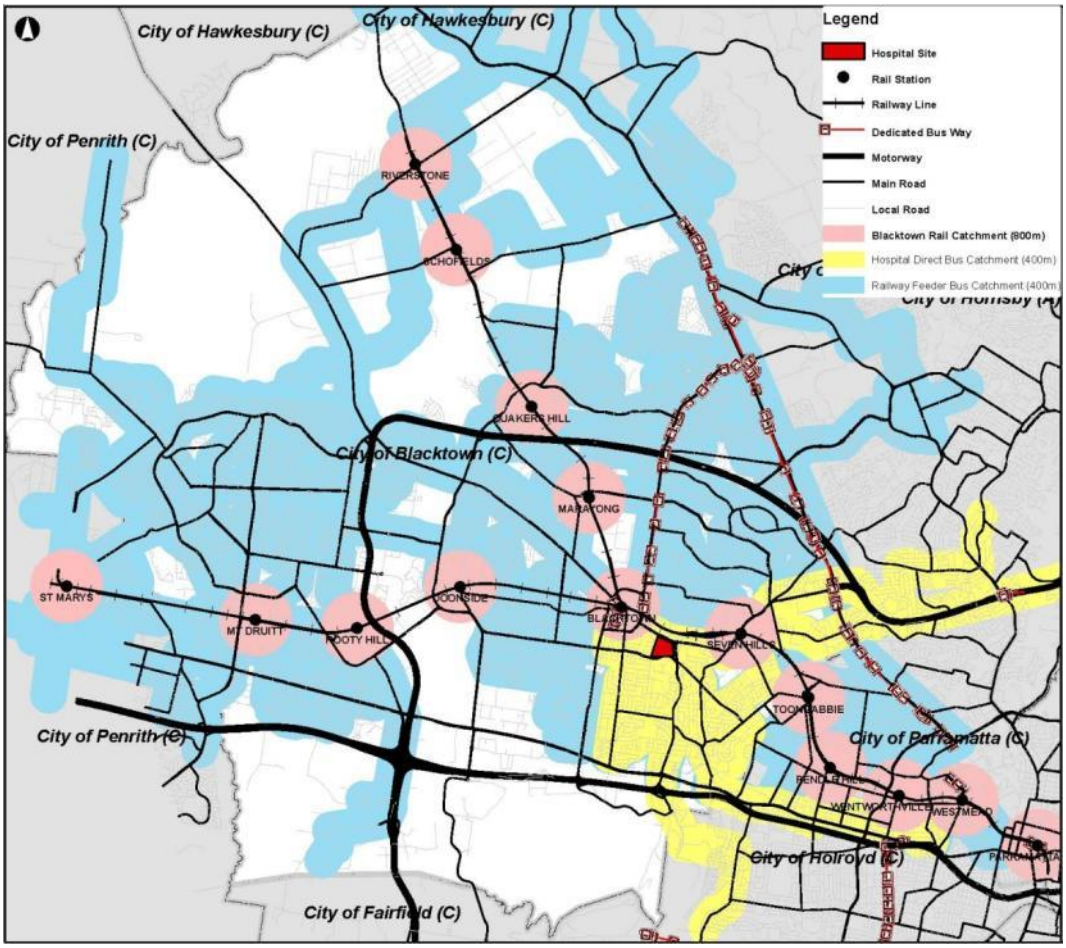
4.3.2 Non-car modes of travel for staff

For the Stage 2 development, the mode of travel and car occupancy assumptions for staff have been adjusted to reflect the Workplace Travel Plan initiatives that will be implemented (See Section 6). Car mode has been reduced to 88% with a car occupancy of 1.25 in Stage 1 and to 83% with a car occupancy of 1.25 in Stage 2. Night staff and visitor and patient travel characteristics have not been changed for the future modelling.

Based on 2011 Journey to work data as described in Section 3.8.2, the current home location of workers in the travel zone which represents Blacktown Hospital indicates that just over 50% of all workers live in the Blacktown/ Mount Druitt area. This indicates that walk, cycle and bus modes could be viable travel options for many workers at Blacktown Hospital. In addition, train is a viable travel option for many of the high ranking home locations.

Figure 15 shows the public transport availability within the Blacktown LGA indicating railway station catchments, direct bus routes passing the site and feeder bus routes to the railway stations.

Figure 15 Public Transport in Blacktown LGA



Based on the travel characteristics adopted for the travel model, the number of trips made by non-car modes can be determined. The potential future mode split of workers travelling to this precinct for day shifts is indicated in Table 12. There are good public transport services to provide for this potential increase in activity.

Table 12 Journey to Work Future Mode Split Assumptions for Daytime Staff

Mode	**Stage 1**		**Stage 2**	
	Trips	(%)	Trips	(%)
Car (driver & passenger)	1750	88%	1910	83%
Train	80	4%	138	6%
Bus	60	3%	92	4%
Taxi	10	0.5%	12	0.5%
Motorbike	10	0.5%	12	0.5%
Bicycle	20	1%	46	2%
Walked only	60	3%	92	4%
TOTAL	**1990**	**100%**	**2302**	**100%**

4.3.3 Future car parking demand

Based on future levels of activity predicted for the campus, a peak parking demand of 1,780 is predicted for the opening of Stage 2. After 8 years of growth in patient activity and staffing numbers, Stage 2 will have a peak parking demand of 2,020 in the afternoon peak period at 2.30pm. The modelled parking demand is shown graphically for Stage 2 opening year in Figure 16 and Stages fully operational in Figure 17.

Figure 16 Stage 2 Opening Year Parking Accumulation from Model

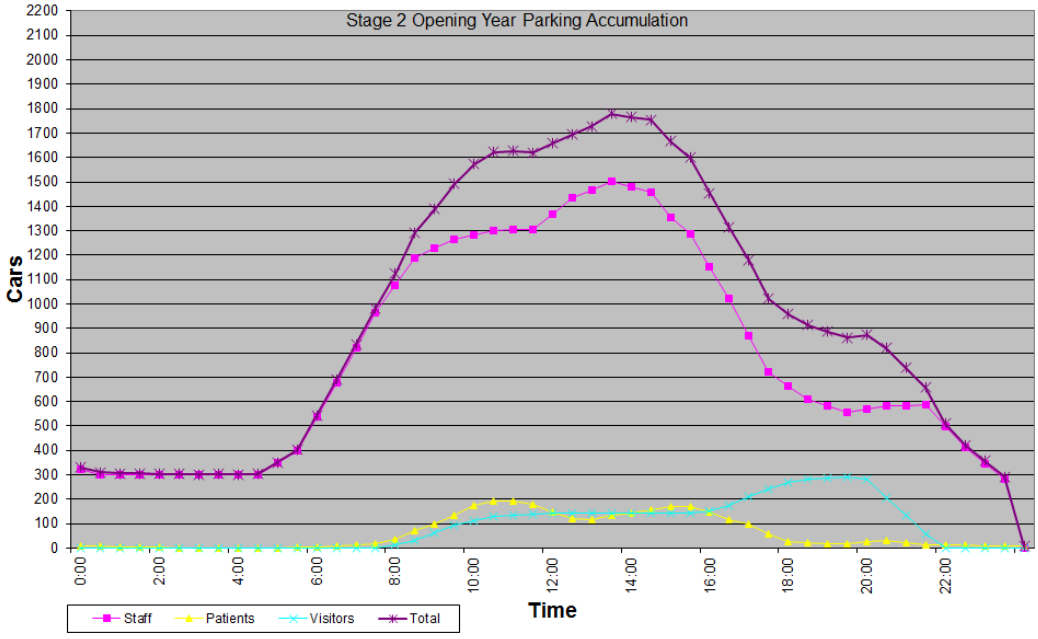
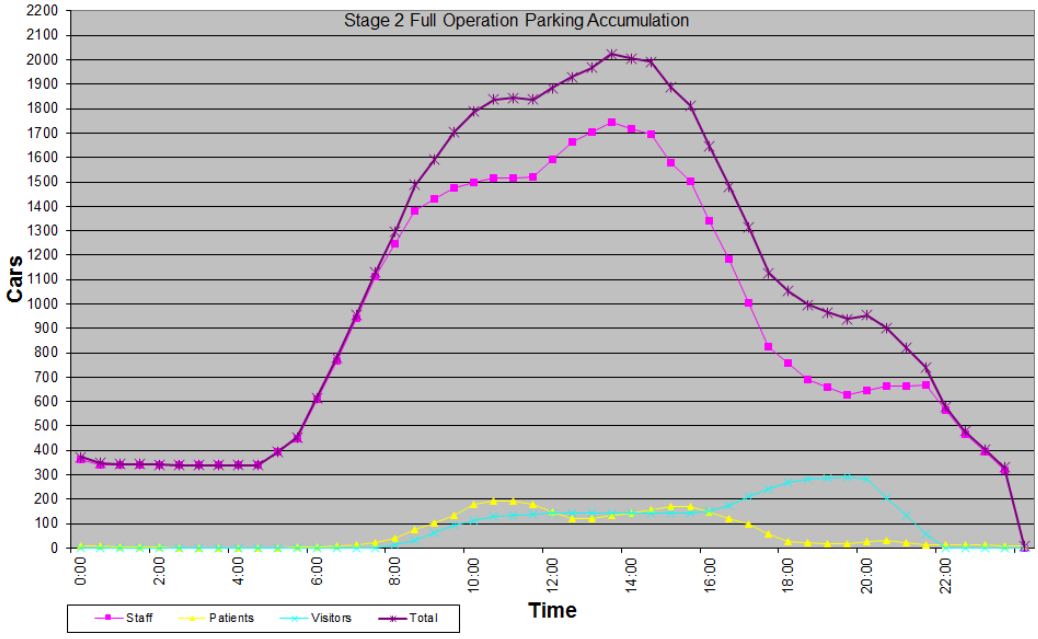


Figure 17 Stage 2 Full Operation Parking Accumulation from Model



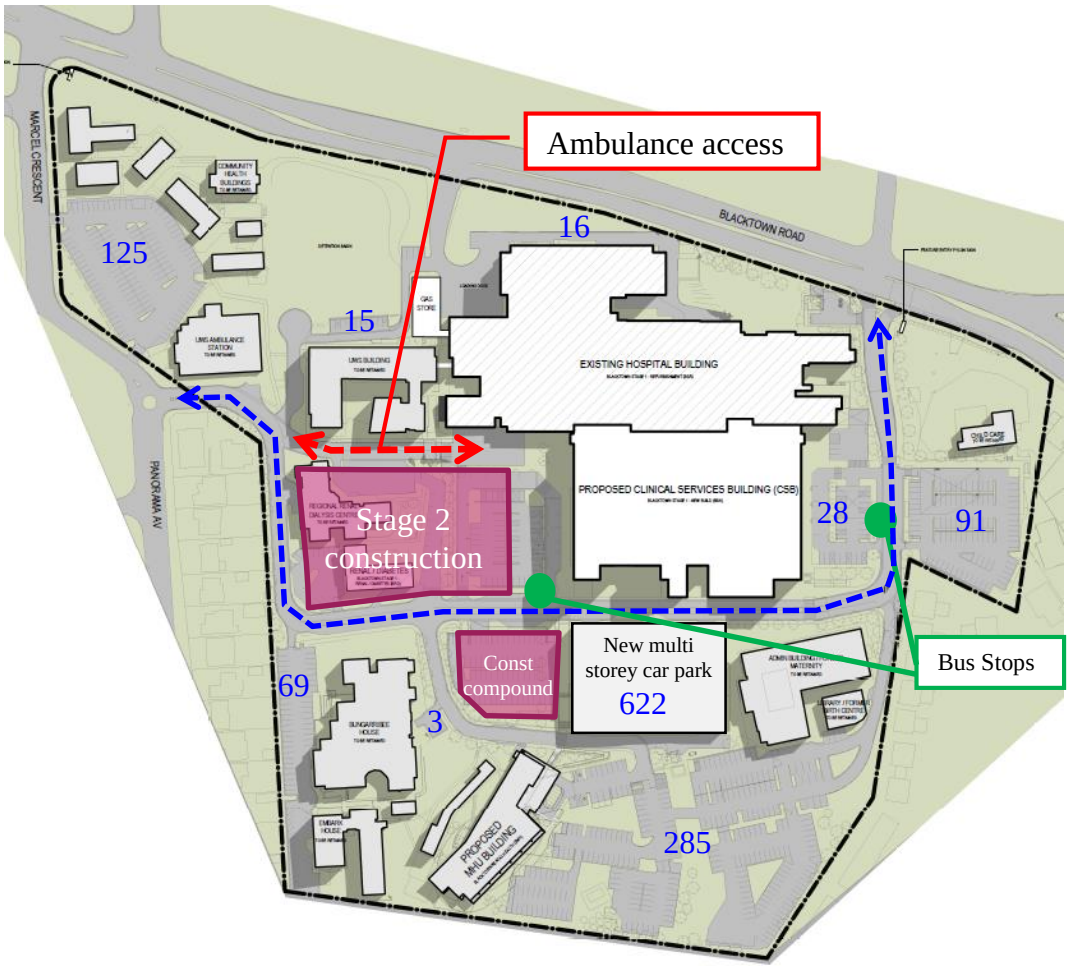
4.3.4 Future car parking provision and access

The floor plans and access arrangement that are currently in place with Stage 1 now open and Stage 2 enabling works underway are shown in Figure 18. The new access to Blacktown Road in conjunction with the existing Panorama Parade access provides a good level of access and services both sides of the campus improving internal circulation to car parks and drop-off areas. Ambulance access will remain from Panorama Parade.

Various works on the hospital site have recently been authorised under SEPP Infrastructure as 'Development Without Consent'. The modification to the eastern half of the P7 car park has resulted in the loss of 26 spaces. A further 40 spaces have been decommissioned from the existing Bungarribee House, RRDC and Oncology car parks. No further parking loss is proposed as part of the Stage 2 Enabling Works Package, however the redundant spaces within the development site have been physically removed as part of the proposed works.

Based on the above, there will be 1,254 parking spaces available across the campus. This includes approximately 632 at-grade car parking spaces, and the multi-storey car park providing an additional 622 spaces.

Figure 18 Blacktown Hospital Stage 1 showing new car parks



The next stage of planning for car park expansion is underway which is the subject of a separate planning application. It is planned to deliver the expansion of the multi-deck car park to the west of the existing car park which will increase the capacity of the multi deck to 1,036 spaces. A new at-grade car park is proposed adjacent to Panorama Parade providing 86 spaces. These new car parks take the total provision to 1,754 spaces on the site as shown in Figure 19.

For the Stage 2 redevelopment, current planning indicates the potential demand for up to 1,780 spaces indicating that car park supply will generally meet the expected demand.

Further extension of the multi-storey car park has been allowed for in the design which involves two additional levels on the car park. This will add approximately 456 spaces and be the subject of a separate planning application should it be required. These spaces may be needed as activity at the campus associated with Stage 2 occupation builds up over a number of years. Modelling for Stage 2 fully operational indicates a demand of 2,020 spaces. As shown in Figure 20, these additional levels would take total car parking supply to 2,200 spaces. The need for these additional spaces will be determined as the hospital operations grow and be the subject of a future planning application.

Figure 19 Blacktown Hospital Stage 2 opening year 2019 showing potential car parks

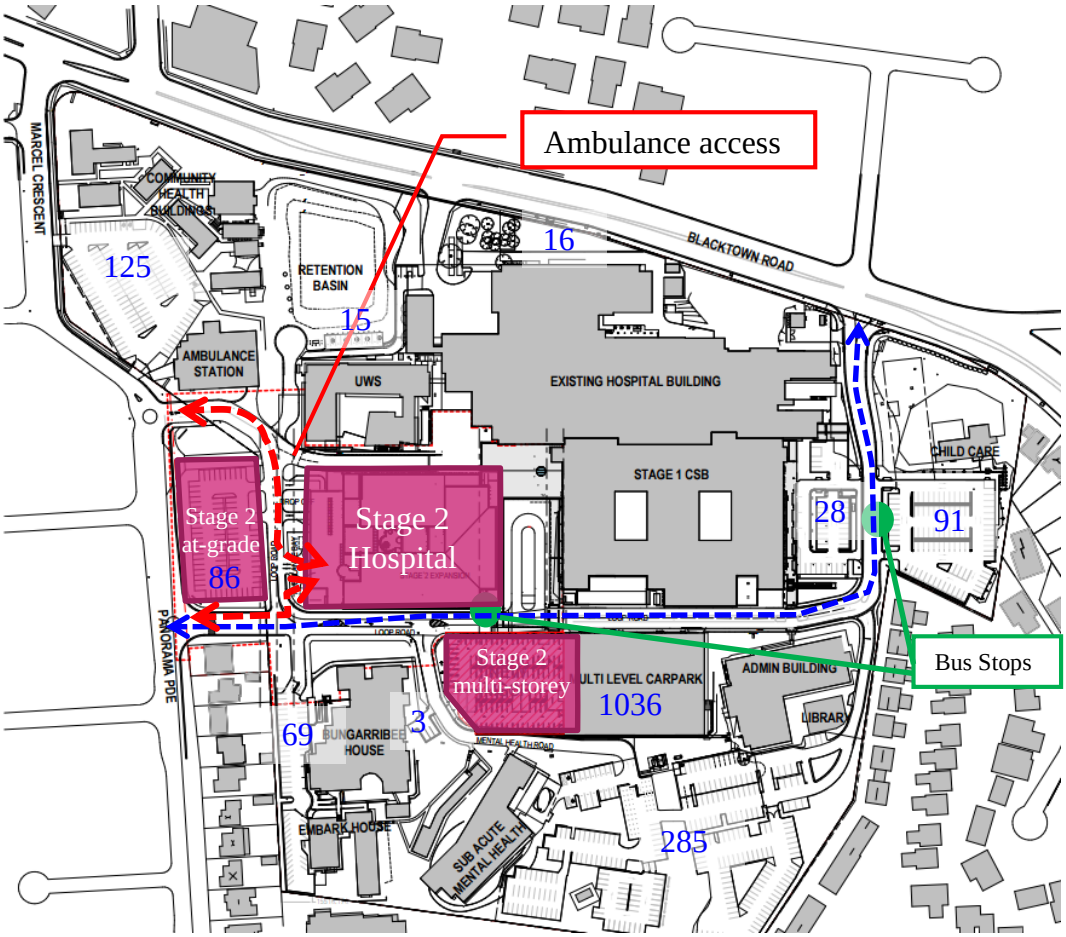
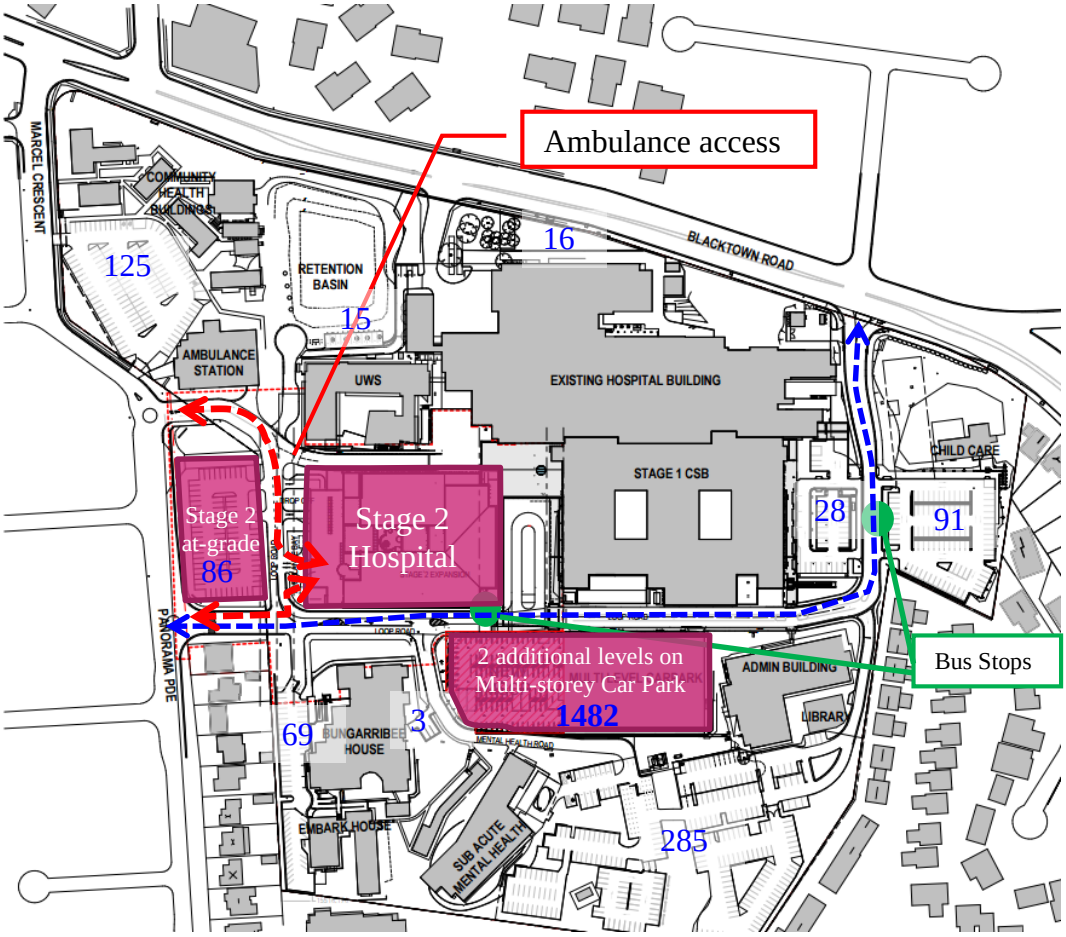


Figure 20 Blacktown Hospital Stage 2 fully operational 2027 showing potential car parks



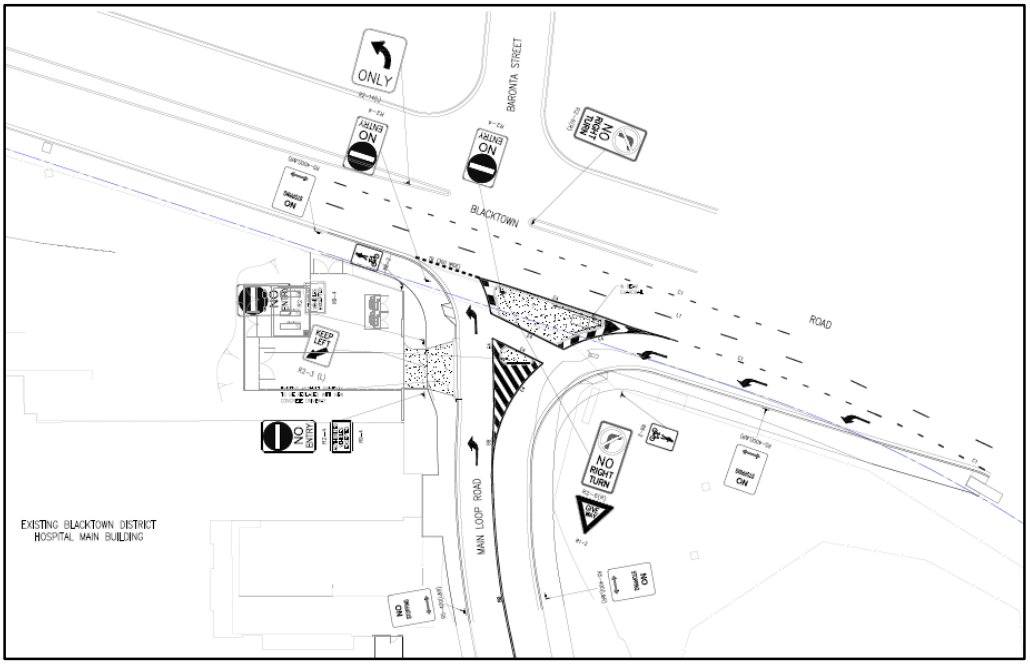
4.3.5 Bicycle Parking

New bicycle parking facilities and end of trip facilities are proposed as part of the multi-storey car park expansion (separate application). These are proposed to be located centrally on the ground floor of the car park which is well located for access to the hospital being on the main north-south pedestrian spine.

4.4 New access road

The new access point onto Blacktown Road constructed in the Stage 1 development at the eastern end of the campus aligns with Baronta Street as shown in Figure 21. Access to the hospital is provided for left turn in movements via a deceleration lane and left turn out movements into the traffic stream via give-way control. A large central island has been provided to store pedestrians and cyclists crossing the hospital access road and to control right turn movements. All turning movements are maintained for Baronta Street. The intersection is approximately 100m to the west of the Wall Park Avenue intersection.

Figure 21 New Hospital Access to Blacktown Road opposite Baronta Street



4.5 Design of access roads and car parks

The proposed access roads, drop-off facilities and car parking provisions associated with the proposed development have been designed to comply with the requirements of the relevant Australian Standards for turn paths, sight distance requirements, aisle widths, etc. The civil design has been undertaken by Robert Bird Group with vehicle turning paths checked by Arup.

4.6 Background traffic growth

The Roads and Maritime Services (RMS) operate a Sydney wide strategic traffic model on the EMME2 model platform. Projections for future years are calculated on a 5 yearly growth projection; 2016, 2021, 2026 and 2031 for the AM and PM peak periods.

The RMS emphasises that this modelling is approximate and based on assumptions which are subject to change. Furthermore, the outputs and its use are subject to the following:

- The modelled volumes are very approximate.
- The configuration of the modelled road networks within the development area has been assumed for modelling and planning purposes, and does not imply any commitments on the part of RMS, Department of Planning and Infrastructure, or local government.
- Any changes to assumptions about future employment and road infrastructure will change the forecast traffic volumes.
- Any person who places any reliance on these forecasts does so at their own risk.

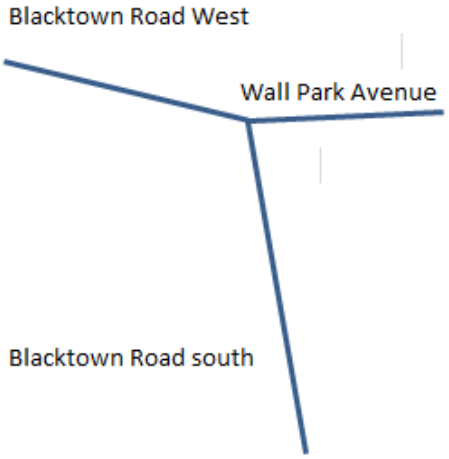
- The information is only provided to the proponent in relation to this development proposal.

The percentage change in traffic predicted by the EMME2 model from the base year 2013 to the future years 2016, 2026 and 2031 are shown in Figure 22 for each approach at the Blacktown Road/ Wall Park Avenue. In the AM peak for the period between 2013 and 2031, growth varies between 8% to 27% on each road link. In the PM Peak growth varies from 0% to 21%.

For Panorama Parade, the future RMS modelling is indicating similar levels of growth in traffic of approximately 25% for both peak periods between 2013 and 2031.

Figure 22 Traffic Growth from EMME2 Model (Source RMS)

Blacktown Road West									
westbound	**2013**	**2016**	**2026**	**2031**	**eastbound**	**2013**	**2016**	**2026**	**2031**
AM	2316	2436	2675	2740	AM	1961	2118	2407	2482
	100%	105%	116%	118%		100%	108%	123%	127%
PM	2384	2518	2698	2893	PM	2588	2739	2881	2711
	100%	106%	113%	121%		100%	106%	111%	105%



Wall Park Avenue				
eastbound	**2013**	**2016**	**2026**	**2031**
AM	2753	2808	2713	2969
	100%	102%	99%	108%
PM	3008	3036	3335	3244
	100%	101%	111%	108%
westbound	**2013**	**2016**	**2026**	**2031**
AM	2897	3044	3147	3314
	100%	105%	109%	114%
PM	3130	3126	3212	3085
	100%	100%	103%	99%

Blacktown Road south									
northbound	**2013**	**2016**	**2026**	**2031**	**southbound**	**2013**	**2016**	**2026**	**2031**
AM	2848	2904	2935	3190	AM	2533	2699	2945	3101
	100%	102%	103%	112%		100%	107%	116%	122%
PM	2546	2581	3090	3002	PM	2925	2972	3245	3132
	100%	101%	121%	118%		100%	102%	111%	107%

4.7 Traffic generation and distribution

The travel model predicts the traffic flows throughout the day. The predicted peak hour flows are shown in Table 13.

Table 13 Predicted Peak Hour Traffic Flows for each stage

	Road Peak Hour	In	Out	Total	Increase from Base	% increase
Base	AM Peak	279	70	349	-	-
	PM Peak	101	209	310	-	-
Stage 1	AM Peak	399	146	545	196	56%
	PM Peak	103	330	433	123	40%
Stage 2 Opening Year	AM Peak	521	137	658	309	89%
	PM Peak	149	441	589	279	90%
Stage 2 Fully Operational	AM Peak	605	158	764	415	119%
	PM Peak	149	510	659	349	113%

The Stage 1 development when fully operational in 2019 results in approximately a 50% increase in traffic activity over the base whilst the Stage 2 development is predicted to result in approximately a doubling of traffic activity over the base.

The future traffic flows have been distributed onto the road system based on the current patterns of arrival and departure, which have been determined based on the turning movement counts at the access point to Panorama Parade and the configuration of the main access road system.

For entry movements, the new left turn entry from Blacktown Road will pick up traffic from the east and south. The split of traffic between the existing access at Panorama Parade and the new access on Blacktown Road (left turn in/ left turn out opposite Baronta Street) is shown in Table 14.

Table 14 Predicted Peak Hour Traffic Flows by access location

	Road Peak Hour	IN				OUT			
		Panorama		Left in/Left out Blacktown Rd Access		Panorama		Left in/Left out Blacktown Rd Access	
		No	%	No	%	No	%	No	%
Existing Base	AM Peak	279	100%	-	-	70	100%	-	-
	PM Peak	101	100%	-	-	209	100%	-	-
Stage 1 Fully Operational	AM Peak	234	59%	165	41%	133	90%	13	10%
	PM Peak	56	55%	47	45%	313	95%	17	5%
Stage 2 Opening Year	AM Peak	305	59%	216	41%	126	90%	11	10%
	PM Peak	84	55%	65	45%	417	95%	24	5%
Stage 2 Fully Operational	AM Peak	353	59%	252	41%	144	90%	14	10%
	PM Peak	84	55%	65	45%	479	95%	31	5%

For the entry movement, 41% of traffic has been assigned to the new access in the AM Peak and 45% in the PM Peak. This provides a good spread of activity and minimises the increase of entry traffic on the existing Panorama Parade access.

For the exit movements, the new left turn out onto Blacktown Road is not expected to be very attractive due to the need to travel backwards through the site from the main car parking areas to access the new road on the eastern end of the site. We have estimated that only 5 – 10% of exit traffic will use the new access road.

The traffic distribution is shown in the following figures:

Existing Base - Figure 23, AM Peak and Figure 24, PM Peak.

Stage 1 Fully Operational - Figure 25, AM Peak and Figure 26, PM Peak

Stage 2 Opening Year - Figure 27, AM Peak and Figure 28, PM Peak.

Stage 2 Fully Operational - Figure 29, AM Peak and Figure 30, PM Peak

Figure 23 Existing AM Peak Traffic Distribution

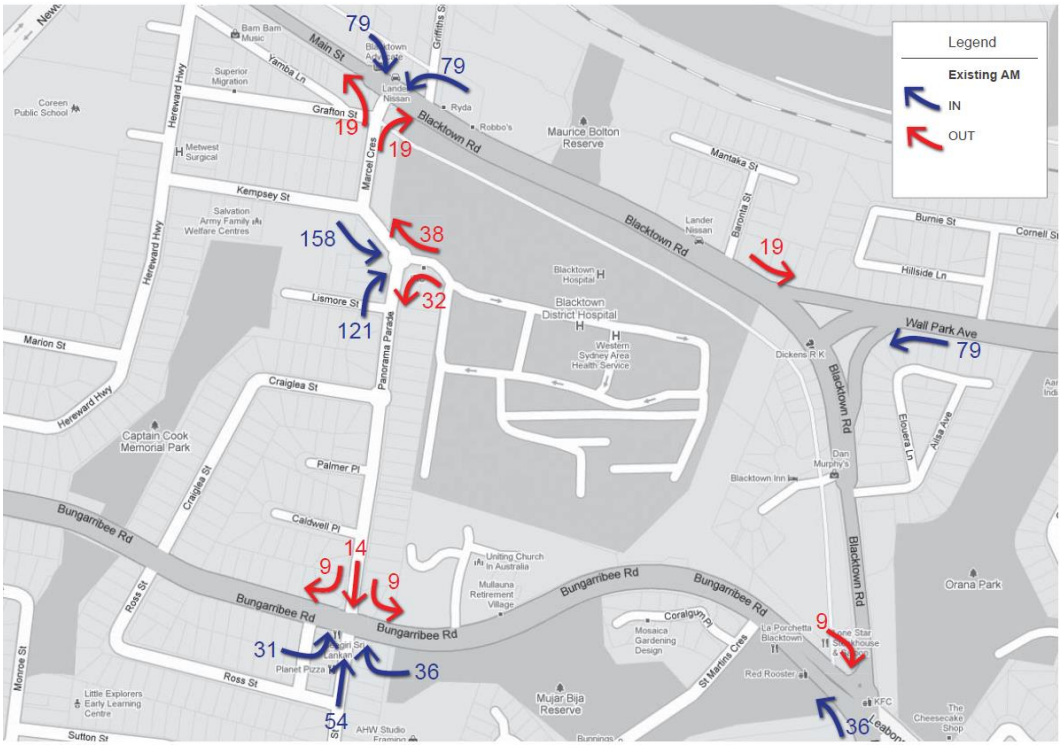


Figure 24 Existing PM Peak Traffic Distribution

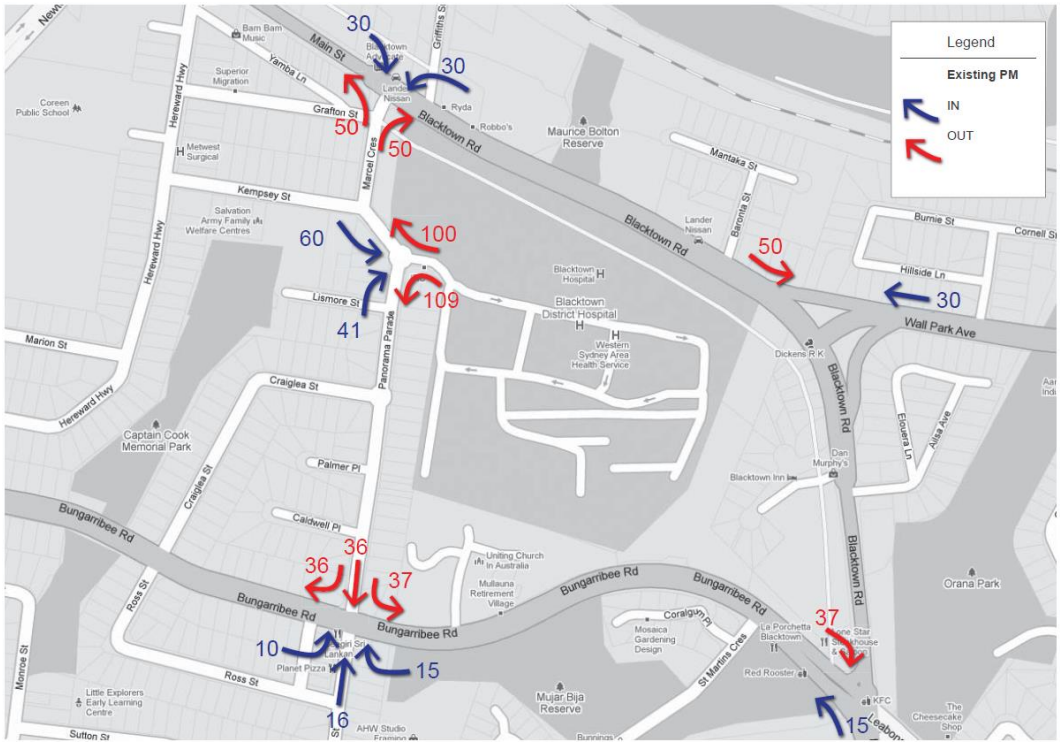


Figure 25 Stage 1 Expansion Fully Operational AM Peak Traffic Redistribution

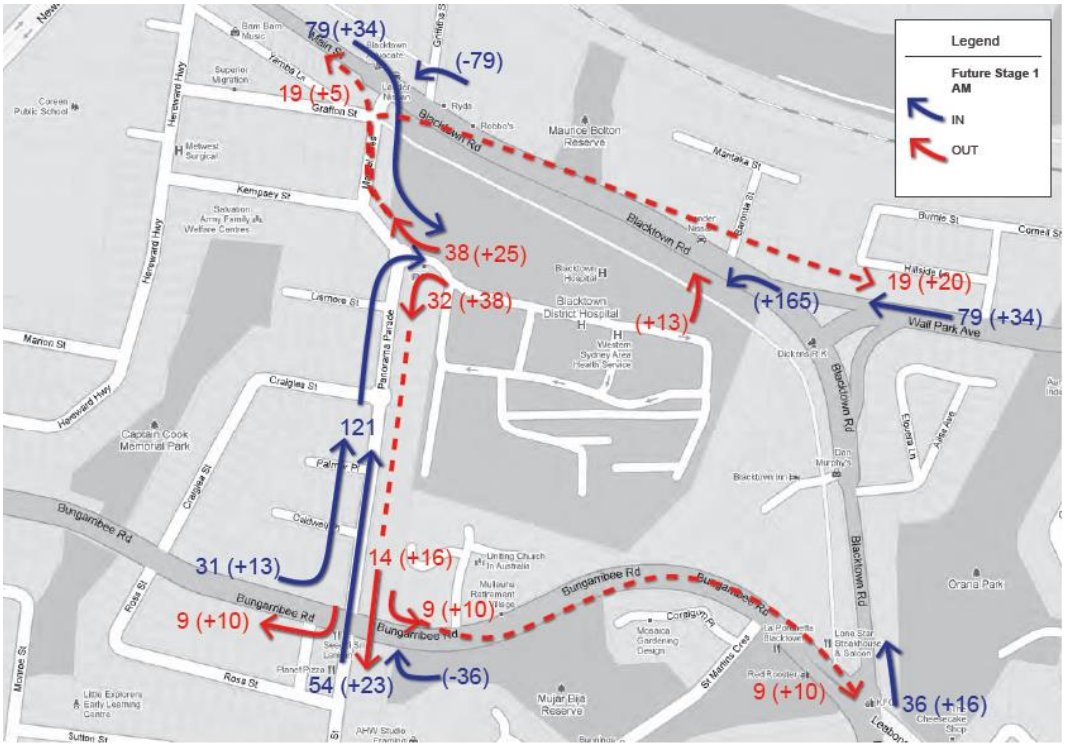


Figure 26 Stage 1 Expansion Fully Operational PM Peak Traffic Redistribution

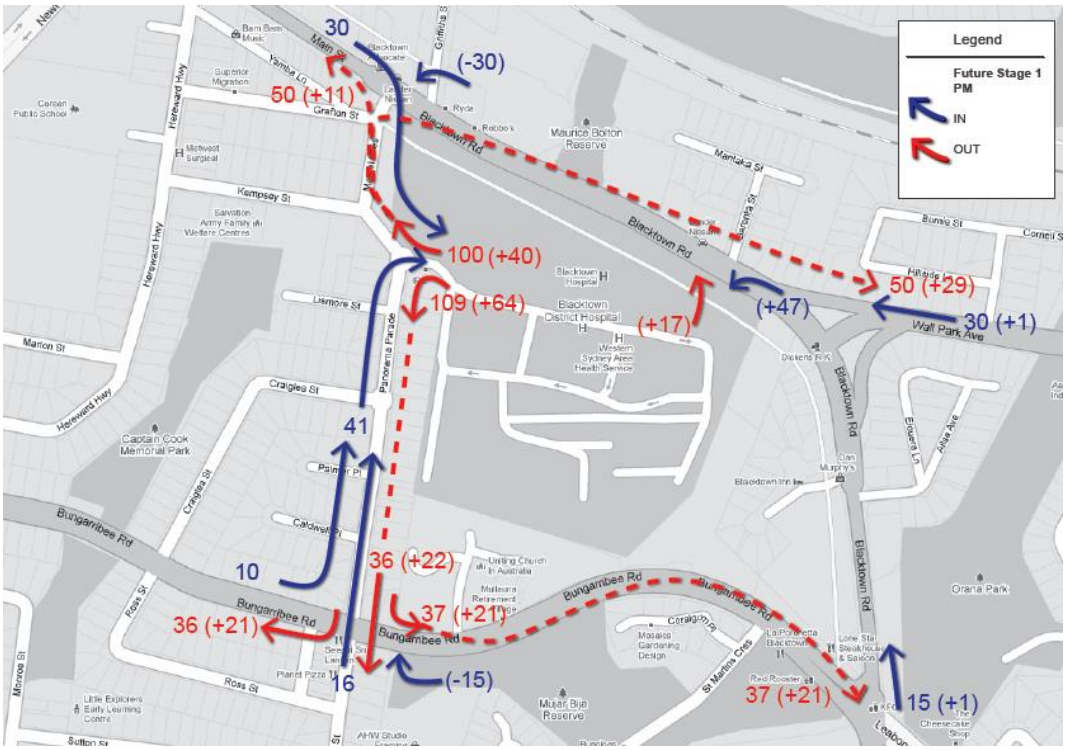


Figure 27 Proposed Stage 2 Expansion Opening Year AM Peak Traffic Redistribution

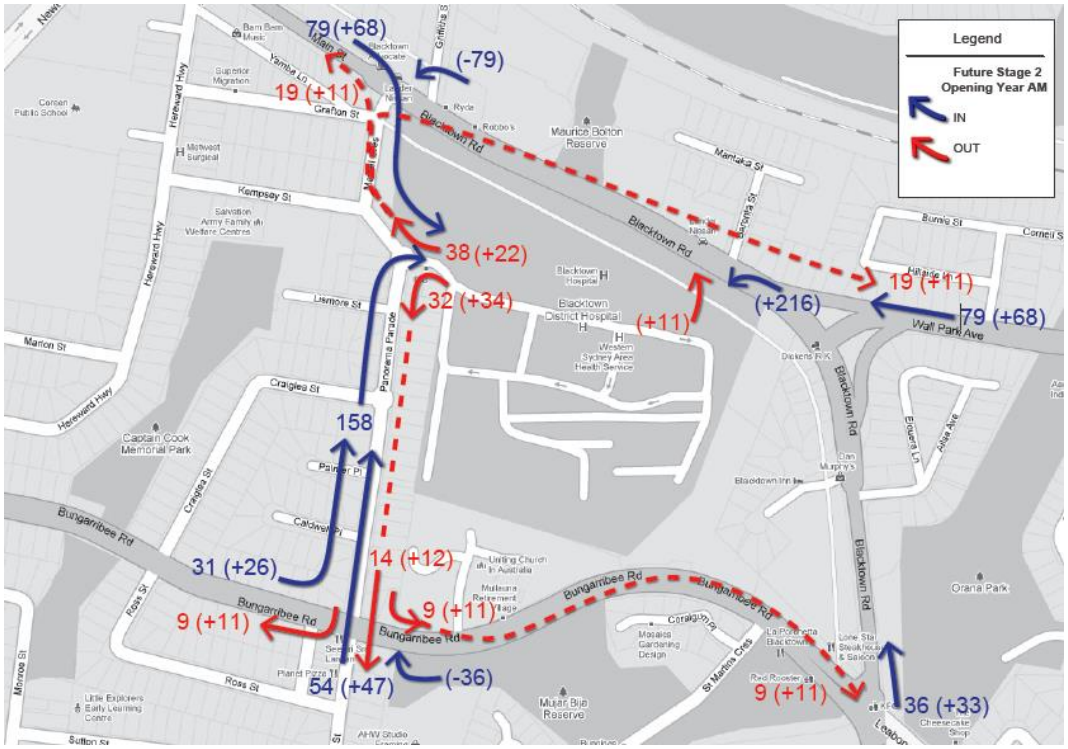


Figure 28 Proposed Stage 2 Expansion Opening Year PM Peak Traffic Redistribution

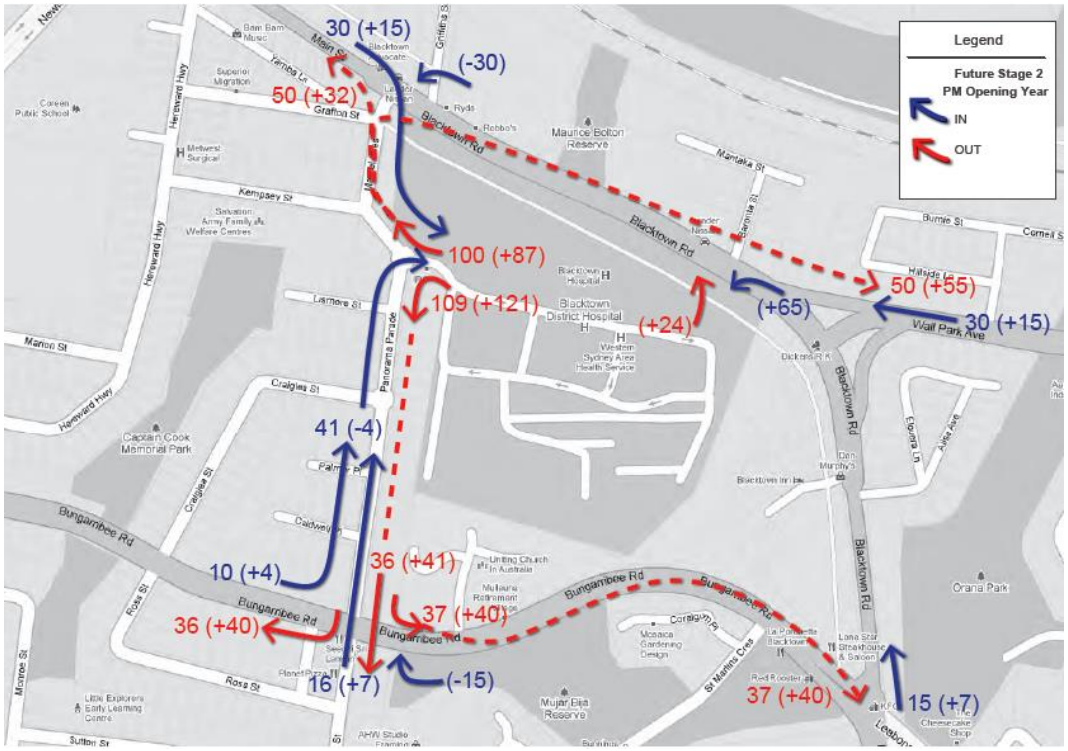


Figure 29 Future Stage 2 Expansion Fully Operational AM Peak Traffic Redistribution

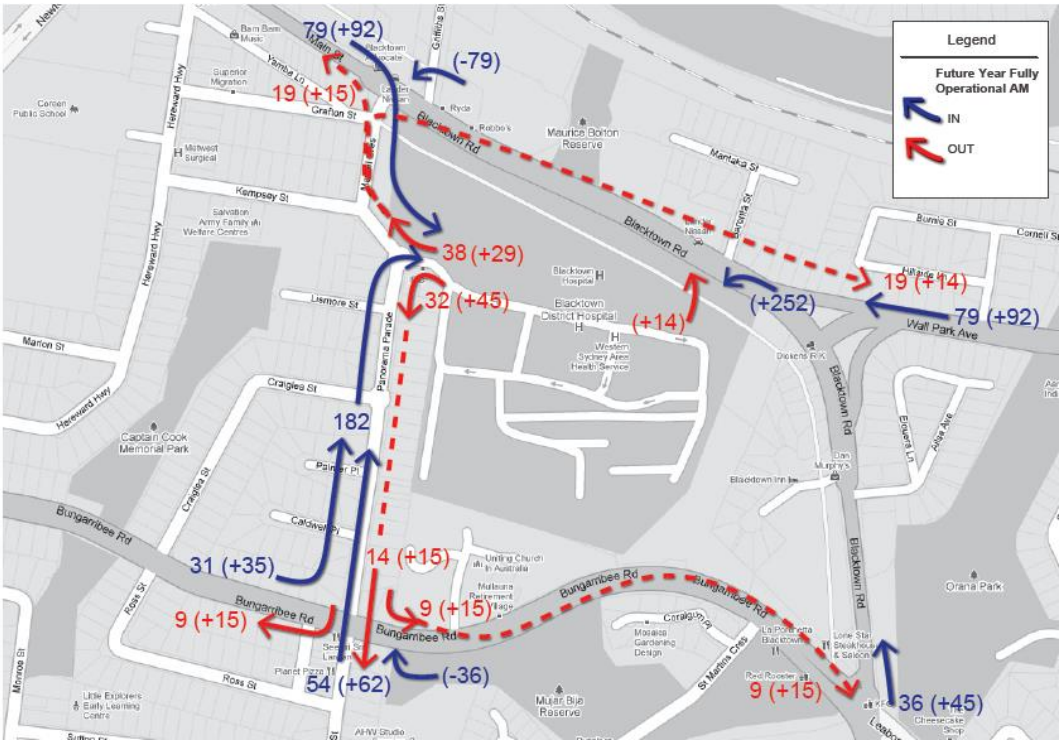
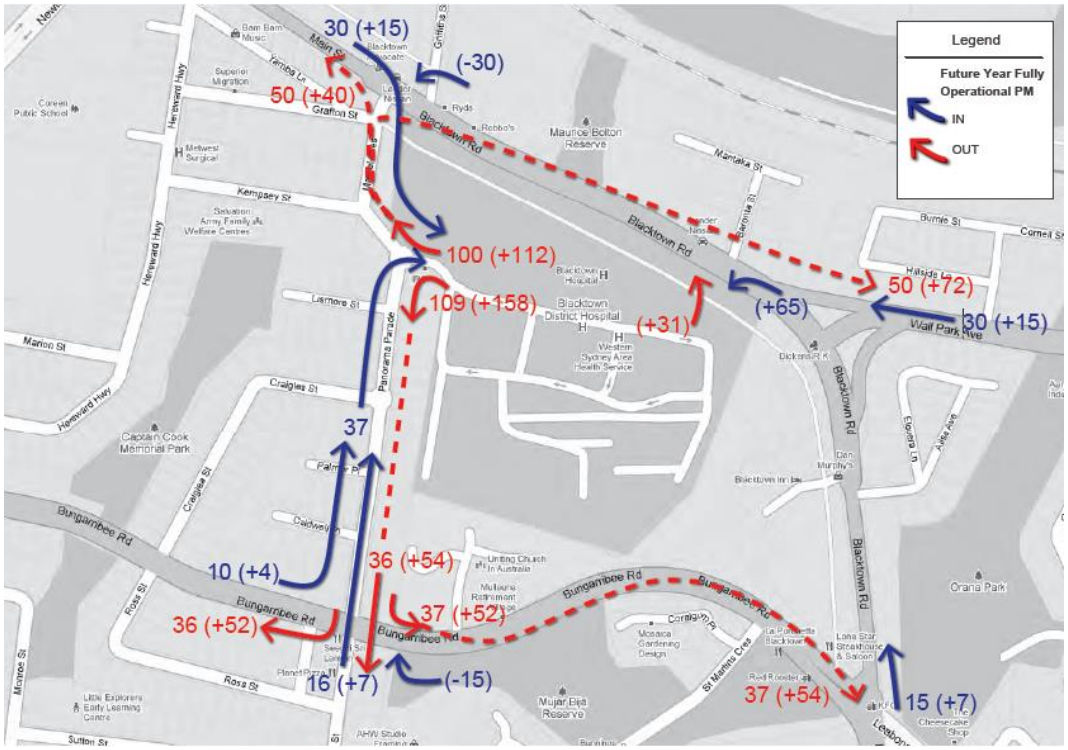


Figure 30 Future Stage 2 Expansion Fully Operational PM Peak Traffic Redistribution



4.8 Traffic Assessment

Arup has undertaken intersection traffic capacity analysis for Stage 1 when fully operational and for Stage 2 hospital expansion using the SIDRA analysis package as described in Section 4.8.1.

The Main Street and Sunnyholt Road/Newton Road intersection to the west of the site has been considered in terms of the level of traffic increase expected as described in Section 4.6.

4.8.1 SIDRA Traffic Analysis

The SIDRA analysis used the previous models to analyse the five key intersections with changed traffic conditions. Please see Table 15 below for the results of the analysis for the AM and PM peak periods.

The analysis shows that the Level of Service for each intersection remains at the level prior to the proposed works with the exception of the Bungarribee Road / Blacktown Road / Leabons Lane intersection which degrades from Level of Service D to E in the AM peak period. The degree of saturation remains the same however the delay increases slightly. For an intersection of two major roads such as these, a peak period operating Level of Service moving from D into E indicates that the intersection has reached capacity and some vehicles may not clear the intersection in one cycle of the traffic lights. It is considered appropriate that RMS monitor the operation of the intersection in coming years as hospital traffic and background traffic grows to determine if local upgrades are required or whether improvements in the wider network alleviate traffic on this route. Otherwise the intersections analysed operate at the same level with the development with a nominal increase in delay. In the PM peak, all intersections continue to operate at acceptable Levels of Service.

The unsignalised intersection of Griffiths Street with Blacktown Road operates well with the exception of the right turn out which needs to merge with the westbound traffic at the Marcel Crescent traffic lights. The delay for this movement is high and vehicles are likely to choose to turn left instead at very busy times.

As a result of this analysis it is expected that the distribution of additional hospital traffic towards the Panorama Parade access route for the Stage 2 hospital expansion can be accommodated at the Blacktown Rd / Marcel Crescent and the Bungaribee Road / Panorama Parade intersections.

The 5 year period between 2010 and 2015 has seen no traffic growth according to the surveys undertaken for this project, as described in Section 3.4.1. It is assumed that much of the traffic growth on Panorama Parade predicted by the RMS modelling, described in Section 4.5, is as a result of the hospital growth with some other local traffic circulation growth.

The Wall Park Avenue and Blacktown Road intersection is currently operating close to capacity however the analysis indicates very little change due to the minor traffic increases due to hospital traffic on this route. After 2016, the RMS latest modelling indicates that there could be continued growth in traffic at the intersection which will need to be taken into account with any future traffic modelling.

Table 15 AM Peak Existing and Future Scenarios Intersection Performance

Intersection	Peak	Scenario	Los	Delay	Dos	
Marcel Crescent / Blacktown Road	AM	Existing	B	19	0.64	Blacktown Rd E
		Stage 1	B	21	0.64	Blacktown Rd E
		Opening Year	B	21	0.67	Blacktown Rd E
		Fully operational	B	21	0.68	Blacktown Rd E
	PM	Existing	B	20	0.64	Blacktown Rd E
		Stage 1	B	20	0.65	Right turn from Blacktown Rd W
		Opening Year	B	22	0.68	Blacktown Rd E
		Fully operational	B	23	0.70	Blacktown Rd E
Griffiths Street / Blacktown Road (Isolated)	AM	Existing	C	42	0.30	Right turn from Griffiths St
		Stage 1	D	45	0.32	Right turn from Griffiths St
		Opening Year	D	45	0.32	Right turn from Griffiths St
		Fully operational	C	42	0.30	Right turn from Griffiths St
	PM	Existing	F	76	0.60	Right turn from Griffiths St
		Stage 1	F	87	0.66	Right turn from Griffiths St
		Opening Year	F	100	0.71	Right turn from Griffiths St
		Fully operational	F	111	0.74	Right turn from Griffiths St
Wall Park Avenue / Blacktown Road	AM	Existing	C	29	0.88	Right turn from Wall Park Ave
		Stage 1	C	30	0.90	Right turn from Wall Park Ave
		Opening Year	C	32	0.90	Left turn from Blacktown Rd N
		Fully operational	C	33	0.92	Right turn from Blacktown Rd S
	PM	Existing	B	24	0.79	Right turn from Blacktown Rd S
		Stage 1	B	24	0.79	Right turn from Blacktown Rd S
		Opening Year	B	24	0.80	Right turn from Wall Park Ave
		Fully operational	B	24	0.80	Right turn from Wall Park Ave
Bungarribee Road / Blacktown Road / Leabons Lane	AM	Existing	D	54	0.97	Through on Blacktown Rd S
		Stage 1	E	60	1.02	Right turn from Blacktown Rd N
		Opening Year	E	62	1.02	Right turn from Blacktown Rd N
		Fully operational	E	62	1.02	Right turn from Blacktown Rd N
	PM	Existing	D	44	0.91	Right turn from Bungarribee Road
		Stage 1	D	47	0.93	Right turn from Bungarribee Road
		Opening Year	D	49	0.94	Right turn from Bungarribee Road
		Fully operational	D	49	0.96	Right turn from Blacktown Rd N
Bungarribee Road / Lock Street / Panorama Parade	AM	Existing	C	29	0.58	Left/through on Bungarribee Rd W
		Stage 1	B	28	0.61	Left/through on Bungarribee Rd W
		Opening Year	C	29	0.62	Left/through on Bungarribee Rd W
		Fully operational	C	29	0.65	Left/through on Bungarribee Rd W
	PM	Existing	B	24	0.50	Left/through on Bungarribee Rd E
		Stage 1	B	27	0.55	Panorama Pde N

		Opening Year	B	28	0.59	Panorama Pde N
		Fully operational	C	29	0.62	Left/through on Bungarribee Rd E
Panorama Parade / Marcel Crescent / Hospital Entrance	AM	Existing	A	10	0.32	Panorama Pde S
		Stage 1	A	10	0.32	Panorama Pde S
		Opening Year	A	10	0.37	Panorama Pde S
		Fully operational	A	10	0.26	Panorama Pde S
	PM	Existing	A	10	0.26	Hospital access
		Stage 1	A	10	0.36	Hospital access
		Opening Year	A	11	0.45	Hospital access
		Fully operational	A	11	0.5	Hospital access

4.8.2 Main Street and Sunnyholt Road/Newton Road

Based on the distribution of traffic described in Section 4.4, approximately 54 additional vehicles are predicted to travel to and from the west on Blacktown Road in the AM Peak representing a 2.3% increase on current traffic volumes. In the PM peak the increase is only 28 vehicles representing a 1.0% increase. These levels of increase will have minimal impact on the operations of the Main Street and Sunnyholt Road/Newton Road intersection.

4.8.3 Summary of the traffic assessment

For the new hospital access on Blacktown Road configured with left turn in / left turn out movements only, the right turn hospital traffic flows on Blacktown Road are directed to use the Panorama Parade access. The distribution of traffic and intersection analysis shows that the Level of Service for each of the intersections providing access to the hospital remains at the level prior to the proposed works. As a result of this analysis it is expected that the proposed works will have no adverse impact on the surrounding road network in terms of traffic capacity or delay. The increases in delay are not significant, however there will be more occasions when congestion will occur as minor incidents or spikes in demand affect the road system.

4.9 Loading Facilities

The existing loading dock on the northern side of the existing hospital building will continue to provide the central loading point for the entire campus. Incoming supplies are dispatched throughout the campus from the central stores facility.

The loading dock has its own all movements access driveway to Blacktown Road which means it does not interfere with the operations of the internal road system.

There are a number of smaller facilities located around the campus that are accessed by smaller delivery vehicles for special deliveries.

5 Pedestrian and Public Transport Access

5.1 Bus routes

There is currently one bus route that enters the hospital. Busways Route 721 loops within the hospital as it travels clockwise on a one-way route via Main Street, Panorama Parade and Bungarribee Road. This route could be adjusted to travel anti-clockwise allowing it to travel through the hospital from Panorama Parade to Blacktown Road as shown on Figure 31. This route provides good accessibility for travel within the Blacktown city centre and for connection to the Blacktown Train Station and Bus Interchange. This route is used by visitors and staff for travel to the hospital and have good capacity for further growth in patronage as the hospital develops.

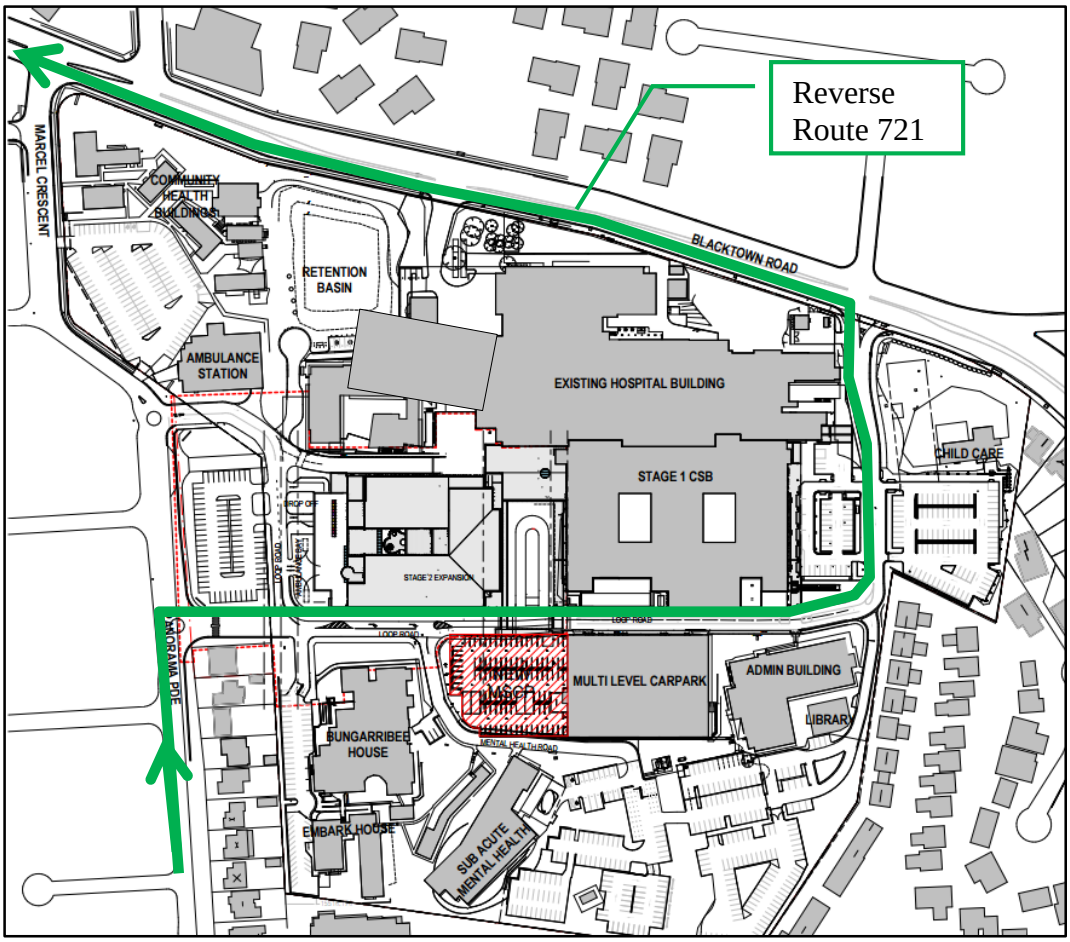


Figure 31 Bus Routes

The regular services along Blacktown Road include Hillsbus Routes 630, 611, 700, 702, and 812. These services do not currently enter the hospital. With the current stage of development the new access to Blacktown road does not permit right turn movements. It is unlikely that bus operators would wish to add additional travel time by running thorough the hospital grounds. The existing pedestrian access from the Blacktown Road bus stops will be available along Marcel Crescent for existing and new staff who will use bus as their mode of travel to work.

5.2 Pedestrian access

There are two DDA compliant pedestrian routes for public access to the hospital. These are via Marcel Crescent which is the existing route and via the new eastern hospital road connection to Blacktown Road as shown on Figure 32. Staff may enter the hospital via the lower level adjacent to the loading dock.

Traffic light control at the intersection of Marcel Crescent and Blacktown Road provides for pedestrian crossing and access to the bus stops on Blacktown Road.

The footpath along the southern side of Blacktown Road has recently been updated to a shared bicycle pedestrian path. This provides an improved level of amenity for both pedestrians and cyclists with a wider paved facility and appropriate drop kerbs at road crossings.

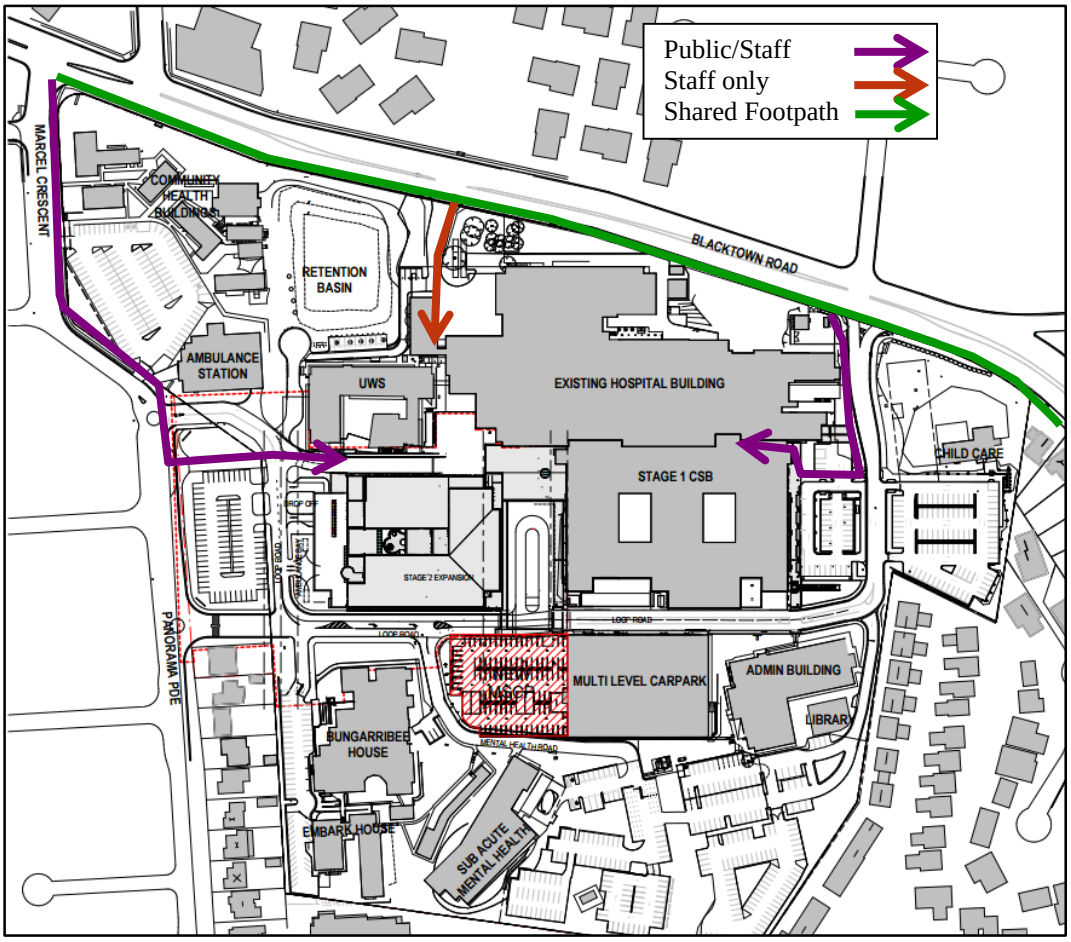


Figure 32 Pedestrian Access from Blacktown Road

6 Sustainable Transport Measures

The NSW State Plan 2010 includes the following transport targets:

- Increase the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016 (2009 value 24%)
- Increase the mode share of bicycle trips made in the Greater Sydney region, at a local and district level, to 5% by 2016 (2009 value 1%)

These targets will be met by measures to promote sustainable means of transport including public transport usage, car sharing, car pooling and pedestrian and bicycle linkages as described below.

6.1 Public transport accessibility

The Blacktown campus has a bus route running through the internal road system which provides direct connection to the nearby railway station. Additional bus routes travel past the site for local travel. The train station is within an acceptable walking distance (1.2km) for people who are willing to combine walking with their travel connection to public transport.

It is therefore considered that the campus is well connected to a number of existing public transport services.

6.2 Site travel plan

With the numerous transport options available to staff and visitors to access the site, the Blacktown Mount Druitt Hospital will establish a green travel plan for Stage 2. A green travel plan is a package of measures introduced to promote the use of public transport, walking and cycling by patrons and employees for travel to and from work and for business related trips. Some specific measures that could be incorporated in this travel plan include:

- Public transport timetables and maps
- Key local walking and cycling routes
- Improvement of current website detailing transport options for both staff and patients
- Establishment of transport information packs to new staff explaining the various ways (other than motor vehicle) of travelling to the site
- Development of a travel plan booklet for staff and visitors
- Liaising with staff, either face to face or via email/telephone, providing them with advice where needed about travelling to work

Provision of good bus service, complemented with the implementation of a green travel plan will reduce the reliance on private vehicle for Blacktown Mount Druitt Hospital staff and patients.

7 Construction Impacts

7.1 Overview

The Stage 1 Main Hospital building development works are now complete. The works include the removal of the temporary access arrangements on the internal roads and the implementation of the future internal road arrangement, linking the hospital to the new access opposite Baronta Street.

The Stage 2 Early Works commenced in October 2015 to prepare the site for the Stage 2 hospital building works to commence in February 2017.

7.2 Construction programme

The construction process is proposed to occur in stages of varying length. The works timeframe is outlined in Table 16 and involves the enabling works, excavation and retaining works and construction of the Stage 2 Building and car park extension.

7.2.1 Indicative Construction Dates

Stage 2 Early Works (Separate application)

- Construction Start - October 2015
- Construction Finish – February 2017

New MSCP (Separate application)

- Construction Start – November 2016
- Construction Finish – October 2017

Stage 2 Main Building (This SSD)

- Construction Start – February 2017
- Construction Finish – Mid 2019

Table 16 Project timeframe for works

Construction Phase	2015	2016				2017				2018				2019	
Stage 2 Early Works															
New MSCP															
Stage 2 Main Building															

7.3 Impact of proposed works

7.3.1 Construction vehicle control point

It is proposed that construction vehicles will use the Marcel Crescent access point and internal hospital road to access the construction control point. All construction vehicle manoeuvring will occur within the construction compound. See Figure 33 below for details of this proposal.

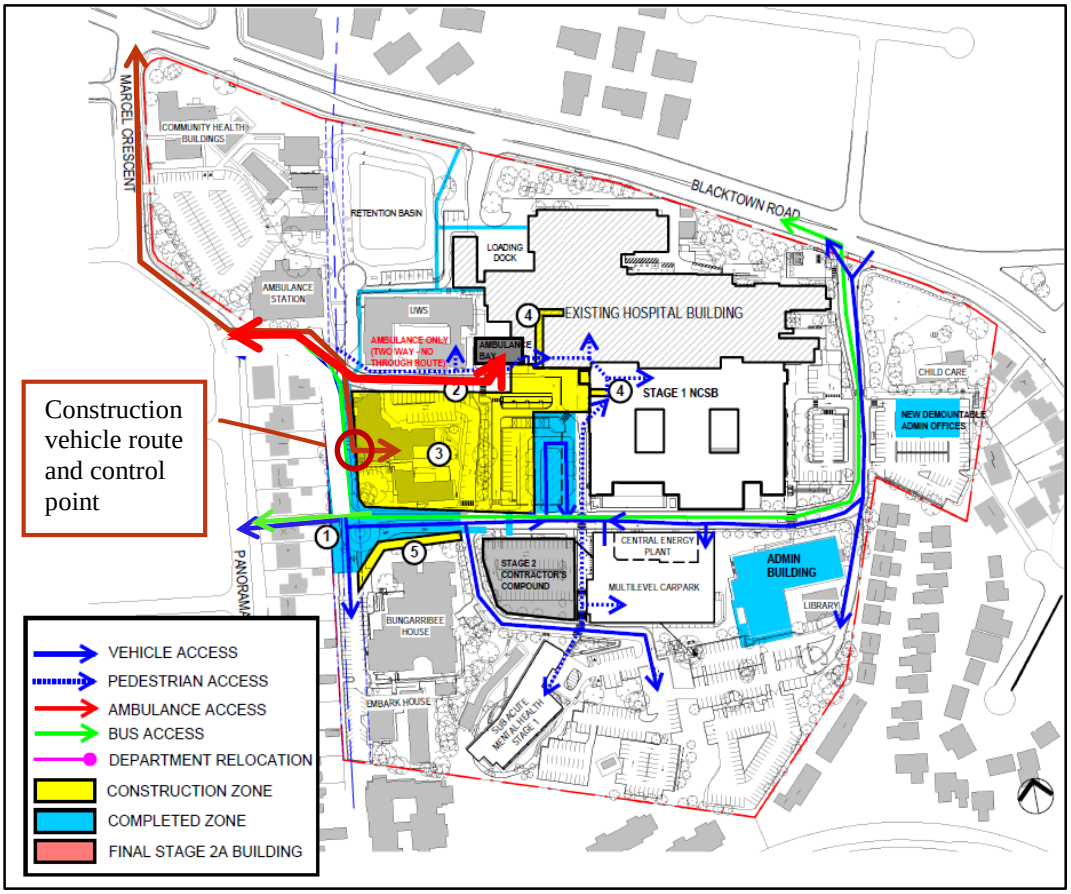
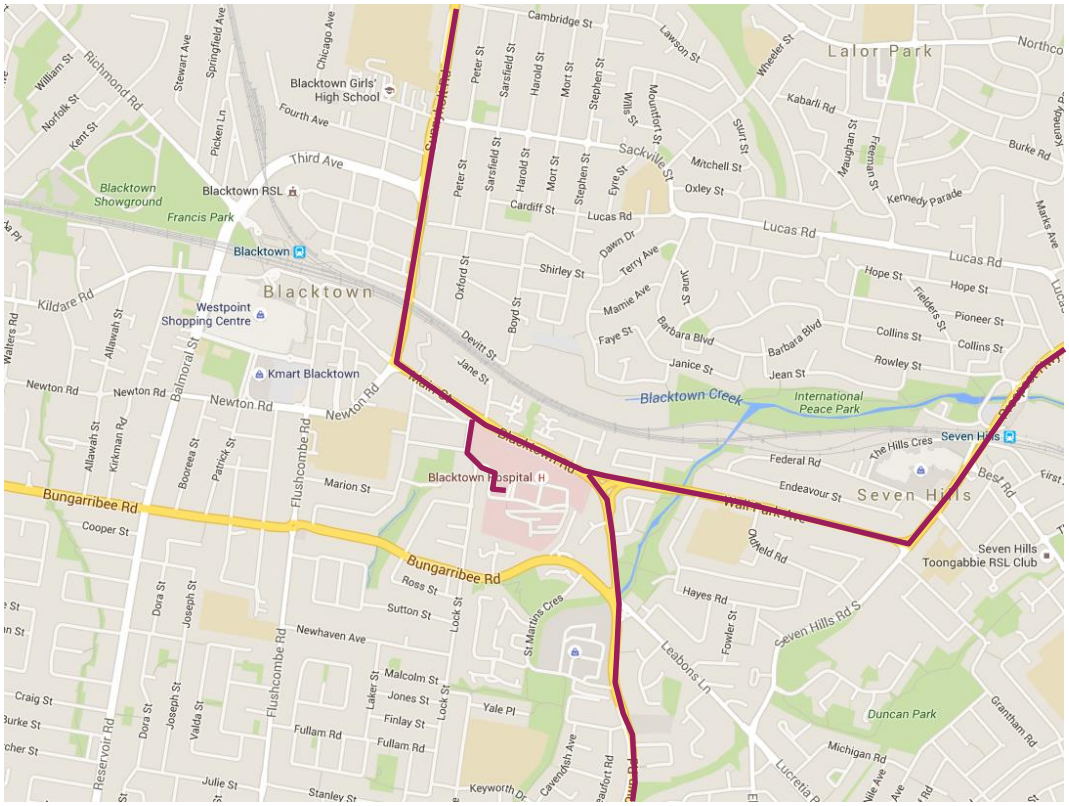


Figure 33 Vehicle routes within Blacktown Hospital during Stage 2 construction

7.3.2 Heavy vehicle routes to site

Trucks will utilise the Marcel Crescent traffic lights to access Blacktown Road for travel in both directions. As seen in Figure 34, the trucks will access the site on Blacktown Road for the M4 and Wall Park Avenue and Sunnyholt Road for the M2/M7.

Figure 34 Construction vehicle routes



7.3.3 Construction traffic volumes

Table 17 Estimated construction traffic volumes

Construction Phase	Approx daily vehicle movements (in + out)	Approx peak hour movements (in + out)
Stage 2 Early Works	40	10
New MSCP	40	4-6
Stage 2 Main Building	60	10-12

7.3.4 Cumulative impact of existing site and construction traffic

The additional site construction traffic generation (up to an average of approximately 15 trucks in the peak hour) is relatively small when compared to the existing site traffic generation of 313 vehicles in the AM peak and 377 vehicles in the PM peak (peak flows at the main roundabout entrance). Blacktown Road carries high traffic volumes in platoons due to the SCATS coordinated

signals and has adequate capacity for the additional truck traffic with negligible impact to the surrounding area.

7.3.5 Construction worker parking

During Stage 2 construction up to 220 parking spaces will be available for construction worker parking at the Blacktown Bowling Club. In addition, it is expected that significant numbers of the construction workforce will travel by train and bus outside the morning and afternoon commuter peak. Construction worker inductions and briefings will reiterate the need to park in the designated car park rather than use on-street car parking or hospital parking.

7.4 Measures to ameliorate impacts

7.4.1 Parking

Demand management strategies are proposed to be utilised by the hospital to reduce the overall demand for car parking on the campus during construction works. These strategies include:

- Improved access control to existing car parking areas
- Staged implementation of the Stage 1 facilities
- Rationalising fleet vehicle parking on the site
- Promotion of public transport for staff access

It is estimated that these demand management strategies will reduce the staff demand for parking at the Blacktown campus at the peak usage times.

On-street car parking will remain available for overflow parking by the public and staff.

7.4.2 Pedestrians

Construction vehicles will use the existing site access and observe all pedestrian controls. The pedestrian footpaths along Blacktown Road and Marcel Crescent are to be maintained with appropriate signage to warn pedestrians of construction activity. If needed, traffic controllers will be used to control pedestrians during the peak heavy vehicle movements entering the site.

Provisions will be made for pedestrians and cyclists to pass the worksite safely. Suitable pedestrian road crossing points would be maintained.

At times it may be necessary to direct pedestrians and cyclists onto the road carriageway and adequate warning signs and barricades would be provided. Traffic controllers or other traffic devices to direct traffic would be provided in accordance with AS 1742.3: 1996.

7.4.3 Driver Code of Conduct

To manage driver conduct the following measures are to be implemented:

- All deliveries are to be pre booked
- All deliveries are to check in at the site office
- Vehicles are to enter and exit the site in a forward direction along the travel path shown on delivery maps
- Drivers are to give way to pedestrians and plant at all times.

7.4.4 Traffic Control Plans

Traffic control plans will be prepared by the contractor prior to work commencing. The TCP will provide a detailed plan of the required signage and traffic and safety management measures to be implemented on-site.

7.5 Public Transport Services

No bus services operating on Blacktown Road would be impacted by construction traffic as the work is confined to off street works within the hospital.

For each phase of the construction works, an internal loop route for the 721 hospital bus service will be maintained within the campus.

7.6 Provisions for Emergency Vehicles

Construction works and vehicle storage will be confined to the site. As such, no additional specific provisions for emergency vehicles have been identified on the surrounding road network.

7.7 Public Consultation

During construction works, residents in the vicinity of the site will be notified about the intended works:

- Prior to the commencement of works
- Where there is potential for works to cause nuisance

Residents will be notified by a letter specifying:

- The nature and extent of the works
- Contact details for the Site Safety Officer to whom complaints about the upgrade should be directed

Details of construction traffic routes and any potential traffic-related impacts will be included in this correspondence.

7.8 Summary

Through the implementation of traffic management measures, the anticipated level of construction traffic can be accommodated on the access road system.

A detailed construction traffic management plan would be prepared at the construction stage of the project. A summary of measures to mitigate potential impacts for pedestrians and cyclists during the construction stage of the project is given below. The measures recognise the high volumes of pedestrians in the vicinity of the site.

The construction schedule for the development will also aim to minimise:

- disruption to traffic movements particularly at peak periods
- interference with public transport services

Adequate fencing will be installed around the perimeter of the construction site to restrict unauthorised public access.

All demolition and construction related vehicles would comply with relevant Blacktown City Council traffic and parking regulations.

8 Conclusions

The Blacktown Hospital campus is approximately 1.2km from Blacktown Railway Station and the Blacktown City Centre. It is well serviced by bus with 6 routes travelling past the site on Blacktown Road and a dedicated loop service between the campus and Blacktown Railway Station. More than half of the staff working in the travel zone within which Blacktown Hospital is located live within the Blacktown and Mt Druitt area. This indicates that there is good opportunity to encourage non-car mode or travel focusing on bicycle and bus in particular through a Workplace Travel Plan.

The future travel characteristics of staff, visitors and patients have been considered for the expanded campus facilities. Existing bus and train services are well placed to cater for increased demand. Car parking provision on the campus has been tailored to meet anticipated future demand as the hospital expands in 2 stages taking into account reduced car dependence. There is scope during the growth in hospital activity as Stage 2 matures in operation to increase on-site car parking provision through a future vertical expansion of the multi storey car park. Alternatively, car parking demand may be stabilised through increased public transport use and alternative modes of travel.

A new access road has been constructed at the eastern side of the campus connecting directly onto Blacktown Road as a left turn in / left turn out intersection opposite Baronta Street. The existing access via Panorama Parade / Marcel Crescent will be maintained to service as the main hospital access including emergency access. A new access onto Panorama Parade on the alignment of the main internal east west roadway will improve hospital access.

The existing service vehicle access on Blacktown Road will be maintained. The adjacent Blacktown Road / Wall Park Avenue intersection currently operates close to capacity however the proposed development would only nominally increase the saturation level. The remainder of the main road system has been modelled with the new access arrangements and continued acceptable levels of operation are expected.

The Stage 2 development will involve a considerable change to on-site parking arrangements. A number of existing parking areas will be replaced by new buildings. The multi-storey car park will initially be extended to the west to accommodate Stage 2 occupation levels of activity and is capable of being extended by two floors to accommodate full Stage 2 occupation.

With Stage 1 now open there is a parking supply of 1,254 spaces on the site. The first stage of extension of the multi-storey car park will commence in November 2016 adding approximately 450 spaces and will be the subject of a separate planning application. These spaces and the separate at-grade car park on Panorama Parade will satisfy the demand as activity at the campus associated with Stage 1 occupation builds up over a number of years and Stage 2 opens with an anticipated demand of 1,780 spaces when fully occupied. All construction workers will park off site in car parking leased from the adjacent Blacktown Bowling Club allowing the hospital to function utilising on-site car parking.

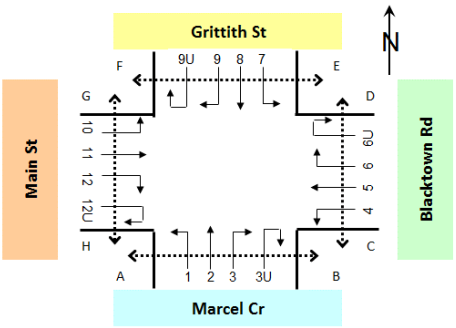
Appendix A

Traffic Survey Data

A1 Vehicle Turning Volume Data

Job No. : N1958
Client : Arup
Suburb : Blacktown
Location : 1. Blacktown Rd / Main St / Marcel Cr / Grittith St

Day/Date : Tuesday, 15th September 2015
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

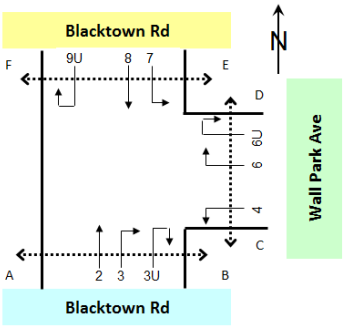


	Approach	Marcel Cr			Blacktown Rd			Grittith St			Main St			Grand Total
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM	8:30 to 9:30	285	4	**289**	1,027	87	**1,114**	54	2	**56**	962	97	**1,059**	**2,518**
PM	16:30 to 17:30	385	0	**385**	1,107	47	**1,154**	134	0	**134**	1,013	47	**1,060**	**2,733**

Approach	Marcel Cr			Blacktown Rd			Grittith St			Main St			Grand Total
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	266	3	**269**	989	97	**1,086**	40	1	**41**	931	85	**1,016**	**2,412**
7:45 to 8:45	239	5	**244**	1,025	100	**1,125**	38	0	**38**	937	91	**1,028**	**2,435**
8:00 to 9:00	259	6	**265**	991	97	**1,088**	36	0	**36**	932	98	**1,030**	**2,419**
8:15 to 9:15	283	6	**289**	1,036	89	**1,125**	42	1	**43**	916	97	**1,013**	**2,470**
8:30 to 9:30	285	4	**289**	1,027	87	**1,114**	54	2	**56**	962	97	**1,059**	**2,518**
AM Totals	**551**	**7**	**558**	**2,016**	**184**	**2,200**	**94**	**3**	**97**	**1,893**	**182**	**2,075**	**4,930**
16:30 to 17:30	385	0	**385**	1,107	47	**1,154**	134	0	**134**	1,013	47	**1,060**	**2,733**
16:45 to 17:45	346	0	**346**	1,053	45	**1,098**	116	0	**116**	1,089	46	**1,135**	**2,695**
17:00 to 18:00	310	0	**310**	1,033	41	**1,074**	91	0	**91**	1,093	48	**1,141**	**2,616**
17:15 to 18:15	307	0	**307**	1,009	39	**1,048**	94	0	**94**	1,077	42	**1,119**	**2,568**
17:30 to 18:30	283	1	**284**	979	41	**1,020**	84	0	**84**	1,042	37	**1,079**	**2,467**
PM Totals	**668**	**1**	**669**	**2,086**	**88**	**2,174**	**218**	**0**	**218**	**2,055**	**84**	**2,139**	**5,200**

Job No. : N1958
Client : Arup
Suburb : Blacktown
Location : 2. Blacktown Rd / Wall Park Ave

Day/Date : Tuesday, 15th September 2015
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

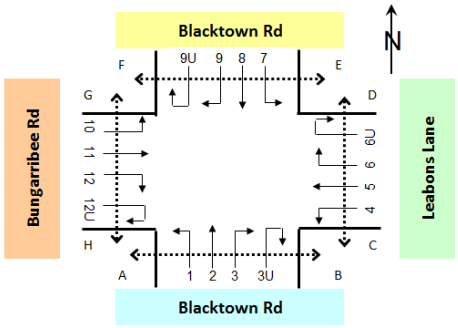


	Approach	Blacktown Rd			Wall Park Ave			Blacktown Rd			Grand Total
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM	8:00 to 9:00	1,276	154	**1,430**	699	80	**779**	820	101	**921**	3,130
PM	16:30 to 17:30	1,239	56	**1,295**	866	48	**914**	1,112	45	**1,157**	3,366

Approach	Blacktown Rd			Wall Park Ave			Blacktown Rd			Grand Total
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	1,260	150	**1,410**	716	70	**786**	830	90	**920**	3,116
7:45 to 8:45	1,288	154	**1,442**	692	71	**763**	798	95	**893**	3,098
8:00 to 9:00	1,276	154	**1,430**	699	80	**779**	820	101	**921**	3,130
8:15 to 9:15	1,228	134	**1,362**	729	82	**811**	802	100	**902**	3,075
8:30 to 9:30	1,117	125	**1,242**	731	84	**815**	815	103	**918**	2,975
AM Totals	**2,377**	**275**	**2,652**	**1,447**	**154**	**1,601**	**1,645**	**193**	**1,838**	6,091
16:30 to 17:30	1,239	56	**1,295**	866	48	**914**	1,112	45	**1,157**	3,366
16:45 to 17:45	1,225	55	**1,280**	822	43	**865**	1,138	40	**1,178**	3,323
17:00 to 18:00	1,221	46	**1,267**	835	37	**872**	1,079	43	**1,122**	3,261
17:15 to 18:15	1,222	47	**1,269**	791	39	**830**	1,057	38	**1,095**	3,194
17:30 to 18:30	1,181	45	**1,226**	799	33	**832**	1,048	40	**1,088**	3,146
PM Totals	**2,420**	**101**	**2,521**	**1,665**	**81**	**1,746**	**2,160**	**85**	**2,245**	6,512

Job No. : N1958
Client : Arup
Suburb : Blacktown
Location : 3. Blacktown Rd / Bungarribee Rd / Leabons Lane

Day/Date : Tuesday, 15th September 2015
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

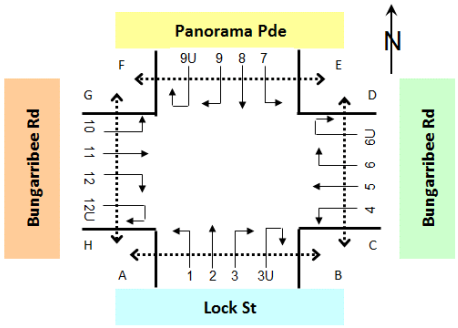


	Approach	Blacktown Rd			Leabons Lane			Blacktown Rd			Bungarribee Rd			Grand Total
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM	8:00 to 9:00	1,037	142	**1,179**	521	13	**534**	772	123	**895**	720	19	**739**	**3,347**
PM	17:00 to 18:00	1,038	42	**1,080**	504	3	**507**	1,044	59	**1,103**	590	6	**596**	**3,286**

Approach	Blacktown Rd			Leabons Lane			Blacktown Rd			Bungarribee Rd			Grand Total
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	1,054	136	**1,190**	446	15	**461**	757	111	**868**	739	19	**758**	**3,277**
7:45 to 8:45	1,045	136	**1,181**	467	14	**481**	752	119	**871**	744	22	**766**	**3,299**
8:00 to 9:00	1,037	142	**1,179**	521	13	**534**	772	123	**895**	720	19	**739**	**3,347**
8:15 to 9:15	1,002	126	**1,128**	550	13	**563**	770	125	**895**	696	18	**714**	**3,300**
8:30 to 9:30	962	125	**1,087**	525	14	**539**	791	132	**923**	613	15	**628**	**3,177**
AM Totals	**2,016**	**261**	**2,277**	**971**	**29**	**1,000**	**1,548**	**243**	**1,791**	**1,352**	**34**	**1,386**	**6,454**
16:30 to 17:30	975	50	**1,025**	468	7	**475**	1,028	70	**1,098**	623	7	**630**	**3,228**
16:45 to 17:45	977	48	**1,025**	484	7	**491**	1,029	61	**1,090**	607	6	**613**	**3,219**
17:00 to 18:00	1,038	42	**1,080**	504	3	**507**	1,044	59	**1,103**	590	6	**596**	**3,286**
17:15 to 18:15	1,040	42	**1,082**	512	5	**517**	1,029	58	**1,087**	570	4	**574**	**3,260**
17:30 to 18:30	1,066	40	**1,106**	515	6	**521**	1,024	48	**1,072**	520	5	**525**	**3,224**
PM Totals	**2,041**	**90**	**2,131**	**983**	**13**	**996**	**2,052**	**118**	**2,170**	**1,143**	**12**	**1,155**	**6,452**

Job No. : N1958
Client : Arup
Suburb : Blacktown
Location : 4. Bungarribee Rd / Lock St / Panorama Pde

Day/Date : Tuesday, 15th September 2015
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

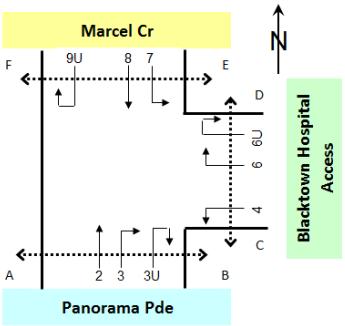


	Approach	Lock St			Bungarribee Rd			Panorama Pde			Bungarribee Rd			Grand Total
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM	8:00 to 9:00	297	9	306	684	21	705	152	5	157	787	23	810	1,978
PM	16:30 to 17:30	128	4	132	761	14	775	305	1	306	627	11	638	1,851

Approach	Lock St			Bungarribee Rd			Panorama Pde			Bungarribee Rd			Grand Total
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	246	6	252	644	19	663	161	2	163	788	20	808	1,886
7:45 to 8:45	264	7	271	668	18	686	147	4	151	812	22	834	1,942
8:00 to 9:00	297	9	306	684	21	705	152	5	157	787	23	810	1,978
8:15 to 9:15	297	8	305	709	21	730	143	7	150	750	20	770	1,955
8:30 to 9:30	276	8	284	660	23	683	145	6	151	670	16	686	1,804
AM Totals	**522**	**14**	**536**	**1,304**	**42**	**1,346**	**306**	**8**	**314**	**1,458**	**36**	**1,494**	**3,690**
16:30 to 17:30	128	4	132	761	14	775	305	1	306	627	11	638	1,851
16:45 to 17:45	126	4	130	769	12	781	276	1	277	626	13	639	1,827
17:00 to 18:00	129	3	132	778	8	786	256	1	257	618	12	630	1,805
17:15 to 18:15	130	5	135	770	12	782	226	4	230	582	9	591	1,738
17:30 to 18:30	133	4	137	791	12	803	196	4	200	522	8	530	1,670
PM Totals	**261**	**8**	**269**	**1,552**	**26**	**1,578**	**501**	**5**	**506**	**1,149**	**19**	**1,168**	**3,521**

Job No. : N1958
Client : Arup
Suburb : Blacktown
Location : 5. Panorama Pde / Marcel Cr / Blacktown Hospital Access

Day/Date : Tuesday, 15th September 2015
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



	Approach	Panorama Pde			Blacktown Hospital Access			Marcel Cr			Grand Total
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM	7:30 to 8:30	400	5	405	93	6	99	267	3	270	774
PM	16:30 to 17:30	161	1	162	271	1	272	246	1	247	681

Approach	Panorama Pde			Blacktown Hospital Access			Marcel Cr			Grand Total
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	400	5	405	93	6	99	267	3	270	774
7:45 to 8:45	384	7	391	76	5	81	235	3	238	710
8:00 to 9:00	372	6	378	83	6	89	240	4	244	711
8:15 to 9:15	348	6	354	98	3	101	259	4	263	718
8:30 to 9:30	331	3	334	104	2	106	265	3	268	708
AM Totals	**731**	**8**	**739**	**197**	**8**	**205**	**532**	**6**	**538**	**1,482**
16:30 to 17:30	161	1	162	271	1	272	246	1	247	681
16:45 to 17:45	170	1	171	237	1	238	240	1	241	650
17:00 to 18:00	181	2	183	217	2	219	217	2	219	621
17:15 to 18:15	183	2	185	183	2	185	191	2	193	563
17:30 to 18:30	174	1	175	182	1	183	187	2	189	547
PM Totals	**335**	**2**	**337**	**453**	**2**	**455**	**433**	**3**	**436**	**1,228**

Appendix B

SIDRA Results

B1 Blacktown Road / Marcel Crescent

AM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

PM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

MOVEMENT SUMMARY

Site: AM Existing

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	114	0.0	0.637	25.8	LOS B	20.7	153.7	0.80	0.74	43.5
5	T1	1037	8.8	0.637	20.3	LOS B	20.7	156.1	0.80	0.73	44.8
Approach		1151	8.0	0.637	20.8	LOS B	20.7	156.1	0.80	0.73	44.6
NorthWest: Blacktown Road W											
11	T1	874	11.4	0.317	4.0	LOS A	6.6	50.8	0.34	0.30	56.3
12	R2	241	0.9	0.622	45.0	LOS D	10.9	77.0	0.96	0.83	33.9
Approach		1115	9.2	0.622	12.9	LOS A	10.9	77.0	0.47	0.42	49.3
SouthWest: Marcel Crescent											
1	L2	180	1.2	0.251	27.6	LOS B	5.9	41.8	0.72	0.76	40.5
3	R2	124	1.7	0.564	52.2	LOS D	6.0	42.4	0.99	0.79	31.8
Approach		304	1.4	0.564	37.7	LOS C	6.0	42.4	0.83	0.77	36.4
All Vehicles		2569	7.7	0.637	19.4	LOS B	20.7	156.1	0.66	0.60	45.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	18.6	LOS B	0.0	0.0	0.61	0.61
All Pedestrians		58	36.8	LOS D			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: AM Stage 1

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	31	0.0	0.643	28.4	LOS B	20.1	150.7	0.83	0.75	42.6
5	T1	1037	8.8	0.643	22.9	LOS B	20.1	151.4	0.83	0.74	43.6
Approach		1067	8.6	0.643	23.0	LOS B	20.1	151.4	0.83	0.74	43.5
NorthWest: Blacktown Road W											
11	T1	874	11.4	0.321	4.3	LOS A	6.9	52.9	0.35	0.31	56.0
12	R2	277	0.9	0.625	42.7	LOS D	12.3	86.6	0.95	0.83	34.7
Approach		1151	8.9	0.625	13.6	LOS A	12.3	86.6	0.50	0.44	48.8
SouthWest: Marcel Crescent											
1	L2	188	1.2	0.238	24.9	LOS B	5.8	40.9	0.67	0.75	41.8
3	R2	145	1.7	0.609	51.8	LOS D	7.0	49.7	0.99	0.81	31.9
Approach		334	1.4	0.609	36.6	LOS C	7.0	49.7	0.81	0.78	36.8
All Vehicles		2552	7.8	0.643	20.5	LOS B	20.1	151.4	0.68	0.61	44.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	21.1	LOS C	0.0	0.0	0.65	0.65
All Pedestrians		58	37.5	LOS D			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.

MOVEMENT SUMMARY

Site: AM Stage 2

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	31	0.0	0.665	29.4	LOS C	20.8	156.0	0.85	0.76	42.1
5	T1	1048	8.8	0.665	23.8	LOS B	20.8	156.7	0.85	0.76	43.1
Approach		1079	8.6	0.665	24.0	LOS B	20.8	156.7	0.85	0.76	43.0
NorthWest: Blacktown Road W											
11	T1	874	11.4	0.317	4.0	LOS A	6.6	50.8	0.34	0.30	56.3
12	R2	313	0.9	0.651	41.5	LOS C	13.8	97.2	0.95	0.84	35.1
Approach		1186	8.7	0.651	13.9	LOS A	13.8	97.2	0.50	0.44	48.6
SouthWest: Marcel Crescent											
1	L2	192	1.2	0.236	24.2	LOS B	5.8	41.0	0.66	0.75	42.1
3	R2	136	1.7	0.617	52.9	LOS D	6.6	47.0	1.00	0.81	31.6
Approach		327	1.4	0.617	36.1	LOS C	6.6	47.0	0.80	0.77	37.0
All Vehicles		2593	7.7	0.665	20.9	LOS B	20.8	156.7	0.68	0.62	44.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	21.8	LOS C	0.0	0.0	0.66	0.66
All Pedestrians		58	37.7	LOS D			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.

MOVEMENT SUMMARY

Site: AM Stage 2 - Fully operational

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	31	0.0	0.683	30.3	LOS C	21.3	159.6	0.87	0.78	41.7
5	T1	1052	8.8	0.683	24.7	LOS B	21.3	160.3	0.87	0.77	42.6
Approach		1082	8.6	0.683	24.9	LOS B	21.3	160.3	0.87	0.77	42.6
NorthWest: Blacktown Road W											
11	T1	874	11.4	0.317	4.0	LOS A	6.6	50.8	0.34	0.30	56.3
12	R2	338	0.9	0.678	41.1	LOS C	14.9	105.3	0.95	0.84	35.2
Approach		1212	8.5	0.678	14.4	LOS A	14.9	105.3	0.51	0.45	48.2
SouthWest: Marcel Crescent											
1	L2	196	1.2	0.236	23.6	LOS B	5.8	41.2	0.65	0.75	42.4
3	R2	139	1.7	0.631	53.1	LOS D	6.8	48.3	1.00	0.82	31.6
Approach		335	1.4	0.631	35.8	LOS C	6.8	48.3	0.80	0.78	37.1
All Vehicles		2628	7.6	0.683	21.4	LOS B	21.3	160.3	0.69	0.63	44.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	22.5	LOS C	0.0	0.0	0.67	0.67
All Pedestrians		58	37.9	LOS D			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.

MOVEMENT SUMMARY

Site: PM Existing

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	95	1.1	0.641	25.2	LOS B	21.5	155.8	0.79	0.73	43.9
5	T1	1117	4.3	0.641	19.7	LOS B	21.7	157.5	0.79	0.72	45.1
Approach		1212	4.1	0.641	20.1	LOS B	21.7	157.5	0.79	0.72	45.0
NorthWest: Blacktown Road W											
11	T1	947	5.2	0.354	5.9	LOS A	8.8	64.3	0.42	0.37	54.7
12	R2	168	0.0	0.605	49.8	LOS D	7.9	55.6	0.98	0.81	32.5
Approach		1116	4.4	0.605	12.6	LOS A	8.8	64.3	0.50	0.44	49.6
SouthWest: Marcel Crescent											
1	L2	213	0.0	0.301	28.8	LOS C	7.2	50.7	0.74	0.77	40.0
3	R2	193	0.0	0.610	48.1	LOS D	9.0	62.7	0.98	0.81	33.0
Approach		405	0.0	0.610	38.0	LOS C	9.0	62.7	0.85	0.79	36.3
All Vehicles		2733	3.6	0.641	19.7	LOS B	21.7	157.5	0.68	0.62	45.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	18.0	LOS B	0.0	0.0	0.60	0.60
All Pedestrians		58	36.6	LOS D			0.84	0.84

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

MOVEMENT SUMMARY

Site: PM Stage 1

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	63	1.1	0.636	25.8	LOS B	21.2	153.2	0.80	0.73	43.8
5	T1	1117	4.3	0.636	20.2	LOS B	21.3	154.4	0.80	0.72	44.9
Approach		1180	4.2	0.636	20.5	LOS B	21.3	154.4	0.80	0.72	44.8
NorthWest: Blacktown Road W											
11	T1	947	5.2	0.364	6.8	LOS A	9.4	68.8	0.45	0.40	54.0
12	R2	168	0.0	0.648	51.4	LOS D	8.1	57.0	1.00	0.83	32.0
Approach		1116	4.4	0.648	13.5	LOS A	9.4	68.8	0.53	0.46	48.9
SouthWest: Marcel Crescent											
1	L2	224	0.0	0.310	28.2	LOS B	7.6	52.9	0.74	0.77	40.2
3	R2	223	0.0	0.632	46.7	LOS D	10.3	71.9	0.97	0.82	33.4
Approach		447	0.0	0.632	37.4	LOS C	10.3	71.9	0.85	0.80	36.5
All Vehicles		2743	3.6	0.648	20.4	LOS B	21.3	154.4	0.70	0.63	44.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	18.6	LOS B	0.0	0.0	0.61	0.61
All Pedestrians		58	36.8	LOS D			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: PM Stage 2

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	63	1.1	0.678	27.6	LOS B	22.7	164.5	0.84	0.76	42.8
5	T1	1142	4.3	0.678	22.1	LOS B	22.8	165.7	0.84	0.76	43.9
Approach		1205	4.2	0.678	22.4	LOS B	22.8	165.7	0.84	0.76	43.8
NorthWest: Blacktown Road W											
11	T1	947	5.2	0.369	7.2	LOS A	9.7	71.0	0.46	0.41	53.6
12	R2	184	0.0	0.661	50.8	LOS D	8.9	62.1	0.99	0.83	32.2
Approach		1132	4.4	0.661	14.3	LOS A	9.7	71.0	0.55	0.48	48.4
SouthWest: Marcel Crescent											
1	L2	246	0.0	0.323	27.0	LOS B	8.1	56.9	0.72	0.77	40.8
3	R2	251	0.0	0.674	46.8	LOS D	11.7	81.8	0.98	0.84	33.4
Approach		497	0.0	0.674	37.0	LOS C	11.7	81.8	0.85	0.81	36.7
All Vehicles		2834	3.5	0.678	21.7	LOS B	22.8	165.7	0.72	0.65	44.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	19.9	LOS B	0.0	0.0	0.63	0.63
All Pedestrians		58	37.2	LOS D			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: PM Stage 2 - Fully operational

Blacktown Road and Marcel Crescent
Signals - Fixed Time Isolated Cycle Time = 100 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
SouthEast: Blacktown Road E											
4	L2	63	1.1	0.697	28.6	LOS C	23.4	169.2	0.86	0.78	42.4
5	T1	1149	4.3	0.697	23.0	LOS B	23.5	170.5	0.86	0.77	43.4
Approach		1213	4.2	0.697	23.3	LOS B	23.5	170.5	0.86	0.77	43.4
NorthWest: Blacktown Road W											
11	T1	947	5.2	0.375	7.7	LOS A	10.0	73.3	0.47	0.42	53.3
12	R2	184	0.0	0.661	50.8	LOS D	8.9	62.1	0.99	0.83	32.2
Approach		1132	4.4	0.661	14.7	LOS B	10.0	73.3	0.56	0.49	48.2
SouthWest: Marcel Crescent											
1	L2	446	0.0	0.660	29.3	LOS C	16.6	116.2	0.82	0.82	39.8
3	R2	268	0.0	0.688	46.3	LOS D	12.5	87.6	0.98	0.85	33.6
Approach		715	0.0	0.688	35.7	LOS C	16.6	116.2	0.88	0.83	37.2
All Vehicles		3059	3.3	0.697	23.0	LOS B	23.5	170.5	0.75	0.68	43.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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
P4	NorthWest Full Crossing	41	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	17	20.5	LOS C	0.0	0.0	0.64	0.64
All Pedestrians		58	37.3	LOS D			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.

B2 Blacktown Road / Griffiths Street

AM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

PM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

MOVEMENT SUMMARY

Site: AM Existing

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	1077	4.6	0.284	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	54	0.0	0.177	16.6	LOS B	0.6	4.1	0.78	0.91	46.3
Approach		1131	4.4	0.284	0.8	NA	0.6	4.1	0.04	0.04	59.1
NorthEast: Griffiths Street											
7	L2	27	7.7	0.033	7.7	LOS A	0.1	0.9	0.44	0.65	51.7
9	R2	32	0.0	0.298	42.0	LOS C	0.9	6.5	0.90	0.99	35.0
Approach		59	3.6	0.298	26.1	LOS B	0.9	6.5	0.68	0.83	41.2
NorthWest: Blacktown Road W											
10	L2	104	3.0	0.274	5.6	LOS A	0.0	0.0	0.00	0.12	57.0
11	T1	894	11.1	0.274	0.0	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		998	10.2	0.274	0.6	NA	0.0	0.0	0.00	0.06	59.1
All Vehicles		2187	7.0	0.298	1.4	NA	0.9	6.5	0.04	0.07	58.4

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

MOVEMENT SUMMARY

Site: AM Stage 1

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	994	4.6	0.262	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	54	0.0	0.184	17.3	LOS B	0.6	4.3	0.79	0.92	45.9
Approach		1047	4.4	0.262	0.9	NA	0.6	4.3	0.04	0.05	59.0
NorthEast: Griffiths Street											
7	L2	27	7.7	0.034	7.8	LOS A	0.1	0.9	0.44	0.65	51.7
9	R2	32	0.0	0.315	44.7	LOS D	1.0	6.8	0.90	0.99	34.1
Approach		59	3.6	0.315	27.6	LOS B	1.0	6.8	0.69	0.83	40.5
NorthWest: Blacktown Road W											
10	L2	104	3.0	0.280	5.6	LOS A	0.0	0.0	0.00	0.12	57.1
11	T1	915	11.1	0.280	0.0	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		1019	10.2	0.280	0.6	NA	0.0	0.0	0.00	0.06	59.2
All Vehicles		2125	7.2	0.315	1.5	NA	1.0	6.8	0.04	0.08	58.3

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

MOVEMENT SUMMARY

Site: AM Stage 2

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	994	4.6	0.262	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	54	0.0	0.186	17.4	LOS B	0.6	4.3	0.80	0.92	45.8
Approach		1047	4.4	0.262	0.9	NA	0.6	4.3	0.04	0.05	59.0
NorthEast: Griffiths Street											
7	L2	27	7.7	0.034	7.8	LOS A	0.1	0.9	0.44	0.65	51.7
9	R2	32	0.0	0.319	45.4	LOS D	1.0	6.9	0.91	0.99	33.9
Approach		59	3.6	0.319	27.9	LOS B	1.0	6.9	0.69	0.84	40.4
NorthWest: Blacktown Road W											
10	L2	104	3.0	0.282	5.6	LOS A	0.0	0.0	0.00	0.12	57.1
11	T1	920	11.1	0.282	0.0	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		1024	10.3	0.282	0.6	NA	0.0	0.0	0.00	0.06	59.2
All Vehicles		2131	7.2	0.319	1.5	NA	1.0	6.9	0.04	0.08	58.3

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

MOVEMENT SUMMARY

Site: AM Stage 2 - Fully operational

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	1008	4.6	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	54	0.0	0.177	16.6	LOS B	0.6	4.1	0.78	0.91	46.3
Approach		1062	4.4	0.266	0.9	NA	0.6	4.1	0.04	0.05	59.1
NorthEast: Griffiths Street											
7	L2	27	7.7	0.033	7.7	LOS A	0.1	0.9	0.44	0.65	51.7
9	R2	32	0.0	0.298	42.0	LOS C	0.9	6.5	0.90	0.99	35.0
Approach		59	3.6	0.298	26.1	LOS B	0.9	6.5	0.68	0.83	41.2
NorthWest: Blacktown Road W											
10	L2	104	3.0	0.274	5.6	LOS A	0.0	0.0	0.00	0.12	57.0
11	T1	894	11.1	0.274	0.0	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		998	10.2	0.274	0.6	NA	0.0	0.0	0.00	0.06	59.1
All Vehicles		2119	7.1	0.298	1.5	NA	0.9	6.5	0.04	0.08	58.4

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

MOVEMENT SUMMARY

Site: PM Existing

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	1166	4.2	0.307	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	48	0.0	0.197	20.0	LOS B	0.6	4.5	0.83	0.94	44.4
Approach		1215	4.1	0.307	0.8	NA	0.6	4.5	0.03	0.04	59.1
NorthEast: Griffiths Street											
7	L2	96	0.0	0.129	8.5	LOS A	0.5	3.2	0.51	0.76	51.4
9	R2	45	0.0	0.604	75.9	LOS F	2.1	14.4	0.96	1.07	26.5
Approach		141	0.0	0.604	30.1	LOS C	2.1	14.4	0.66	0.86	39.4
NorthWest: Blacktown Road W											
10	L2	47	0.0	0.301	5.6	LOS A	0.0	0.0	0.00	0.05	57.9
11	T1	1093	4.5	0.301	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		1140	4.3	0.301	0.3	NA	0.0	0.0	0.00	0.02	59.6
All Vehicles		2496	4.0	0.604	2.2	NA	2.1	14.4	0.05	0.08	57.7

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

MOVEMENT SUMMARY

Site: PM Stage 1

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	1135	4.2	0.299	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	48	0.0	0.209	21.1	LOS B	0.7	4.8	0.84	0.94	43.8
Approach		1183	4.1	0.299	0.9	NA	0.7	4.8	0.03	0.04	59.0
NorthEast: Griffiths Street											
7	L2	96	0.0	0.131	8.7	LOS A	0.5	3.3	0.52	0.77	51.3
9	R2	45	0.0	0.655	87.3	LOS F	2.3	15.9	0.97	1.09	24.4
Approach		141	0.0	0.655	33.9	LOS C	2.3	15.9	0.66	0.87	37.9
NorthWest: Blacktown Road W											
10	L2	47	0.0	0.309	5.6	LOS A	0.0	0.0	0.00	0.05	57.9
11	T1	1123	4.5	0.309	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		1171	4.3	0.309	0.3	NA	0.0	0.0	0.00	0.02	59.6
All Vehicles		2495	4.0	0.655	2.5	NA	2.3	15.9	0.05	0.08	57.5

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

MOVEMENT SUMMARY

Site: PM Stage 2

Blacktown Road and Griffiths Street
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
SouthEast: Blacktown Road E											
5	T1	1135	4.2	0.299	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	48	0.0	0.220	22.3	LOS B	0.7	5.0	0.85	0.95	43.2
Approach		1183	4.1	0.299	0.9	NA	0.7	5.0	0.03	0.04	59.0
NorthEast: Griffiths Street											
7	L2	96	0.0	0.134	8.8	LOS A	0.5	3.3	0.53	0.77	51.2
9	R2	45	0.0	0.706	100.4	LOS F	2.5	17.6	0.97	1.11	22.5
Approach		141	0.0	0.706	38.2	LOS C	2.5	17.6	0.67	0.88	36.3
NorthWest: Blacktown Road W											
10	L2	47	0.0	0.316	5.6	LOS A	0.0	0.0	0.00	0.05	57.9
11	T1	1151	4.5	0.316	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		1198	4.3	0.316	0.3	NA	0.0	0.0	0.00	0.02	59.6
All Vehicles		2522	4.0	0.706	2.7	NA	2.5	17.6	0.05	0.08	57.3

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

MOVEMENT SUMMARY

Site: PM Stage 2 - Fully operational

Blacktown Road and Griffiths Street
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road E											
5	T1	1167	4.2	0.308	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	48	0.0	0.228	23.1	LOS B	0.7	5.2	0.86	0.96	42.8
Approach		1216	4.1	0.308	1.0	NA	0.7	5.2	0.03	0.04	59.0
NorthEast: Griffiths Street											
7	L2	96	0.0	0.136	8.9	LOS A	0.5	3.4	0.53	0.78	51.1
9	R2	45	0.0	0.742	111.0	LOS F	2.7	18.8	0.98	1.13	21.1
Approach		141	0.0	0.742	41.7	LOS C	2.7	18.8	0.67	0.89	35.1
NorthWest: Blacktown Road W											
10	L2	47	0.0	0.321	5.6	LOS A	0.0	0.0	0.00	0.05	57.9
11	T1	1168	4.5	0.321	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		1216	4.4	0.321	0.3	NA	0.0	0.0	0.00	0.02	59.6
All Vehicles		2573	4.0	0.742	2.9	NA	2.7	18.8	0.05	0.08	57.1

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

B3 Blacktown Road / Wall Park Avenue

AM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

PM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

MOVEMENT SUMMARY

Site: AM Existing

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	760	10.8	0.282	4.5	LOS A	6.0	45.7	0.35	0.31	55.9
3	R2	745	10.7	0.882	41.1	LOS C	38.9	297.7	0.97	0.97	35.2
Approach		1505	10.8	0.882	22.6	LOS B	38.9	297.7	0.66	0.64	43.3
NorthEast: Wall Park Avenue E											
4	L2	381	15.7	0.308	9.5	LOS A	5.3	41.8	0.35	0.66	50.9
6	R2	439	5.5	0.877	62.0	LOS E	12.3	90.1	1.00	0.99	29.5
Approach		820	10.3	0.877	37.6	LOS C	12.3	90.1	0.70	0.84	36.7
NorthWest: Blacktown Road N											
7	L2	387	6.8	0.219	5.7	LOS A	0.0	0.0	0.00	0.52	54.7
8	T1	598	16.0	0.856	50.7	LOS D	15.8	123.4	1.00	1.00	32.8
Approach		985	12.4	0.856	33.0	LOS C	15.8	123.4	0.60	0.81	39.0
All Vehicles		3311	11.1	0.882	29.4	LOS C	38.9	297.7	0.65	0.74	40.2

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

MOVEMENT SUMMARY

Site: AM Stage1

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	815	10.8	0.306	5.0	LOS A	6.8	51.9	0.37	0.33	55.5
3	R2	745	10.7	0.900	45.5	LOS D	41.3	315.5	0.99	0.99	33.8
Approach		1560	10.8	0.900	24.3	LOS B	41.3	315.5	0.67	0.65	42.5
NorthEast: Wall Park Avenue E											
4	L2	381	15.7	0.308	9.5	LOS A	5.3	41.8	0.35	0.66	50.9
6	R2	475	5.5	0.886	62.4	LOS E	13.4	98.5	1.00	1.00	29.4
Approach		856	10.1	0.886	38.9	LOS C	13.4	98.5	0.71	0.85	36.2
NorthWest: Blacktown Road N											
7	L2	408	6.8	0.231	5.7	LOS A	0.0	0.0	0.00	0.52	54.7
8	T1	598	16.0	0.856	50.7	LOS D	15.8	123.4	1.00	1.00	32.8
Approach		1006	12.3	0.856	32.4	LOS C	15.8	123.4	0.59	0.81	39.2
All Vehicles		3422	11.0	0.900	30.3	LOS C	41.3	315.5	0.66	0.74	39.8

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

MOVEMENT SUMMARY

Site: AM Stage2

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	795	10.8	0.303	5.3	LOS A	6.8	52.1	0.38	0.34	55.2
3	R2	745	10.7	0.900	45.5	LOS D	41.3	315.5	0.99	0.99	33.8
Approach		1540	10.8	0.900	24.7	LOS B	41.3	315.5	0.68	0.66	42.3
NorthEast: Wall Park Avenue E											
4	L2	381	15.7	0.305	9.4	LOS A	5.1	40.2	0.35	0.65	50.9
6	R2	511	5.5	0.893	62.9	LOS E	14.6	107.0	1.00	1.01	29.3
Approach		892	9.9	0.893	40.0	LOS C	14.6	107.0	0.72	0.86	35.8
NorthWest: Blacktown Road N											
7	L2	399	6.8	0.225	5.7	LOS A	0.0	0.0	0.00	0.52	54.7
8	T1	598	16.0	0.903	57.2	LOS E	16.9	132.4	1.00	1.07	31.0
Approach		997	12.3	0.903	36.6	LOS C	16.9	132.4	0.60	0.85	37.5
All Vehicles		3428	11.0	0.903	32.2	LOS C	41.3	315.5	0.67	0.77	39.0

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

MOVEMENT SUMMARY

Site: AM Stage2 - fully operational

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	807	10.8	0.312	5.7	LOS A	7.2	55.1	0.40	0.35	54.9
3	R2	745	10.7	0.919	51.0	LOS D	44.0	336.0	1.00	1.02	32.2
Approach		1553	10.8	0.919	27.4	LOS B	44.0	336.0	0.69	0.67	41.0
NorthEast: Wall Park Avenue E											
4	L2	381	15.7	0.305	9.4	LOS A	5.1	40.2	0.35	0.65	50.9
6	R2	536	5.5	0.882	60.9	LOS E	15.1	110.4	1.00	1.00	29.8
Approach		917	9.8	0.882	39.5	LOS C	15.1	110.4	0.73	0.85	36.0
NorthWest: Blacktown Road N											
7	L2	402	6.8	0.227	5.7	LOS A	0.0	0.0	0.00	0.52	54.7
8	T1	598	16.0	0.903	57.2	LOS E	16.9	132.4	1.00	1.07	31.0
Approach		1000	12.3	0.903	36.5	LOS C	16.9	132.4	0.60	0.85	37.6
All Vehicles		3469	10.9	0.919	33.2	LOS C	44.0	336.0	0.67	0.77	38.6

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

MOVEMENT SUMMARY

Site: PM Existing

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	748	5.2	0.276	5.2	LOS A	6.3	45.7	0.37	0.33	55.3
3	R2	615	3.3	0.788	34.0	LOS C	26.9	193.8	0.93	0.89	37.9
Approach		1363	4.3	0.788	18.2	LOS B	26.9	193.8	0.62	0.58	45.9
NorthEast: Wall Park Avenue E											
4	L2	513	7.2	0.410	11.2	LOS A	8.2	60.8	0.44	0.73	50.0
6	R2	449	3.0	0.773	53.4	LOS D	11.4	81.9	1.00	0.90	31.7
Approach		962	5.3	0.773	30.9	LOS C	11.4	81.9	0.70	0.81	39.4
NorthWest: Blacktown Road N											
7	L2	548	2.1	0.300	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
8	T1	685	7.5	0.772	41.9	LOS C	16.3	119.5	0.99	0.91	35.6
Approach		1234	5.1	0.772	25.8	LOS B	16.3	119.5	0.55	0.74	42.2
All Vehicles		3559	4.9	0.788	24.3	LOS B	26.9	193.8	0.62	0.70	42.7

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

MOVEMENT SUMMARY

Site: PM Stage1

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	765	5.2	0.282	5.2	LOS A	6.4	47.0	0.38	0.33	55.3
3	R2	615	3.3	0.788	34.0	LOS C	26.9	193.8	0.93	0.89	37.9
Approach		1380	4.3	0.788	18.0	LOS B	26.9	193.8	0.62	0.58	45.9
NorthEast: Wall Park Avenue E											
4	L2	513	7.2	0.410	11.2	LOS A	8.2	60.8	0.44	0.73	50.0
6	R2	451	3.0	0.775	53.5	LOS D	11.4	82.2	1.00	0.90	31.7
Approach		963	5.2	0.775	31.0	LOS C	11.4	82.2	0.70	0.81	39.4
NorthWest: Blacktown Road N											
7	L2	579	2.1	0.316	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
8	T1	685	7.5	0.772	41.9	LOS C	16.3	119.5	0.99	0.91	35.6
Approach		1264	5.0	0.772	25.3	LOS B	16.3	119.5	0.54	0.73	42.5
All Vehicles		3607	4.8	0.788	24.0	LOS B	26.9	193.8	0.61	0.69	42.8

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

MOVEMENT SUMMARY

Site: PM Stage2

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	756	5.2	0.278	5.2	LOS A	6.3	46.3	0.38	0.33	55.3
3	R2	615	3.3	0.788	34.0	LOS C	26.9	193.8	0.93	0.89	37.9
Approach		1371	4.3	0.788	18.1	LOS B	26.9	193.8	0.62	0.58	45.9
NorthEast: Wall Park Avenue E											
4	L2	513	7.2	0.410	11.2	LOS A	8.2	60.8	0.44	0.73	50.0
6	R2	465	3.0	0.800	54.7	LOS D	12.0	86.4	1.00	0.92	31.4
Approach		978	5.2	0.800	31.9	LOS C	12.0	86.4	0.71	0.82	39.0
NorthWest: Blacktown Road N											
7	L2	606	2.1	0.331	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
8	T1	685	7.5	0.772	41.9	LOS C	16.3	119.5	0.99	0.91	35.6
Approach		1292	5.0	0.772	24.9	LOS B	16.3	119.5	0.53	0.73	42.7
All Vehicles		3640	4.8	0.800	24.2	LOS B	26.9	193.8	0.61	0.70	42.7

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

MOVEMENT SUMMARY

Site: PM Stage2 - fully operational

Wall Park Avenue and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road S											
2	T1	756	5.2	0.278	5.2	LOS A	6.3	46.3	0.38	0.33	55.3
3	R2	615	3.3	0.788	34.0	LOS C	26.9	193.8	0.93	0.89	37.9
Approach		1371	4.3	0.788	18.1	LOS B	26.9	193.8	0.62	0.58	45.9
NorthEast: Wall Park Avenue E											
4	L2	513	7.2	0.410	11.2	LOS A	8.2	60.8	0.44	0.73	50.0
6	R2	465	3.0	0.800	54.7	LOS D	12.0	86.4	1.00	0.92	31.4
Approach		978	5.2	0.800	31.9	LOS C	12.0	86.4	0.71	0.82	39.0
NorthWest: Blacktown Road N											
7	L2	624	2.1	0.341	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
8	T1	685	7.5	0.772	41.9	LOS C	16.3	119.5	0.99	0.91	35.6
Approach		1309	4.9	0.772	24.6	LOS B	16.3	119.5	0.52	0.73	42.8
All Vehicles		3658	4.8	0.800	24.1	LOS B	26.9	193.8	0.61	0.70	42.8

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

B4 Blacktown Road / Bungaribee Road / Leabons lane

AM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

PM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

MOVEMENT SUMMARY

Site: AM Existing

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	146	3.6	0.099	7.0	LOS A	1.6	11.4	0.24	0.59	52.7
2	T1	1006	14.2	0.972	73.1	LOS F	35.1	275.6	1.00	1.29	27.3
3b	R3	88	1.2	0.609	57.1	LOS E	4.5	31.6	1.00	0.80	30.5
Approach		1241	12.0	0.972	64.2	LOS E	35.1	275.6	0.91	1.17	29.2
SouthEast: Leabons Lane											
21b	L3	83	5.1	0.924	69.2	LOS E	16.4	117.3	1.00	1.14	29.2
22	T1	329	1.3	0.924	62.3	LOS E	16.8	120.1	1.00	1.13	29.3
23a	R1	149	3.5	0.924	66.2	LOS E	16.8	120.1	1.00	1.11	29.2
Approach		562	2.4	0.924	64.4	LOS E	16.8	120.1	1.00	1.12	29.2
North: Blacktown Road N											
7a	L1	88	6.0	0.645	35.6	LOS C	15.8	124.4	0.91	0.80	38.4
8	T1	663	17.0	0.645	30.9	LOS C	15.8	124.4	0.91	0.79	39.6
9b	R3	191	6.1	0.938	74.7	LOS F	11.9	87.7	1.00	1.06	26.7
Approach		942	13.7	0.938	40.2	LOS C	15.8	125.6	0.93	0.85	35.9
NorthWest: Bungarribee Road											
27b	L3	292	3.6	0.358	18.9	LOS B	7.7	55.8	0.61	0.75	45.8
28	T1	338	1.2	0.968	73.9	LOS F	22.5	159.3	1.00	1.22	27.1
29a	R1	148	3.5	0.442	44.5	LOS D	6.6	47.6	0.94	0.79	34.6
Approach		778	2.6	0.968	47.7	LOS D	22.5	159.3	0.84	0.96	33.7
All Vehicles		3523	8.9	0.972	54.2	LOS D	35.1	275.6	0.91	1.03	31.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	16	43.3	LOS E	0.0	0.0	0.93	0.93
P5	SouthEast Full Crossing	5	30.4	LOS D	0.0	0.0	0.78	0.78
P3	North Full Crossing	3	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	8	38.7	LOS D	0.0	0.0	0.88	0.88
All Pedestrians		40	40.9	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: AM Stage 1

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	108	3.6	0.074	6.9	LOS A	1.1	8.3	0.24	0.59	52.7
2	T1	1061	14.2	0.991	81.8	LOS F	39.4	309.2	1.00	1.35	25.6
3b	R3	88	1.2	0.609	57.1	LOS E	4.5	31.6	1.00	0.80	30.5
Approach		1258	12.4	0.991	73.6	LOS F	39.4	309.2	0.93	1.25	27.1
SouthEast: Leabons Lane											
21b	L3	83	5.1	0.924	69.2	LOS E	16.4	117.3	1.00	1.14	29.2
22	T1	329	1.3	0.924	62.3	LOS E	16.8	120.1	1.00	1.13	29.3
23a	R1	149	3.5	0.924	66.2	LOS E	16.8	120.1	1.00	1.11	29.2
Approach		562	2.4	0.924	64.4	LOS E	16.8	120.1	1.00	1.12	29.2
North: Blacktown Road N											
7a	L1	88	6.0	0.645	35.6	LOS C	15.8	124.4	0.91	0.80	38.4
8	T1	663	17.0	0.645	30.9	LOS C	15.8	124.4	0.91	0.79	39.6
9b	R3	191	6.1	1.016	107.2	LOS F	14.6	107.7	1.00	1.20	21.6
Approach		942	13.7	1.016	46.8	LOS D	15.8	125.6	0.93	0.88	33.8
NorthWest: Bungarribee Road											
27b	L3	292	3.6	0.363	19.9	LOS B	7.9	57.3	0.64	0.75	45.2
28	T1	338	1.2	0.970	74.8	LOS F	22.7	160.6	1.00	1.22	26.9
29a	R1	159	3.5	0.473	44.8	LOS D	7.1	51.4	0.94	0.79	34.5
Approach		788	2.6	0.970	48.5	LOS D	22.7	160.6	0.86	0.96	33.5
All Vehicles		3551	9.0	1.016	59.5	LOS E	39.4	309.2	0.93	1.07	30.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	16	43.3	LOS E	0.0	0.0	0.93	0.93
P5	SouthEast Full Crossing	5	30.4	LOS D	0.0	0.0	0.78	0.78
P3	North Full Crossing	3	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	8	37.9	LOS D	0.0	0.0	0.87	0.87
All Pedestrians		40	40.7	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: AM Stage 2

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	108	3.6	0.074	6.9	LOS A	1.1	8.3	0.24	0.59	52.7
2	T1	1077	14.2	1.005	90.0	LOS F	41.9	329.1	1.00	1.41	24.2
3b	R3	88	1.2	0.609	57.1	LOS E	4.5	31.6	1.00	0.80	30.5
Approach		1274	12.4	1.005	80.7	LOS F	41.9	329.1	0.93	1.30	25.8
SouthEast: Leabons Lane											
21b	L3	83	5.1	0.924	69.2	LOS E	16.4	117.3	1.00	1.14	29.2
22	T1	329	1.3	0.924	62.3	LOS E	16.8	120.1	1.00	1.13	29.3
23a	R1	149	3.5	0.924	66.2	LOS E	16.8	120.1	1.00	1.11	29.2
Approach		562	2.4	0.924	64.4	LOS E	16.8	120.1	1.00	1.12	29.2
North: Blacktown Road N											
7a	L1	88	6.0	0.645	35.6	LOS C	15.8	124.4	0.91	0.80	38.4
8	T1	663	17.0	0.645	30.9	LOS C	15.8	124.4	0.91	0.79	39.6
9b	R3	191	6.1	1.016	107.2	LOS F	14.6	107.7	1.00	1.20	21.6
Approach		942	13.7	1.016	46.8	LOS D	15.8	125.6	0.93	0.88	33.8
NorthWest: Bungarribee Road											
27b	L3	292	3.6	0.382	20.7	LOS B	8.5	61.1	0.67	0.77	44.8
28	T1	338	1.2	0.970	74.8	LOS F	22.7	160.6	1.00	1.22	26.9
29a	R1	151	3.5	0.448	44.6	LOS D	6.7	48.4	0.94	0.79	34.6
Approach		780	2.6	0.970	48.8	LOS D	22.7	160.6	0.86	0.97	33.4
All Vehicles		3558	9.0	1.016	62.1	LOS E	41.9	329.1	0.93	1.09	29.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	16	43.3	LOS E	0.0	0.0	0.93	0.93
P5	SouthEast Full Crossing	5	30.4	LOS D	0.0	0.0	0.78	0.78
P3	North Full Crossing	3	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	8	37.9	LOS D	0.0	0.0	0.87	0.87
All Pedestrians		40	40.7	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: AM Stage 2 - Fully operational

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	108	3.6	0.074	6.9	LOS A	1.1	8.3	0.24	0.59	52.7
2	T1	1092	14.2	0.986	79.2	LOS F	40.0	314.1	1.00	1.34	26.1
3b	R3	88	1.2	0.609	57.1	LOS E	4.5	31.6	1.00	0.80	30.5
Approach		1288	12.4	0.986	71.6	LOS F	40.0	314.1	0.94	1.24	27.5
SouthEast: Leabons Lane											
21b	L3	83	5.1	0.984	89.5	LOS F	19.2	137.2	1.00	1.26	25.1
22	T1	329	1.3	0.984	82.2	LOS F	19.4	138.7	1.00	1.25	25.3
23a	R1	149	3.5	0.984	85.6	LOS F	19.4	138.7	1.00	1.24	25.3
Approach		562	2.4	0.984	84.2	LOS F	19.4	138.7	1.00	1.25	25.2
North: Blacktown Road N											
7a	L1	88	6.0	0.626	34.7	LOS C	15.6	122.4	0.90	0.79	38.8
8	T1	663	17.0	0.626	30.0	LOS C	15.6	122.4	0.90	0.78	40.0
9b	R3	191	6.1	1.016	107.2	LOS F	14.6	107.7	1.00	1.20	21.6
Approach		942	13.7	1.016	46.0	LOS D	15.6	123.6	0.92	0.87	34.0
NorthWest: Bungarribee Road											
27b	L3	292	3.6	0.367	20.4	LOS B	8.1	58.4	0.65	0.76	44.9
28	T1	338	1.2	0.970	74.8	LOS F	22.7	160.6	1.00	1.22	26.9
29a	R1	164	3.5	0.489	44.9	LOS D	7.4	53.2	0.95	0.80	34.5
Approach		794	2.6	0.970	48.7	LOS D	22.7	160.6	0.86	0.96	33.4
All Vehicles		3586	9.0	1.016	61.8	LOS E	40.0	314.1	0.92	1.08	29.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	16	43.3	LOS E	0.0	0.0	0.93	0.93
P5	SouthEast Full Crossing	5	29.7	LOS C	0.0	0.0	0.77	0.77
P3	North Full Crossing	3	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	8	37.0	LOS D	0.0	0.0	0.86	0.86
All Pedestrians		40	40.4	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: PM Existing

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	94	0.0	0.064	7.4	LOS A	1.1	7.5	0.26	0.59	52.5
2	T1	923	4.7	0.871	46.5	LOS D	24.9	181.4	1.00	1.03	34.0
3b	R3	120	0.9	0.675	56.1	LOS D	6.1	42.8	1.00	0.83	30.8
Approach		1137	3.9	0.871	44.3	LOS D	24.9	181.4	0.94	0.97	34.6
SouthEast: Leabons Lane											
21b	L3	117	0.9	0.858	56.9	LOS E	13.5	94.5	1.00	1.05	32.1
22	T1	320	0.0	0.858	51.5	LOS D	14.3	101.0	1.00	1.02	32.0
23a	R1	97	2.2	0.858	56.9	LOS E	14.3	101.0	1.00	1.00	31.7
Approach		534	0.6	0.858	53.7	LOS D	14.3	101.0	1.00	1.02	32.0
North: Blacktown Road N											
7a	L1	82	5.1	0.658	33.7	LOS C	18.2	133.9	0.90	0.80	39.3
8	T1	803	6.6	0.658	29.0	LOS C	18.2	134.6	0.90	0.79	40.5
9b	R3	276	1.9	0.904	65.0	LOS E	16.3	115.7	1.00	1.01	28.7
Approach		1161	5.3	0.904	37.9	LOS C	18.2	134.6	0.92	0.84	36.8
NorthWest: Bungarribee Road											
27b	L3	207	5.1	0.266	23.7	LOS B	7.1	51.8	0.79	0.78	43.7
28	T1	212	2.0	0.720	43.6	LOS D	9.0	64.1	0.97	0.86	34.7
29a	R1	222	2.4	0.908	64.8	LOS E	12.9	92.3	1.00	1.07	29.0
Approach		641	3.1	0.908	44.5	LOS D	12.9	92.3	0.92	0.90	34.7
All Vehicles		3473	3.7	0.908	43.6	LOS D	24.9	181.4	0.94	0.92	34.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	17	41.4	LOS E	0.0	0.0	0.91	0.91
P5	SouthEast Full Crossing	8	28.1	LOS C	0.0	0.0	0.75	0.75
P3	North Full Crossing	1	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	9	39.6	LOS D	0.0	0.0	0.89	0.89
All Pedestrians		43	39.0	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: PM Stage 1

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	78	0.0	0.053	7.3	LOS A	0.9	6.2	0.25	0.59	52.5
2	T1	940	4.7	0.920	55.8	LOS D	28.1	204.4	1.00	1.12	31.3
3b	R3	120	0.9	0.675	56.1	LOS D	6.1	42.8	1.00	0.83	30.8
Approach		1138	4.0	0.920	52.5	LOS D	28.1	204.4	0.95	1.06	32.2
SouthEast: Leabons Lane											
21b	L3	117	0.9	0.858	57.4	LOS E	13.5	94.5	1.00	1.05	32.0
22	T1	320	0.0	0.858	51.7	LOS D	14.3	101.0	1.00	1.02	31.9
23a	R1	97	2.2	0.858	56.9	LOS E	14.3	101.0	1.00	1.00	31.7
Approach		534	0.6	0.858	53.9	LOS D	14.3	101.0	1.00	1.02	31.9
North: Blacktown Road N											
7a	L1	82	5.1	0.677	34.6	LOS C	18.5	136.2	0.91	0.81	38.9
8	T1	803	6.6	0.677	29.9	LOS C	18.5	136.8	0.91	0.80	40.1
9b	R3	276	1.9	0.904	65.0	LOS E	16.3	115.7	1.00	1.01	28.7
Approach		1161	5.3	0.904	38.6	LOS C	18.5	136.8	0.93	0.85	36.6
NorthWest: Bungarribee Road											
27b	L3	207	5.1	0.258	22.1	LOS B	6.6	47.9	0.73	0.76	44.4
28	T1	212	2.0	0.696	43.2	LOS D	9.2	65.6	0.97	0.85	34.9
29a	R1	244	2.4	0.928	67.9	LOS E	14.7	105.0	1.00	1.11	28.4
Approach		663	3.1	0.928	45.7	LOS D	14.7	105.0	0.91	0.91	34.3
All Vehicles		3496	3.7	0.928	46.8	LOS D	28.1	204.4	0.94	0.96	33.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	17	41.4	LOS E	0.0	0.0	0.91	0.91
P5	SouthEast Full Crossing	8	28.9	LOS C	0.0	0.0	0.76	0.76
P3	North Full Crossing	1	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	9	40.5	LOS E	0.0	0.0	0.90	0.90
All Pedestrians		43	39.3	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: PM Stage 2

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	78	0.0	0.053	7.3	LOS A	0.9	6.2	0.25	0.59	52.5
2	T1	946	4.7	0.926	57.3	LOS E	28.7	208.9	1.00	1.14	30.9
3b	R3	120	0.9	0.675	56.1	LOS D	6.1	42.8	1.00	0.83	30.8
Approach		1144	4.0	0.926	53.7	LOS D	28.7	208.9	0.95	1.07	31.8
SouthEast: Leabons Lane											
21b	L3	117	0.9	0.913	65.9	LOS E	14.8	104.1	1.00	1.13	29.8
22	T1	320	0.0	0.913	59.7	LOS E	15.4	108.7	1.00	1.10	29.9
23a	R1	97	2.2	0.913	64.4	LOS E	15.4	108.7	1.00	1.08	29.8
Approach		534	0.6	0.913	61.9	LOS E	15.4	108.7	1.00	1.10	29.8
North: Blacktown Road N											
7a	L1	82	5.1	0.677	34.6	LOS C	18.5	136.2	0.91	0.81	38.9
8	T1	803	6.6	0.677	29.9	LOS C	18.5	136.8	0.91	0.80	40.1
9b	R3	276	1.9	0.904	65.0	LOS E	16.3	115.7	1.00	1.01	28.7
Approach		1161	5.3	0.904	38.6	LOS C	18.5	136.8	0.93	0.85	36.6
NorthWest: Bungarribee Road											
27b	L3	207	5.1	0.249	19.8	LOS B	5.9	43.0	0.66	0.74	45.6
28	T1	212	2.0	0.674	42.8	LOS D	9.4	66.9	0.97	0.83	35.1
29a	R1	264	2.4	0.937	69.6	LOS E	16.2	115.9	1.00	1.13	28.0
Approach		683	3.1	0.937	46.2	LOS D	16.2	115.9	0.89	0.92	34.2
All Vehicles		3522	3.7	0.937	48.5	LOS D	28.7	208.9	0.94	0.97	33.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	17	41.4	LOS E	0.0	0.0	0.91	0.91
P5	SouthEast Full Crossing	8	28.9	LOS C	0.0	0.0	0.76	0.76
P3	North Full Crossing	1	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	9	40.5	LOS E	0.0	0.0	0.90	0.90
All Pedestrians		43	39.3	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: PM Stage 2 - Fully operational

Bungarribee Road/Leabons Lane and Blacktown Road
Signals - Fixed Time Isolated Cycle Time = 100 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: Blacktown Road S											
1a	L1	78	0.0	0.053	7.3	LOS A	0.9	6.2	0.25	0.59	52.5
2	T1	946	4.7	0.926	57.3	LOS E	28.7	208.9	1.00	1.14	30.9
3b	R3	120	0.9	0.675	56.1	LOS D	6.1	42.8	1.00	0.83	30.8
Approach		1144	4.0	0.926	53.7	LOS D	28.7	208.9	0.95	1.07	31.8
SouthEast: Leabons Lane											
21b	L3	117	0.9	0.913	65.9	LOS E	14.8	104.1	1.00	1.13	29.8
22	T1	320	0.0	0.913	59.7	LOS E	15.4	108.7	1.00	1.10	29.9
23a	R1	97	2.2	0.913	64.4	LOS E	15.4	108.7	1.00	1.08	29.8
Approach		534	0.6	0.913	61.9	LOS E	15.4	108.7	1.00	1.10	29.8
North: Blacktown Road N											
7a	L1	82	5.1	0.697	35.6	LOS C	18.8	138.4	0.93	0.82	38.6
8	T1	803	6.6	0.697	30.9	LOS C	18.8	139.1	0.93	0.81	39.6
9b	R3	276	1.9	0.955	78.0	LOS F	18.1	128.9	1.00	1.08	26.1
Approach		1161	5.3	0.955	42.4	LOS C	18.8	139.1	0.94	0.88	35.2
NorthWest: Bungarribee Road											
27b	L3	207	5.1	0.242	17.8	LOS B	5.3	38.3	0.60	0.73	46.6
28	T1	212	2.0	0.653	42.5	LOS C	9.6	68.1	0.97	0.82	35.3
29a	R1	277	2.4	0.920	65.5	LOS E	16.5	117.7	1.00	1.09	28.9
Approach		696	3.1	0.920	44.3	LOS D	16.5	117.7	0.87	0.90	34.8
All Vehicles		3535	3.7	0.955	49.4	LOS D	28.7	208.9	0.94	0.98	33.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	7	44.2	LOS E	0.0	0.0	0.94	0.94
P1S	South Slip/Bypass Lane Crossing	17	41.4	LOS E	0.0	0.0	0.91	0.91
P5	SouthEast Full Crossing	8	29.7	LOS C	0.0	0.0	0.77	0.77
P3	North Full Crossing	1	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	9	40.5	LOS E	0.0	0.0	0.90	0.90
All Pedestrians		43	39.5	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.

B5 Bungarribee Road / Panorama Parade / Lock Street

AM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

PM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

MOVEMENT SUMMARY

Site: AM Existing

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	48	15.2	0.577	34.5	LOS C	12.9	92.7	0.87	0.78	38.7
2	T1	180	0.6	0.577	28.8	LOS C	12.9	92.7	0.87	0.78	39.7
3	R2	94	1.1	0.577	34.3	LOS C	12.9	92.7	0.87	0.78	39.0
Approach		322	2.9	0.577	31.2	LOS C	12.9	92.7	0.87	0.78	39.4
East: Bungarribee Road E											
4	L2	74	1.4	0.469	33.5	LOS C	11.6	83.1	0.84	0.74	39.7
5	T1	533	3.4	0.469	28.0	LOS B	11.7	84.2	0.84	0.72	40.8
6	R2	136	2.3	0.353	22.3	LOS B	3.5	25.0	0.81	0.77	42.8
Approach		742	3.0	0.469	27.5	LOS B	11.7	84.2	0.83	0.73	41.0
North: Parorama Parade											
7	L2	35	9.1	0.366	35.7	LOS C	6.4	46.2	0.83	0.74	38.1
8	T1	79	0.0	0.366	30.0	LOS C	6.4	46.2	0.83	0.74	39.0
9	R2	52	4.1	0.366	35.6	LOS C	6.4	46.2	0.83	0.74	38.3
Approach		165	3.2	0.366	33.0	LOS C	6.4	46.2	0.83	0.74	38.6
West: Bungarribee Road W											
10	L2	102	2.1	0.583	34.9	LOS C	15.1	108.1	0.88	0.78	39.0
11	T1	646	2.9	0.583	29.3	LOS C	15.1	108.1	0.88	0.77	40.2
12	R2	104	3.0	0.248	20.7	LOS B	2.6	18.9	0.74	0.74	43.6
Approach		853	2.8	0.583	28.9	LOS C	15.1	108.1	0.86	0.77	40.4
All Vehicles		2082	2.9	0.583	29.1	LOS C	15.1	108.1	0.85	0.76	40.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	3	25.2	LOS C	0.0	0.0	0.71	0.71
P3	North Full Crossing	2	25.2	LOS C	0.0	0.0	0.71	0.71
P4	West Full Crossing	35	32.0	LOS D	0.1	0.1	0.80	0.80
All Pedestrians		40	31.1	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: AM Stage 1

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	48	15.2	0.559	31.5	LOS C	13.3	95.0	0.83	0.77	40.0
2	T1	204	0.6	0.559	25.8	LOS B	13.3	95.0	0.83	0.77	41.2
3	R2	94	1.1	0.559	31.3	LOS C	13.3	95.0	0.83	0.77	40.4
Approach		346	2.8	0.559	28.1	LOS B	13.3	95.0	0.83	0.77	40.8
East: Bungarribee Road E											
4	L2	74	1.4	0.456	32.6	LOS C	11.4	81.8	0.82	0.73	40.0
5	T1	533	3.4	0.456	27.1	LOS B	11.5	82.8	0.82	0.71	41.2
6	R2	98	2.3	0.330	24.5	LOS B	2.7	19.6	0.83	0.75	41.7
Approach		704	3.0	0.456	27.3	LOS B	11.5	82.8	0.82	0.72	41.1
North: Parorama Parade											
7	L2	45	9.1	0.404	33.1	LOS C	7.7	55.2	0.81	0.74	39.2
8	T1	96	0.0	0.404	27.5	LOS B	7.7	55.2	0.81	0.74	40.1
9	R2	62	4.1	0.404	33.1	LOS C	7.7	55.2	0.81	0.74	39.3
Approach		203	3.3	0.404	30.4	LOS C	7.7	55.2	0.81	0.74	39.6
West: Bungarribee Road W											
10	L2	116	2.1	0.611	34.6	LOS C	16.3	116.9	0.88	0.79	39.1
11	T1	646	2.9	0.611	28.5	LOS B	16.3	116.9	0.87	0.76	40.5
12	R2	104	3.0	0.310	23.5	LOS B	2.9	21.1	0.78	0.75	42.2
Approach		866	2.8	0.611	28.7	LOS C	16.3	116.9	0.86	0.76	40.5
All Vehicles		2120	2.9	0.611	28.3	LOS B	16.3	116.9	0.84	0.75	40.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	3	24.5	LOS C	0.0	0.0	0.70	0.70
P3	North Full Crossing	2	24.5	LOS C	0.0	0.0	0.70	0.70
P4	West Full Crossing	35	28.9	LOS C	0.1	0.1	0.76	0.76
All Pedestrians		40	28.3	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: AM Stage 2

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	48	15.2	0.590	32.5	LOS C	14.5	103.7	0.85	0.78	39.6
2	T1	227	0.6	0.590	26.8	LOS B	14.5	103.7	0.85	0.78	40.7
3	R2	94	1.1	0.590	32.4	LOS C	14.5	103.7	0.85	0.78	40.0
Approach		369	2.6	0.590	29.0	LOS C	14.5	103.7	0.85	0.78	40.4
East: Bungarribee Road E											
4	L2	74	1.4	0.456	32.6	LOS C	11.4	81.8	0.82	0.73	40.0
5	T1	533	3.4	0.456	27.1	LOS B	11.5	82.8	0.82	0.71	41.2
6	R2	98	2.3	0.333	24.5	LOS B	2.7	19.6	0.83	0.75	41.7
Approach		704	3.0	0.456	27.3	LOS B	11.5	82.8	0.82	0.72	41.1
North: Parorama Parade											
7	L2	47	9.1	0.428	34.1	LOS C	8.1	58.6	0.83	0.75	38.7
8	T1	100	0.0	0.428	28.5	LOS B	8.1	58.6	0.83	0.75	39.7
9	R2	64	4.1	0.428	34.1	LOS C	8.1	58.6	0.83	0.75	38.9
Approach		212	3.3	0.428	31.4	LOS C	8.1	58.6	0.83	0.75	39.2
West: Bungarribee Road W											
10	L2	128	2.1	0.621	34.7	LOS C	16.6	119.2	0.89	0.79	39.0
11	T1	646	2.9	0.621	28.6	LOS C	16.6	119.2	0.87	0.76	40.4
12	R2	104	3.0	0.310	23.5	LOS B	2.9	21.1	0.78	0.75	42.2
Approach		879	2.8	0.621	28.9	LOS C	16.6	119.2	0.86	0.77	40.4
All Vehicles		2164	2.9	0.621	28.6	LOS C	16.6	119.2	0.85	0.75	40.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	3	24.5	LOS C	0.0	0.0	0.70	0.70
P3	North Full Crossing	2	24.5	LOS C	0.0	0.0	0.70	0.70
P4	West Full Crossing	35	28.9	LOS C	0.1	0.1	0.76	0.76
All Pedestrians		40	28.3	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: AM Stage 2 Fully operational

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	48	15.2	0.594	31.2	LOS C	14.9	106.9	0.84	0.77	40.2
2	T1	245	0.6	0.594	25.5	LOS B	14.9	106.9	0.84	0.77	41.4
3	R2	94	1.1	0.594	31.1	LOS C	14.9	106.9	0.84	0.77	40.6
Approach		387	2.5	0.594	27.6	LOS B	14.9	106.9	0.84	0.77	41.0
East: Bungarribee Road E											
4	L2	74	1.4	0.469	33.5	LOS C	11.6	83.1	0.84	0.74	39.7
5	T1	533	3.4	0.469	28.0	LOS B	11.7	84.2	0.84	0.72	40.8
6	R2	98	2.3	0.345	25.4	LOS B	2.8	20.0	0.85	0.76	41.3
Approach		704	3.0	0.469	28.2	LOS B	11.7	84.2	0.84	0.73	40.7
North: Parorama Parade											
7	L2	51	9.1	0.442	34.3	LOS C	8.2	59.4	0.83	0.76	38.6
8	T1	95	0.0	0.442	28.6	LOS C	8.2	59.4	0.83	0.76	39.5
9	R2	67	4.1	0.442	34.2	LOS C	8.2	59.4	0.83	0.76	38.8
Approach		213	3.5	0.442	31.8	LOS C	8.2	59.4	0.83	0.76	39.1
West: Bungarribee Road W											
10	L2	139	2.1	0.647	35.8	LOS C	17.2	123.1	0.90	0.81	38.5
11	T1	646	2.9	0.647	29.6	LOS C	17.2	123.1	0.89	0.78	40.0
12	R2	104	3.0	0.316	24.1	LOS B	3.0	21.5	0.79	0.75	41.9
Approach		889	2.8	0.647	29.9	LOS C	17.2	123.1	0.88	0.78	39.9
All Vehicles		2194	2.9	0.647	29.1	LOS C	17.2	123.1	0.85	0.76	40.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	3	25.2	LOS C	0.0	0.0	0.71	0.71
P3	North Full Crossing	2	25.2	LOS C	0.0	0.0	0.71	0.71
P4	West Full Crossing	35	28.2	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		40	27.8	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: PM Existing

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	28	11.1	0.296	33.4	LOS C	5.1	36.9	0.79	0.72	38.9
2	T1	60	1.8	0.296	27.8	LOS B	5.1	36.9	0.79	0.72	39.8
3	R2	51	0.0	0.296	33.3	LOS C	5.1	36.9	0.79	0.72	39.2
Approach		139	3.0	0.296	30.9	LOS C	5.1	36.9	0.79	0.72	39.4
East: Bungarribee Road E											
4	L2	119	0.0	0.498	28.4	LOS B	14.2	100.7	0.78	0.72	41.9
5	T1	647	2.3	0.498	22.5	LOS B	14.2	100.7	0.77	0.69	43.4
6	R2	49	0.0	0.142	19.8	LOS B	1.2	8.6	0.68	0.70	44.2
Approach		816	1.8	0.498	23.2	LOS B	14.2	100.7	0.77	0.69	43.2
North: Parorama Parade											
7	L2	40	2.6	0.489	34.0	LOS C	10.1	70.9	0.84	0.77	38.9
8	T1	127	0.0	0.489	28.4	LOS B	10.1	70.9	0.84	0.77	39.7
9	R2	92	0.0	0.489	33.9	LOS C	10.1	70.9	0.84	0.77	39.0
Approach		259	0.4	0.489	31.2	LOS C	10.1	70.9	0.84	0.77	39.3
West: Bungarribee Road W											
10	L2	56	0.0	0.391	27.1	LOS B	10.6	75.1	0.74	0.66	42.9
11	T1	577	1.5	0.391	21.5	LOS B	10.7	75.8	0.74	0.65	44.0
12	R2	39	8.1	0.137	20.8	LOS B	1.0	7.2	0.72	0.70	43.4
Approach		672	1.7	0.391	22.0	LOS B	10.7	75.8	0.74	0.65	43.9
All Vehicles		1885	1.7	0.498	24.4	LOS B	14.2	100.7	0.77	0.69	42.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	5	19.8	LOS B	0.0	0.0	0.63	0.63
P3	North Full Crossing	4	19.8	LOS B	0.0	0.0	0.63	0.63
P4	West Full Crossing	16	32.8	LOS D	0.0	0.0	0.81	0.81
All Pedestrians		25	28.0	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.

MOVEMENT SUMMARY

Site: PM Stage 1

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	28	11.1	0.277	31.0	LOS C	4.9	35.3	0.76	0.71	39.9
2	T1	60	1.8	0.277	25.4	LOS B	4.9	35.3	0.76	0.71	40.9
3	R2	51	0.0	0.277	30.9	LOS C	4.9	35.3	0.76	0.71	40.2
Approach		139	3.0	0.277	28.6	LOS C	4.9	35.3	0.76	0.71	40.4
East: Bungarribee Road E											
4	L2	119	0.0	0.543	31.6	LOS C	14.9	106.0	0.83	0.76	40.4
5	T1	647	2.3	0.543	25.8	LOS B	14.9	106.0	0.83	0.73	41.7
6	R2	34	0.0	0.105	22.1	LOS B	0.9	6.3	0.72	0.70	43.0
Approach		800	1.8	0.543	26.5	LOS B	14.9	106.0	0.82	0.73	41.6
North: Parorama Parade											
7	L2	62	2.6	0.545	31.8	LOS C	12.5	88.1	0.83	0.78	39.8
8	T1	151	0.0	0.545	26.3	LOS B	12.5	88.1	0.83	0.78	40.6
9	R2	114	0.0	0.545	31.8	LOS C	12.5	88.1	0.83	0.78	39.9
Approach		326	0.5	0.545	29.3	LOS C	12.5	88.1	0.83	0.78	40.2
West: Bungarribee Road W											
10	L2	56	0.0	0.432	30.2	LOS C	11.4	80.5	0.79	0.70	41.3
11	T1	577	1.5	0.432	24.7	LOS B	11.5	81.3	0.79	0.69	42.4
12	R2	39	8.1	0.147	23.3	LOS B	1.0	7.8	0.77	0.71	42.2
Approach		672	1.7	0.432	25.1	LOS B	11.5	81.3	0.79	0.69	42.3
All Vehicles		1937	1.7	0.545	26.6	LOS B	14.9	106.0	0.81	0.72	41.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	5	22.4	LOS C	0.0	0.0	0.67	0.67
P3	North Full Crossing	4	22.4	LOS C	0.0	0.0	0.67	0.67
P4	West Full Crossing	16	29.7	LOS C	0.0	0.0	0.77	0.77
All Pedestrians		25	27.0	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.

MOVEMENT SUMMARY

Site: PM Stage 2

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	28	11.1	0.279	30.3	LOS C	5.1	36.7	0.75	0.70	40.3
2	T1	67	1.8	0.279	24.7	LOS B	5.1	36.7	0.75	0.70	41.3
3	R2	51	0.0	0.279	30.2	LOS C	5.1	36.7	0.75	0.70	40.6
Approach		146	3.0	0.279	27.7	LOS B	5.1	36.7	0.75	0.70	40.8
East: Bungarribee Road E											
4	L2	119	0.0	0.588	34.3	LOS C	15.7	111.3	0.87	0.78	39.2
5	T1	647	2.3	0.588	28.5	LOS B	15.7	111.3	0.87	0.76	40.5
6	R2	34	0.0	0.112	23.9	LOS B	0.9	6.6	0.75	0.70	42.1
Approach		800	1.8	0.588	29.1	LOS C	15.7	111.3	0.86	0.76	40.4
North: Parorama Parade											
7	L2	82	2.6	0.592	30.4	LOS C	14.7	103.5	0.83	0.79	40.3
8	T1	169	0.0	0.592	24.9	LOS B	14.7	103.5	0.83	0.79	41.2
9	R2	134	0.0	0.592	30.4	LOS C	14.7	103.5	0.83	0.79	40.4
Approach		385	0.6	0.592	28.0	LOS B	14.7	103.5	0.83	0.79	40.7
West: Bungarribee Road W											
10	L2	60	0.0	0.473	32.8	LOS C	12.1	85.3	0.83	0.73	40.1
11	T1	577	1.5	0.473	27.3	LOS B	12.2	86.2	0.83	0.72	41.2
12	R2	39	8.1	0.157	25.2	LOS B	1.1	8.3	0.80	0.71	41.3
Approach		676	1.7	0.473	27.6	LOS B	12.2	86.2	0.83	0.72	41.1
All Vehicles		2007	1.6	0.592	28.3	LOS B	15.7	111.3	0.84	0.75	40.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	5	24.5	LOS C	0.0	0.0	0.70	0.70
P3	North Full Crossing	4	24.5	LOS C	0.0	0.0	0.70	0.70
P4	West Full Crossing	16	27.4	LOS C	0.0	0.0	0.74	0.74
All Pedestrians		25	26.3	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.

MOVEMENT SUMMARY

Site: PM Stage 2 Fully operational

Parorama Parade / Lock Street and Bungarribee Road
Signals - Fixed Time Isolated Cycle Time = 100 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lock Street											
1	L2	28	11.1	0.275	29.6	LOS C	5.0	36.1	0.74	0.70	40.6
2	T1	67	1.8	0.275	23.9	LOS B	5.0	36.1	0.74	0.70	41.7
3	R2	51	0.0	0.275	29.5	LOS C	5.0	36.1	0.74	0.70	40.9
Approach		146	3.0	0.275	26.9	LOS B	5.0	36.1	0.74	0.70	41.2
East: Bungarribee Road E											
4	L2	119	0.0	0.623	36.1	LOS C	16.2	114.8	0.90	0.80	38.5
5	T1	647	2.3	0.623	30.3	LOS C	16.2	114.8	0.89	0.78	39.7
6	R2	34	0.0	0.118	25.4	LOS B	1.0	6.9	0.79	0.70	41.4
Approach		800	1.8	0.623	31.0	LOS C	16.2	114.8	0.89	0.78	39.6
North: Parorama Parade											
7	L2	95	2.6	0.619	29.5	LOS C	16.2	113.8	0.83	0.79	40.7
8	T1	184	0.0	0.619	23.9	LOS B	16.2	113.8	0.83	0.79	41.6
9	R2	146	0.0	0.619	29.5	LOS C	16.2	113.8	0.83	0.79	40.8
Approach		425	0.6	0.619	27.1	LOS B	16.2	113.8	0.83	0.79	41.1
West: Bungarribee Road W											
10	L2	60	0.0	0.501	34.6	LOS C	12.5	88.1	0.86	0.75	39.4
11	T1	577	1.5	0.501	29.0	LOS C	12.6	89.0	0.86	0.74	40.4
12	R2	39	8.1	0.164	26.7	LOS B	1.2	8.6	0.83	0.72	40.6
Approach		676	1.7	0.501	29.4	LOS C	12.6	89.0	0.85	0.74	40.3
All Vehicles		2047	1.6	0.623	29.4	LOS C	16.2	114.8	0.86	0.76	40.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow 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	5	25.9	LOS C	0.0	0.0	0.72	0.72
P3	North Full Crossing	4	25.9	LOS C	0.0	0.0	0.72	0.72
P4	West Full Crossing	16	25.9	LOS C	0.0	0.0	0.72	0.72
All Pedestrians		25	25.9	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.

B6 Panorama Parade / Hospital Access

AM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

PM Peak Existing

Stage 1 Fully Operational

Stage 2 Opening Year

Stage 2 Fully Operational

MOVEMENT SUMMARY

Site: AM Existing

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	287	1.1	0.316	5.2	LOS A	2.1	14.5	0.24	0.55	53.0
3	R2	137	1.5	0.316	7.9	LOS A	2.1	14.5	0.24	0.55	52.6
3u	U	2	0.0	0.316	9.2	LOS A	2.1	14.5	0.24	0.55	53.0
Approach		426	1.2	0.316	6.1	LOS A	2.1	14.5	0.24	0.55	52.9
East: Hospital Access											
4	L2	43	2.4	0.087	5.9	LOS A	0.4	3.2	0.29	0.60	51.6
6	R2	55	0.0	0.087	8.1	LOS A	0.4	3.2	0.29	0.60	52.0
6u	U	1	0.0	0.087	9.5	LOS A	0.4	3.2	0.29	0.60	52.3
Approach		99	1.1	0.087	7.1	LOS A	0.4	3.2	0.29	0.60	51.8
North: Marcel Crescent											
7	L2	176	1.2	0.247	6.1	LOS A	1.4	10.1	0.36	0.57	52.3
8	T1	105	1.0	0.247	5.7	LOS A	1.4	10.1	0.36	0.57	53.0
9u	U	3	0.0	0.247	9.8	LOS A	1.4	10.1	0.36	0.57	53.1
Approach		284	1.1	0.247	6.0	LOS A	1.4	10.1	0.36	0.57	52.6
All Vehicles		809	1.2	0.316	6.2	LOS A	2.1	14.5	0.29	0.56	52.6

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

MOVEMENT SUMMARY

Site: AM Stage 1

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	287	1.1	0.324	5.3	LOS A	2.1	15.0	0.27	0.55	52.9
3	R2	137	1.5	0.324	8.0	LOS A	2.1	15.0	0.27	0.55	52.5
3u	U	2	0.0	0.324	9.3	LOS A	2.1	15.0	0.27	0.55	52.9
Approach		426	1.2	0.324	6.2	LOS A	2.1	15.0	0.27	0.55	52.8
East: Hospital Access											
4	L2	81	2.4	0.130	5.9	LOS A	0.7	4.9	0.30	0.60	51.7
6	R2	67	0.0	0.130	8.1	LOS A	0.7	4.9	0.30	0.60	52.1
6u	U	1	0.0	0.130	9.5	LOS A	0.7	4.9	0.30	0.60	52.5
Approach		149	1.3	0.130	6.9	LOS A	0.7	4.9	0.30	0.60	51.9
North: Marcel Crescent											
7	L2	128	1.2	0.208	6.1	LOS A	1.2	8.3	0.35	0.56	52.3
8	T1	105	1.0	0.208	5.7	LOS A	1.2	8.3	0.35	0.56	53.1
9u	U	3	0.0	0.208	9.7	LOS A	1.2	8.3	0.35	0.56	53.1
Approach		237	1.1	0.208	6.0	LOS A	1.2	8.3	0.35	0.56	52.7
All Vehicles		813	1.2	0.324	6.3	LOS A	2.1	15.0	0.30	0.56	52.6

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

MOVEMENT SUMMARY

Site: AM Stage 2

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	287	1.1	0.365	5.5	LOS A	2.5	17.6	0.34	0.57	52.7
3	R2	173	1.5	0.365	8.2	LOS A	2.5	17.6	0.34	0.57	52.2
3u	U	2	0.0	0.365	9.5	LOS A	2.5	17.6	0.34	0.57	52.7
Approach		462	1.3	0.365	6.5	LOS A	2.5	17.6	0.34	0.57	52.5
East: Hospital Access											
4	L2	89	2.4	0.158	5.9	LOS A	0.9	6.2	0.31	0.60	51.6
6	R2	94	0.0	0.158	8.1	LOS A	0.9	6.2	0.31	0.60	52.0
6u	U	1	0.0	0.158	9.5	LOS A	0.9	6.2	0.31	0.60	52.4
Approach		184	1.2	0.158	7.1	LOS A	0.9	6.2	0.31	0.60	51.8
North: Marcel Crescent											
7	L2	162	1.2	0.248	6.4	LOS A	1.5	10.3	0.41	0.59	52.1
8	T1	105	1.0	0.248	6.0	LOS A	1.5	10.3	0.41	0.59	52.9
9u	U	3	0.0	0.248	10.0	LOS A	1.5	10.3	0.41	0.59	52.9
Approach		271	1.1	0.248	6.3	LOS A	1.5	10.3	0.41	0.59	52.4
All Vehicles		917	1.2	0.365	6.6	LOS A	2.5	17.6	0.35	0.58	52.3

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

MOVEMENT SUMMARY

Site: AM Stage 2 Fully operational

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	287	1.1	0.381	5.5	LOS A	2.7	18.8	0.33	0.57	52.6
3	R2	201	1.5	0.381	8.1	LOS A	2.7	18.8	0.33	0.57	52.2
3u	U	2	0.0	0.381	9.5	LOS A	2.7	18.8	0.33	0.57	52.6
Approach		491	1.3	0.381	6.6	LOS A	2.7	18.8	0.33	0.57	52.4
East: Hospital Access											
4	L2	91	2.4	0.153	5.9	LOS A	0.9	6.0	0.31	0.60	51.6
6	R2	85	0.0	0.153	8.1	LOS A	0.9	6.0	0.31	0.60	52.0
6u	U	1	0.0	0.153	9.5	LOS A	0.9	6.0	0.31	0.60	52.4
Approach		177	1.2	0.153	7.0	LOS A	0.9	6.0	0.31	0.60	51.8
North: Marcel Crescent											
7	L2	189	1.2	0.281	6.6	LOS A	1.7	12.0	0.45	0.61	52.0
8	T1	105	1.0	0.281	6.2	LOS A	1.7	12.0	0.45	0.61	52.8
9u	U	3	0.0	0.281	10.2	LOS A	1.7	12.0	0.45	0.61	52.8
Approach		298	1.1	0.281	6.5	LOS A	1.7	12.0	0.45	0.61	52.3
All Vehicles		965	1.2	0.381	6.6	LOS A	2.7	18.8	0.36	0.59	52.3

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

MOVEMENT SUMMARY

Site: PM Existing

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	128	0.0	0.161	6.0	LOS A	0.9	6.2	0.40	0.59	52.7
3	R2	39	2.7	0.161	8.7	LOS A	0.9	6.2	0.40	0.59	52.1
3u	U	3	0.0	0.161	10.0	LOS A	0.9	6.2	0.40	0.59	52.6
Approach		171	0.6	0.161	6.6	LOS A	0.9	6.2	0.40	0.59	52.6
East: Hospital Access											
4	L2	109	1.0	0.264	6.5	LOS A	1.5	10.7	0.42	0.65	51.2
6	R2	177	0.0	0.264	8.7	LOS A	1.5	10.7	0.42	0.65	51.6
6u	U	1	0.0	0.264	10.1	LOS A	1.5	10.7	0.42	0.65	51.9
Approach		287	0.4	0.264	7.9	LOS A	1.5	10.7	0.42	0.65	51.4
North: Marcel Crescent											
7	L2	72	1.5	0.192	5.5	LOS A	1.1	8.0	0.18	0.51	52.8
8	T1	178	0.0	0.192	5.1	LOS A	1.1	8.0	0.18	0.51	53.6
9u	U	11	0.0	0.192	9.1	LOS A	1.1	8.0	0.18	0.51	53.6
Approach		260	0.4	0.192	5.4	LOS A	1.1	8.0	0.18	0.51	53.4
All Vehicles		718	0.4	0.264	6.7	LOS A	1.5	10.7	0.33	0.59	52.4

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

MOVEMENT SUMMARY

Site: PM Stage 1

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	128	0.0	0.152	6.2	LOS A	0.8	5.8	0.44	0.60	52.6
3	R2	23	2.7	0.152	8.9	LOS A	0.8	5.8	0.44	0.60	52.1
3u	U	3	0.0	0.152	10.2	LOS A	0.8	5.8	0.44	0.60	52.6
Approach		155	0.4	0.152	6.7	LOS A	0.8	5.8	0.44	0.60	52.6
East: Hospital Access											
4	L2	177	1.0	0.356	6.6	LOS A	2.2	15.7	0.45	0.65	51.2
6	R2	219	0.0	0.356	8.8	LOS A	2.2	15.7	0.45	0.65	51.6
6u	U	1	0.0	0.356	10.2	LOS A	2.2	15.7	0.45	0.65	52.0
Approach		397	0.4	0.356	7.8	LOS A	2.2	15.7	0.45	0.65	51.4
North: Marcel Crescent											
7	L2	72	1.5	0.183	5.4	LOS A	1.1	7.7	0.14	0.51	52.9
8	T1	178	0.0	0.183	5.0	LOS A	1.1	7.7	0.14	0.51	53.8
9u	U	11	0.0	0.183	9.0	LOS A	1.1	7.7	0.14	0.51	53.7
Approach		260	0.4	0.183	5.3	LOS A	1.1	7.7	0.14	0.51	53.5
All Vehicles		812	0.4	0.356	6.8	LOS A	2.2	15.7	0.35	0.60	52.3

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

MOVEMENT SUMMARY

Site: PM Stage 2

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	128	0.0	0.171	6.5	LOS A	1.0	6.8	0.49	0.63	52.4
3	R2	35	2.7	0.171	9.2	LOS A	1.0	6.8	0.49	0.63	51.8
3u	U	3	0.0	0.171	10.6	LOS A	1.0	6.8	0.49	0.63	52.3
Approach		166	0.6	0.171	7.2	LOS A	1.0	6.8	0.49	0.63	52.3
East: Hospital Access											
4	L2	237	1.0	0.448	6.7	LOS A	3.1	22.0	0.50	0.66	51.2
6	R2	268	0.0	0.448	9.0	LOS A	3.1	22.0	0.50	0.66	51.5
6u	U	1	0.0	0.448	10.4	LOS A	3.1	22.0	0.50	0.66	51.9
Approach		506	0.4	0.448	7.9	LOS A	3.1	22.0	0.50	0.66	51.3
North: Marcel Crescent											
7	L2	54	1.5	0.177	5.5	LOS A	1.1	7.5	0.18	0.51	52.8
8	T1	178	0.0	0.177	5.0	LOS A	1.1	7.5	0.18	0.51	53.7
9u	U	11	0.0	0.177	9.1	LOS A	1.1	7.5	0.18	0.51	53.6
Approach		242	0.3	0.177	5.3	LOS A	1.1	7.5	0.18	0.51	53.5
All Vehicles		915	0.4	0.448	7.1	LOS A	3.1	22.0	0.41	0.62	52.1

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

MOVEMENT SUMMARY

Site: PM Stage 2 Fully operational

Marcel Crescent, Panorama Parade and Hospital Access
Roundabout

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: Panorama Parade											
2	T1	128	0.0	0.176	6.7	LOS A	1.0	7.0	0.52	0.65	52.3
3	R2	35	2.7	0.176	9.4	LOS A	1.0	7.0	0.52	0.65	51.8
3u	U	3	0.0	0.176	10.7	LOS A	1.0	7.0	0.52	0.65	52.3
Approach		166	0.6	0.176	7.3	LOS A	1.0	7.0	0.52	0.65	52.2
East: Hospital Access											
4	L2	276	1.0	0.502	6.8	LOS A	3.7	26.3	0.53	0.66	51.1
6	R2	295	0.0	0.502	9.1	LOS A	3.7	26.3	0.53	0.66	51.5
6u	U	1	0.0	0.502	10.5	LOS A	3.7	26.3	0.53	0.66	51.8
Approach		572	0.5	0.502	8.0	LOS A	3.7	26.3	0.53	0.66	51.3
North: Marcel Crescent											
7	L2	56	1.5	0.179	5.5	LOS A	1.1	7.6	0.18	0.51	52.8
8	T1	178	0.0	0.179	5.0	LOS A	1.1	7.6	0.18	0.51	53.7
9u	U	11	0.0	0.179	9.1	LOS A	1.1	7.6	0.18	0.51	53.6
Approach		244	0.3	0.179	5.3	LOS A	1.1	7.6	0.18	0.51	53.5
All Vehicles		982	0.4	0.502	7.2	LOS A	3.7	26.3	0.44	0.62	52.0

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