Transport and Accessibility Impact Assessment

Wyong Hospital Redevelopment

State Significant Development No. 9536

Prepared for Health Infrastructure c/o Colliers International

11 February 2019

181457 TAAA

Structural
Civil
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Facade
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Revision Register

Rev	Date	Prepared by	Reviewed by	Approved by	Remarks
0	27/09/18	KA	MB	-	Draft for planner review
0.1	25/10/18	KA	MB	-	Revised draft for comment
0.2	08/11/18	KA	MB	-	Revised draft
1	23/11/18	KA	MB	PY	For issue
1.1	26/11/18	KA	MB	PY	Revised issue
1.2	06/12/18	KA	MB	PY	Revised issue
2	**11/02/19**	**MB**	**MB**	**PY**	**Revised issue for SSDA**

Document Control

Internal reference	181457 TAAA
File path	P:\2018\1814\181457\Reports\TTW\Traffic\1000 - Traffic Impact Assessment\190211 Traffic SSDA Report Rev 2.docx

Executive Summary

This transport and accessibility impact assessment has been prepared to examine the proposed development of a Clinical Services Building (CSB) at Wyong Hospital and its impact on the local transport network. As a State Significant Development in a primarily residential area, it is of critical importance to adequately understand the anticipated behaviour of the proposed development to avoid unnecessary impact on local residents. This report determines this impact and make recommendations to lessen this where appropriate, in addition to assessing the adequacy of the development with regard to relevant standards and legislation.

A review of the current site has been undertaken including traffic counts and modelling. The road network surrounding the site currently operates at a good Level of Service at the site entry and through the internal roundabout.

The proposed expansion provides additional car parking capacity to the site in the form of an undercroft car park with a capacity of 114 parking bays. The provision of undercroft parking brings the total parking capacity on-site to 1,220 spaces including provision of accessible parking spaces for the new development. Additional parking capacity exceeds the increase in demand over a 10-year timeframe. Provision of this additional parking on-site is expected to result in minimal overflow to on-street parking. With implementation of recommended sustainable travel initiatives, parking demands will be further reduced.

Traffic modelling for the future travel demand has been modelled for 10 years of background growth as required for this SSDA. Intersections are shown to maintain acceptable Levels of Service, with minor adjustments to the existing signal phasing arrangement proposed to maintain and improve the operation of the primary site entry. No physical upgrades or additional infrastructure are required nor proposed.

A Green Travel Plan (GTP) including a Workplace Travel Plan (WTP), and a Construction Traffic and Pedestrian Management Plan (CTPMP) are also prepared as part of this transport study. These Plans are intended to be dynamic documents. These documents will be further developed by the Local Health District (LHD) and the builder respectively in response to future conditions and operations.

Overall, the proposed development is considered to create acceptable levels of impact to the local transport network and should be deemed suitable for approval based on this assessment of traffic and parking conditions.

1 Introduction

1.1 Background

The proposal seeks consent for the construction of a new Clinical Services Building (CSB), and associated works, comprising:

- A 6-storey Clinical Services Building (1-storey undercroft parking, 1-storey podium, 4-storey tower), including:
    - Undercroft parking for 114 cars and plant (Level 1)
    - Podium Level
        - Level 2 comprising Emergency Department (ED), ED drop-off, ambulance parking, medical imaging, Psychiatric Emergency Centre (PECC), and a public link to the existing building (Block A);
    - Building Upper Levels
        - Level 3 comprising Intensive Care Unit (ICU), Paediatrics, and a clinical link to the existing building (Block A);
        - Level 4 comprising of Inpatient Units (IPU);
        - Level 5 comprising of shell Inpatient Unit and Acute Medical Unit;
        - Level 6 comprising plant
- Minor alterations and additions to existing Block A (to facilitate the proposed bridge link)
- Formalisation of east-west road connection to Louisiana Road; and
- Associated works including landscaping, earthworks, and servicing upgrades

The new CSB and associated works will expand the existing services at the Wyong Hospital Campus, providing a contemporary, flexible healthcare facility suited to the new model of care and future healthcare needs of the catchment population.

Taylor Thomson Whitting (TTW) has been engaged by Colliers International on behalf of Health Infrastructure (HI) to provide traffic advice and reporting on the proposed Hospital redevelopment. This transport and accessibility impact assessment has been developed in response to the Secretary's Environmental Assessment Requirements (SEARs) for the site, which have been detailed in Section 2 of this report.

1.2 Objectives

The key objective of this report is to identify the future impacts the Hospital development will have on the local transport network. In order to determine this impact, a thorough understanding of both the existing conditions and anticipated operational requirements are necessary. An impact assessment must consider the impacts for all transport users, including public transport, private vehicles, cyclists, and pedestrians.

This report also assesses the adequacy of the proposed development within the context of various standards and legislation, both those that apply directly to the site and those which may form part of a broader or regional context to all types of development.

1.3 Structure

Section 2 – Response to SEARs

Section 2 of this report presents the SEARs related to traffic for this development, and the relevant sections of this report in which each item has been addressed. Note also that each section of this report provides reference to the relevant SEARs addressed within that section.

Section 3 – Existing Conditions

Section 3 of this report examines the existing conditions at and around the site. The site's role within the context of the broader road and public transport network is explained, along

with an assessment of existing parking conditions along local streets. Traffic counts and modelling have been undertaken to determine the current operation of the road network.

Section 4 – Approved Works

Section 4 of this report discussed the approved works to date including additional parking capacity under SEPP pathway.

Section 5 – Proposed Works

Section 5 of this report details the proposed development and its impacts on the local area with regards to traffic and transport. Details of on-site transport infrastructure including car parking, pedestrian facilities, bicycle storage, and service and loading requirements are provided and assessed for their adequacy. Connection to the local public transport network is considered, in addition to discussion of site-specific requirements for improved connectivity.

Section 6 – Car Parking

Section 6 of this report details the car parking demand and provision of the proposed development and the future operations of the hospital. Discussion is also provided regarding on-street parking and campus parking controls.

Section 7 – Traffic Analysis

Section 7 of this report discusses the traffic analysis and modelling undertaken for the projected operation to demonstrate the capacity of the road network to cater for additional traffic.

Section 8 – Green Travel Plan

Section 8 of this report introduces the Green Travel Plan (including Workplace Travel Plan) that has been developed for the site in response to the relevant SEARs.

Section 9 – Construction Traffic

Section 9 of this report introduces the Construction Traffic and Pedestrian Management Plan that has been developed for the site in response to the relevant SEARs.

Section 10 – Conclusion

Section 10 presents the conclusions of this report, summarising the overall project impacts and key findings.

1.4 Consultation

This report has been prepared following consultation between the design team and relevant stakeholders, including:

- Pre-SSDA Traffic Meeting – 8th August 2018
  - Attendees included representatives from Central Coast Council and Roads and Maritime Services (RMS)
  - Transport for NSW (TfNSW) was invited to this meeting and were provided with records of subsequent correspondence for review and input
  - Minutes of this meeting are attached to this document in **Appendix A** and were distributed to attendees on 23rd August 2018
- Requests for Information (RFIs) from Council, RMS, and TfNSW – 14th August 2018
  - A list of RFIs was distributed with draft minutes on 14th August
  - The list was re-distributed with final minutes on 23rd August
  - No response was received from any agency in relation to these RFIs
- RMS traffic modelling requirements – actioned 21st September 2018
  - Traffic signal phasing diagram was requested from RMS with RFI list
  - Plans were requested by phone and email correspondence on 17th September 2018

  - Plans were provided by RMS on 21st September and have informed the traffic modelling undertaken for this report

Prior to publication of the final SEARS, we note that responses were provided to the Department of Planning and Environment to the draft SEARs (issued 16/08/2018) by the following relevant agencies with comments and actions listed as follows:

- Central Coast Council
  - We are not aware of a Council response to the draft SEARs.
- Roads and Maritime Services
  - Response provided 25/08/2018
  - All RMS comments (or equivalent) were incorporated into the final SEARs.
- Transport for NSW
  - Response provided 31/08/2018
  - No additions or changes were requested.

1.5 References

This report has been prepared in the context of and with knowledge of a variety of relevant documents, standards, and guidelines:

- Australian Standards, including but not limited to:
  - *AS2890 – Parking facilities*
  - *AS1428 – Design for access and mobility*
- *Guide to Traffic Management* (Austroads), including but not limited to:
  - Part 12: Traffic Impacts of Developments (2016)
- *Cycling Aspects of Austroads Guides* (Austroads, 2014)
- *Planning Guidelines for Walking and Cycling* (Department of Infrastructure, Planning and Natural Resources, 2004)
- *EIS Guideline: Roads and Related Facilities* (Department of Urban Affairs and Planning, 1996)
- State Environmental Planning Policies (NSW Government), including:
  - *SEPP (Infrastructure) 2007*
  - *SEPP (State and Regional Development) 2011*
- *Guide to Traffic Generating Developments* (Roads and Traffic Authority, 2002)
- *NSW Long Term Transport Master Plan* (Transport for NSW, 2012)

Additional documentation reviewed from relevant local jurisdictions and similar nearby developments includes:

- *Wyong Development Control Plan 2013* (Central Coast Council, 2013)
- *Wyong Local Environmental Plan* (NSW Government, 2013)
- *Central Coast Regional Transport Plan 2013 (Central Coast Council, 2013)*
- *Central Coast Local Health District Health Promotion Action* 2016-17 (Central Coast Local Health District, 2017)

Additional documentation reviewed from other consultants and input on previous project documentation includes:

- *Wyong Hospital – car parking supply and demand* (Arup, January 2018)
- *Wyong Hospital Enabling Works Traffic Report* (Arup, August 2017)
- *Wyong Hospital Schematic Design Report – Traffic and Parking* (Arup, March 2015)

2 Response to SEARs

Under application number SSD 18_9536 we have been provided with Secretary's Environmental Assessment Requirements (SEARs). These requirements were issued on the 6th September 2018 following consultation with local stakeholders and reissued on 25th September 2018. The key issues relevant to a Transport and Accessibility Impact Assessment include those shown in Table 2.1 and have been addressed in various sections of this report as referenced.

Note also that each section of this report provides reference back to the relevant SEARs addressed within that section.

Table 2.1: Response to SEARs

Key issues		Comments and references
1	**Statutory and Strategic Context**	
	Address the statutory provisions contained in all relevant environmental planning instruments, including: • Biodiversity Conservation Act 2016 • State Environmental Planning Policy (State & Regional Development) 2011; • State Environmental Planning Policy (Infrastructure) 2007; • State Environmental Planning Policy No. 64 – Advertising and Signage; • State Environmental Planning Policy No. 55 – Remediation of Land; • State Environmental Planning Policy No. 33 – Hazardous and Offensive Development • Draft State Environmental Planning Policy (Remediation of Land); • Draft State Environmental Planning Policy (Environment) • Wyong Local Environmental Plan 2013.	*This transport and accessibility impact assessment has been prepared in the context of the relevant planning policies as listed.*
2	**Policies**	
	Address the relevant planning provisions, goals, and strategic planning objectives in the following: • NSW State Priorities; • Central Coast Regional Plan 2036; • Future Transport Strategy 2056; • State Infrastructure Strategy 2018 – 2038 Building the Momentum; • Crime Prevention Through Environmental Design (CPTED) Principles; • Healthy Urban Development Checklist, NSW Health; • Better Placed: An integrated design policy for the built environment of New South Wales (GANSW, 2017); and • Greater Sydney Commission's Draft North District Plan.	*This transport and accessibility impact assessment has been prepared in the context of the relevant strategies and objectives as listed.*
5	**Transport and Accessibility (Construction and Operation)** Include a transport and accessibility impact assessment, which details, but not limited to the following:	
5.1	Accurate details of the current daily and peak hour vehicle, existing and future transport networks and pedestrian and cycle movements provided on the road network located adjacent to the proposed development;	*Section 3.3 – Traffic Volumes* *Section 3.4 – Active Transport* *Section 3.5 – Public Transport* *Section 3.8 – Traffic Conditions*

Key issues		Comments and references
5.2	Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian, and bicycle trips based on surveys within the local area;	*Section 3.3 – Traffic Volumes* *Section 5.3 – Active Transport* *Section 5.4 – Public Transport* *Section 7.1 – Trip Generation*
5.3	The adequacy of existing public transport or any future public transport infrastructure within the vicinity of the site, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development;	*Section 5.3 – Active Transport* *Section 5.4 – Public Transport*
5.4	Measures to integrate the development with the existing/future public transport network;	*Section 5.4 – Public Transport*
5.5	The distribution on the road network of the trips generated by the proposed development (predicted traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation);	*Section 7.3 – Trip Generation*
5.6	The impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for, and details of, upgrades or road improvement works, if required (traffic modelling is to be undertaken using SIDRA network modelling for current and future years);	*Section 7.4 – Future Traffic Conditions*
5.7	Consideration of the traffic impacts on existing and proposed intersections, in particular, the site signalised access intersection with the Pacific Highway, and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area;	*Section 7.4 – Future Traffic Conditions*
5.8	Review of the location of the internal roundabout to ensure no traffic queues onto the Pacific Highway due to internal constraints	*Section 7.6 – Internal Traffic Conditions*
5.9	Traffic analysis of any major / relevant intersections impacted, using SIDRA or similar traffic model, including: • Current traffic counts and 10-year traffic growth projections; • With and without development scenarios; • 95th percentile back of queue lengths; • Delays, degree of saturation, queue lengths and level of service on all legs for the relevant intersections shown in tabular form; and • Submission of files for Roads and Maritime review. Note, SCATS data is to be used to accurately model the intersection.	*Section 7.2 – Traffic Growth* *Section 7.4 – Future Traffic Conditions*
5.10	The identification of infrastructure required to ameliorate any impacts on traffic efficiency and road safety impacts associated with the proposed development, including details on improvements required to affected intersections (preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades)	*Section 7.5 – Proposed Adjustments*
5.11	Details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location-specific sustainable travel plan (preliminary Green Travel Plan and specific Workplace travel plan) and the provision of facilities to increase the non-car mode share for travel to and from the site	*Section 8 – Green Travel Plan* *See also separate documentation.*

Key issues		Comments and references
5.12	The proposed walking and cycling access arrangements and connections to public transport services	*Section 5.3 – Active Transport* *Section 5.4 – Public Transport*
5.13	The proposed access arrangements, including car and bus pick-up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian, and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones;	*Section 5.2 - Site Access*
5.14	Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance;	*Section 5.3 – Active Transport*
5.15	Proposed number of on-site car parking spaces for staff, patients and visitors and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site;	*Section 6 – Car Parking*
5.16	An assessment of the cumulative on-street parking impacts of cars, staff parking and any other parking demands associated with the development;	*Section 6.5 – On-Street Parking*
5.17	An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures and personal safety in line with CPTED;	*Section 5.7 – Road Safety*
5.18	Emergency vehicle access, service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times)	*Section 5.5 – Service and Loading* *Section 5.6 – Emergency Vehicles*
5.19	The preparation of a preliminary Construction Traffic and Pedestrian Management Plan to demonstrate the proposed management of the impact in relation to construction traffic addressing the following: • Assessment of cumulative impacts associated with other construction activities (if any); • An assessment of road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity; • Details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process; • Details of anticipated peak hour and daily construction vehicle movements to and from the site; • Details of on-site car parking and access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle; and • Details of temporary cycling and pedestrian access during construction.	*Section 9 – Construction Traffic* *See also separate documentation.*
5.20	Relevant Policies and Guidelines: • Guide to Traffic Generating Developments (Roads and Maritimes Services) • EIS Guidelines – Road and Related Facilities (DoPI) (where relevant) • Cycling Aspects of Austroads Guides • NSW Planning Guidelines for Walking and Cycling • Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development • Standards Australia AS2890.3 (Bicycle Parking Facilities)	*This transport and accessibility impact assessment has been prepared in the context of the relevant policies and guidelines as listed.*

3 Existing Conditions

3.1 Site Location

The subject site is located at 664 Pacific Highway, in Hamlyn Terrace. The parcel of land is designated as Lot 1 in DP 1147734. The extents of this lot are illustrated in Figure 3.1 below, in the context of the local major road network.

The land is currently occupied by the existing Wyong Hospital. Other land use in the surrounding area is generally free-standing or townhouse-style residential dwellings. Figure 3.1 also demonstrates other key developments in the nearby area including aged care, private hospital, and school facilities.

Figure 3.2 illustrates the various land uses in the surrounding area, as specified in the Wyong Local Environmental Plan 2014.

The site is located immediately adjacent to the NSW state road network. Pacific Highway acts as the main frontage to the site via the signalised intersection with Craigie Avenue. Louisiana Road is a local collector for the area, connecting both Wahroonga Road and Warnervale Road with Pacific Highway. Sparks Road is a state road that runs in the east-west direction and serves to connect M1 Pacific Motorway to Pacific Highway. Figure 3.3 illustrates the state and regional roads in the vicinity of the site.

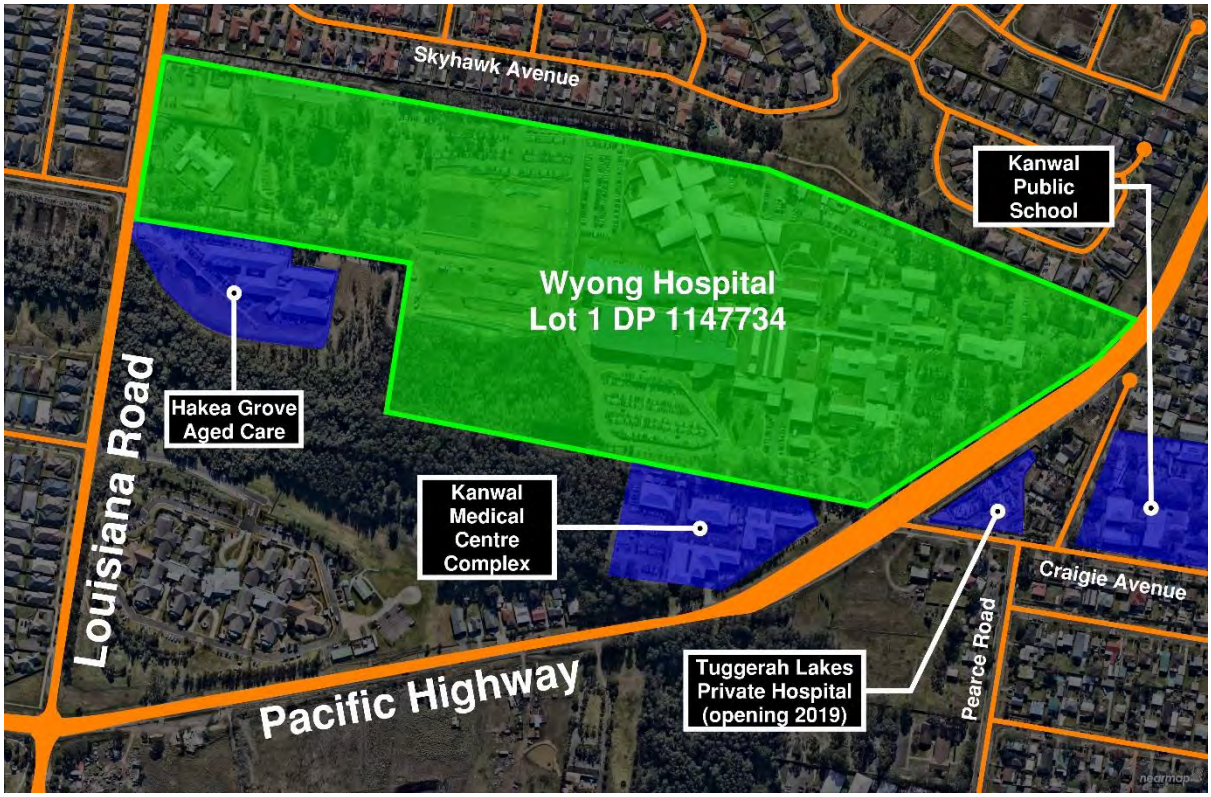


Figure 3.1: Site location
Image source: Nearmap (dated 15th July 2018)

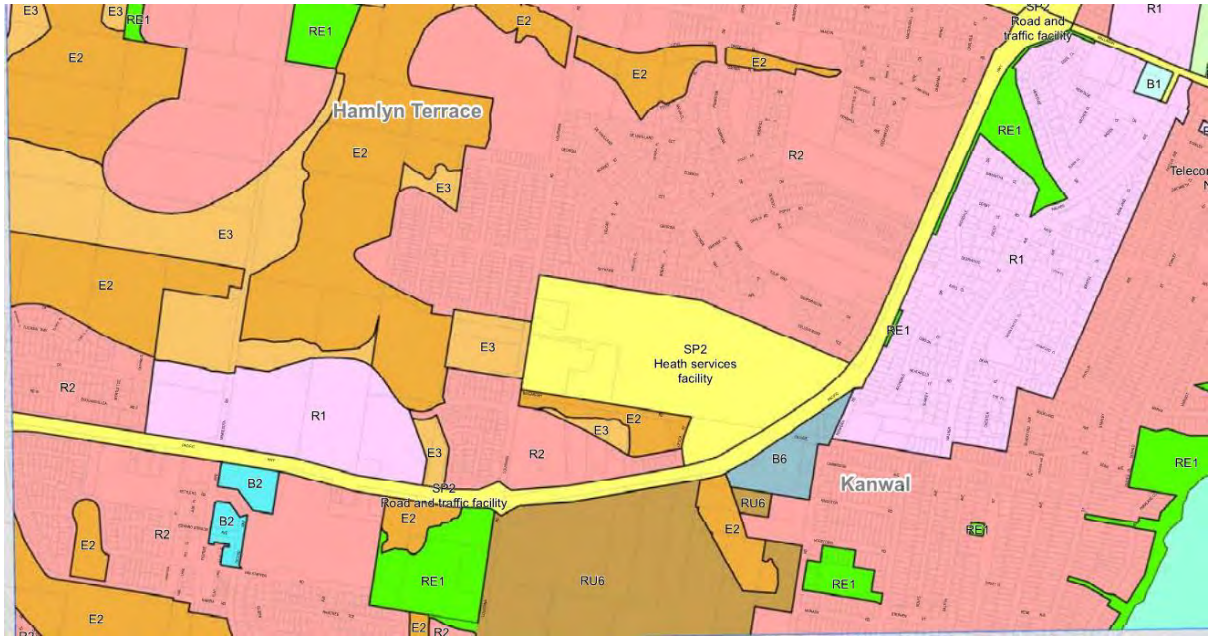


Figure 3.2: Site zoning
Image source: Wyong Local Environmental Plan 2013, Sheet LZN_013 (dated 08th December 2017)

Figure 3.3: State and regional roads
Image source: Nearmap (dated 15th July 2018)

3.2 Site Access

Vehicular access to the site is provided at the Craigie Avenue intersection with Pacific Highway. Other access points include an emergency-vehicles-only driveway located approximately 100 metres north of the main entry along Pacific Highway, and an unformed road access from Louisiana Road.

The Pacific Highway, adjacent to the site, provides 4 travel lanes and a cycling lane northbound and 3 travel lanes and a cycling lane southbound with a divided carriageway and overall width of 26 metres which reduces to 10.5 metres (a reduction of 15.5 metres) in the areas further from the site frontage where the road reduces to 2 traveling lanes northbound and 1 travel lane southbound with parking lanes on both directions of travel.

Figure 3.4 illustrates the access options available at the existing site.

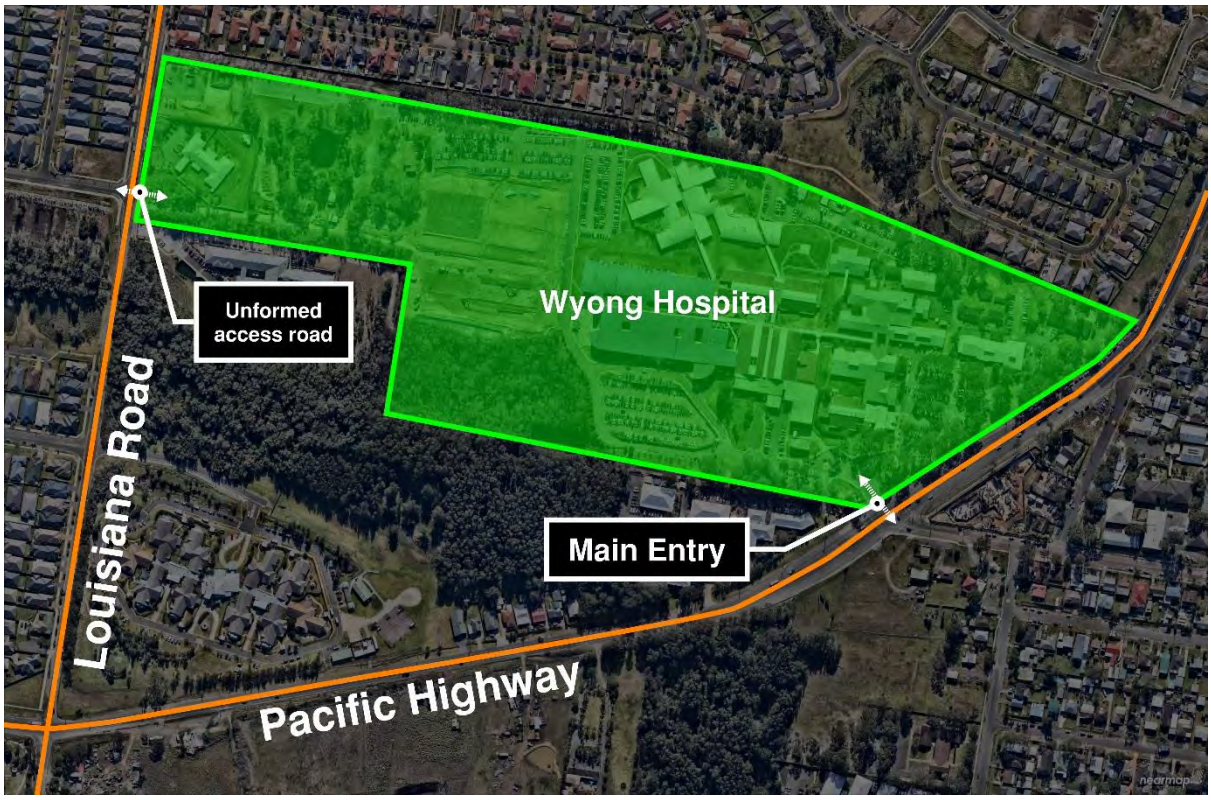


Figure 3.4: Existing site access
Image source: Nearmap (dated 18th July 2017)

3.3 Traffic Volumes

Secretary's Environmental Assessment Requirement 5.1: Accurate details of the current daily and peak hour vehicle, existing and future transport networks and pedestrian and cycle movements provided on the road network located adjacent to the proposed development;

To determine the existing traffic generation of the site, traffic movements into/out of the site were observed 6:00am – 9:00am and 3:00pm – 6:00pm on Tuesday 25th September 2018. These times were selected as they relate to the anticipated peak traffic generating periods of a future hospital development.

The results indicated that the existing use of the site generates 697 trips (545 in, 152 out) during the morning peak (7:30am – 8:30am) and 749 trips (248 in, 501 out) in the afternoon peak (3:00pm – 4:00pm).

Geographical distribution of traffic is approximately 60% to the northeast (Pacific Highway), 10% to the southeast (Craigie Avenue), and 30% to the southwest (Pacific Highway).

3.4 Active Transport

Secretary's Environmental Assessment Requirement 5.1: Accurate details of the current daily and peak hour vehicle, existing and future transport networks and pedestrian and cycle movements provided on the road network located adjacent to the proposed development;

The NSW Government Central Coast Regional Transport Plan provides a blueprint for the future and a strategic direction for the delivery of major transport projects over the next 20 years in the region. "Almost 90 percent of people in regional NSW live within easy walking or cycling distance of a local centre, with access to shops, schools, and workplaces."

One of the initiatives introduced in the Regional Transport Plan is the Walking Communities program, which promises to deliver state infrastructure investments and contribute to local government initiatives to help boost rates of walking. Figure 3.5 shows the local walking and cycling catchments near the Hospital.

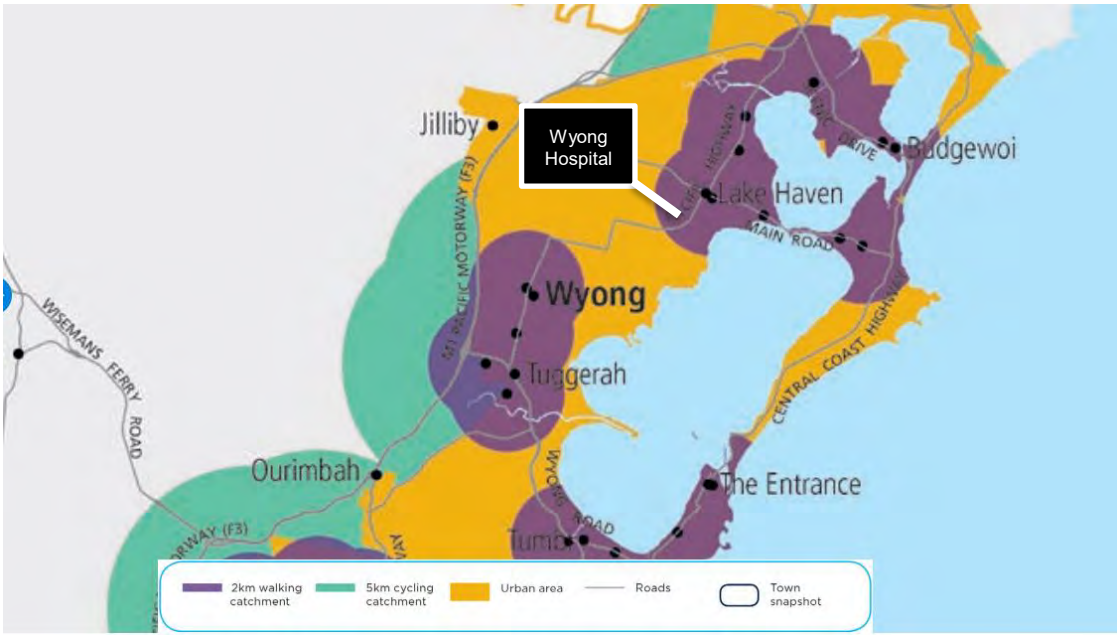


Figure 3.5: Central Coast walking and cycling catchments
Image source: Central Coast Regional Transport Plan (dated: December 2013)

3.4.1 Pedestrian Facilities

The local area is well-serviced by pedestrian facilities. Nearby roads generally provide concrete footpaths on both sides of the road, and many local residential streets also provide footpaths.

Signalised pedestrian crossings at the intersection of Pacific Highway with Craigie Avenue are provided.

The bus stops in Pacific Highway opposite the Hospital entry are provided with seats and accessible paths.

3.4.2 Cycling Facilities

There are some formalised cycling facilities within the vicinity of the site. RMS provides a Cycleway Finder map, which is publicly available on their website.

Pacific Highway, near the development site, provides a road shoulder along its length and a dedicated cycling lane near the Hospital. It is categorised as a “high difficulty on-road environment”. At the Hospital entrance, off Pacific Highway, a shared path is present which provides cyclists and vehicles alike access to the Hospital. Elsewhere, Sparks Road, which is 1.4km from the site, also provides a dedicated cycling lane.

Figure 3.6 provides an extract of the bike map surrounding the Hospital and local area.

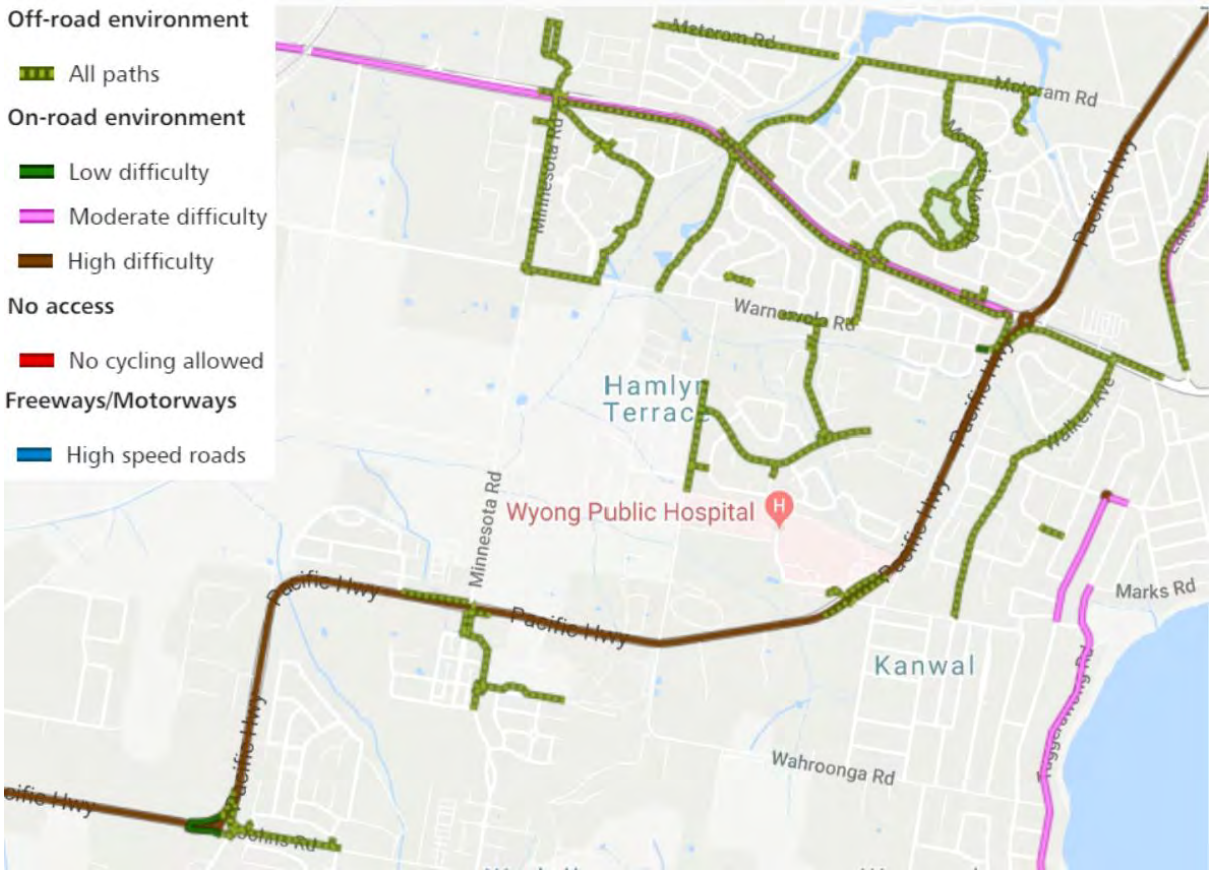


Figure 3.6: Local cycling facilities
Image source: RMS Cycleway Finder (accessed: 18th September 2018)

3.5 Public Transport

Secretary's Environmental Assessment Requirement 5.1: Accurate details of the current daily and peak hour vehicle, existing and future transport networks and pedestrian and cycle movements provided on the road network located adjacent to the proposed development;

Further to the availability of active transport infrastructure and services, it is necessary to gain an understanding of the existing public transport network within the vicinity of the site.

3.5.1 Public Bus Services

Public bus services operate along Pacific Highway and within the Hospital site. Bus services in the area are operated by Busways and Red Bus Services.

Bus routes 21 and 29 (servicing areas north of the site) and routes 19 and 26 (servicing areas south of the site) stop within the site at the existing main building entry. These services provide good connectivity from directly within the site.

Bus routes 80, 82, 93, and 94 service the region from northbound and southbound bus stops along the Pacific Highway. These stops are each located within less than 100 metres of the main site entry intersection. Pedestrian footpaths are provided within the existing Hospital site through to the main intersection, and full signalised pedestrian crossings are provided across all legs.

Figure 3.7 shows these routes in the context of the local area and other transport routes in the region. The average frequency of local bus services is shown in Table 3.1 below.

Figure 3.7: Local public transport

Image source: Busways Wyong Network Map 2010 (accessed: 18th September 2018)

Table 3.1: Public bus trip frequency during peak periods
Data source: Transport for NSW

Route	Destinations	Approx. Frequency
21	The Entrance North to Gosford via Bateau Bay East	3 times daily on weekdays
26	The Entrance to Wyong	6 times daily
29	Bay Village to Wyong Hospital via Lake Haven	Every 60 minutes
80	Lake Haven to Tuggerah via Lake Haven Drive & Pacific Highway	Every 30 minutes
82	Lake Haven to Tuggerah via Wyongah, Tuggerawong & Tacoma	Every 30 minutes
93	Noraville to Tuggerah via Wyong & Toukley	Every 60 minutes
94	Budgewoi to Tuggerah via San Remo & Wyong	Every 30 minutes

3.5.2 Other Public Transport

The nearest train stations to the site are Warnervale Station (3.0 km) and Wyong Station (5.7km). Bus services are available connecting to Wyong Station. Walking distances are approximately 49 minutes and 1 hour 30 minutes respectively.

A community bus service can be booked to transport a person from home to the Hospital.

There are no known plans published for additional transport infrastructure in the area. Consultation to date with Council, RMS, and TfNSW has not identified any changes to public transport infrastructure in the immediate term.

3.6 Existing Travel Patterns

3.6.1 Site Survey

A travel survey was undertaken by Arup as part of a 2015 Traffic and Parking Study which determined the following travel characteristics for the site. These statistics are considered to be approximately reflective of the current travel habits of site users.

Table 3.2: Current travel characteristics
Source: Arup (2015). Some data points may be incomplete.

Travel Mode	Staff	Outpatients	Inpatients
Private vehicle	96.7%	87%	92%
Public transport	0.8%	8%	5%
Walking	1%	-	-
Cycling	1%	-	-

A staff survey conducted in 2013 also indicated that 36% of staff would consider carpooling. A number of carpooling schemes are currently in place as detailed in the Green Travel Plan (see Section 8).

3.6.2 Journey to Work

The 2011 Journey to Work (JTW) data[1] provides an estimate of employee travel modes into and out of the local areas defined by Travel Zones (TZ). The site is located within TZ 5192 'Wyong Hospital' (refer to Figure 3.8). Wyong Hospital and the adjacent medical centres and clinics are the only major employment centres within the TZ and are therefore a good representation of Hospital staff activity.

Figure 3.8: Travel Zone 5192 extents

An assessment of travel mode share (from JTW data Table 15: 'Destination Travel Zone by Mode235') is shown in Table 3.3 below[2]. 'Mode15' categorisation of travel modes (as listed in the left column) is used for a clearer and simpler assessment of key travel modes through allocation a primary mode when multiple modes have been used in one trip.

A summary of key mode categories is also provided in Table 3.4.

The JTW data is generally consistent with the later Arup surveys and identifies that the overwhelming majority of Hospital staff travel to the site via car, and as the only occupant (i.e. limited car-pooling or drop-off).

[1] Bureau of Transport Statistics public dataset derived from 2011 Census of Population and Housing
[2] Mode share table excludes responses for "worked at home", "did not go to work", and "mode not stated", and excludes categories with zero responses.

Table 3.3: Journey To Work data
Source: JTW Table 15: DTZ by Mode 235

Travel mode (JTW Mode15)	Mode share (%)
Train	0.6%
Bus	0.9%
Ferry	0.3%
Taxi	0.7%
Car as driver	91.1%
Car as passenger	3.3%
Truck	0.3%
Motorbike	0.6%
Bicycle	0.5%
Other mode	0.3%
Walked only	1.5%
Total	**100%**

Table 3.4: Journey To Work summary

Mode summary[3]	Mode share (%)
Private vehicle (car, taxi, truck, motorbike)	96.3%
Public transport (train, bus, ferry)	1.7%
Active transport (bicycle, walking)	2.0%
Total	**100%**

[3] Mode summary table excludes “other mode” as unidentified data.

3.7 Car Parking

The 2018 Arup study determined that as at October 2017 there were 838 formal car spaces associated with the hospital campus, including 38 accessible parking spaces.

Following implementation of new parking areas under a previously approved REF, on-site capacity is to be increased to 1,110 spaces. The distribution of existing parking areas and capacities is demonstrated in **Appendix B**.

Additionally, it was observed that due to the shortfall in on-site parking supply, staff and patients make use of approximately 150 temporary/informal parking bays on the campus used by vehicles either parking in the gravel area to the west of the Hospital or along roadways. These have not been included in the overall car parking capacity calculations.

3.8 Traffic Conditions

> *Secretary's Environmental Assessment Requirement 5.1: Accurate details of the current daily and peak hour vehicle, existing and future transport networks and pedestrian and cycle movements provided on the road network located adjacent to the proposed development.*

Intersection movement counts, and mid-block tube counts were undertaken at various locations to record background traffic volumes. Analysis and modelling has been undertaken with these results to determine the level of operation of the existing road network. The scope of the traffic data collection and traffic modelling has been determined through a review of the proposed works and anticipated area of impact and includes input from RMS as received during the consultation period.

3.8.1 Traffic Volume Summaries

For seven days between Tuesday 25th September and Monday 1st October 2018, a 24-hour mid-block tube count was installed to collect traffic volume data along the internal Hospital road between internal roundabout and main carpark. Recorded data is attached in **Appendix C** of this report.

The recorded traffic counts demonstrated that, traffic flows were consistent from day to day. Weekday daily traffic flows through the week varied by no more than 4% from the weekday average on the internal hospital road. Figure 3.9 demonstrates the behaviour of traffic flows across each weekday at the internal road, with minimal daily variation from the average.

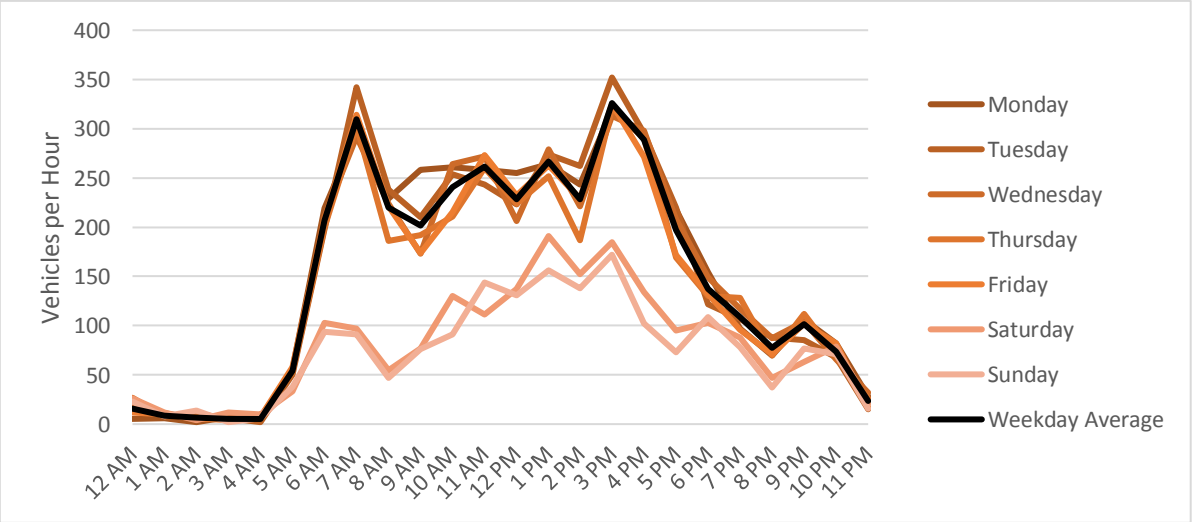


Figure 3.9: Seven-day traffic volumes within the Hospital
Data source: Traffic counts undertaken Tuesday 25th September – Monday 1st October 2018

3.8.2 Intersection Modelling

Intersection traffic counts, recording vehicle volumes, turning manoeuvres, were undertaken as part of this study on Tuesday 25th September 2018 from 6am to 9am and 3pm to 6pm. Recorded data is attached in **Appendix C** of this report.

SIDRA intersection modelling has been completed for the selected intersections under existing conditions and is attached in **Appendix D** of this report. All existing intersections operate at a satisfactory Level of Service, with a detailed comparison provided in Section 7 with regards to pre- and post-development conditions.

Given that traffic flow is consistent on a daily basis (as discussed above), it is expected that these modelling results are a good representation of background traffic behaviour.

Table 3.5: Summary of existing conditions intersection modelling
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection	Existing Operation		
	DOS	Delay (sec)	LOS
Pacific Highway / Wyong Hospital (AM)	0.868	37.8	**C**
Pacific Highway / Wyong Hospital (PM)	0.843	32.2	**C**
Hospital Internal Roundabout (AM)	0.048	4.0	**A**
Hospital Internal Roundabout (PM)	0.278	2.9	**A**

4 Existing Parking

Existing car parking areas are located to the north of the proposed CSB as shown in Figure 4.1:

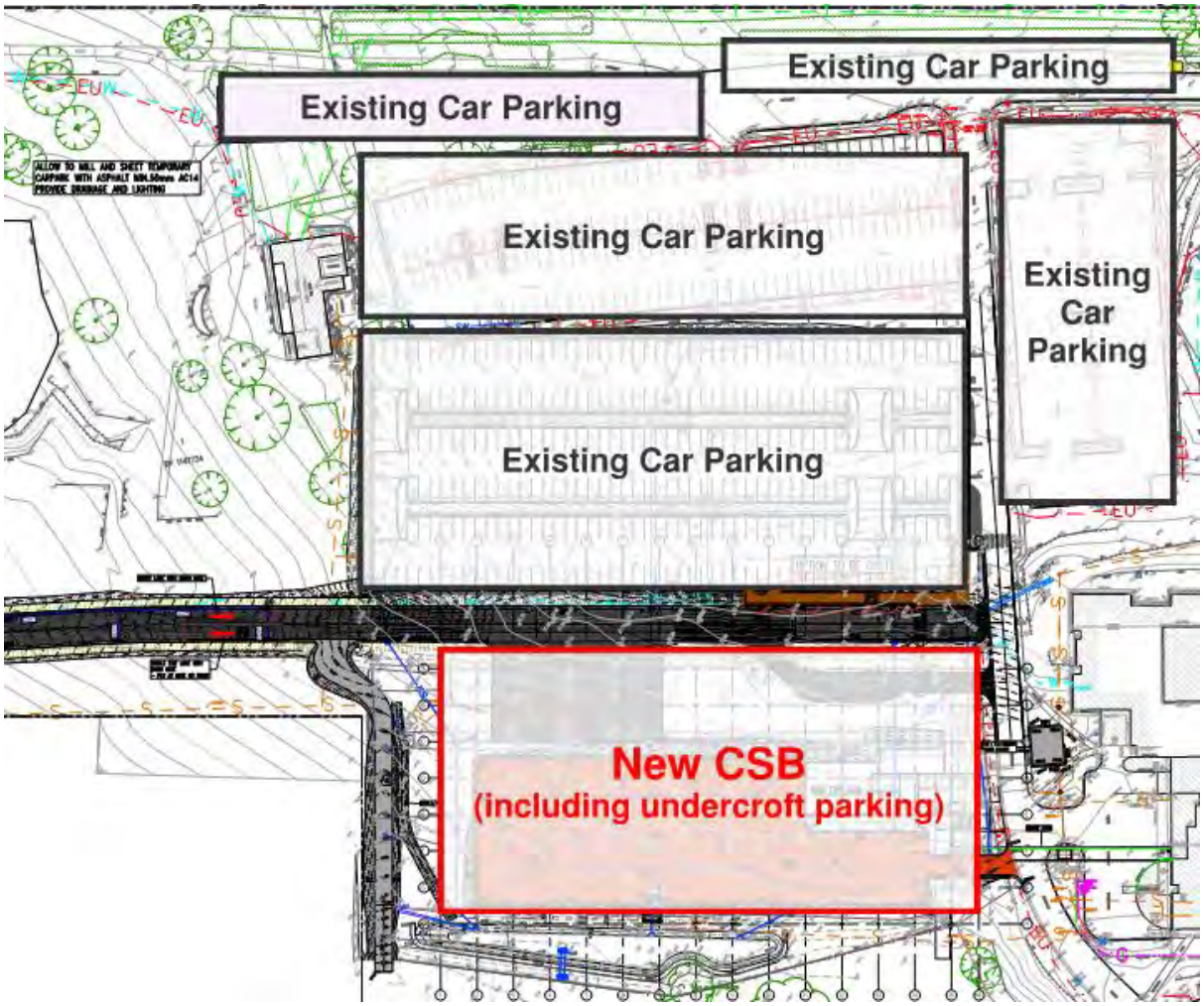


Figure 4.1: Existing and proposed works

5 Proposed Works

5.1 New Development

The proposal seeks consent for the construction of a new Clinical Services Building (CSB), and associated works, comprising:

- A 6-storey Clinical Services Building (1-storey undercroft parking, 1-storey podium, 4-storey tower), including:
  - Undercroft parking for 114 cars and plant (Level 1)
  - Podium Level
    - Level 2 comprising Emergency Department (ED), ED drop-off, ambulance parking, medical imaging, Psychiatric Emergency Centre (PECC), and a public link to the existing building (Block A);
  - Building Upper Levels
    - Level 3 comprising Intensive Care Unit (ICU), Paediatrics, and a clinical link to the existing building (Block A);
    - Level 4 comprising of Inpatient Units (IPU);
    - Level 5 comprising of shell Inpatient Unit and Acute Medical Unit;
    - Level 6 comprising plant
- Minor alterations and additions to existing Block A (to facilitate the proposed bridge link)
- Formalisation of east-west road connection to Louisiana Road; and
- Associated works including landscaping, earthworks, and servicing upgrades

The new CSB and associated works will expand the existing services at the Wyong Hospital Campus, providing a contemporary, flexible healthcare facility suited to the new model of care and future healthcare needs of the catchment population.

The overall building layout is shown in Figure 5.1 below.

The proposal also includes a portion of shell space on Level 5. Staff and bed numbers used to assess traffic and parking conditions have considered full use of this area.

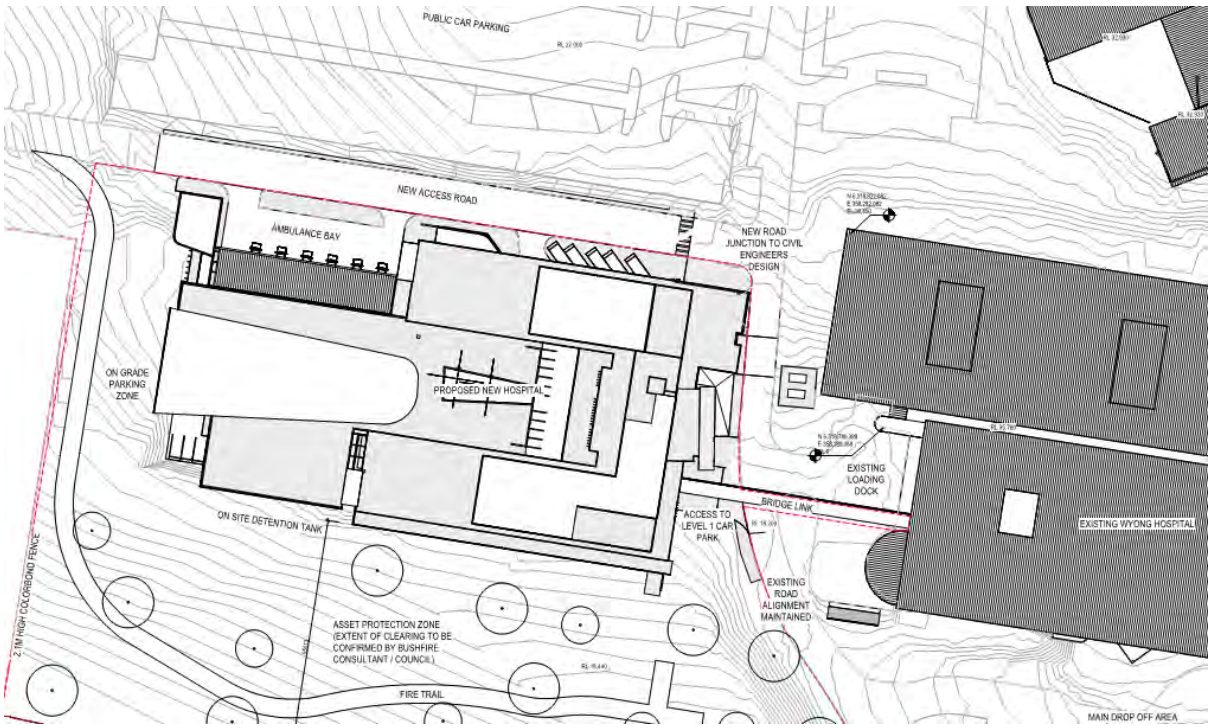


Figure 5.1: Proposed site layout
Source: 55372-HDR-AR-DWG-SSD1003 [B], HDR

5.2 Site Access

Secretary's Environmental Assessment Requirement 5.13: The proposed access arrangements, including car and bus pick-up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian, and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones.

All public access to the new building will be as per the existing conditions, through the Pacific Highway signalised intersection.

Vehicular access to the undercroft car parking is via a driveway at the south-east of the building from the existing internal road.

A short-term drop-off area is provided at the new building entry.

Internal site movements beneath the new link bridge will be retained for cars and trucks, with a clear height provision of at least 4.5 metres.

The formalisation of the east-west road connection to Louisiana Road provides clear site access for emergency vehicles. Access for emergency vehicles is further described in Section 5.6.

5.3 Active Transport

Secretary's Environmental Assessment Requirement 5.2: Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian, and bicycle trips based on surveys within the local area;

Secretary's Environmental Assessment Requirement 5.3: The adequacy of existing public transport or any future public transport infrastructure within the vicinity of the site, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development.

Secretary's Environmental Assessment Requirement 5.12: The proposed walking and cycling access arrangements and connections to public transport services.

Secretary's Environmental Assessment Requirement 5.14: Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance.

5.3.1 Pedestrian Movements

All existing infrastructure is to be retained (or reconstructed where necessary along the site frontage) and is considered to be adequate for the future operation. Existing pedestrian footpaths provide good amenity for users as discussed previously in Section 3.4.1.

5.3.2 Cycling Facilities

The Wyong DCP Chapter *2.11 Parking Controls* provides requirements for bicycle parking. The DCP specifies that "For any other type of development (excluding residential) bicycle parking facilities shall be provided at a rate of one bicycle space per ten car spaces." Given the proposed net parking increase of 99 spaces, 10 bicycle storage spaces would be required under the controls of the DCP.

Bicycle storage with space for 12 bicycles is proposed, which is sufficient for the development noting the existing minimal usage of bicycles by staff.

Within the new building, each department provides staff shower and locker facilities, which will provide end-of-trip activities. A plan of shower and locker locations (for Level 2; facilities also provided on other levels) is shown in Figure 5.2 below.

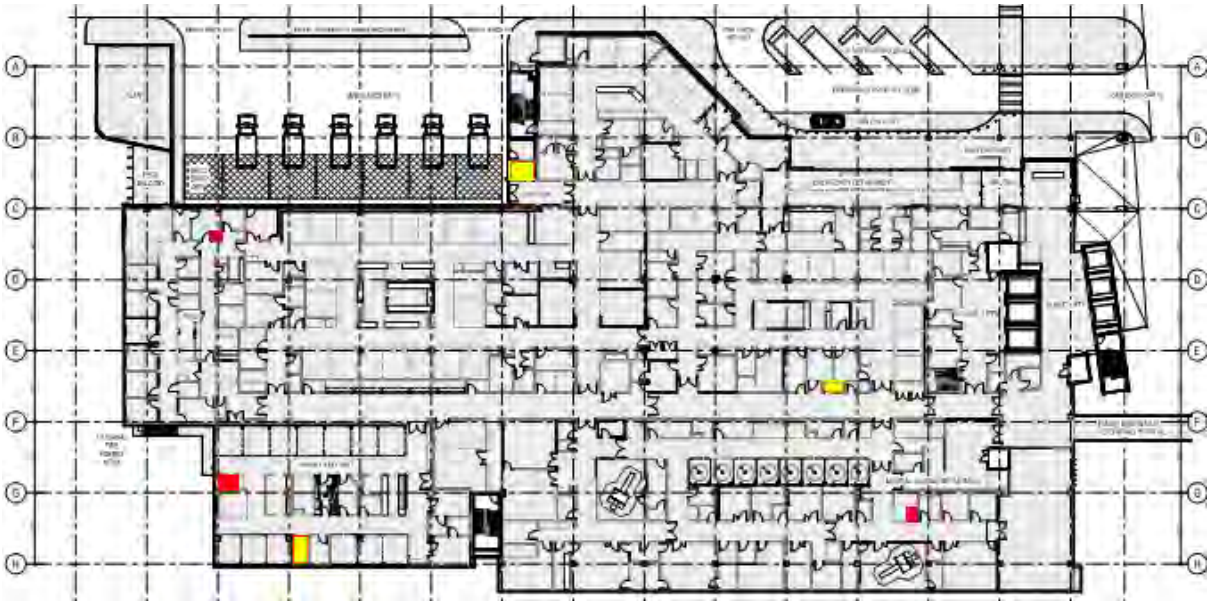


Figure 5.2: Shower and locker locations (Level 2 extract)
Source: HDR markup

5.4 Public Transport

Secretary's Environmental Assessment Requirement 5.2: Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian, and bicycle trips based on surveys within the local area.

Secretary's Environmental Assessment Requirement 5.3: The adequacy of existing public transport or any future public transport infrastructure within the vicinity of the site, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development.

Secretary's Environmental Assessment Requirement 5.4: Measures to integrate the development with the existing/future public transport network.

Secretary's Environmental Assessment Requirement 5.12: The proposed walking and cycling access arrangements and connections to public transport services.

Hospitals experience limited demand for public transport services due to the nature of their requirements and operation (noting upwards of 97% vehicle mode split for staff and 95% for visitors). This is expected to remain generally consistent for users of the CSB.

Notwithstanding the above, sustainable travel initiatives are proposed in Section 6 which are intended to improve the usage of active and public transport modes.

It is not proposed to modify any existing public transport infrastructure or services. The new building will be able to utilise the same pedestrian connections to existing public transport services as for the rest of the hospital campus. The existing campus provides excellent connectivity to a number of internal bus services, and a short walk to additional bus services along the Pacific Highway. Bus services provide good connections to regional areas both north and south of the site.

There are no known plans published for additional transport infrastructure in the area that would impact or interface with the Hospital or the new CSB. Consultation to date with Council,

RMS, and TfNSW has not identified any changes to public transport infrastructure in the immediate term. If additional infrastructure or services are introduced in the future, it is anticipated that the relevant agencies or service providers would consult with the Hospital as a major trip generator in the area. The Hospital and the LHD would engage in consultation and strategies as required to encourage usage of any potential future public transport.

5.5 Service and Loading

Secretary's Environmental Assessment Requirement 5.18: Emergency vehicle access, service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).

Deliveries related to the new CSB will be received within the existing loading dock, which has sufficient capacity for additional deliveries. From here, deliveries will be taken via lift to Level 3 where the new CSB can be accessed via the staff link bridge (i.e. no public access).

5.6 Emergency Vehicles

Secretary's Environmental Assessment Requirement 5.18: Emergency vehicle access, service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).

5.6.1 Access Points

Ambulance access to the new ambulance bay and emergency department will be along the northern building frontage adjacent to a new road connection to Louisiana Road. The existing temporary construction driveway from Louisiana Road is to be formalised to provide this secondary vehicle access. Access from the external network for emergency vehicles will be possible via either of the two access points.

The Louisiana Road access point will be signposted with "Emergency Department Access" signage or similar. Due to the good operation of the main Pacific Highway intersection and the majority of local areas serviced by this main road, it is expected that there would be minimal public vehicle movements in the vicinity of the Louisiana Road access. This provides a good location for unimpeded emergency vehicle access.

General movements of emergency vehicles (under non-emergency scenarios) will utilise the Louisiana Road and Pacific Highway intersections under all existing legal controls, including a left-in left-out restriction at Louisiana Road. When required in emergency scenarios, emergency vehicles will manoeuvre under lights and siren control as required.

5.7 Road Safety

Secretary's Environmental Assessment Requirement 5.17: An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures and personal safety in line with CPTED.

To maximise the safety of patients and visitors around the Hospital, pedestrian interaction with vehicles should be minimised. Where interaction cannot be avoided, measures should be put in place to ensure an acceptable operation and a low level of risk.

5.7.1 Ambulance Movements

While the primary access point to the hospital is to be provided by the Pacific Highway / Craigie Avenue intersection, a secondary vehicle access point is proposed to the hospital from Louisiana Road. It is critical for ambulances to move onto the site quickly and often at high

speeds. Separation of these movements (or a portion of these movements) to an alternative access point will assist in improving user safety within the hospital campus.

Where high-speed ambulance movements are required to operate through the main entry, existing safety protocols will be maintained and followed as per the existing conditions.

5.7.2 Drop-Off and Pick-Up Facilities

The new building includes a dedicated drop-off and pick-up bay which provides for a steady flow of traffic in a forward direction. Relative to other configurations of drop-off and pick-up facilities such as a typical angled parking layout, this provides for increased safety of pedestrians (including patients and visitors) at the building entry.

6 Car Parking

Secretary's Environmental Assessment Requirement 5.15: Proposed number of on-site car parking spaces for staff, patients and visitors and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site.

Secretary's Environmental Assessment Requirement 5.16: An assessment of the cumulative on-street parking impacts of cars, staff parking and any other parking demands associated with the development.

6.1 Local Guidelines

The Wyong DCP Chapter 2.11 *Parking and Access* provides parking rates for various categories of development. The parking controls relevant to the proposed development are as follows:

- Hospital
  - 1 space per two beds PLUS
  - 1 space per two employees PLUS
  - Adequate spaces to be provided for staff
- *Service Requirements (including Ambulance):*
  - 1 space per 2,000m^2 GFA with a minimum of 1 space

It is expected that approximately 1,643 employees and 432 beds will operate at the hospital upon project completion, expanding to 2,010 employees and 480 beds in the year 2026/27. To align with Council's parking controls the minimum provision would therefore be 1,038 spaces on completion, and 1,245 spaces in 2026/27.

Whilst acknowledging the DCP controls, a site-specific assessment is generally considered to be more accurate than a standard rate, particularly for hospital developments.

6.2 Forecast Demand

A previous Business Case and parking studies for the redevelopment project have found that future operational demand is approximately 1,262 spaces, based on a detailed assessment of staff and patient forecasts. An extract of the car parking demand assessment is provided in Table 6.1 below, which was calibrated for the Year 2017/18 against recorded conditions on-site.

Table 6.1: Staff, patient, and visitor activity - car parking demand
Source: Wyong Hospital – car parking supply and demand (Arup, January 2018)

	Year 2017/18	Project Completion Year 2020/21	Fully Operational Year 2026/27
1. Daily Staff Attendance (75% of FTEs)			
Nurses	599	650	801
Clerical/Misc	340	362	440
Ancillary Medicine/Community	28	30	38
Hotel/Allied	122	132	163
Medical	144	157	194
Medical - Sessional	142	169	222
University	131	143	152
TOTAL Daily Attendance	**1506**	**1643**	**2010**
2. Current Staff Profile			
All day / non shift	40%	40%	40%
Morning shift	24%	24%	24%
Evening shift	24%	24%	24%
Night shift	12%	12%	12%
3. Staff Vehicle Trip Characteristics			
Mode Split			
700-1100 (Day)	97%	97%	97%
1130-630 (Night)	100%	97%	100%
Car Occupancy			
700-1100 (Day)	1.12	1.12	1.12
1130-630 (Night)	1.03	1.03	1.03
4. Visitor/Patient Attendance			
Patients	**people/p.a.**	**people/p.a.**	**people/p.a.**
Outpatients	127,446	131,698	140,633
Inpatients	18,111	23,940	21,767
Emergency	60,789	75,754	98,651
Renal Dialysis	4,816	4,816	4,816
Beds	353	432	480
Assumed occupancy rate	91%	91%	91%
5. Visitor/Patient Vehicle Trip Characteristics*			
Mode Split (%)	95%	95%	95%
Vehicle Occupancy – Patients	1.0	1.0	1.0
Vehicle Occupancy - Visitors	1.5	1.5	1.5
Visitor Car Bed Trips / Day	2.5	2.5	2.5
6. Peak Parking Demand			
Staff Parking	597	666	829
Patient & Visitor Parking	238	263	288
University	75	75	75
Pool Vehicles	54	70	70
Total Parking Demand	***964***	**1074**	**1262**

6.3 Proposed Provision

The existing site provides 1,110 formal parking spaces.

The proposed development will provide an additional 114 parking bays in the form of an undercroft car park within the new building. Additional works are proposed to implement 6 accessible parking spaces in existing areas of the site, resulting in the loss of 4 spaces to shared areas. Combined new parking under this SSDA will therefore total 110 parking bays.

The distribution of proposed parking areas and capacities across the site is demonstrated in **Appendix B**.

For this SSD, this represents an increase of 382 parking spaces since the previous supply and demand study (in conjunction with other previously approved additions to capacity). The forecast increase in parking demand over the same period is 298 spaces. Therefore, the proposed development results in 84 additional spaces over the anticipated change in demand, as demonstrated in Table 6.2.

Table 6.2: Summary of Project Car Parking

	Previous Conditions	Fully Operational (2026/27)	Change
Demand	964	1,262	+ 298
Formal Capacity	838	1,220	+ 382
		Change:	**+ 84**

The proposed development parking provision is sufficient to cater for the additional staff and beds proposed, with significant surplus capacity.

For the overall campus, the project provides a total formal parking capacity of 1,220 spaces. Over a 10-year timeframe for the fully operational building, this will therefore be a shortfall of 42 spaces, as detailed in Table 6.3.

Table 6.3: Summary of Campus Car Parking

	Previous Conditions	Existing Conditions	Project Completion (2020/21)	Fully Operational (2026/27)
Demand	964	964	1,074	1,262
Formal Capacity	838	1,110	1,220	1,220
Surplus / Deficit	**- 126**	**+ 146**	**+ 146**	**- 42**

The remaining future (2026/27) campus shortfall is expected to be met through a combination of on-street parking, informal parking, and changes in travel habits over time. It is noted that informal parking is an existing behaviour observed on-site including on grass/informal areas to the northern and eastern perimeters of the site (as discussed in Section 3.7) and is not an introduced impact from the proposed development. This informal demand within the site was shown to be approximately 150 informal spaces as demonstrated in the Arup parking studies.

Furthermore, this full demand will occur over time as the building becomes fully operational (noting an excess of over 140 spaces upon project completion), with opportunities in the interim to reduce parking demands through methods such as sustainable travel initiatives (see Section 5). The provision for boom gates and paid parking has also been shown to be an influencing factor in the reduction of parking demand at similar sites. It is recommended that the CCLHD liaise with Council to monitor on-street parking under future use.

It is noted that the Arup parking study calculates a parking contribution of 829 staff spaces from the overall demand of 1,262 spaces, with a 97% vehicle mode split for staff. Therefore, for every 1% mode shift that can be achieved, staff parking demands shall be reduced by 8-9 spaces. Closure of the anticipated parking deficit would require a 5% change in staff travel behaviour, which is considered realistic and achievable within the 10-year operational timeframe (including changes to travel mode and car-pooling activity).

In summary, the proposed parking capacity is considered acceptable for the site-specific demands and long-term operations of the Hospital.

6.4 Accessible Parking

The existing campus has 38 accessible spaces from a total provision of 838 formal parking spaces, representing a rate of 4.5%. This is slightly higher than typically observed in hospital sites (around 3-4%) and significantly higher than the BCA requirements of 1-2%.

It is proposed that 6 new accessible spaces are to be provided in the existing eastern car park. The future accessible parking rate shall therefore be 44 accessible spaces from a total provision of 1,220 spaces, or a rate of 3.6%. This remains typical of most hospital sites and significantly above BCA requirements.

All new accessible parking spaces will be provided in accordance with the design requirements of AS2890.6.

6.5 On-Street Parking

The development will result in no changes to the capacity of on-street parking. The significant additional parking capacity within the site will result in reductions of any existing excess demands for on-street parking.

With the future introduction of campus parking controls, some parking demand may move from within the site to local streets. Further discussion is provided in Section 6.6. It is recommended that the CCLHD liaise with Council to monitor on-street parking under future use.

6.6 Campus Parking Controls

To monitor and control parking demand and turnover across the hospital campus, it is proposed to implement a boom gate control system at the site entry points. A paid parking system will encourage a higher turnover of visitor parking throughout the day, ensuring that parking is more available for users when required.

With the introduction of campus parking controls, it is anticipated that some parking demand may move from within the site to local streets. As the parking scheme is expected to be reasonably priced (see policy details below) in order to maintain parking turnover and not generate any notable revenue streams, it is considered that this activity would be minimal.

Furthermore, any shift from hospital parking to street parking will be offset by the more significant ability for the site to cater for parking demand with the increased capacity. Current on-street parking usage is estimated at around 77 spaces (based on 8% response rate for staff, patients, and visitors). The significant increase in on-site parking from a previous deficit of 126 spaces to a future deficit of 42 spaces (and an interim surplus as high as 157 spaces) is expected to improve the on-street parking conditions both before and after the introduction of campus parking controls.

Parking fees are expected to be in accordance with NSW Health's *Campuses which are subject to car parking development* (PD2013_031) and *Concessional Fees and Eligibility* (PD2017_008) policies. These policies provide maximum fee rates for general users, and concessional rates for eligible users under various permit schemes, those with particular medical conditions, or frequent carers.

To ensure minimal disruption to traffic flow of emergency vehicles entering the site from the Pacific Highway, the boom gate system is to be developed in conjunction with the manufacturer to determine an appropriate method of access. For the new Louisiana Road access point, an alternative control mechanism will be implemented to ensure access at all times (see further discussion in Section 5.6).

An indicative layout of the boom gate entry area near the Pacific Highway access is shown in Figure 6.1. Final lane alignments shall be determined in coordination with the manufacturer, which may include local widening internal to the site to accommodate the necessary lane alignments and ensure no impacts to the internal roundabout and to the external road network. The current design provides queuing space for approximately 5 vehicles fully clear of the roundabout and roadway at both the western and north-eastern entries, with dual lanes for flexibility and redundancy. Some overflow queuing at each location could occur without disruption to traffic flows.

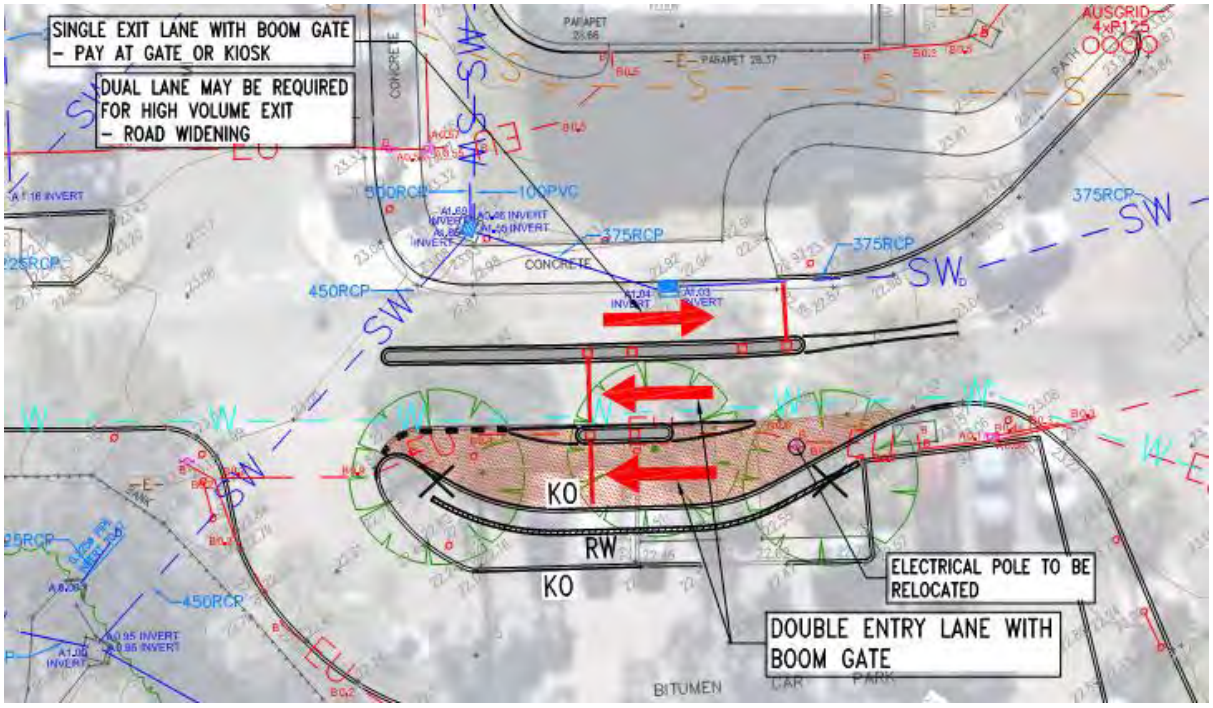


Figure 6.1: Provisional boom gate layout
Subject to change. Source: C111 Siteworks Plan Sheet 6 (TTW)

7 Traffic Analysis

7.1 Trip Generation

Secretary's Environmental Assessment Requirement 5.2: Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian, and bicycle trips based on surveys within the local area.

A draft version of the RMS *Guide to Traffic Generating Developments* provides a trip generation rate specifically for hospitals based on collected survey data throughout urban and regional NSW. For metropolitan hospitals and regional hospitals with lower accessibility, trip generation rates are therefore presented as follows:

$$AM\ Peak = 0.41\ (S) + 0.62(B)$$

$$PM\ Peak = 0.59\ (S) + 0.05(B)$$

where S is the number of staff during the main day shift and B is the number of beds at the hospital.

As per Table 6.1, there is a proposed provision of 127 additional beds and 504 additional daily staff between 2017/18 (existing) and 2026/27 (fully operational including new development). As the RMS trip generation rates address main day shift rather than total daily attendance, the combined staff attendance profiles of all day (40%) plus morning/evening (both 24%) has been considered. Therefore 64% of total daily attendance is the equivalent of approximately 322 additional main day shift staff.

This attendance overlap calculation is a conservative assumption and actual trip generation is expected to be lower. Peak trip generation occurs during the major shift start, not the major shift overlap. Due to potential uncertainties in shift starting times, this conservative assumption has been made.

The proposed operational growth of 322 main day shift staff and 127 beds will therefore result in additional trips in the order of 200 trips during peak periods as demonstrated in Table 7.1:

Table 7.1: Summary of generated trips

	Existing	2026/27	Increase
Number of main day shift staff	964	1286	**322**
Number of beds	353	480	**127**
AM peak hour trips	614	825	**211**
PM peak hour trips	586	783	**196**

Due to the high proportion of private vehicle usage for the existing site (>95% for visitors and >97% for staff), generation of trips by public and active transport is expected to be minor and shall result in negligible impacts to the local transport networks.

7.2 Traffic Growth

To provide an accurate understanding of the future traffic conditions, modelling has been undertaken for the year 2028 assuming 10 years of traffic growth beyond the current 2018 conditions. Forecasts beyond this date are unlikely to provide accurate information due to uncertainties in the future of the area, long-term transport, and road network changes, and changing behaviour of hospital users. Hospital operational forecasts extend through to the year 2026/27 and this is considered suitable for the 10-year traffic forecasts.

Background traffic growth across the forecast period has been assumed at 2% per annum. While this is a typical factor for traffic growth, it is also a conservative representation of the population growth in the local area. Between 2012 and 2017, the population in the Wyong Ward area grew from 67,813 to 71,784, an average annual growth of 1.2%.

While almost matching the historical population trends, a traffic growth factor of 2% is expected to provide a high-end estimate of traffic growth in the area. As per data published by RMS, traffic along Pacific Highway near to the site is currently growing at around 2% per annum[4].

We note that background growth factors have only been applied to through movements along the Pacific Highway and movements at Craigie Avenue, as traffic volumes for hospital movements are based on final operational values for staffing and beds (i.e. inclusive of growth).

7.3 Trip Distribution

Secretary's Environmental Assessment Requirement 5.5: The distribution on the road network of the trips generated by the proposed development (predicted traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation).

Distribution of additional trips has been calculated based on the distribution of existing movements at the site entry, which are approximately 60% to the northeast (Pacific Highway), 10% to the southeast (Craigie Avenue), and 30% to the southwest (Pacific Highway). Figure 7.1 shows the distribution of the development traffic onto the local network.

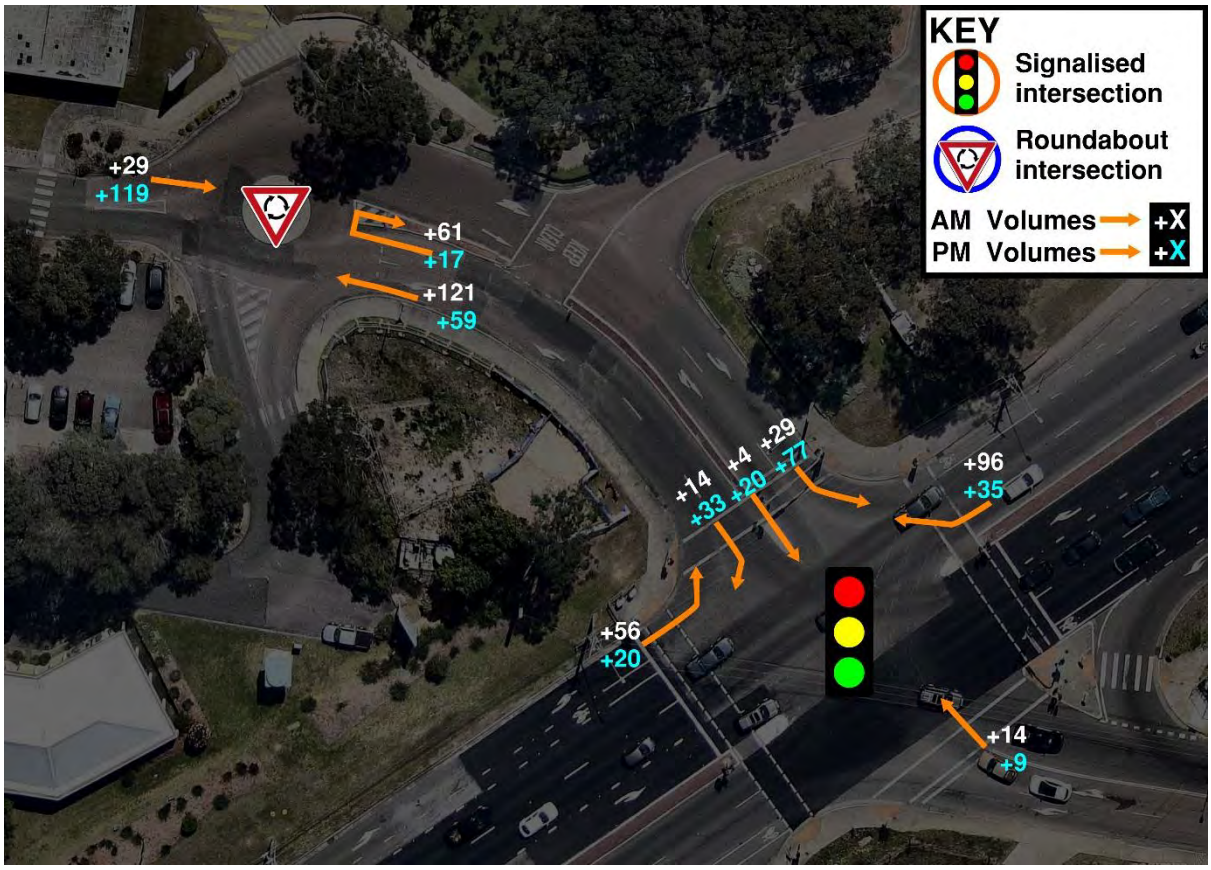


Figure 7.1: Distribution of traffic generated by the development

[4] RMS Site ID 05013 (Both Directions). 2006: 15,351 veh/day. 2016: 18,777 veh/day. Average annual growth = 2%.

7.4 Future Traffic Conditions

Secretary's Environmental Assessment Requirement 5.6: The impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for, and details of, upgrades or road improvement works, if required (traffic modelling is to be undertaken using SIDRA network modelling for current and future years).

Secretary's Environmental Assessment Requirement 5.7: Consideration of the traffic impacts on existing and proposed intersections, in particular, the site signalised access intersection with the Pacific Highway, and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area.

Secretary's Environmental Assessment Requirement 5.9: Traffic analysis of any major / relevant intersections impacted, using SIDRA or similar traffic model, including:

- *Current traffic counts and 10-year traffic growth projections;*
- *With and without development scenarios;*
- *95th percentile back of queue lengths;*
- *Delays, degree of saturation, queue lengths and level of service on all legs for the relevant intersections shown in tabular form; and*
- *Submission of files for Roads and Maritime review. Note, SCATS data is to be used to accurately model the intersection.*

Full SIDRA modelling results are attached in **Appendix D**. Table 7.2 to Table 7.6 provide a summary of the projected traffic conditions.

The final column of Table 7.2 to Table 7.6 demonstrate the modelled performance of the Pacific Highway intersection under proposed phasing modifications, see Section 7.5.

Table 7.2: Summary of intersection modelling results (Intersection Total)
Modelled in SIDRA Intersection 8.0. Data shown is average values across total intersection

Peak Period	Criteria	2018	2018 + Development	2028	2028 + Development	2028 + Development (Alt. Phasing)
AM	Avg Delay (sec)	37.8	42.1	41.4	58.7	24.5
	DoS	0.868	0.91	0.902	1.031	0.745
	LoS	C	C	C	E	B
	95% Queue Length (m)	162.4	188.1	224.3	312	115.8
PM	Avg Delay (sec)	32.2	32.7	35.5	37.2	23.6
	DoS	0.843	0.792	0.824	0.856	0.792
	LoS	C	C	C	C	B
	95% Queue Length (m)	130.4	129.1	181.2	191.6	96.1

Table 7.3: Intersection modelling results (East Leg – Craigie Avenue)

Peak Period	Criteria	2018	2018 + Development	2028	2028 + Development	2028 + Development (Alt. Phasing)
AM	Avg Delay (sec)	34.5	37.3	39.6	39.3	32.4
	DoS	0.573	0.64	0.695	0.74	0.681
	LoS	C	C	C	C	C
	95% Queue Length (m)	61.4	73.9	81.3	89.3	72.4
PM	Avg Delay (sec)	30.9	35.2	39.1	39.7	34.2
	DoS	0.503	0.556	0.651	0.678	0.649
	LoS	C	C	C	C	C
	95% Queue Length (m)	46.9	56	70.2	74.6	66.9

Table 7.4: Intersection modelling results (North East Leg – Pacific Highway)

Peak Period	Criteria	2018	2018 + Development	2028	2028 + Development	2028 + Development (Alt. Phasing)
AM	Avg Delay (sec)	42	48.1	47	81.2	22.6
	DoS	0.868	0.91	0.902	1.031	0.745
	LoS	C	D	D	F	B
	95% Queue Length (m)	162.4	188.1	224.3	312	115.8
PM	Avg Delay (sec)	28.6	29.3	30.2	31.1	19.7
	DoS	0.557	0.52	0.545	0.562	0.401
	LoS	C	C	C	C	B
	95% Queue Length (m)	71.5	76	100.2	101.6	69.8

Table 7.5: Intersection modelling results (North West Leg – Hospital Entry)

Peak Period	Criteria	2018	2018 + Development	2028	2028 + Development	2028 + Development (Alt. Phasing)
AM	Avg Delay (sec)	27.3	29.2	30.2	29.6	23.8
	DoS	0.201	0.274	0.208	0.274	0.255
	LoS	B	C	C	C	B
	95% Queue Length (m)	20.7	30.3	22.7	30.3	25
PM	Avg Delay (sec)	27.4	32.1	33.4	35.6	30.6
	DoS	0.637	0.792	0.692	0.826	0.792
	LoS	B	C	C	C	C
	95% Queue Length (m)	63.5	96.1	79.2	108.1	96.1

Table 7.6: Intersection modelling results (South West Leg – Pacific Highway)

Peak Period	Criteria	2018	2018 + Development	2028	2028 + Development	2028 + Development (Alt. Phasing)
AM	Avg Delay (sec)	34.6	38.1	35.3	37.8	23.6
	DoS	0.51	0.535	0.529	0.605	0.629
	LoS	C	C	C	C	B
	95% Queue Length (m)	77.3	85.7	99.9	105	64
PM	Avg Delay (sec)	37.7	34.8	39.2	41.8	19.5
	DoS	0.843	0.756	0.824	0.856	0.768
	LoS	C	C	C	C	B
	95% Queue Length (m)	130.4	129.1	181.2	191.6	83.5

Figure 7.2 shows the level of service, existing traffic volumes, projected volume increases due to background growth and hospital development for the AM and PM peak hour periods.

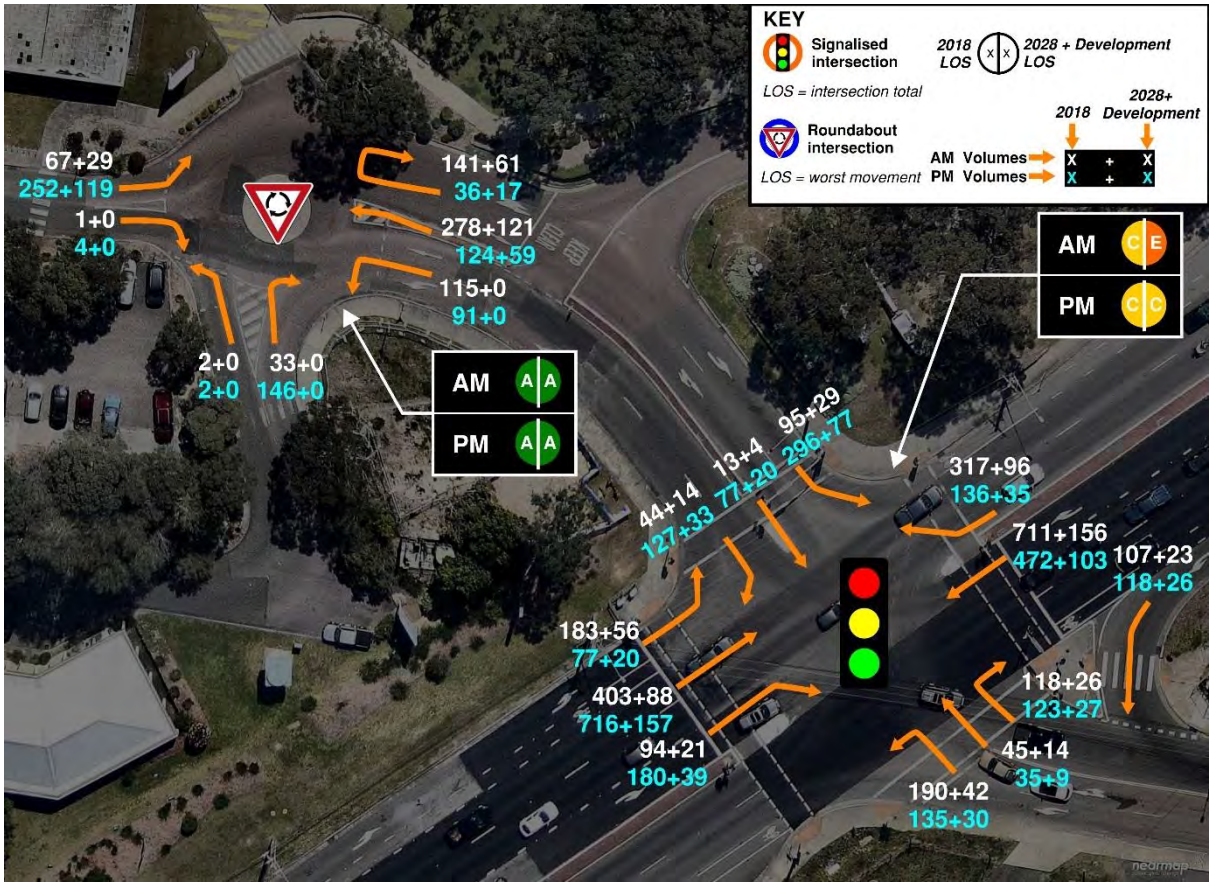


Figure 7.2: Comparison of existing and future traffic conditions

7.5 Proposed Adjustments

Secretary's Environmental Assessment Requirement 5.10: The identification of infrastructure required to ameliorate any impacts on traffic efficiency and road safety impacts associated with the proposed development, including details on improvements required to affected intersections (preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades)

As indicated in Table 7.2, the 2028 with development traffic scenario demonstrates a decrease in performance relative to the 2018 existing condition. There is opportunity for this to be ameliorated by adjusting the signal phasing and timing parameters for the signalised intersection to provide for additional through movements (which experience additional delay under the proposed development conditions) at phases E and F of the current phasing sequence as shown in Figure 7.3.

The final columns of Table 7.2 to Table 7.6 demonstrate the modelled performance of the Pacific Highway intersection under the proposed phasing modifications which may improve performance to levels greater than those of the existing conditions.

It is expected that this phasing change, or any other phasing change as proposed by RMS or others, will be able to assist in performing intersection performance in the future. It is noted that the decrease in performance occurs of a 10-year timeframe allowing sufficient time for RMS to monitor and adjust the operation of the intersection as necessary, as part of normal operating procedures.

Correspondence with RMS further indicates the possibility of integrating this intersection from a master-isolated mode into the Masterlink SCATS network which may also improve intersection performance in the future.

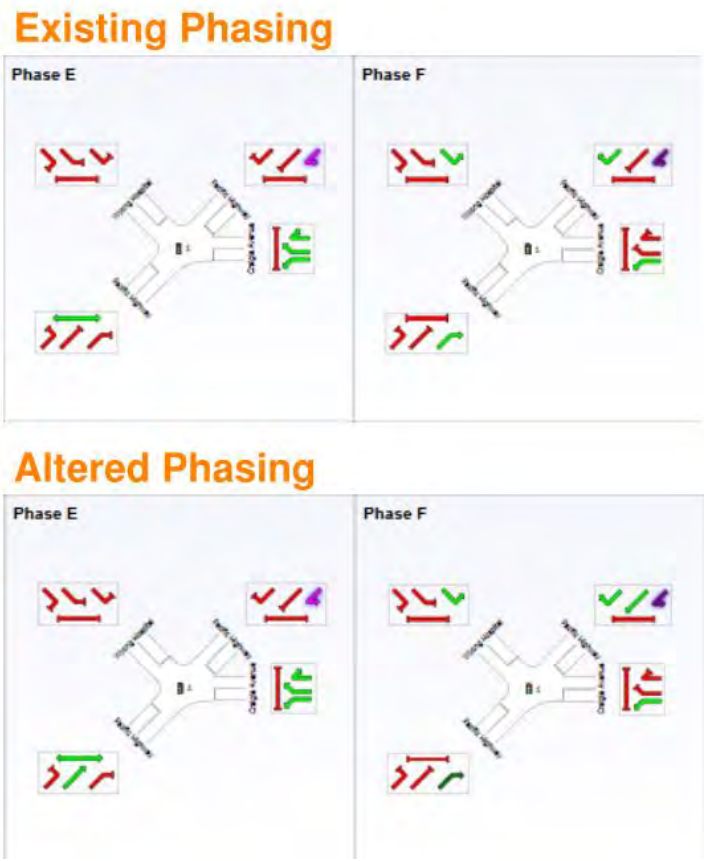


Figure 7.3: Comparison of existing and proposed alterations to phases E and F

7.6 Internal Traffic Conditions

Secretary's Environmental Assessment Requirement 5.8: Review of the location of the internal roundabout to ensure no traffic queues onto the Pacific Highway due to internal constraints

Intersection modelling demonstrates that the queue length increases from 9.5m under the existing conditions to 16.2m in the proposed development conditions. The length of the road connecting Pacific Highway to the roundabout is approximately 46m, which is significantly greater than the modelled queue length. No impacts to signal operation are expected due to operation of the internal roundabout.

Table 7.7: Summary of intersection modelling results (Internal Roundabout)
Data shown for Degree of Saturation and Level of Service is for movement with highest delay. Data shown for queue length is for movement with longest queue, which may be a different movement.

Peak Period	Criteria	2018	2028 + Development
AM	Avg Delay (sec)	4.0	5.4
	Degree of Saturation	0.048	0.056
	Level of Service	A	A
	95% Queue Length (m)	9.5	15.9
PM	Avg Delay (sec)	2.9	8.8
	Degree of Saturation	0.278	0.403
	Level of Service	A	A
	95% Queue Length (m)	9.7	16.2

8 Green Travel Plan

Secretary's Environmental Assessment Requirement 5.11: Details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location-specific sustainable travel plan (preliminary Green Travel Plan and specific Workplace travel plan) and the provision of facilities to increase the non-car mode share for travel to and from the site

A Green Travel Plan for this site including a Workplace Travel Plan has been developed and submitted as part of this SSDA.

The document is intended be dynamic and respond to staff and visitor behaviours. NSW Health has a track record of developing Green Travel Plans and Workplace Travel Plans for many hospital sites, and this Green Travel Plan and Workplace Travel Plan will form a strong reference point for further development or new documents in the future.

9 Construction Traffic

Secretary's Environmental Assessment Requirement 5.19: The preparation of a preliminary Construction Traffic and Pedestrian Management Plan to demonstrate the proposed management of the impact in relation to construction traffic

A Construction Traffic and Pedestrian Management Plan for this site has been developed and submitted as part of this SSDA.

A detailed CTPMP shall be developed by the builder with consideration of all final design selections and construction methodology. The draft CTPMP is intended to provide a framework within which a future CTPMP can be developed and implemented, and to demonstrate the potential operation of the construction site.

10 Conclusion

This transport and accessibility impact assessment has been prepared to examine the proposed Wyong Hospital expansion and its impact on the local transport network.

A detailed analysis of traffic impacts has been undertaken, with a post-development analysis of relevant local intersections. With 10 years of background traffic growth, and an estimated staff population of 678 staff, all intersections continue to operate at acceptable Levels of Service (at Level of Service B under a recommended signal phasing modification).

Provision of 114 undercroft car parking spaces on-site is proposed to cater for forecast staff and visitor demands on a campus-wide basis. The proposed development parking provision is sufficient to cater for the additional staff and beds proposed, with significant surplus provision (and shortfall reduction) of 84 spaces. On a campus-wide assessment, overall final parking provision of 1,220 parking spaces will result in a short-term supply/demand surplus of approximately 146 spaces and a long-term shortfall of approximately 42 spaces under existing travel habit assumptions. Changes in travel habits over time resulting in reduced vehicle usage are expected to reduce the parking demand over the next 10 years to a quantity which can be accommodated fully within the site before reaching peak operation, resulting in limited impact to external areas.

Active transport facilities including pedestrian and cycling infrastructure are currently well catered for within the road network, which has good pedestrian footpaths and an on-road cycling network. Additional facilities including bicycle storage rails and shower facilities shall be available to staff, and a Green Travel Plan (GTP) including Workplace Travel Plan (WTP) has been developed which plans to encourage active transport usage.

A Construction Traffic and Pedestrian Management Plan (CTPMP) has also been developed. Once design development for the Hospital has been completed and a builder engaged, a detailed CTPMP will be prepared and submitted to authorities. Main traffic impacts are expected to occur during excavation and concrete pours. The site has good road access for construction vehicles, with close proximity to state roads (Pacific Highway).

The proposed development is considered acceptable with regards to its traffic and parking impacts. The capacity of the local road network and the site with regards to both traffic and parking is considered sufficient to cater for the new building and is recommended for approval.

Prepared by	Reviewed by	Approved by
		
MICHAEL BABBAGE Senior Traffic Engineer	**MICHAEL BABBAGE** Senior Traffic Engineer	**PAUL YANNOULATOS** Technical Director

Appendix A – Consultation

Agency Consultation & Correspondence

Taylor Thomson Whitting

Structural
Civil
Traffic
Facade

Project	**Wyong Hospital Redevelopment**
Meeting	Pre-SSDA Traffic Meeting
Date	11:00am, 08 August 2018
Location	Central Coast Council, Wyong

Attendees	**Organisation**	**Contact**
Emily Goodworth (EG)	Central Coast Council (CCC)	emily.goodworth@centralcoast.nsw.gov.au
Adam Mularczyk (AM)	Central Coast Council (CCC)	adam.mularczyk@centralcoast.nsw.gov.au
Steven McDonald (SM)	Central Coast Council (CCC)	steven.mcdonald@centralcoast.nsw.gov.au
Marc Desmond (MD)	Roads & Maritime Services (RMS)	marc.j.desmond@rms.nsw.gov.au
Peter Marler (PM)	Roads & Maritime Services (RMS)	peter.c.marler@rms.nsw.gov.au
Paul Yannoulatos (PY)	Taylor Thomson Whitting (TTW)	paul.yannoulatos@ttw.com.au
Michael Babbage (MB)	Taylor Thomson Whitting (TTW)	michael.babbage@ttw.com.au
John Stalley (JS)	Colliers (CIPM)	john.stalley@colliers.com
Justin Barrett (JB)	NSW Health Infrastructure (HI)	justin.barrett@health.nsw.gov.au
Apologies		
Ben Konetschnik (BK)	Roads & Maritime Services (RMS)	ben.konetschnik@rms.nsw.gov.au
Bonnie Custance (BC)	Colliers (CIPM)	bonnie.custance@colliers.com
Justin Larsson (JL)	Colliers (CIPM)	justin.larsson@colliers.com
Scott Anderson (SA)	Colliers (CIPM)	scott.l.anderson@colliers.com
Ryan Thoroughgood (RT)	NSW Health Infrastructure (HI)	ryan.thoroughgood@health.nsw.gov.au
Jane Fielding (JF)	Architectus	jane.fielding@architectus.com.au
Lee Farrell (LF)	Transport for NSW (TfNSW)	lee.farrell@transport.nsw.gov.au
Distribution		
As above		

Item	Description	Action	Date
1	**INTRODUCTION**		
1.1	**Meeting Overview**		
1.1a	Project team seeking input prior to submission of a Request for SEARs through Department of Planning.		
1.1b	This meeting to address Traffic items only.		
1.2	**Project Overview**		
1.2a	Enabling Works were approved under an REF which seeks to provide 271 additional parking spaces on-site and prepare for construction of a new building on an existing car park (new building under separate application).		
1.2b	Enabling Works on the site are currently underway and due for completion around November 2018.		

Item	Description	Action	Date
1.2c	Due to various factors including clinical interruptions, the new hospital building is proposed to be moved from the location planned under the REF to replace one section of new parking, resulting in a comparative loss of approximately 100 spaces relative to the approved REF.		
1.2d	To match the car parking capacity of the approved REF, approximately 100 spaces to be provided as undercroft parking in new building, therefore maintaining additional parking under REF of net 271 additional spaces.		
1.2e	The new building includes an Emergency Department, and capacity for approximately 7 ambulances. Access for emergency vehicles and service vehicles (no general access) is planned via a new hospital access point from Louisiana Road, which is currently being used for construction access.		
2	**DISCUSSION**		
2.1	**Project Manager (Colliers)**		
2.1a	CIPM-JS confirmed existing main entry at Craigie Avenue intersection to be retained as main entry. Principle of existing loop road commencing at main entry to be maintained for general access.		
2.2	**Health Infrastructure**		
2.2a	HI-JB confirmed SSDA will cover single phase of works, with Enabling Works already underway.		
2.2b	HI-JB noted that SSDA including traffic report will address and model any changes resulting from the SSDA relative to the approved REF.		
2.3	**Council**		
2.3a	CCC-SM queried whether movements between the new Ambulance Station on Louisiana Road and the hospital would be via public or internal roads. HI-JB advised that movements would be on public roads where required, but expected to be minimal.		
2.3b	CCC-SM noted that overflow parking currently occurs on Pacific Highway near main entry, assumed to be staff. It was noted that the increase in parking capacity under the approved REF (currently under construction) is designed to meet total campus parking demand.		
2.3c	CCC-AM queried whether there is a Master Plan in place for the hospital site. HI-JB noted that there is a general strategy in place to provide a central building zone with parking on edges however this is subject to change. The SSDA proposal for the new building is primarily intended to move facilities and free up old buildings for future development.		
2.3d	CCC-EG requested that the Request for SEARs and SSDA clearly address what the approved REF covered (including parking calculations), and what changes under the proposed development (including floor area, staffing details).		
2.3e	CCC-SM noted proximity of hospital circulation roundabout to signalised intersection. Proximity and queuing effects to be discussed as part of SSDA. *[Post-meeting clarification: Roundabout is within hospital land. Boundaries include internal roadway up to Pacific Highway, and leg of roundabout leading to medical centre. Medical centre building and parking is under separate lot.]*		

Item	Description	Action	Date
2.4	**RMS**		
2.4a	RMS-PM queried whether approved REF report included intersection modelling. TTW-PY confirmed that this is the case as per previous reports by Arup. *[Post-meeting clarification: Arup modelling at existing Pacific Highway entrance shows no change in Level of Service and negligible change in delay <1.0 sec.]*		
2.4b	RMS-MD queried whether REF traffic report has been reviewed by RMS or Council. **CIPM-JS to distribute relevant reports to Council and RMS.** CCC-AM noted Council had met with Arup but did not recall sighting a report.	~~CIPM-JS~~	~~17/08/18~~ *(attached)*
2.4c	RMS-MD queried whether draft RMS traffic generation guidelines had been reviewed by the project team. TTW-PY confirmed these have not been provided for review. **RMS-MD to send draft traffic generation documents to CIPM for distribution.**	~~RMS-MD~~	~~17/08/18~~ *Complete 08/08/18 (attached)*
2.4d	RMS-PM noted that RMS typically requests SIDRA files during SSDA process for review. TTW-PY confirmed files would be provided at the appropriate time.		
	Meeting closed approx. 12:10pm.		

Minutes	Michael Babbage, TTW
TTW Reference	181457 TAAA P:\2018\1814\181457\Minutes\180808 Pre SSDA Traffic Meeting.docx
Attachments	• RMS Draft Traffic Generation Guidelines for Hospitals • Wyong Hospital Enabling Works Traffic Report, Arup (2017)

RMS Draft Traffic Generation Guidelines for Hospitals

6.8.3 Hospitals (2013)

Surveys of hospitals were undertaken between 2007 and 2011. The trip rates and information presented is a summary of the available information arising from studies of 21 hospitals within Sydney.

Table 32 Hospital sample summary

Hospital type	AM and PM peak trip rate (vehicle trips/staff/hour)	Peak hour trip rate (vehicle trips/bed/hour)
Metropolitan Hospitals with High transport accessibility (8 sites)	0.3-0.5	1.1-2.7
Metropolitan and regional hospitals with lower accessibility (13 sites)	0.4-0.9	0.8-2.3

Notes

- These trip rates actually reflect trip rate for all users of the hospital. Staff produces a lower rate.
- Most trip generation rates for hospitals rely on the number of beds and the number of staff during a shift period. In practice, it is often difficult to ascertain the number of staff in different categories such as nursing, medical, domestic, admin, technical due to administration and staff allocation of departments. Furthermore, the trip generation of hospitals differs significantly on the basis of their location, size and types of activities. For example, hospitals in urban areas have a lower rate of vehicular trips and parking generation when compared with regional hospitals or the hospitals that are located where there is limited public transport accessibility. Therefore, it is more appropriate to categorise hospitals in terms of their locations and accessibility (particularly by public transport) and then to assess their trip and parking generation rates.
- A review of the data in 2013 indicated that the trip generation rates and transport requirements of the hospitals are more related to their function than the number of beds. For example, in hospitals with high outpatient services, the trip generation rates are likely to be higher. Professional judgement is required in interpreting and applying the available data.

Peak generation model

The following models provide a means for calculating the approximate peak period traffic generation for hospitals when both the number of staff and beds are known. The models should be used within the range of estimation.

Table 33 Peak hour trip generation model for hospitals

Hospital Type	Trips (veh/h)
High Accessibility	AM Peak = 0.34 (S) + 0.32 (B)
	PM Peak = 0.39 (S) + 0.33(B)
Low Accessibility	AM Peak = 0.41 (S) + 0.62 (B)
	PM Peak = 0.59 (S) + 0.05 (B)

Variables

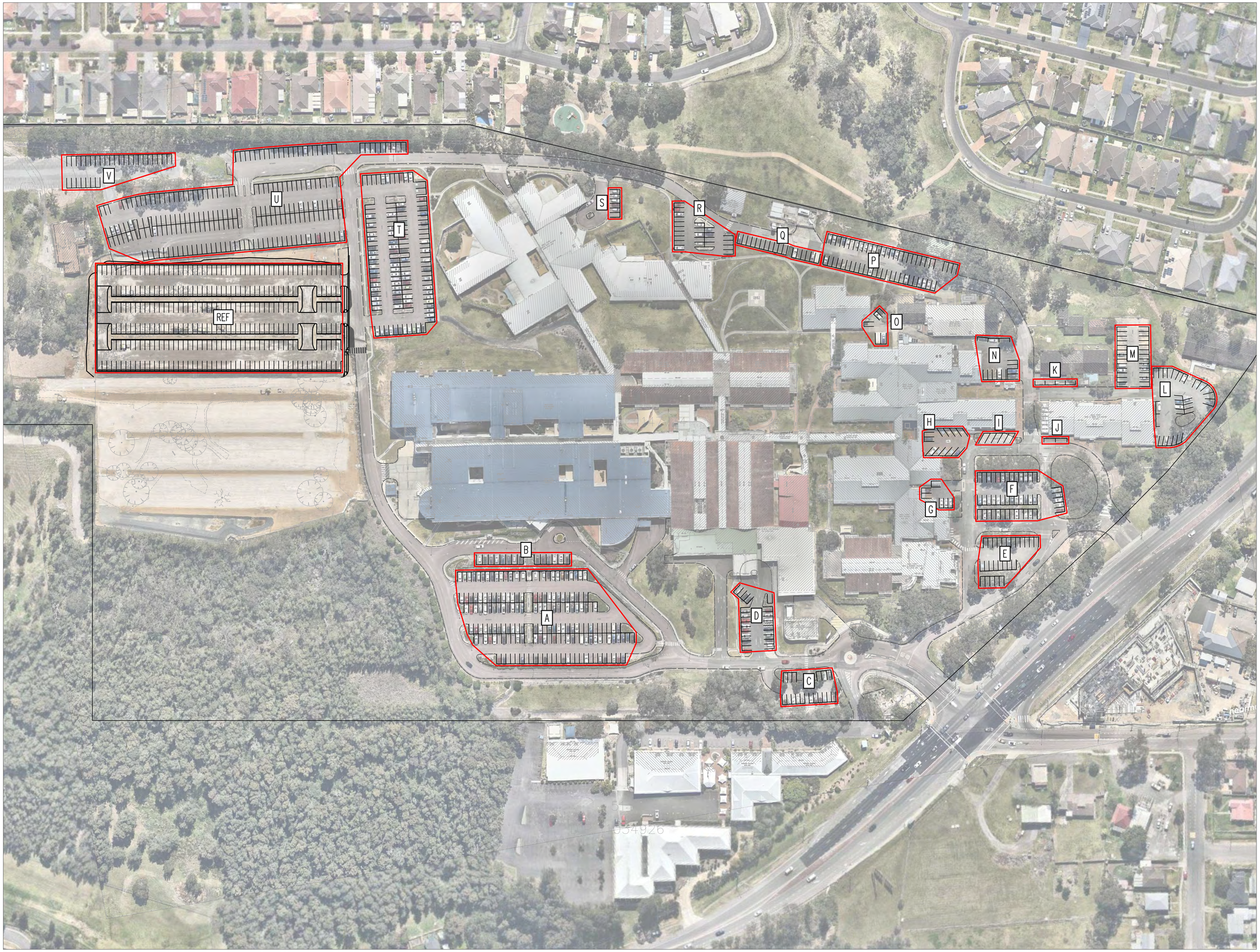
- (S): Number of staff during the main day shift at the hospital
- (B): Number of beds

Wyong Hospital Enabling Works Traffic Report, Arup (2017)

Appendix B – Car Park Plans

Hospital Car Parking Layout Plans

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING T100



ZONE	CAPACITY
A	170
B	14
C	17
D	21
E	25
F	44
G	6
H	11
I	5
J	2
K	4
L	25
M	25
N	12
O	5
P	51
Q	17
R	23
S	6
T	118
U	202
V	29
REF	278
TOTAL	1110

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PRELIMINARY

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3	REVISED ISSUE	KA	KA	25.01.19
2	REVISED ISSUE	MB	MB	22.11.18
1	PRELIMINARY	MB	MB	21.11.18

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Project
WYONG HOSPITAL REDEVELOPMENT

Sheet Subject
CAR PARK ARRANGEMENT - EXISTING CONDITIONS

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Job No	Drawing No	Revision
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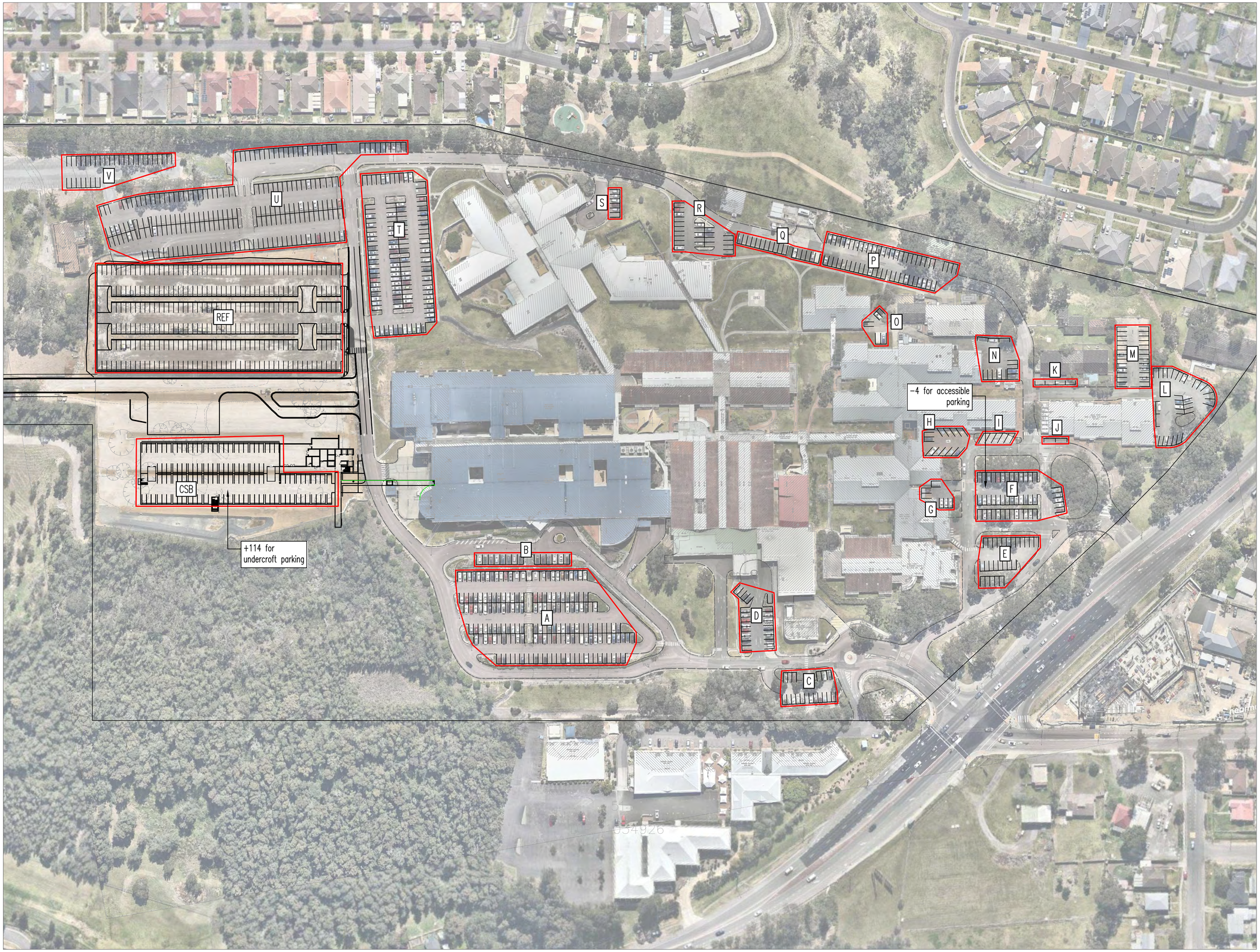

ZONE	CAPACITY
A	170
B	14
C	17
D	21
E	25
F	40
G	6
H	11
I	5
J	2
K	4
L	25
M	25
N	12
O	5
P	51
Q	17
R	23
S	6
T	118
U	202
V	29
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PRELIMINARY

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2	REVISED ISSUE	MB	MB	22.11.18
1	PRELIMINARY	MB	MB	21.11.18

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Project
WYONG HOSPITAL REDEVELOPMENT

Sheet Subject
CAR PARK ARRANGEMENT - PROPOSED

Scale : A1 1:1000
Drawn MB
Authorised

Job No 181457
Drawing No T112
Revision 3

Plot File Created: Jan 25, 2019 - 3:37pm

Appendix C – Traffic Counts

Local Intersection & Mid-Block Traffic Counts

Job No	N4507 - Wyong Hospital
Client	TTW
Site	ATC 1 - Wyong Hospital
Location	Wyong
Site No	1
Start Date	20-Sep-18
Description	Volume Summary
Direction	Combined

Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	24-Sep	25-Sep	26-Sep	20-Sep	21-Sep	22-Sep	23-Sep		
AM Peak	296	342	292	303	314	130	144		
PM Peak	319	352	313	321	325	191	172	**3593**	**3104**
0:00	5	15	20	27	12	26	23	16	18
1:00	6	11	8	8	10	12	8	9	9
2:00	2	5	9	11	6	4	14	7	7
3:00	7	6	6	5	4	12	2	6	6
4:00	4	2	6	7	7	10	6	5	6
5:00	56	50	54	53	58	33	38	54	49
6:00	219	198	211	200	207	103	94	207	176
7:00	296	342	292	303	314	97	91	309	248
8:00	229	238	224	186	221	55	47	220	171
9:00	258	210	173	192	174	77	76	201	166
10:00	261	254	264	211	215	130	91	241	204
11:00	258	243	272	260	273	111	144	261	223
12:00	255	223	206	224	232	137	131	228	201
13:00	264	274	279	252	263	191	156	266	240
14:00	243	262	221	187	229	152	138	228	205
15:00	319	352	313	321	325	185	172	326	284
16:00	291	295	298	290	271	134	102	289	240
17:00	218	220	208	169	172	95	73	197	165
18:00	154	122	149	130	132	103	109	137	128
19:00	97	107	117	128	96	88	78	109	102
20:00	70	88	87	70	71	47	37	77	67
21:00	106	85	104	112	102	63	77	102	93
22:00	82	68	66	69	82	79	71	73	74
23:00	28	15	32	26	17	21	16	24	22
Total	3728	3685	3619	3441	3493	1965	1794	3593	3104

7-19	3046	3035	2899	2725	2821	1467	1330	2905	2475
6-22	3538	3513	3418	3235	3297	1768	1616	3400	2912
6-24	3648	3596	3516	3330	3396	1868	1703	3497	3008
0-24	3728	3685	3619	3441	3493	1965	1794	3593	3104

Job No	N4507 - Wyong Hospital
Client	TTW
Site	ATC 1 - Wyong Hospital
Location	Wyong
Site No	1
Start Date	20-Sep-18
Description	Volume Summary
Direction	EB

Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	24-Sep	25-Sep	26-Sep	20-Sep	21-Sep	22-Sep	23-Sep		
AM Peak	123	108	121	121	126	46	55		
PM Peak	222	246	216	208	214	114	108	**1734**	**1497**
0:00	4	10	14	17	10	19	13	11	12
1:00	3	5	3	6	4	5	3	4	4
2:00	0	2	3	5	2	2	6	2	3
3:00	0	2	1	3	1	5	1	1	2
4:00	1	0	1	2	2	2	1	1	1
5:00	4	4	7	6	9	5	8	6	6
6:00	28	18	21	21	27	12	8	23	19
7:00	73	85	68	83	88	46	49	79	70
8:00	45	47	53	40	47	15	14	46	37
9:00	100	87	67	76	66	22	26	79	63
10:00	117	108	120	81	101	42	23	105	85
11:00	123	107	121	121	126	46	55	120	100
12:00	121	120	104	108	108	67	73	112	100
13:00	113	120	117	107	131	83	65	118	105
14:00	137	142	131	113	119	74	69	128	112
15:00	211	246	216	207	214	114	108	219	188
16:00	222	219	208	208	198	85	59	211	171
17:00	149	154	134	122	131	57	41	138	113
18:00	83	64	79	70	70	47	62	73	68
19:00	69	71	75	87	63	59	56	73	69
20:00	47	69	61	52	52	36	25	56	49
21:00	61	46	54	60	52	26	36	55	48
22:00	65	50	51	56	60	63	55	56	57
23:00	18	11	19	17	12	12	10	15	14
Total	1794	1787	1728	1668	1693	944	866	1734	1497

7-19	1494	1499	1418	1336	1399	698	644	1429	1213
6-22	1699	1703	1629	1556	1593	831	769	1636	1397
6-24	1782	1764	1699	1629	1665	906	834	1708	1468
0-24	1794	1787	1728	1668	1693	944	866	1734	1497

Job No	N4507 - Wyong Hospital
Client	TTW
Site	ATC 1 - Wyong Hospital
Location	Wyong
Site No	1
Start Date	20-Sep-18
Description	Volume Summary
Direction	WB

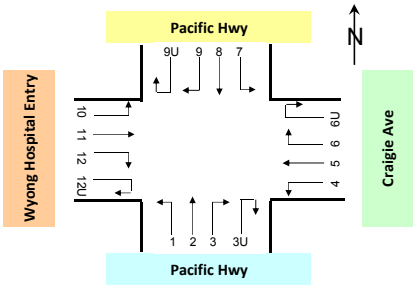
Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	24-Sep	25-Sep	26-Sep	20-Sep	21-Sep	22-Sep	23-Sep		
AM Peak	223	257	224	220	226	91	89		
PM Peak	151	154	162	145	132	108	91	**1859**	**1606**
0:00	1	5	6	10	2	7	10	5	6
1:00	3	6	5	2	6	7	5	4	5
2:00	2	3	6	6	4	2	8	4	4
3:00	7	4	5	2	3	7	1	4	4
4:00	3	2	5	5	5	8	5	4	5
5:00	52	46	47	47	49	28	30	48	43
6:00	191	180	190	179	180	91	86	184	157
7:00	223	257	224	220	226	51	42	230	178
8:00	184	191	171	146	174	40	33	173	134
9:00	158	123	106	116	108	55	50	122	102
10:00	144	146	144	130	114	88	68	136	119
11:00	135	136	151	139	147	65	89	142	123
12:00	134	103	102	116	124	70	58	116	101
13:00	151	154	162	145	132	108	91	149	135
14:00	106	120	90	74	110	78	69	100	92
15:00	108	106	97	114	111	71	64	107	96
16:00	69	76	90	82	73	49	43	78	69
17:00	69	66	74	47	41	38	32	59	52
18:00	71	58	70	60	62	56	47	64	61
19:00	28	36	42	41	33	29	22	36	33
20:00	23	19	26	18	19	11	12	21	18
21:00	45	39	50	52	50	37	41	47	45
22:00	17	18	15	13	22	16	16	17	17
23:00	10	4	13	9	5	9	6	8	8
Total	1934	1898	1891	1773	1800	1021	928	1859	1606

7-19	1552	1536	1481	1389	1422	769	686	1476	1262
6-22	1839	1810	1789	1679	1704	937	847	1764	1515
6-24	1866	1832	1817	1701	1731	962	869	1789	1540
0-24	1934	1898	1891	1773	1800	1021	928	1859	1606

Job No. : N4507
Client : TTW
Suburb : Wyong Hospital
Location : 1. Pacific Hwy / Wyong Hospital Entry / Craigie Ave

Day/Date : Tue, 25th September 2018
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

MATRIX Traffic and Transport Data

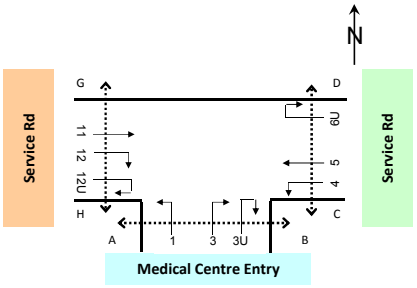


Approach	Pacific Hwy												Craigie Ave											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
6:00 to 7:00	103	0	**103**	188	44	**232**	24	2	**26**	0	0	**0**	89	5	**94**	24	1	**25**	111	4	**115**	0	0	**0**
6:15 to 7:15	112	1	**113**	207	48	**255**	28	3	**31**	0	0	**0**	95	5	**100**	32	0	**32**	109	6	**115**	0	0	**0**
6:30 to 7:30	128	3	**131**	222	52	**274**	31	3	**34**	0	0	**0**	88	4	**92**	34	0	**34**	105	5	**110**	0	0	**0**
6:45 to 7:45	132	4	**136**	237	49	**286**	35	4	**39**	0	0	**0**	114	5	**119**	37	0	**37**	98	3	**101**	0	0	**0**
7:00 to 8:00	142	4	**146**	265	45	**310**	40	5	**45**	0	0	**0**	138	9	**147**	39	0	**39**	104	2	**106**	0	0	**0**
7:15 to 8:15	170	3	**173**	315	49	**364**	56	6	**62**	0	0	**0**	159	10	**169**	40	0	**40**	114	2	**116**	0	0	**0**
7:30 to 8:30	182	1	**183**	356	47	**403**	87	7	**94**	0	0	**0**	178	12	**190**	45	0	**45**	115	3	**118**	0	0	**0**
7:45 to 8:45	173	0	**173**	396	38	**434**	114	8	**122**	0	0	**0**	179	10	**189**	42	0	**42**	116	6	**122**	0	0	**0**
8:00 to 9:00	140	1	**141**	421	43	**464**	127	7	**134**	0	0	**0**	173	6	**179**	45	0	**45**	112	7	**119**	0	0	**0**
AM Totals	**385**	**5**	**390**	**874**	**132**	**1,006**	**191**	**14**	**205**	**0**	**0**	**0**	**400**	**20**	**420**	**108**	**1**	**109**	**327**	**13**	**340**	**0**	**0**	**0**
15:00 to 16:00	77	0	**77**	685	31	**716**	173	7	**180**	0	0	**0**	132	3	**135**	35	0	**35**	123	0	**123**	0	0	**0**
15:15 to 16:15	80	1	**81**	666	23	**689**	161	7	**168**	0	0	**0**	116	2	**118**	31	0	**31**	108	2	**110**	0	0	**0**
15:30 to 16:30	70	1	**71**	638	19	**657**	167	8	**175**	0	0	**0**	110	2	**112**	24	0	**24**	106	3	**109**	0	0	**0**
15:45 to 16:45	63	2	**65**	652	21	**673**	156	5	**161**	0	0	**0**	115	2	**117**	16	0	**16**	115	6	**121**	0	0	**0**
16:00 to 17:00	54	2	**56**	638	16	**654**	139	4	**143**	0	0	**0**	99	2	**101**	18	0	**18**	117	6	**123**	0	0	**0**
16:15 to 17:15	42	1	**43**	642	16	**658**	144	3	**147**	0	0	**0**	100	2	**102**	19	0	**19**	111	5	**116**	0	0	**0**
16:30 to 17:30	42	1	**43**	642	16	**658**	135	2	**137**	0	0	**0**	99	1	**100**	19	0	**19**	104	4	**108**	0	0	**0**
16:45 to 17:45	33	1	**34**	637	11	**648**	150	2	**152**	0	0	**0**	100	3	**103**	15	0	**15**	85	1	**86**	0	0	**0**
17:00 to 18:00	32	1	**33**	596	13	**609**	155	2	**157**	0	0	**0**	111	2	**113**	16	0	**16**	81	3	**84**	0	0	**0**
PM Totals	**163**	**3**	**166**	**1,919**	**60**	**1,979**	**467**	**13**	**480**	**0**	**0**	**0**	**342**	**7**	**349**	**69**	**0**	**69**	**321**	**9**	**330**	**0**	**0**	**0**

Approach	Pacific Hwy												Wyong Hospital Entry											
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
6:00 to 7:00	75	3	**78**	440	35	**475**	162	2	**164**	0	0	**0**	15	1	**16**	7	0	**7**	14	2	**16**	0	0	**0**
6:15 to 7:15	83	4	**87**	457	38	**495**	187	4	**191**	0	0	**0**	20	1	**21**	10	0	**10**	18	2	**20**	0	0	**0**
6:30 to 7:30	66	5	**71**	488	44	**532**	223	4	**227**	0	0	**0**	35	1	**36**	8	1	**9**	28	2	**30**	0	0	**0**
6:45 to 7:45	61	6	**67**	493	45	**538**	259	3	**262**	0	0	**0**	62	2	**64**	10	2	**12**	42	3	**45**	0	0	**0**
7:00 to 8:00	69	7	**76**	587	38	**625**	270	3	**273**	0	0	**0**	80	3	**83**	12	2	**14**	47	2	**49**	0	0	**0**
7:15 to 8:15	79	8	**87**	627	43	**670**	309	2	**311**	0	0	**0**	91	3	**94**	9	2	**11**	47	1	**48**	0	0	**0**
7:30 to 8:30	97	10	**107**	669	42	**711**	315	2	**317**	0	0	**0**	93	2	**95**	12	1	**13**	42	2	**44**	0	0	**0**
7:45 to 8:45	112	9	**121**	650	38	**688**	293	2	**295**	0	0	**0**	82	1	**83**	11	0	**11**	38	1	**39**	0	0	**0**
8:00 to 9:00	118	9	**127**	593	48	**641**	255	2	**257**	0	0	**0**	77	1	**78**	16	0	**16**	40	1	**41**	0	0	**0**
AM Totals	**262**	**19**	**281**	**1,620**	**121**	**1,741**	**687**	**7**	**694**	**0**	**0**	**0**	**172**	**5**	**177**	**35**	**2**	**37**	**101**	**5**	**106**	**0**	**0**	**0**
15:00 to 16:00	114	4	**118**	449	23	**472**	135	1	**136**	0	0	**0**	296	1	**297**	77	0	**77**	127	0	**127**	0	0	**0**
15:15 to 16:15	127	3	**130**	434	26	**460**	136	1	**137**	0	0	**0**	325	1	**326**	86	0	**86**	138	0	**138**	0	0	**0**
15:30 to 16:30	127	3	**130**	401	17	**418**	132	1	**133**	0	0	**0**	344	0	**344**	84	0	**84**	130	1	**131**	0	0	**0**
15:45 to 16:45	134	5	**139**	405	15	**420**	110	1	**111**	0	0	**0**	333	1	**334**	72	0	**72**	139	2	**141**	0	0	**0**
16:00 to 17:00	129	4	**133**	414	15	**429**	99	2	**101**	0	0	**0**	318	1	**319**	70	0	**70**	146	2	**148**	0	0	**0**
16:15 to 17:15	118	4	**122**	431	8	**439**	76	3	**79**	0	0	**0**	280	2	**282**	60	0	**60**	143	2	**145**	0	0	**0**
16:30 to 17:30	132	5	**137**	471	11	**482**	65	2	**67**	0	0	**0**	218	3	**221**	48	0	**48**	131	1	**132**	0	0	**0**
16:45 to 17:45	138	4	**142**	447	12	**459**	65	2	**67**	0	0	**0**	181	2	**183**	34	0	**34**	113	0	**113**	0	0	**0**
17:00 to 18:00	143	3	**146**	450	8	**458**	59	1	**60**	0	0	**0**	146	2	**148**	23	0	**23**	102	1	**103**	0	0	**0**
PM Totals	**386**	**11**	**397**	**1,313**	**46**	**1,359**	**293**	**4**	**297**	**0**	**0**	**0**	**760**	**4**	**764**	**170**	**0**	**170**	**375**	**3**	**378**	**0**	**0**	**0**

Job No. : N4507
Client : TTW
Suburb : Wyong Hospital
Location : 2. Internal roundabout at Wyong Hospital

Day/Date : Tue, 25th September 2018
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



Approach	Medical Centre Entry										Service Rd								
Direction	Direction 1 (Left Turn)				Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)				Direction 6U (U Turn)	
Time Period	Lights	Heavies	Total		Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total		Lights	Heavies	Total
6:00 to 7:00	0	0	**0**		11	0	**11**	0	0	**0**	16	0	**16**	202	3	**205**		69	0	**69**
6:15 to 7:15	0	0	**0**		10	0	**10**	0	0	**0**	18	0	**18**	227	5	**232**		84	0	**84**
6:30 to 7:30	0	0	**0**		12	0	**12**	0	0	**0**	26	0	**26**	257	8	**265**		94	0	**94**
6:45 to 7:45	0	0	**0**		17	0	**17**	0	0	**0**	47	0	**47**	277	7	**284**		109	0	**109**
7:00 to 8:00	0	0	**0**		21	0	**21**	0	0	**0**	66	0	**66**	274	7	**281**		123	0	**123**
7:15 to 8:15	1	0	**1**		26	0	**26**	0	0	**0**	85	0	**85**	294	5	**299**		136	0	**136**
7:30 to 8:30	2	0	**2**		33	0	**33**	0	0	**0**	115	0	**115**	276	2	**278**		141	0	**141**
7:45 to 8:45	4	0	**4**		37	0	**37**	0	0	**0**	116	0	**116**	228	3	**231**		144	0	**144**
8:00 to 9:00	4	0	**4**		46	0	**46**	0	0	**0**	124	0	**124**	179	3	**182**		108	0	**108**
AM Totals	**4**	**0**	**4**		**78**	**0**	**78**	**0**	**0**	**0**	**206**	**0**	**206**	**655**	**13**	**668**		**300**	**0**	**300**
15:00 to 16:00	2	0	**2**		113	0	**113**	1	0	**1**	91	0	**91**	122	1	**123**		40	0	**40**
15:15 to 16:15	2	0	**2**		146	0	**146**	0	0	**0**	91	0	**91**	122	2	**124**		36	0	**36**
15:30 to 16:30	1	0	**1**		152	0	**152**	0	0	**0**	90	0	**90**	108	2	**110**		28	0	**28**
15:45 to 16:45	1	0	**1**		160	0	**160**	0	0	**0**	80	0	**80**	87	2	**89**		22	1	**23**
16:00 to 17:00	0	0	**0**		161	1	**162**	1	0	**1**	73	1	**74**	72	2	**74**		22	1	**23**
16:15 to 17:15	1	0	**1**		146	1	**147**	1	0	**1**	56	1	**57**	65	2	**67**		19	1	**20**
16:30 to 17:30	1	0	**1**		117	1	**118**	1	0	**1**	48	1	**49**	60	1	**61**		15	1	**16**
16:45 to 17:45	1	0	**1**		97	1	**98**	1	0	**1**	36	1	**37**	60	2	**62**		12	0	**12**
17:00 to 18:00	2	0	**2**		75	0	**75**	0	0	**0**	28	0	**28**	65	2	**67**		9	0	**9**
PM Totals	**4**	**0**	**4**		**349**	**1**	**350**	**2**	**0**	**2**	**192**	**1**	**193**	**259**	**5**	**264**		**71**	**1**	**72**

Approach							Service Rd								
Direction							Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)		
Time Period							Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
6:00 to 7:00							17	3	**20**	0	0	**0**	0	0	**0**
6:15 to 7:15							28	2	**30**	0	0	**0**	0	0	**0**
6:30 to 7:30							49	4	**53**	0	0	**0**	0	0	**0**
6:45 to 7:45							68	6	**74**	0	0	**0**	0	0	**0**
7:00 to 8:00							84	5	**89**	0	0	**0**	0	0	**0**
7:15 to 8:15							84	5	**89**	0	0	**0**	0	0	**0**
7:30 to 8:30							64	3	**67**	1	0	**1**	0	0	**0**
7:45 to 8:45							54	1	**55**	3	0	**3**	0	0	**0**
8:00 to 9:00							49	2	**51**	5	0	**5**	0	0	**0**
AM Totals							**150**	**10**	**160**	**5**	**0**	**5**	**0**	**0**	**0**
15:00 to 16:00							264	1	**265**	3	0	**3**	0	0	**0**
15:15 to 16:15							251	1	**252**	4	0	**4**	0	0	**0**
15:30 to 16:30							245	1	**246**	4	0	**4**	0	0	**0**
15:45 to 16:45							243	2	**245**	5	0	**5**	0	0	**0**
16:00 to 17:00							231	2	**233**	3	0	**3**	0	0	**0**
16:15 to 17:15							225	2	**227**	3	0	**3**	0	0	**0**
16:30 to 17:30							198	2	**200**	2	0	**2**	0	0	**0**
16:45 to 17:45							174	1	**175**	1	0	**1**	0	0	**0**
17:00 to 18:00							160	2	**162**	1	0	**1**	0	0	**0**
PM Totals							**655**	**5**	**660**	**7**	**0**	**7**	**0**	**0**	**0**

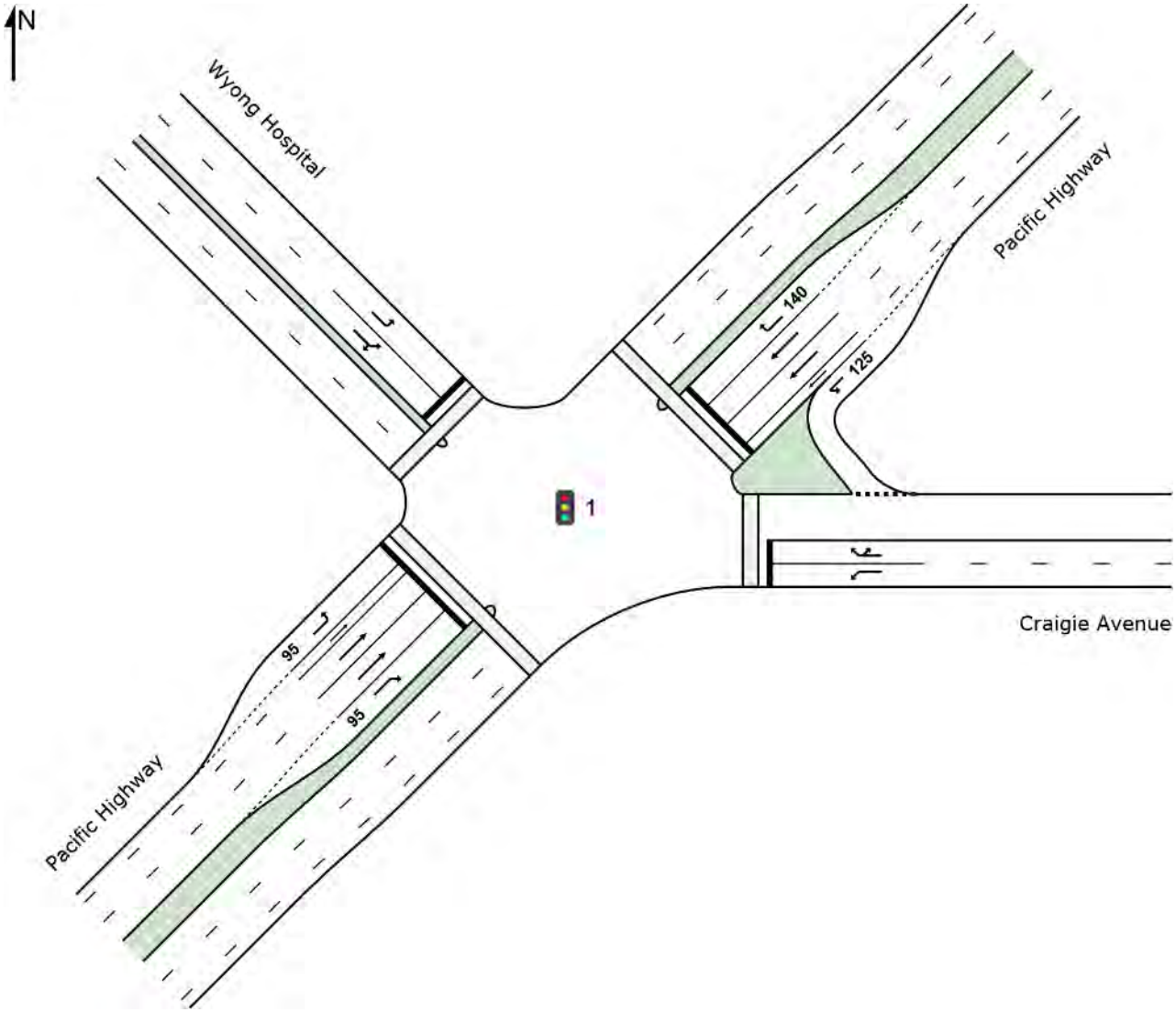
Appendix D – Traffic Modelling

SIDRA Intersection Modelling Results

SITE LAYOUT

Site: 1 [Pacific Highway with Craigie Avenue (AM) - EXISTING]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Pacific Highway with Craigie Avenue (AM) - EXISTING]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	200	6.3	0.249	22.3	LOS B	6.6	48.9	0.66	0.66	0.66	41.4
6a	R1	47	0.0	0.573	46.7	LOS D	8.6	61.4	0.96	0.81	0.96	10.3
6b	R3	124	2.5	0.573	49.5	LOS D	8.6	61.4	0.96	0.81	0.96	39.2
Approach		372	4.2	0.573	34.5	LOS C	8.6	61.4	0.80	0.73	0.80	37.6
NorthEast: Pacific Highway												
24b	L3	113	9.3	0.085	8.6	LOS A	0.5	4.0	0.17	0.65	0.17	61.4
25	T1	749	5.9	0.868	53.4	LOS D	22.1	162.4	1.00	1.00	1.23	45.8
26	R2	334	0.6	0.625	27.7	LOS B	11.3	79.7	0.89	0.83	0.89	48.3
Approach		1196	4.8	0.868	42.0	LOS C	22.1	162.4	0.89	0.92	1.03	47.2
NorthWest: Wyong Hospital												
27	L2	100	2.1	0.141	16.0	LOS B	1.9	13.8	0.69	0.69	0.69	53.2
27a	L1	14	7.7	0.201	44.6	LOS D	2.8	20.7	0.90	0.73	0.90	10.6
29	R2	46	4.5	0.201	46.7	LOS D	2.8	20.7	0.90	0.73	0.90	30.6
Approach		160	3.3	0.201	27.3	LOS B	2.8	20.7	0.77	0.70	0.77	43.9
SouthWest: Pacific Highway												
30	L2	193	0.5	0.231	26.4	LOS B	6.3	44.4	0.66	0.76	0.66	40.1
31	T1	425	11.6	0.510	40.5	LOS C	10.1	77.6	0.92	0.77	0.92	50.0
32a	R1	99	7.4	0.215	25.5	LOS B	2.9	21.5	0.83	0.74	0.83	42.6
Approach		717	8.1	0.510	34.6	LOS C	10.1	77.6	0.84	0.76	0.84	47.7
All Vehicles		2444	5.6	0.868	37.8	LOS C	22.1	162.4	0.85	0.83	0.92	46.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P6	NorthEast Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P8	SouthWest Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	49.3	LOS E			0.95	0.95

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: 1 [Pacific Highway with Craigie Avenue (AM) - EXISTING+DEV]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	200	6.3	0.234	21.7	LOS B	6.8	50.3	0.63	0.64	0.63	41.8
6a	R1	62	0.0	0.640	52.2	LOS D	10.4	73.9	0.98	0.82	0.99	9.5
6b	R3	124	2.5	0.640	54.9	LOS D	10.4	73.9	0.98	0.82	0.99	37.6
Approach		386	4.1	0.640	37.3	LOS C	10.4	73.9	0.80	0.73	0.80	35.9
NorthEast: Pacific Highway												
24b	L3	113	9.3	0.085	8.6	LOS A	0.6	4.4	0.16	0.65	0.16	61.4
25	T1	749	5.9	0.910	65.0	LOS E	25.6	188.1	1.00	1.05	1.31	42.6
26	R2	435	0.7	0.734	29.2	LOS C	16.3	114.8	0.94	0.86	0.95	47.5
Approach		1297	4.5	0.910	48.1	LOS D	25.6	188.1	0.91	0.95	1.09	44.8
NorthWest: Wyong Hospital												
27	L2	131	2.4	0.169	15.8	LOS B	2.6	18.9	0.67	0.69	0.67	53.3
27a	L1	18	5.9	0.274	49.7	LOS D	4.1	30.3	0.92	0.75	0.92	9.8
29	R2	61	5.2	0.274	51.8	LOS D	4.1	30.3	0.92	0.75	0.92	29.0
Approach		209	3.5	0.274	29.2	LOS C	4.1	30.3	0.76	0.71	0.76	42.9
SouthWest: Pacific Highway												
30	L2	252	0.8	0.317	30.8	LOS C	9.7	68.2	0.71	0.78	0.71	37.7
31	T1	425	11.6	0.535	45.3	LOS D	11.1	85.7	0.94	0.78	0.94	48.3
32a	R1	99	7.4	0.189	25.6	LOS B	3.0	22.0	0.80	0.72	0.80	42.6
Approach		776	7.6	0.535	38.1	LOS C	11.1	85.7	0.85	0.77	0.85	45.7
All Vehicles		2668	5.2	0.910	42.1	LOS C	25.6	188.1	0.86	0.85	0.95	44.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P8	SouthWest Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	54.3	LOS E			0.95	0.95

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: 1 [Pacific Highway with Craigie Avenue (AM) - 10 YR]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	244	6.5	0.319	26.4	LOS B	9.4	69.5	0.71	0.69	0.71	39.1
6a	R1	47	0.0	0.695	53.7	LOS D	11.4	81.3	0.99	0.86	1.04	9.2
6b	R3	152	2.8	0.695	56.4	LOS D	11.4	81.3	0.99	0.86	1.04	37.1
Approach		443	4.5	0.695	39.6	LOS C	11.4	81.3	0.84	0.77	0.86	35.8
NorthEast: Pacific Highway												
24b	L3	137	9.2	0.105	8.7	LOS A	0.7	5.5	0.17	0.66	0.17	61.3
25	T1	914	5.9	0.902	59.7	LOS E	30.5	224.3	1.00	1.04	1.25	44.0
26	R2	334	0.6	0.645	28.1	LOS B	11.7	82.3	0.90	0.83	0.90	48.1
Approach		1384	4.9	0.902	47.0	LOS D	30.5	224.3	0.89	0.95	1.06	45.7
NorthWest: Wyong Hospital												
27	L2	100	2.1	0.147	17.9	LOS B	2.3	16.4	0.71	0.69	0.71	52.1
27a	L1	14	7.7	0.208	49.1	LOS D	3.1	22.7	0.91	0.73	0.91	9.9
29	R2	46	4.5	0.208	51.2	LOS D	3.1	22.7	0.91	0.73	0.91	29.2
Approach		160	3.3	0.208	30.2	LOS C	3.1	22.7	0.79	0.71	0.79	42.5
SouthWest: Pacific Highway												
30	L2	193	0.5	0.217	25.9	LOS B	6.5	45.7	0.62	0.75	0.62	40.4
31	T1	518	11.6	0.529	40.6	LOS C	13.0	99.9	0.91	0.77	0.91	50.0
32a	R1	121	7.8	0.278	27.5	LOS B	3.7	27.7	0.85	0.75	0.85	41.4
Approach		832	8.5	0.529	35.3	LOS C	13.0	99.9	0.83	0.76	0.83	47.9
All Vehicles		2819	5.8	0.902	41.4	LOS C	30.5	224.3	0.86	0.85	0.94	45.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P8	SouthWest Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	54.3	LOS E			0.95	0.95

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: 1 [Pacific Highway with Craigie Avenue (AM) - 10 YR+DEV]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	244	6.5	0.296	23.6	LOS B	8.8	65.3	0.67	0.67	0.67	40.6
6a	R1	62	0.0	0.740	55.2	LOS D	12.5	89.3	1.00	0.89	1.09	9.1
6b	R3	152	2.8	0.740	57.9	LOS E	12.5	89.3	1.00	0.89	1.09	36.7
Approach		458	4.4	0.740	39.3	LOS C	12.5	89.3	0.82	0.77	0.86	35.5
NorthEast: Pacific Highway												
24b	L3	137	9.2	0.104	8.7	LOS A	0.8	6.0	0.17	0.66	0.17	61.3
25	T1	914	5.9	1.031	114.3	LOS F	42.4	312.1	1.00	1.34	1.73	32.7
26	R2	435	0.7	0.789	34.4	LOS C	18.0	126.5	0.98	0.90	1.06	45.2
Approach		1485	4.7	1.031	81.2	LOS F	42.4	312.1	0.92	1.15	1.39	36.1
NorthWest: Wyong Hospital												
27	L2	131	2.4	0.176	16.5	LOS B	2.8	19.9	0.69	0.70	0.69	52.9
27a	L1	18	5.9	0.274	49.7	LOS D	4.1	30.3	0.92	0.75	0.92	9.8
29	R2	61	5.2	0.274	51.8	LOS D	4.1	30.3	0.92	0.75	0.92	29.0
Approach		209	3.5	0.274	29.6	LOS C	4.1	30.3	0.78	0.71	0.78	42.7
SouthWest: Pacific Highway												
30	L2	252	0.8	0.305	29.3	LOS C	9.4	66.2	0.69	0.78	0.69	38.5
31	T1	518	11.6	0.605	44.6	LOS D	13.6	105.0	0.95	0.80	0.95	48.6
32a	R1	121	7.8	0.246	26.5	LOS B	3.7	27.5	0.83	0.74	0.83	42.0
Approach		891	8.0	0.605	37.8	LOS C	13.6	105.0	0.86	0.78	0.86	46.2
All Vehicles		3043	5.5	1.031	58.7	LOS E	42.4	312.1	0.88	0.96	1.11	38.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P8	SouthWest Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	54.3	LOS E			0.95	0.95

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: 1 [Pacific Highway with Craigie Avenue (AM) - 10 YR+DEV - FIXED]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	244	6.5	0.521	20.6	LOS B	6.8	50.2	0.89	0.78	0.89	42.4
6a	R1	62	0.0	0.681	44.0	LOS D	10.2	72.4	0.98	0.86	1.03	10.8
6b	R3	152	2.8	0.681	46.7	LOS D	10.2	72.4	0.98	0.86	1.03	40.1
Approach		458	4.4	0.681	32.4	LOS C	10.2	72.4	0.93	0.81	0.96	38.3
NorthEast: Pacific Highway												
24b	L3	137	9.2	0.123	10.7	LOS A	1.6	11.7	0.31	0.68	0.31	59.8
25	T1	914	5.9	0.523	20.5	LOS B	15.7	115.8	0.76	0.67	0.76	58.2
26	R2	435	0.7	0.745	30.8	LOS C	15.8	111.6	0.96	0.87	1.00	46.8
Approach		1485	4.7	0.745	22.6	LOS B	15.8	115.8	0.78	0.73	0.79	55.3
NorthWest: Wyong Hospital												
27	L2	131	2.4	0.157	12.7	LOS A	2.1	15.2	0.63	0.68	0.63	55.2
27a	L1	18	5.9	0.255	40.7	LOS C	3.4	25.0	0.91	0.74	0.91	11.4
29	R2	61	5.2	0.255	42.8	LOS D	3.4	25.0	0.91	0.74	0.91	31.9
Approach		209	3.5	0.255	23.8	LOS B	3.4	25.0	0.74	0.70	0.74	45.7
SouthWest: Pacific Highway												
30	L2	252	0.8	0.375	31.8	LOS C	9.1	64.0	0.79	0.80	0.79	37.2
31	T1	518	11.6	0.441	15.4	LOS B	6.0	46.2	0.84	0.70	0.84	60.8
32a	R1	121	7.8	0.629	41.8	LOS C	5.6	41.8	0.92	0.84	0.98	34.5
Approach		891	8.0	0.629	23.6	LOS B	9.1	64.0	0.83	0.74	0.84	52.8
All Vehicles		3043	5.5	0.745	24.5	LOS B	15.8	115.8	0.81	0.74	0.83	51.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P6	NorthEast Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P7	NorthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P8	SouthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	44.3	LOS E			0.94	0.94

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

MOVEMENT SUMMARY

Site: 1 [Pacific Highway with Craigie Avenue (PM) - EXISTING]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	142	2.2	0.197	21.5	LOS B	4.1	29.4	0.70	0.66	0.70	42.1
6a	R1	37	0.0	0.503	36.9	LOS C	6.7	46.9	0.94	0.79	0.94	12.2
6b	R3	129	0.0	0.503	39.6	LOS C	6.7	46.9	0.94	0.79	0.94	42.6
Approach		308	1.0	0.503	30.9	LOS C	6.7	46.9	0.83	0.73	0.83	40.2
NorthEast: Pacific Highway												
24b	L3	124	3.4	0.103	9.7	LOS A	1.0	7.0	0.29	0.68	0.29	60.5
25	T1	498	4.9	0.557	33.4	LOS C	9.8	71.5	0.93	0.78	0.93	52.6
26	R2	143	0.7	0.444	28.4	LOS B	4.1	29.1	0.94	0.78	0.94	47.9
Approach		765	3.9	0.557	28.6	LOS C	9.8	71.5	0.83	0.76	0.83	52.8
NorthWest: Wyong Hospital												
27	L2	313	0.3	0.543	18.3	LOS B	6.2	43.7	0.89	0.80	0.89	52.0
27a	L1	81	0.0	0.637	39.4	LOS C	9.1	63.5	0.98	0.83	1.00	11.8
29	R2	134	0.0	0.637	41.5	LOS C	9.1	63.5	0.98	0.83	1.00	32.7
Approach		527	0.2	0.637	27.4	LOS B	9.1	63.5	0.92	0.81	0.93	43.1
SouthWest: Pacific Highway												
30	L2	81	0.0	0.090	20.0	LOS B	1.9	13.4	0.57	0.71	0.57	44.3
31	T1	755	4.3	0.843	42.6	LOS D	18.0	130.4	1.00	0.98	1.22	49.3
32a	R1	189	3.9	0.492	26.1	LOS B	5.6	40.7	0.90	0.78	0.90	42.2
Approach		1025	3.9	0.843	37.7	LOS C	18.0	130.4	0.95	0.92	1.11	48.3
All Vehicles		2626	2.8	0.843	32.2	LOS C	18.0	130.4	0.89	0.83	0.96	48.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P6	NorthEast Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P7	NorthWest Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P8	SouthWest Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			0.94	0.94

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

MOVEMENT SUMMARY

Site: 1 [Pacific Highway with Craigie Avenue (PM) - EXISTING+DEV]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	142	2.2	0.202	24.3	LOS B	4.6	33.0	0.71	0.67	0.71	40.5
6a	R1	46	0.0	0.556	41.9	LOS C	8.0	56.0	0.96	0.80	0.96	11.1
6b	R3	129	0.0	0.556	44.7	LOS D	8.0	56.0	0.96	0.80	0.96	40.8
Approach		318	1.0	0.556	35.2	LOS C	8.0	56.0	0.85	0.74	0.85	37.9
NorthEast: Pacific Highway												
24b	L3	124	3.4	0.104	10.0	LOS A	1.1	8.0	0.30	0.68	0.30	60.4
25	T1	498	4.9	0.500	34.2	LOS C	10.4	76.0	0.90	0.76	0.90	52.3
26	R2	181	0.6	0.520	29.2	LOS C	5.6	39.5	0.93	0.80	0.93	47.5
Approach		803	3.7	0.520	29.3	LOS C	10.4	76.0	0.82	0.75	0.82	52.3
NorthWest: Wyong Hospital												
27	L2	395	0.3	0.663	20.3	LOS B	9.5	66.7	0.92	0.82	0.92	50.8
27a	L1	102	0.0	0.792	48.0	LOS D	13.7	96.1	1.00	0.95	1.16	10.2
29	R2	168	0.0	0.792	50.1	LOS D	13.7	96.1	1.00	0.95	1.16	29.8
Approach		665	0.2	0.792	32.1	LOS C	13.7	96.1	0.95	0.88	1.02	40.8
SouthWest: Pacific Highway												
30	L2	102	0.0	0.109	20.4	LOS B	2.6	18.1	0.56	0.72	0.56	44.0
31	T1	755	4.3	0.756	39.0	LOS C	17.8	129.1	0.98	0.88	1.05	50.5
32a	R1	189	3.9	0.452	26.1	LOS B	5.9	42.6	0.86	0.77	0.86	42.2
Approach		1046	3.8	0.756	34.8	LOS C	17.8	129.1	0.92	0.85	0.96	49.3
All Vehicles		2833	2.6	0.792	32.7	LOS C	17.8	129.1	0.89	0.82	0.92	47.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P6	NorthEast Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P7	NorthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P8	SouthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	44.3	LOS E			0.94	0.94

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

MOVEMENT SUMMARY

Site: 1 [Pacific Highway with Craigie Avenue (PM) - 10 YR]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	174	2.4	0.246	26.8	LOS B	6.3	45.1	0.72	0.68	0.72	39.1
6a	R1	37	0.0	0.651	47.9	LOS D	10.0	70.2	0.98	0.83	1.00	10.1
6b	R3	158	0.0	0.651	50.6	LOS D	10.0	70.2	0.98	0.83	1.00	38.9
Approach		368	1.1	0.651	39.1	LOS C	10.0	70.2	0.86	0.76	0.87	37.1
NorthEast: Pacific Highway												
24b	L3	152	3.5	0.131	10.3	LOS A	1.5	10.5	0.32	0.69	0.32	60.1
25	T1	606	4.9	0.545	35.5	LOS C	13.7	100.2	0.90	0.76	0.90	51.8
26	R2	143	0.7	0.397	29.1	LOS C	4.4	30.7	0.90	0.79	0.90	47.6
Approach		901	4.0	0.545	30.2	LOS C	13.7	100.2	0.80	0.76	0.80	52.2
NorthWest: Wyong Hospital												
27	L2	313	0.3	0.527	21.2	LOS B	8.3	57.9	0.88	0.80	0.88	50.3
27a	L1	81	0.0	0.692	49.8	LOS D	11.3	79.2	1.00	0.86	1.04	9.9
29	R2	134	0.0	0.692	51.9	LOS D	11.3	79.2	1.00	0.86	1.04	29.2
Approach		527	0.2	0.692	33.4	LOS C	11.3	79.2	0.92	0.82	0.94	40.2
SouthWest: Pacific Highway												
30	L2	81	0.0	0.085	21.0	LOS B	2.2	15.3	0.54	0.71	0.54	43.6
31	T1	920	4.3	0.824	44.1	LOS D	25.0	181.2	1.00	0.95	1.11	48.7
32a	R1	232	4.1	0.531	26.0	LOS B	7.5	54.0	0.87	0.79	0.87	42.2
Approach		1233	4.0	0.824	39.2	LOS C	25.0	181.2	0.94	0.90	1.03	47.9
All Vehicles		3029	3.0	0.824	35.5	LOS C	25.0	181.2	0.89	0.83	0.93	47.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P6	NorthEast Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P8	SouthWest Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	49.3	LOS E			0.95	0.95

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: 1 [Pacific Highway with Craigie Avenue (PM) - 10 YR+DEV]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	174	2.4	0.246	26.8	LOS B	6.3	45.1	0.72	0.68	0.72	39.1
6a	R1	46	0.0	0.678	48.5	LOS D	10.7	74.6	0.99	0.85	1.03	10.0
6b	R3	158	0.0	0.678	51.3	LOS D	10.7	74.6	0.99	0.85	1.03	38.7
Approach		378	1.1	0.678	39.7	LOS C	10.7	74.6	0.87	0.77	0.89	36.5
NorthEast: Pacific Highway												
24b	L3	152	3.5	0.133	10.4	LOS A	1.5	11.1	0.32	0.69	0.32	60.0
25	T1	606	4.9	0.562	36.5	LOS C	13.9	101.6	0.91	0.77	0.91	51.5
26	R2	181	0.6	0.512	30.6	LOS C	5.7	40.4	0.94	0.80	0.94	46.9
Approach		939	3.8	0.562	31.1	LOS C	13.9	101.6	0.82	0.77	0.82	51.7
NorthWest: Wyong Hospital												
27	L2	395	0.3	0.646	21.7	LOS B	10.7	75.2	0.91	0.82	0.91	50.1
27a	L1	102	0.0	0.826	54.7	LOS D	15.4	108.1	1.00	0.98	1.19	9.2
29	R2	168	0.0	0.826	56.8	LOS E	15.4	108.1	1.00	0.98	1.19	27.8
Approach		665	0.2	0.826	35.6	LOS C	15.4	108.1	0.95	0.89	1.03	39.2
SouthWest: Pacific Highway												
30	L2	102	0.0	0.107	21.2	LOS B	2.8	19.5	0.55	0.72	0.55	43.4
31	T1	920	4.3	0.856	48.0	LOS D	26.4	191.6	1.00	0.98	1.17	47.5
32a	R1	232	4.1	0.541	26.7	LOS B	7.6	55.0	0.88	0.79	0.88	41.9
Approach		1254	3.9	0.856	41.8	LOS C	26.4	191.6	0.94	0.93	1.06	46.7
All Vehicles		3236	2.8	0.856	37.2	LOS C	26.4	191.6	0.90	0.85	0.96	46.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P6	NorthEast Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P8	SouthWest Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	49.3	LOS E			0.95	0.95

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: 1 [Pacific Highway with Craigie Avenue (PM) - 10 YR+DEV - FIXED]

Signalised Intersection of Pacific Highway with Craigie Avenue and Wyong Hospital entry
Site Category: Existing
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Craigie Avenue												
4a	L1	174	2.4	0.218	21.1	LOS B	5.3	37.8	0.67	0.65	0.67	42.3
6a	R1	46	0.0	0.649	43.2	LOS D	9.6	66.9	0.98	0.83	1.00	10.9
6b	R3	158	0.0	0.649	45.9	LOS D	9.6	66.9	0.98	0.83	1.00	40.4
Approach		378	1.1	0.649	34.2	LOS C	9.6	66.9	0.83	0.75	0.85	38.7
NorthEast: Pacific Highway												
24b	L3	152	3.5	0.163	13.7	LOS A	2.4	17.6	0.47	0.72	0.47	57.8
25	T1	606	4.9	0.352	19.2	LOS B	9.6	69.8	0.70	0.60	0.70	58.8
26	R2	181	0.6	0.401	26.6	LOS B	5.5	38.8	0.84	0.79	0.84	48.8
Approach		939	3.8	0.401	19.7	LOS B	9.6	69.8	0.69	0.65	0.69	57.0
NorthWest: Wyong Hospital												
27	L2	395	0.3	0.571	17.7	LOS B	8.3	57.9	0.86	0.80	0.86	52.3
27a	L1	102	0.0	0.792	48.0	LOS D	13.7	96.1	1.00	0.95	1.16	10.2
29	R2	168	0.0	0.792	50.1	LOS D	13.7	96.1	1.00	0.95	1.16	29.8
Approach		665	0.2	0.792	30.6	LOS C	13.7	96.1	0.92	0.86	0.98	41.5
SouthWest: Pacific Highway												
30	L2	102	0.0	0.121	23.3	LOS B	2.9	20.0	0.61	0.73	0.61	42.0
31	T1	920	4.3	0.600	13.1	LOS A	9.1	66.2	0.84	0.73	0.84	62.0
32a	R1	232	4.1	0.768	43.3	LOS D	11.5	83.5	0.95	0.93	1.11	33.9
Approach		1254	3.9	0.768	19.5	LOS B	11.5	83.5	0.84	0.77	0.87	56.7
All Vehicles		3236	2.8	0.792	23.6	LOS B	13.7	96.1	0.81	0.75	0.84	52.2

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

Movement Performance - Pedestrians

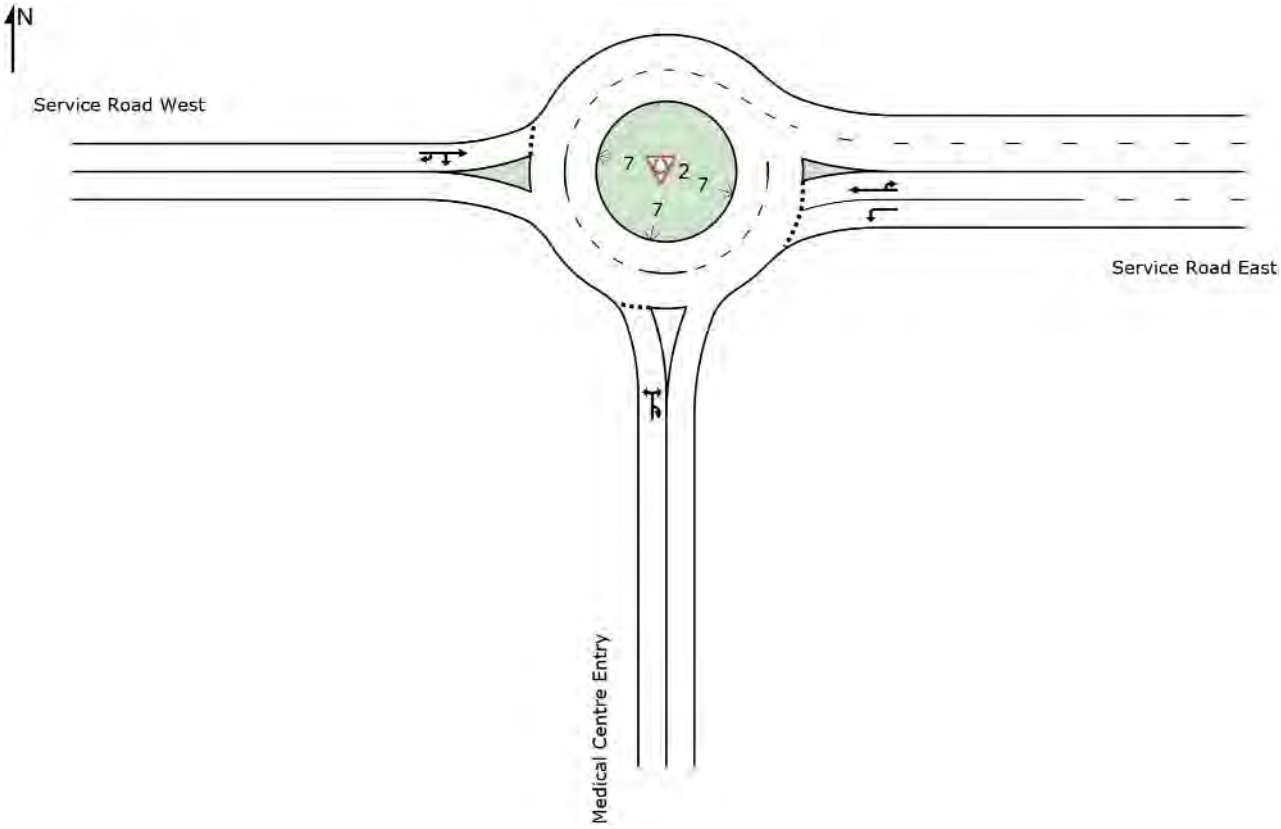
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P6	NorthEast Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P7	NorthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P8	SouthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	44.3	LOS E			0.94	0.94

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

SITE LAYOUT

Site: 2 [Internal Roundabout Wyong Hospital (AM) - EXISTING]

Two-lane internal roundabout at Wyong Hospital
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 2 [Internal Roundabout Wyong Hospital (AM) - EXISTING]

Two-lane internal roundabout at Wyong Hospital
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Medical Centre Entry												
1	L2	2	0.0	0.048	2.7	LOS A	0.2	1.4	0.46	0.50	0.46	18.3
3	R2	35	0.0	0.048	3.8	LOS A	0.2	1.4	0.46	0.50	0.46	19.7
3u	U	1	0.0	0.048	4.0	LOS A	0.2	1.4	0.46	0.50	0.46	21.9
Approach		38	0.0	0.048	3.8	LOS A	0.2	1.4	0.46	0.50	0.46	19.7
East: Service Road East												
4	L2	121	0.0	0.108	0.4	LOS A	0.5	3.2	0.03	0.09	0.03	21.4
5	T1	293	0.7	0.266	0.0	LOS A	1.4	9.5	0.03	0.13	0.03	19.4
6u	U	148	0.0	0.266	1.7	LOS A	1.4	9.5	0.03	0.13	0.03	25.8
Approach		562	0.4	0.266	0.5	LOS A	1.4	9.5	0.03	0.12	0.03	21.2
West: Service Road West												
11	T1	71	4.5	0.077	1.0	LOS A	0.3	2.2	0.31	0.19	0.31	18.8
12	R2	1	0.0	0.077	2.2	LOS A	0.3	2.2	0.31	0.19	0.31	23.3
12u	U	1	0.0	0.077	2.6	LOS A	0.3	2.2	0.31	0.19	0.31	25.4
Approach		73	4.3	0.077	1.0	LOS A	0.3	2.2	0.31	0.19	0.31	18.9
All Vehicles		673	0.8	0.266	0.8	LOS A	1.4	9.5	0.09	0.15	0.09	20.9

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

MOVEMENT SUMMARY

Site: 2 [Internal Roundabout Wyong Hospital (AM) - EXISTING + DEV]

Two-lane internal roundabout at Wyong Hospital
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Medical Centre Entry												
1	L2	2	0.0	0.056	4.1	LOS A	0.2	1.7	0.56	0.58	0.56	17.3
3	R2	35	0.0	0.056	5.2	LOS A	0.2	1.7	0.56	0.58	0.56	18.6
3u	U	1	0.0	0.056	5.4	LOS A	0.2	1.7	0.56	0.58	0.56	20.4
Approach		38	0.0	0.056	5.2	LOS A	0.2	1.7	0.56	0.58	0.56	18.5
East: Service Road East												
4	L2	121	0.0	0.111	0.4	LOS A	0.5	3.3	0.03	0.09	0.03	21.4
5	T1	420	0.8	0.380	0.0	LOS A	2.3	15.9	0.04	0.13	0.04	19.4
6u	U	213	0.0	0.380	1.7	LOS A	2.3	15.9	0.04	0.13	0.04	25.8
Approach		754	0.4	0.380	0.5	LOS A	2.3	15.9	0.04	0.12	0.04	21.2
West: Service Road West												
11	T1	101	4.2	0.114	1.4	LOS A	0.5	3.4	0.37	0.26	0.37	18.6
12	R2	1	0.0	0.114	2.5	LOS A	0.5	3.4	0.37	0.26	0.37	23.0
12u	U	1	0.0	0.114	3.0	LOS A	0.5	3.4	0.37	0.26	0.37	25.0
Approach		103	4.1	0.114	1.4	LOS A	0.5	3.4	0.37	0.26	0.37	18.7
All Vehicles		895	0.8	0.380	0.8	LOS A	2.3	15.9	0.10	0.15	0.10	20.8

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

MOVEMENT SUMMARY

Site: 2 [Internal Roundabout Wyong Hospital (PM) - EXISTING]

Two-lane internal roundabout at Wyong Hospital
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Medical Centre Entry												
1	L2	2	0.0	0.163	1.4	LOS A	0.7	4.8	0.32	0.41	0.32	19.3
3	R2	154	0.0	0.163	2.5	LOS A	0.7	4.8	0.32	0.41	0.32	20.9
3u	U	1	0.0	0.163	2.7	LOS A	0.7	4.8	0.32	0.41	0.32	23.3
Approach		157	0.0	0.163	2.5	LOS A	0.7	4.8	0.32	0.41	0.32	20.9
East: Service Road East												
4	L2	96	0.0	0.074	0.4	LOS A	0.3	2.2	0.05	0.09	0.05	21.4
5	T1	131	1.6	0.109	0.0	LOS A	0.5	3.5	0.04	0.09	0.04	19.5
6u	U	38	0.0	0.109	1.7	LOS A	0.5	3.5	0.04	0.09	0.04	26.2
Approach		264	0.8	0.109	0.4	LOS A	0.5	3.5	0.04	0.09	0.04	20.9
West: Service Road West												
11	T1	265	0.4	0.278	1.2	LOS A	1.4	9.7	0.39	0.27	0.39	18.6
12	R2	4	0.0	0.278	2.4	LOS A	1.4	9.7	0.39	0.27	0.39	22.9
12u	U	1	0.0	0.278	2.9	LOS A	1.4	9.7	0.39	0.27	0.39	24.9
Approach		271	0.4	0.278	1.2	LOS A	1.4	9.7	0.39	0.27	0.39	18.6
All Vehicles		692	0.5	0.278	1.2	LOS A	1.4	9.7	0.24	0.23	0.24	20.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2 [Internal Roundabout Wyong Hospital (PM) - EXISTING + DEV]

Two-lane internal roundabout at Wyong Hospital
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Medical Centre Entry												
1	L2	2	0.0	0.174	5.0	LOS A	0.7	5.2	0.39	0.70	0.39	25.5
3	R2	154	0.0	0.174	7.2	LOS A	0.7	5.2	0.39	0.70	0.39	25.1
3u	U	1	0.0	0.174	8.8	LOS A	0.7	5.2	0.39	0.70	0.39	25.2
Approach		157	0.0	0.174	7.2	LOS A	0.7	5.2	0.39	0.70	0.39	25.1
East: Service Road East												
4	L2	96	0.0	0.082	3.6	LOS A	0.4	2.5	0.05	0.52	0.05	30.9
5	T1	193	1.6	0.158	3.2	LOS A	0.8	5.4	0.05	0.54	0.05	32.4
6u	U	56	0.0	0.158	7.4	LOS A	0.8	5.4	0.05	0.54	0.05	30.3
Approach		344	0.9	0.158	4.0	LOS A	0.8	5.4	0.05	0.54	0.05	31.6
West: Service Road West												
11	T1	391	0.3	0.403	4.7	LOS A	2.3	16.2	0.46	0.60	0.46	30.0
12	R2	4	0.0	0.403	7.4	LOS A	2.3	16.2	0.46	0.60	0.46	28.6
12u	U	1	0.0	0.403	8.8	LOS A	2.3	16.2	0.46	0.60	0.46	28.6
Approach		396	0.3	0.403	4.7	LOS A	2.3	16.2	0.46	0.60	0.46	30.0
All Vehicles		897	0.5	0.403	4.9	LOS A	2.3	16.2	0.29	0.59	0.29	29.5

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