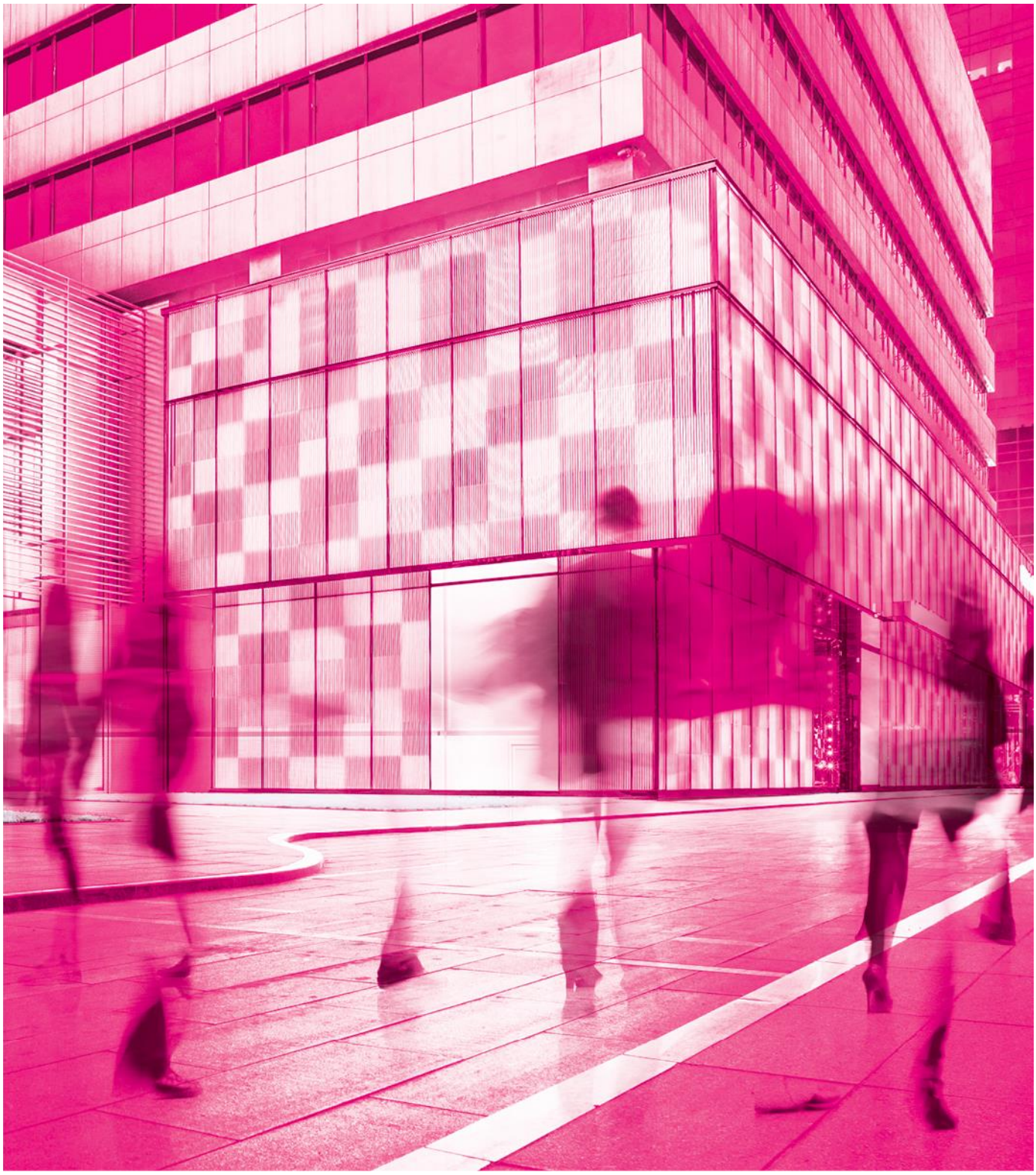

Traffic Impact Assessment;

Campbelltown Hospital Main Works

For Health Infrastructure

30 July 2018

parking;
traffic;
civil design;
communication;

ptc.

Document Control

Campbelltown Hospital, Traffic Impact Assessment

Issue	Date	Issue Details	Author	Reviewed
1	**09/01/2018**	**1st Draft**	**SC**	**AU**
2	**23/02/2018**	**2nd Draft**	**EY**	**AU**
3	**24/05/2018**	**3rd Draft**	**EY**	**AU**
4	**01/06/2018**	**4th Draft**	**EY**	**AU**
5	**05/06/2018**	**5th Draft**	**EY**	**AU**
6	**22/06/2018**	**6th Draft**	**EY**	**AU**
7	**26/06/2018**	**Final**	**EY**	**AU**
8	**27/06/2018**	**Final**	**EY**	**AU**
9	**30/07/2018**	**Final**	**EY**	**AU**

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Contents

1. Executive Summary

This Traffic Impact Assessment (TIA) evaluates the parking and traffic considerations as part of Campbelltown Hospital Redevelopment Stage 2.

As part of the Stage 2 Redevelopment, there will be removal of existing parking totalling 447 spaces and construction of on-grade parking totalling 201 spaces. This results in a net decrease of 246 spaces. Outside the scope of the Stage 2 Redevelopment are separate works involving the construction of a multi-deck car park (799 spaces) and modification to on-grade parking (245 gain and 210 loss resulting in net gain of 35 spaces). These works are expected to conclude prior to the Stage 2 Redevelopment works. Hence at the conclusion of Stage 2 Redevelopment there will be an increase from the existing provision of 1280 parking spaces to 1868 spaces (i.e. an increase of 588 spaces). A summary table is provided in Table 1.

The total provision of car parking has been designed to meet the projected parking requirements of the Hospital determined in a Parking Demand Assessment performed previously by ptc. For the purposes of traffic generation, 80% of the net increase in parking has been used to derive the total trip generation in the AM and PM peak scenarios. This is a very conservative estimate and is derived from occupancy surveys conducted in July 2017.

This net increase in parking is used to determine the traffic generation with 329 inbound / 141 outbound trips in the AM peak and 141 inbound / 329 outbound trips in the PM peak. SIDRA modelling has been performed and found that most surveyed intersections operate similarly pre- and post-development. The addition of a left-in / left-out intersection at Therry Road and relocation and modification of the Appin Road access is expected to further increase amenity and reduce the traffic strain on the existing Therry Road / Central Road roundabout. A summary of the SIDRA modelling summary results is provided in Table 2.

The proposal also involves significant redevelopment of the internal road layout, presenting benefits in improved access to the various car parks, greater flexibility for staff and public access, improved circulation of the internal roads, provision of car and bus drop-off bays, and potential for future expansion opportunities. Illustrated (Figure 1) is the proposed internal road layout.

A preliminary Construction Traffic Management Plan (CTMP) is provided within this report to outline the construction traffic measures to improve site safety to the public and workers. It is envisaged that this will be continually reviewed and amended if required, due to changes in design, advice from contractors once engaged, and/or additional requirements of DPE, Council, RMS or any other authority requirements. It outlines the high-level considerations for the construction of the proposal and for Construction Certification (CC), an updated CTMP will be required. Due to overlapping construction schedules, the final CTMP should perform a cumulative assessment to determine the total construction traffic impact as a result of the various works in the Hospital.

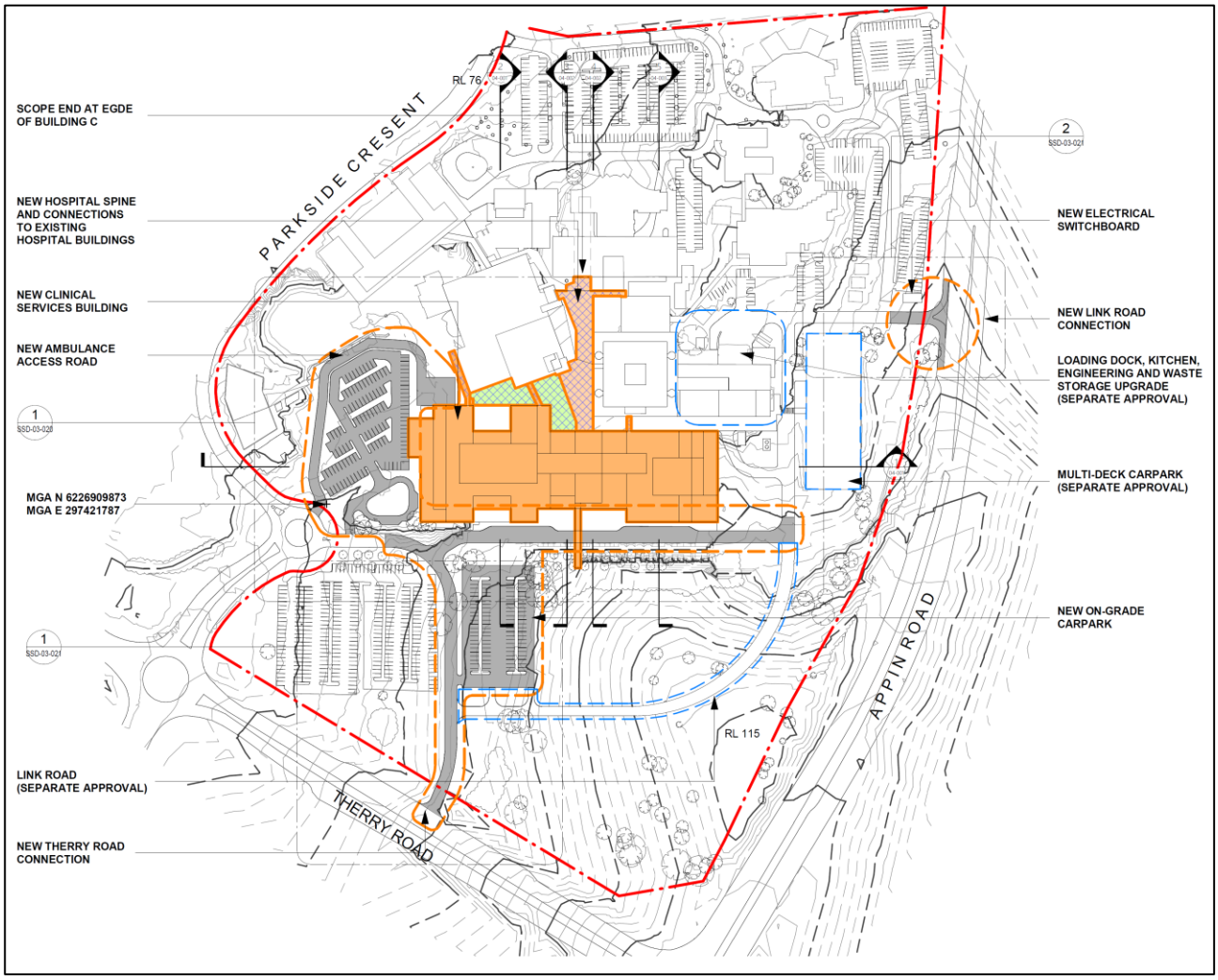


Figure 1 – Proposed Site Layout

Table 1 – Proposed Parking Provision (SSD scope and external to SSD)

Car Park Facility	Number of parking spaces
Existing	1280
SSD scope	-246
Outside SSD scope	+834
Total	1868

Table 2 – Summary of Existing and Future Traffic Conditions

Intersection	Time	Period	Level of Service	Degree of Saturation (v/c)	Average Delay (s)	95% Queue Length (m)
Therry Road / Central Road Roundabout	AM Peak	Existing	LOS A	0.421	8.2	16.5
		Development	LOS A	0.488	9.0	21.3
	PM Peak	Existing	LOS B	0.767	16.3	45.7
		Development	LOS B	0.876	20.3	67.7
Parkside Crescent / Central Road Roundabout	AM Peak	Existing	LOS A	0.264	5.3	11.4
		Development	LOS A	0.402	6.2	20.9
	PM Peak	Existing	LOS A	0.338	6.2	15.3
		Development	LOS A	0.410	7.0	19.7
Parkside Crescent Access	AM Peak	Existing	LOS A	0.159	2.0	5.2
		Development	LOS A	0.193	2.3	6.6
	PM Peak	Existing	LOS A	0.235	1.2	2.6
		Development	LOS A	0.265	1.4	4.0
Appin Road Access	AM Peak	Existing	LOS A	0.406	0.5	1.5
		Development	LOS A	0.438	0.7	0.0
	PM Peak	Existing	LOS A	0.275	0.5	3.3
		Development	LOS A	0.310	1.0	0.0
Therry Road / Appin Road	AM Peak	Existing	LOS A	0.769	14.3	151.1
		Development	LOS B	0.862	18.6	207.5
	PM Peak	Existing	LOS B	0.834	17.8	104.7
		Development	LOS B	0.896	25.8	166.5
Therry Road new access	AM Peak	Existing	N/A	N/A	N/A	N/A
		Development	LOS A	0.114	0.5	0.7
	PM Peak	Existing	N/A	N/A	N/A	N/A
		Development	LOS A	0.263	0.5	2.6

2. Secretary's Environmental Assessment Requirements

Below is a summary table of the Secretary's Environmental Assessment Requirements (SEARs) for the proposed development and the response to each requirement. The application number for the SEARs is SSD 9241 and date of issue is 18 April 2018.

Table 3 – Response to SEARs regarding traffic elements

Requirement	Response / Reference
Address the relevant planning provisions, goals and strategic planning objectives in the following: • *Future Transport Strategy 2056 and supporting plans* • *Planning Guidelines for Walking and Cycling*	The documents are considered in the preparation of this report and relevant planning provisions, goals and strategic planning objectives are adopted where appropriate.
Accurate details of the current daily and peak hour vehicle, public transport, pedestrian and cycle movement and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;	Details of the daily and peak hour vehicle traffic have been collected from tube count data and intersection surveys. This is summarised and analysed in Section 8. A qualitative assessment of the existing transport facilities, and online survey results from a previous report is provided in Section 5.
An assessment of the operation of existing and future transport networks including the bus network and their ability to accommodate the forecast number of trips to and from the development;	The existing transport network is outlined in Section 5. The existing bus utilisation is extremely low (see Section 5.4.2) and there is forecast to be ample capacity, especially as the number of bus services to the Hospital is to be increased towards the end of the year (see Section 5.4.2).
Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips;	The trip generation of the Hospital redevelopment is assessed based on the net increase in parking. See Sections 8.2 and 8.3.
The adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development	Existing utilisation of public transport and active travel is very low (see Sections 5.4 and 5.5). Future upgrades to infrastructure will be determined following discussions with the DoP, TfNSW, and Campbelltown Council.
The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Roads and Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network	The proponent is in discussion with RMS and TfNSW in regard to future transport need as part of this development. The design is still undergoing revision and this may affect the position of the bus stop/bays and bus access and egress routes. If any substantial changes are expected, discussions will be held with

Requirement	Response / Reference
	RMS and TfNSW to discuss the suitability of proposed bus arrangements.
Details of any upgrading or road improvement works required to accommodate the proposed development	An additional left-in / left-out entry on Therry Road is proposed and the existing Appin Road access is proposed to be relocated further south. See Section 9.
Details of travel demand management measures to encourage sustainable travel choices and details of programs for implementation;	Refer to the Green Travel Plan prepared by **ptc.** (Attachment 4)
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 upgrading or road improvement works, if required (note: traffic modelling is to be undertaken with scope to be agreed by TfNSW and RMS in advance);	The impact of traffic generation has been assessed in a SIDRA network model (see Section 8.5). **ptc.** has contacted Campbelltown Council and the Department of Planning who have advised that there are no known nearby significant developments at this stage, hence a cumulative traffic assessment has not been undertaken. As discussed above, the proponent is in discussion with RMS in regard to future road network improvements as part of this project.
The proposed active transport access arrangements and connections to public transport services and surrounding walking and cycling networks	Refer to the Green Travel Plan prepared by **ptc.** (Attachment 4)
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	A high-level assessment of the preliminary access arrangements is discussed in Section 9.
Details of the proposed number of car parking spaces and compliance with appropriate parking codes and justification for the level of car parking provided on-site and measures to discourage staff from parking on surrounding residential streets (including the formulation of a Green Travel Plan for the hospital campus);	Details as to the car parking provision and adequacy in meeting the forecast demands is provided in Section 7. All car parking will be designed to the relevant Australian Standards at detailed design stage. The Green Travel Plan is provided as Attachment 4.
Details of the proposed number of bicycle parking spaces (in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance) and the provision of end-of-trip facilities	Campbelltown Council DCP does not specify a set rate for bicycle parking in Hospitals (only residential developments). As such, provision of bicycle parking will be on merit basis as part of the Hospital

Requirement	Response / Reference
	redevelopment, keeping in mind that current utilisation of cycling as a mode of transport is very low (see Section 5.5.2). Provision of bicycle parking and associated End of Trip Facilities (EOTF) should be conducted in a manner so as to provide a nominal amount of parking without limiting future expansion of bicycle parking and EOTF on the basis that greater amenity could encourage greater uptake of cycling. Bicycle parking will comply with AS2890.3.
Details of emergency vehicle access arrangements	Preliminary access arrangements for emergency vehicles have been discussed in Section 7.5.
An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures	An assessment of the crash statistics is presented in Section 5.3.
Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times)	There will be no change in loading delivery arrangements as part of the SSD scope.
In relation to construction traffic: • *Assessment of cumulative impacts associated with other construction activities;* • *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 access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle;*	An indicative Construction Management Plan is provided in Section 10.

Requirement	Response / Reference
• *Details of temporary cycling and pedestrian access during construction;* • *Details of proposed construction vehicle access arrangements at all stages of construction; and* • *Traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact (which must include vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures for all demolition/construction activities).*	

3. Introduction

3.1 Project Summary

ptc. has been engaged by Health Infrastructure (HI) to prepare a Traffic Impact Assessment for the proposal of the Campbelltown Hospital Stage 2 Development Main Works. The works include:

- Expansion of the Clinical Services Block;
- Decentralised site access;
- Establishment of an Education and Research precinct;
- Expansion of Cancer Therapy;
- Inpatient & Outpatient Expansion; and
- Centralisation of administration services

The location of the hospital is outlined in Figure 1 below.

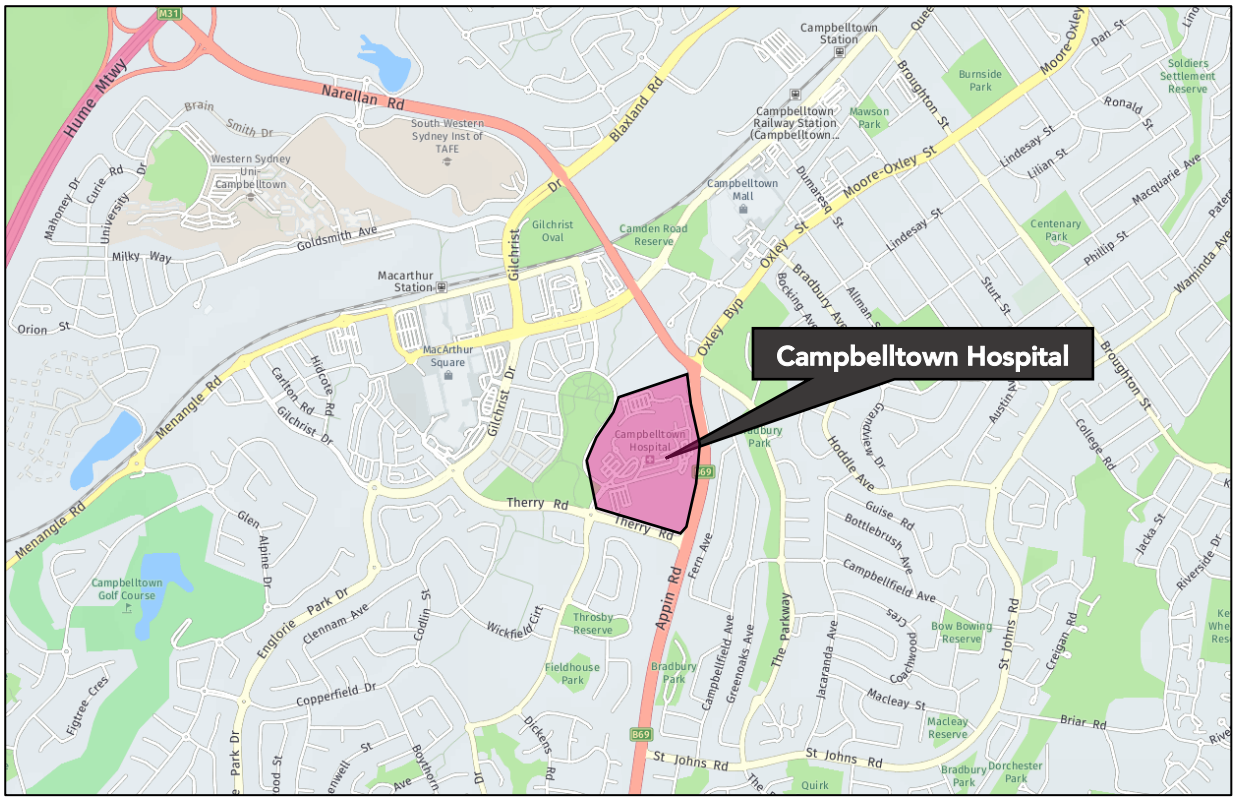


Figure 2 – Campbelltown Hospital location

3.2 Purpose of this Report

This report presents the following considerations in relation to the Traffic and Parking Impact Assessment of the Proposal:

Section 1	Executive Summary;
Section 2	Secretary's Environmental Assessment Requirements and ptc. response
Section 3	Introduction to the project;
Section 4	Background information of the project;
Section 5	A description of the road network serving the development property, existing transportation options and active transport facilities;
Section 6	A description of the proposed development;
Section 7	A description of the proposed parking provision;
Section 8	Determination of the traffic activity associated with the development proposal, and the adequacy of the surrounding road network;
Section 9	Assessment of the proposed development, vehicular access and internal circulation arrangements in relation to compliance with the relevant standards, Council policies and general best practice;
Section 10	Preliminary Construction Traffic Management Plan (CTMP);
Section 11	Summary & Conclusion

4. Background

4.1 Site Context

The development site is Campbelltown Hospital and lies within the following lot:

- Lot 6, DP1058047.

The site is located within an infrastructure zone (SP2), situated to the south-west of Campbelltown town centre. Key features surrounding the site include:

- To the north-east lies a commercial core precinct (B3) comprising of Campbelltown Mall, Australia Post and local restaurants and shops;
- To the west lies a public recreation precinct (RE1) which includes Marsden Park and Birunji Creek;

The greater residential precinct of Campbelltown, comprising typically of low density residential (R2) and high density residential (R4) zones.

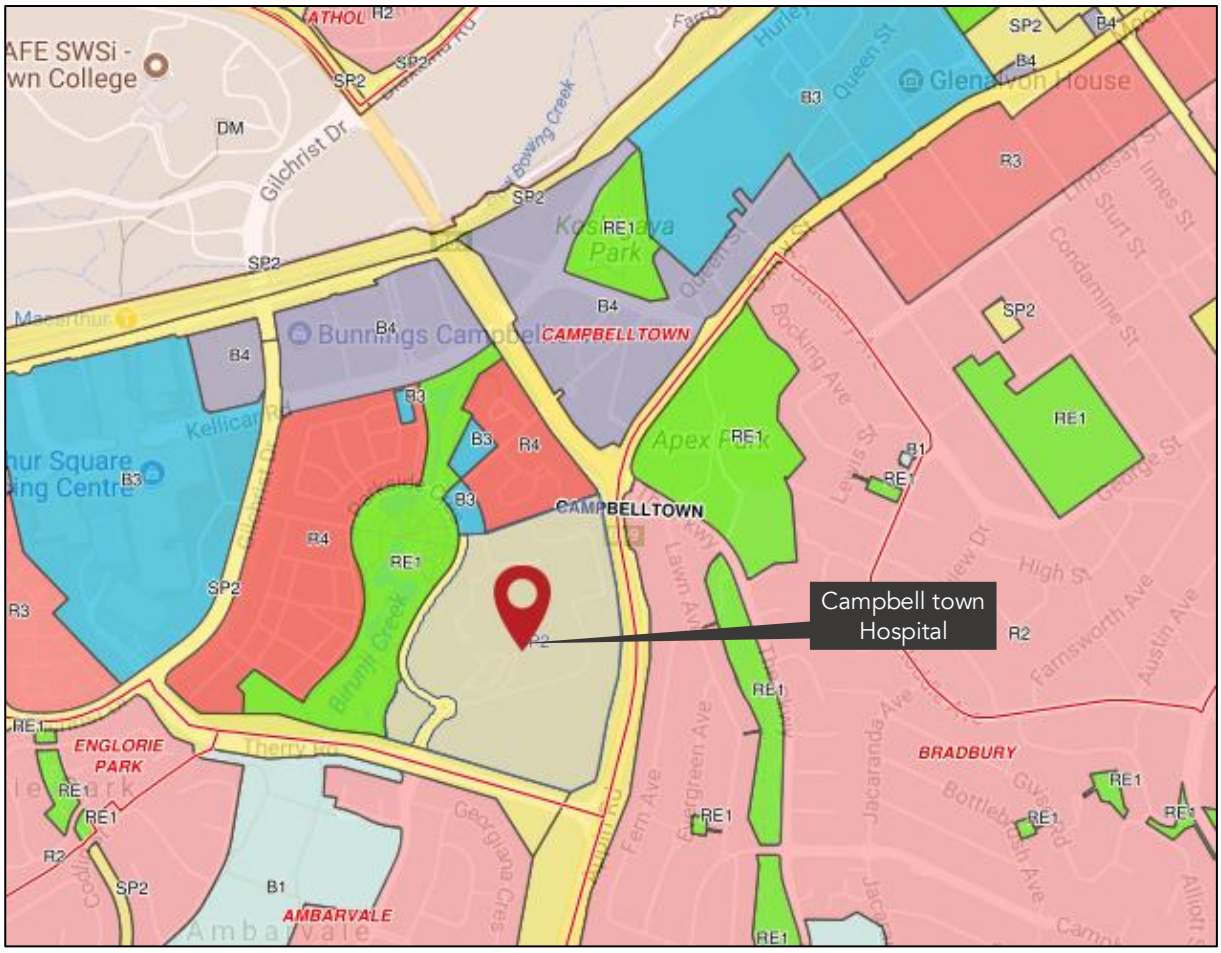


Figure 3 – Land Zoning Map (Source: Planning Portal NSW)

4.2 Campbelltown Hospital

Campbelltown Hospital is a major metropolitan hospital that provides a diverse range of services including intensive care, cardiology, maternity, gynaecology, paediatrics, palliative care, respiratory and stroke medicine, surgery and emergency medicine and broad aged care services.

The Hospital is part of the NSW health system with its major responsibility is to improve the health of the community of Macarthur. The Hospital delivers quality health care to the residents of the three local government areas of Wollondilly, Camden and Campbelltown.

A summary of the current key statistics of the Hospital is as follows:

Table 4 – Campbelltown Hospital Key Statistics

Key Statistics	
Clinical Staff (FTE)	1,101
Administration & Support Services Staff	767
Outpatient Occasions of Service (per annum)	216,682
Emergency Department Presentations (per annum)	70,408
Students (average per day)	160

The Hospital is to undergo significant expansion over the next 15 years in response to the following drivers:

- Expected population growth of 58% across the Macarthur LGAs (Campbelltown, Camden & Wollondilly);
- Growth of 144% in Macarthur residents aged 70+;
- Growth of 58% in children aged 0-14 years;
- Diabetes rates 32% higher than the State average;
- Emergency Department presentations expected to increase by 90%;
- More than 50% of Macarthur residents requiring surgery currently travel outside the Macarthur region for their healthcare.

As a result of the planned expansion over the next 15 years, additional parking will be required for staff, outpatients and visitors to inpatients. A detailed assessment of the parking demand and provision is provided in Section 7.

4.2.1 Campus Layout

The existing site plan of Campbelltown Hospital is as follows:

Figure 4 – Existing Site Layout

5. Existing Transportation Facilities

5.1 Road Hierarchy

The subject site is located in the suburb of Campbelltown and is primarily serviced by State roads including Appin Road, Oxley Street, Kellicar Road, Menangle Road and Narellan Road, as well as Regional roads including Therry Road and Gilchrist Drive. The site is also serviced by local roads managed by Campbelltown City Council.

Figure 5 – Road Hierarchy Map (Source: RMS Classification Review)

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- State Roads - Freeways and Primary Arterials (RMS Managed)
- Regional Roads - Secondary or sub arterials (Council Managed, Part funded by the State)
- Local Roads - Collector and local access roads (Council Managed)

The road network servicing the site is summarised in the tables below.

Appin Road	
Road Classification	State Road
Alignment	North – South
Number of Lanes	2 lanes in each direction (varies)
Carriageway Type	Divided
Carriageway Width	22m
Speed Limit	60km/h along site boundary
School Zone	No
Forms Site Frontage	Yes

Figure 6 – Appin Road (Northbound)

Therry Road	
Road Classification	State Road
Alignment	East – West
Number of Lanes	2 lanes in each direction
Carriageway Type	Divided
Carriageway Width	21m
Speed Limit	60km/h
School Zone	No
Parking Controls	No Stopping and No Parking on both sides
Forms Site Frontage	No

Figure 7 – Therry Road (Westbound)

Central Road	
Road Classification	Local Road
Alignment	North – South
Number of Lanes	1 lane in each direction
Carriageway Type	Divided by median island
Carriageway Width	20m
Speed Limit	50km/h
School Zone	No
Forms Site Frontage	No

Figure 8 – Central Road (Northbound towards the hospital)

Parkside Crescent	
Road Classification	Local Road
Alignment	North – South
Number of Lanes	1 lane in each direction
Carriageway Type	Divided
Carriageway Width	11m
Speed Limit	50km/h
School Zone	No
Parking Controls	3P
Forms Site Frontage	Yes

Figure 9 – Parkside Crescent (Northbound)

Hyde Parade	
Road Classification	Local Road
Alignment	East – West
Number of Lanes	1 lane in each direction
Carriageway Type	Divided
Carriageway Width	10m
Speed Limit	50km/h
School Zone	No
Parking Controls	2P on both sides
Forms Site Frontage	Yes

Figure 10 – Hyde Parade (Eastbound)

5.2 Existing Vehicular Access

Vehicle access to the Hospital Campus is provided in a number of locations in order to serve the various car parks, loading areas and the Emergency Vehicle areas. The key vehicle access locations to the Hospital are presented in Figure 11.

- **Access 1: Parkside Crescent / Central Road Roundabout:** The roundabout provides access to the car parks primarily located towards the southern end of the hospital such as CP7, CP7A, CP9, CP5 etc. Generally, traffic travelling to/from the south, east or west via Therry Road and Woodhouse Drive use these hospital entrances. Tube count data (collected between 16 July 2017 and 22 July 2017, refer to Figure 23) indicates that this roundabout served an average of 6,951 vehicles per day (77% of hospital traffic).
- **Access 2 Parkside Crescent Access**: This left-in/ left-out access primarily serves car parks CP2 and CP3. Generally, traffic coming from the north and travelling to the south use this access. This access served an average of 1,489 vehicles per day (16% of hospital traffic).
- **Access 3 Appin Road Access:** This left-in/left-out access primarily serves the car parks located towards the eastern and northern ends (e.g. car parks 1, 2, 3, 4, 5 etc.). This access served an average of 651 vehicles per day, representing 7% of daily hospital traffic.

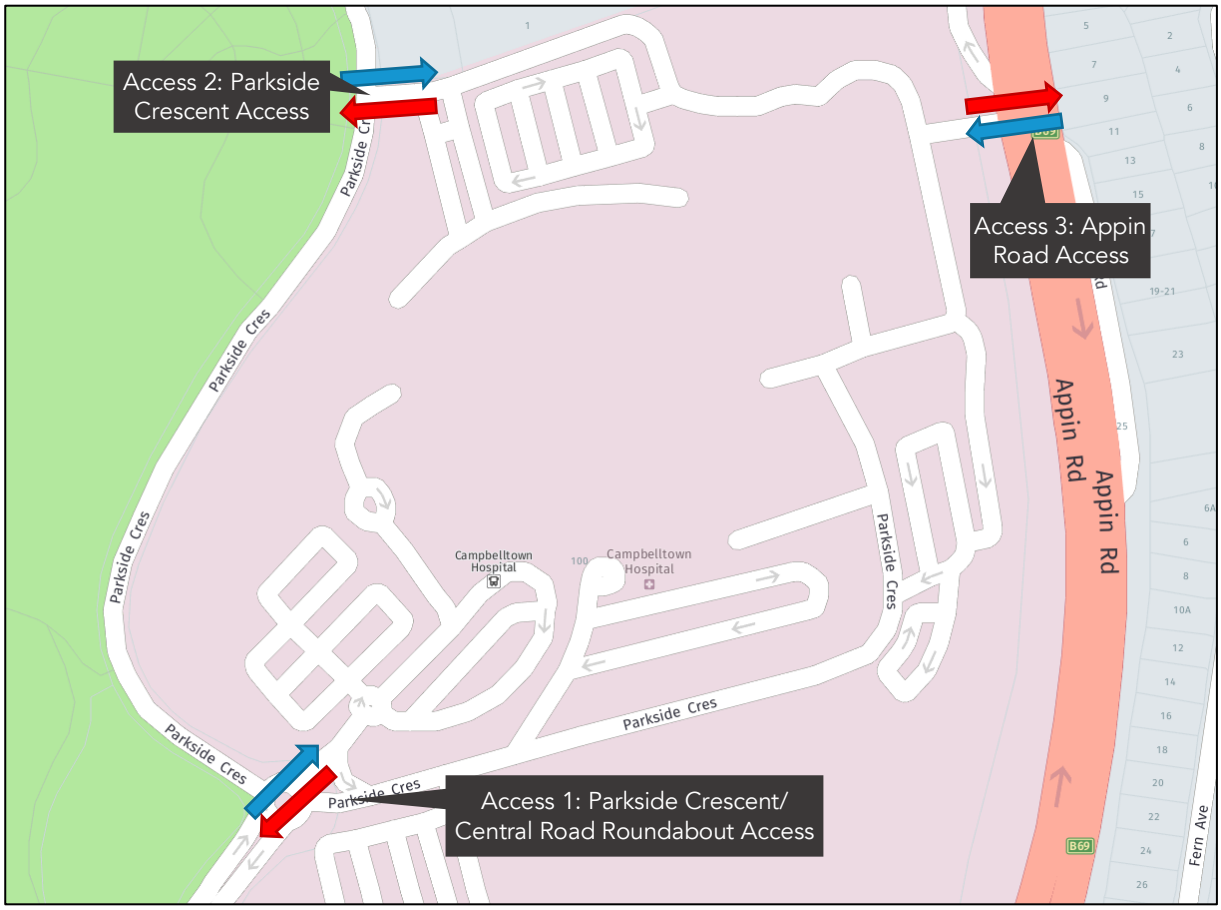


Figure 11 – Existing Vehicular Access Locations

5.2.1 Key Intersections

In addition to the vehicular access points in Section 5.2, the following key intersections currently exist within the vicinity of the site:

- Parkside Crescent Access: Priority controlled left-in / left-out T-junction
- Parkside Crescent / Central Road Roundabout: Priority controlled roundabout
- Therry Road / Central Road Roundabout: Priority controlled roundabout
- Appin Road Access: Priority controlled left-in / left-out T-junction
- Therry Road / Appin Road: Signalised T-junction

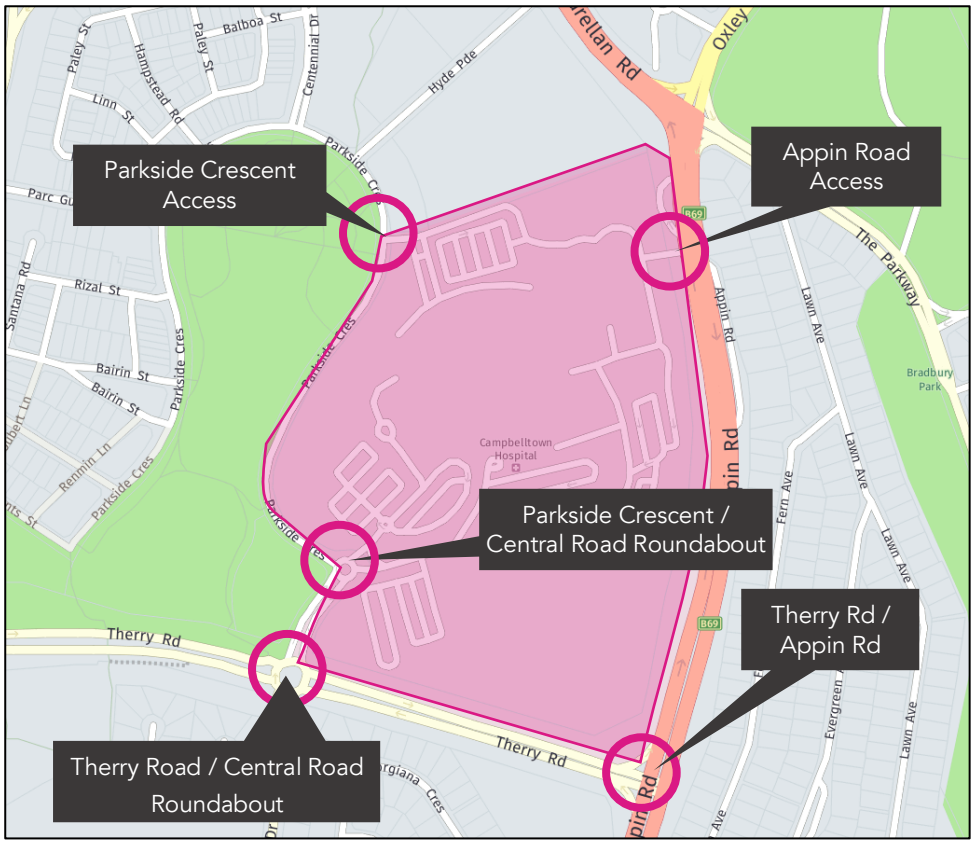


Figure 12 – Key Intersections

5.3 Crash Statistics

Transport for NSW (TfNSW) crash data provides crash statistics in the immediate area over the five year period from 2012-2016.

A review of the data indicates that crashes in the vicinity of the Hospital have occurred at the following key intersections:

- Narellan Road/ Appin Road
- Therry Road/ Appin Road
- Therry Road/ Central Road
- Parkside Crescent/ Hyde Parade

Over the five-year reporting period, no fatal crashes have been recorded. The majority of the crashes that have been recorded range from non-casualty to moderate injuries, with eight recorded crashes which involved serious injuries. Moreover, a larger number of these crashes were caused by rear-ending. It is noted that this assessment does not imply that there are any existing traffic issues. In addition, there were no crashes that resulted in serious or fatal injuries at any of the existing Hospital entrances.

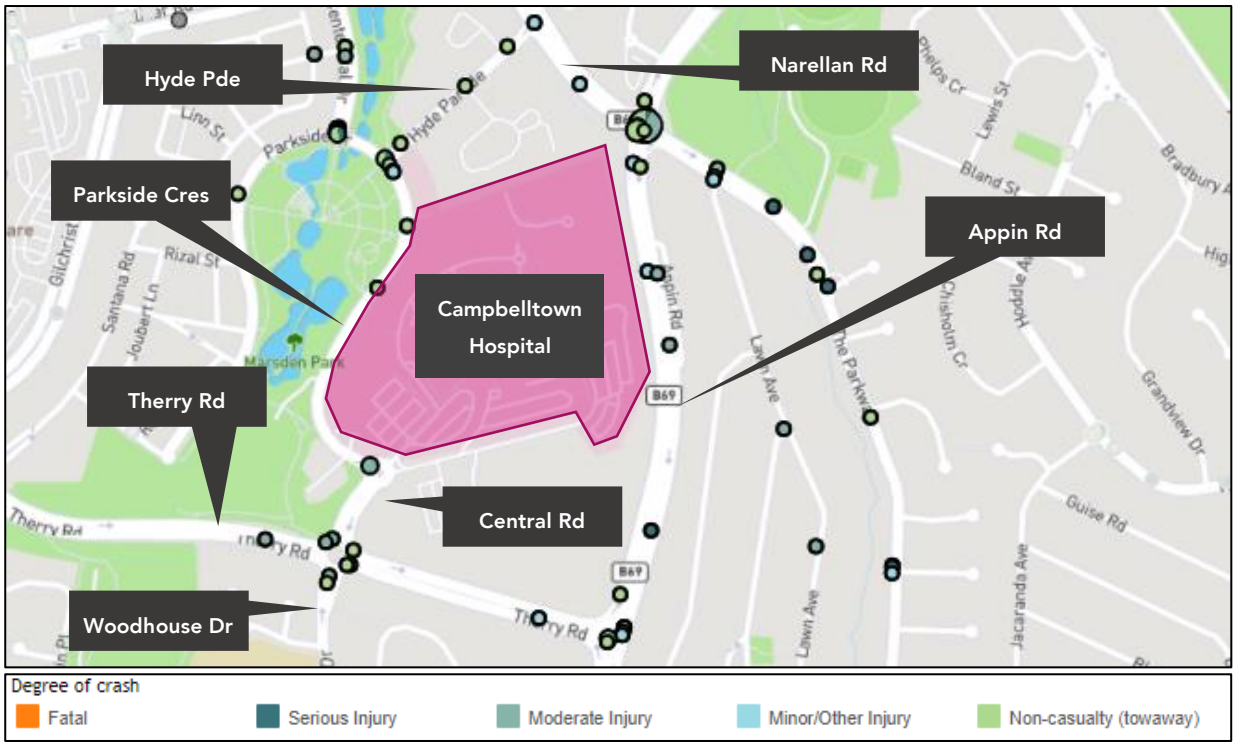


Figure 13 – TfNSW Crash and Casualty Statistics (2012-2016)

5.4 Public Transport

The development site is served by a number of public transport services. The NSW Planning Guidelines for Walking and Cycling 2004 suggests a distance of up to 400m and 800m reflects comfortable walking distance as access to local amenities and public transport links, respectively. Furthermore, the Guidelines also suggest a distance of 1500m is suitable for cycling accessibility to public transport facilities and local amenities.

Figure 14 illustrates an 800m radius catchment from the hospital below.

Figure 14 – 800m radius surrounding the Hospital

5.4.1 Train

The Hospital is serviced by two train stations, Campbelltown and Macarthur, within a 2km radius. Macarthur is the closest station, approximately 1.2km from the Hospital.

Campbelltown and Macarthur stations are both on the T8 Airport & South and Intercity Southern Highlands Lines. Services on these lines provide access to the campus from the north, south, east and west as follows:

Table 5 – Train Routes servicing Campbelltown Hospital

Train Line	From & To	Frequency (approx.)	Services operate approx. (Weekdays)	Services operate approx. (Weekends)
T8 Airport & South Line (Suburban)	Macarthur to City via Airport or Sydenham	Weekday every 5-10mins (peak) & every 15mins (off-peak), Weekend every 15mins	Macarthur 3:23am – 10:58pm, Campbelltown 3:27am – 11:02pm	Macarthur 3:43am – 11:28pm, Campbelltown 3:47am – 11:32pm
T8 Airport & South Line (Suburban)	City to Macarthur via Airport or Sydenham	Weekday every 15mins (peak) & every 15mins (off-peak), Weekend every 10-15mins	Campbelltown 5:28am – 1:18am, Macarthur 5:31am – 1:21am	Campbelltown 6:03am – 2:18am, Macarthur 6:06am – 2:21am
Southern Highlands Line (Intercity)	Goulburn to Campbelltown (departing to City)	Weekday every 30mins (peak) & 45-60mins (off-peak), Weekend every 50-70mins (peak) & every 120mins (off-peak)	Macarthur 4:47am–11:39pm Campbelltown arr. 4:50am–11:42pm, Campbelltown dep. 4:57am-10:17pm	Macarthur 5:22am – 11:28pm Campbelltown arr. 5:25am–11:31pm, Campbelltown dep. 5:32am – 11:32pm
Southern Highlands Line (Intercity)	Campbelltown to Goulburn (arriving from City)	Weekday every 30mins (peak) & 45-60mins (off-peak), Weekend every 60-90mins (peak) & every 120mins (off-peak)	Campbelltown arr. 5:27am –12:17am, Campbelltown dep. 5:28am -12:24am, Macarthur 5:31am – 12:27am	Campbelltown arr. 6:02am–12:47am, Campbelltown dep. 6:03am – 12:54am, Macarthur 6:06am – 12:57am

Services via the T8 Airport & South Line are limited-stops, with a reasonable frequency for both weekdays and weekends (from early morning to late evening). Services via the Southern Highlands Line serve as express services to and from City in additional to the frequent limited-stops services via the aforementioned T8 Airport & South Line.

Intercept surveys of Hospital staff and visitors conducted on 19 July 2017 and 20 July 2017 and online surveys for Hospital staff conducted from 18th July 2017 – 30th July 2017 by ptc. identified that 3% of outpatients and 2.9% of visitors travel to the Hospital via train. Only 0.6% of staff utilised trains (or a combination of trains and bus) as their preferred mode share option. This is mainly due to the need for transit connections between transport modes e.g. trains and buses. This is noted, in the survey, as the major reason why public transport utilisation is extremely low amongst hospital-related users.

5.4.2 Bus Services

The Hospital is serviced by a number of bus services (see Figure 15). These services are summarised in Table 6.

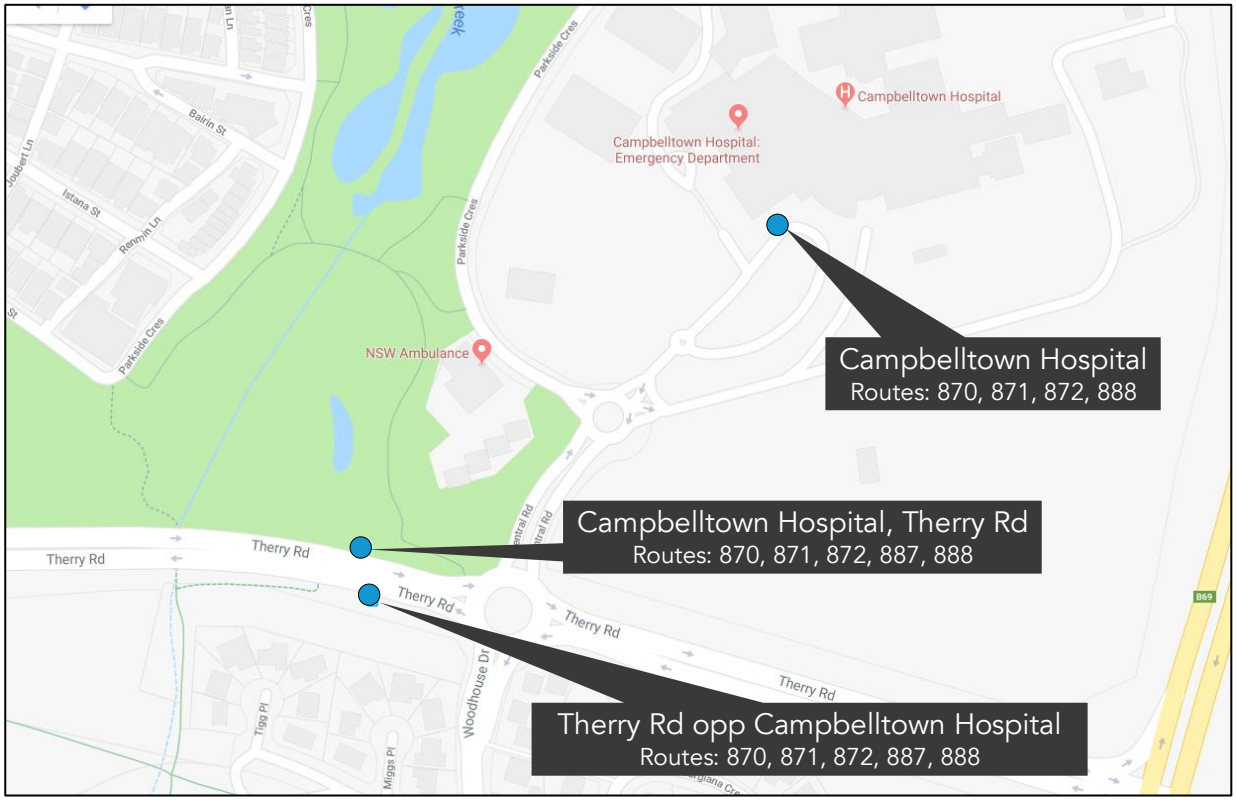


Figure 15 – Nearby Bus Stops

Table 6 – Bus Routes Servicing Campbelltown Hospital

Bus Route	From & To	Frequency (approx.)	Services operate approx. (Weekdays)	Services operate approx. (Weekends)
870	Campbelltown to Liverpool	Weekdays every 30-60 mins, Sat every 60 mins, Sun every 120 mins	6:02am – 10:01pm	Sat 9:06am – 9:00pm, Sun 8:56am – 7:45pm
870	Liverpool to Campbelltown	Weekdays every 30-60 mins, Sat every 60 mins, Sun every 60-120 mins	5:51am – 9:41pm	Sat 6:41am – 8:37pm, Sun 7:10am – 8:05pm
871	Campbelltown to Liverpool	Weekdays & Sat every 60 mins, Sun every 120 mins	9:18am – 1:15pm	Sat 7:26am – 5:25pm, Sun 7:55am – 3:55pm
871	Liverpool to Campbelltown	Weekdays & Sat every 60 mins, Sun every 120 mins	10:04am – 3:04pm	Sat 8:14am – 6:17pm, Sun 9:07am – 7:08pm

Bus Route	From & To	Frequency (approx.)	Services operate approx. (Weekdays)	Services operate approx. (Weekends)
872	Campbelltown to Liverpool	Weekday & Sat every 30 mins, Sun every 60 mins	6:01am – 10:30pm	Sat 6:50am – 10:30pm, Sun 7:23am – 9:45pm
872	Liverpool to Campbelltown	Weekdays & Sat every 30 mins, Sun every 60 mins	6:07am – 10:21pm	Sat 7:12am – 10:23pm, Sun 7:46am – 9:38pm
888	Campbelltown to St Helens Park Loop	Weekdays 2 services, Sat & Sun 1 service	11:59am & 3:38pm	Sat 12:13pm, Sun 11:57am

Currently, the utilisation of bus services at the hospital is quite low. Surveys undertaken by ptc. in July 2017 indicate that 4% of outpatients, 3.7% of visitors, and 0.3% of staff utilise bus as the preferred mode share option. Opal data collected for the bus stop inside the Hospital (from 7 May 2018 – 13 May 2018) reveals the average number of daily one-way trips to be 143 and the average number of hospital-related commuters per bus to be 1.3.

The number of bus services to the Hospital is expected to double towards the end of 2018. Discussions with the bus service provider, Interline Bus Company, indicate the expected upgrade to occur in November 2018.

5.5 Active Travel

5.5.1 Walking

Walking is a viable transport option for distances under 800m and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improved health for the individual, reduced congestion on the road network and reduced noise and emission pollution. Site observations show that the existing footpath networks and crossing points between the adjoining residential precincts and the hospital are generally adequate.

A very low proportion of hospital-users walk to and from the Hospital, with 0.2% of staff, 1.2% of visitors and no outpatients walking to the hospital (as per surveys conducted in July 2017).

5.5.2 Bicycle network

Similar to walking, cycling is only likely to be an attractive mode share for staff members who live within relatively close distance to the campus. Surveys conducted in July 2017 indicate that no staff members cycle to the Hospital, and 0.4% of other hospital-users bicycle/motorcycle to the Hospital.

Bicycle racks accommodating 10 bicycle parking spaces are currently provided at the Hospital, however, no end-of-trip-facilities (EOTF) (i.e. bicycle lockers, showers) are provided. In the surveys, 12.6% of staff responded that they will be interested in cycling if EOTF are provided.

The Hospital is reasonably accessible to bicycles from all directions, due to generous road width with hard shoulders in the locality; however, the area is reasonably hilly which may deter staff from cycling. The only dedicated cycle paths are from the north, on Narellan Road and Oxley Street as shown in Figure 16:

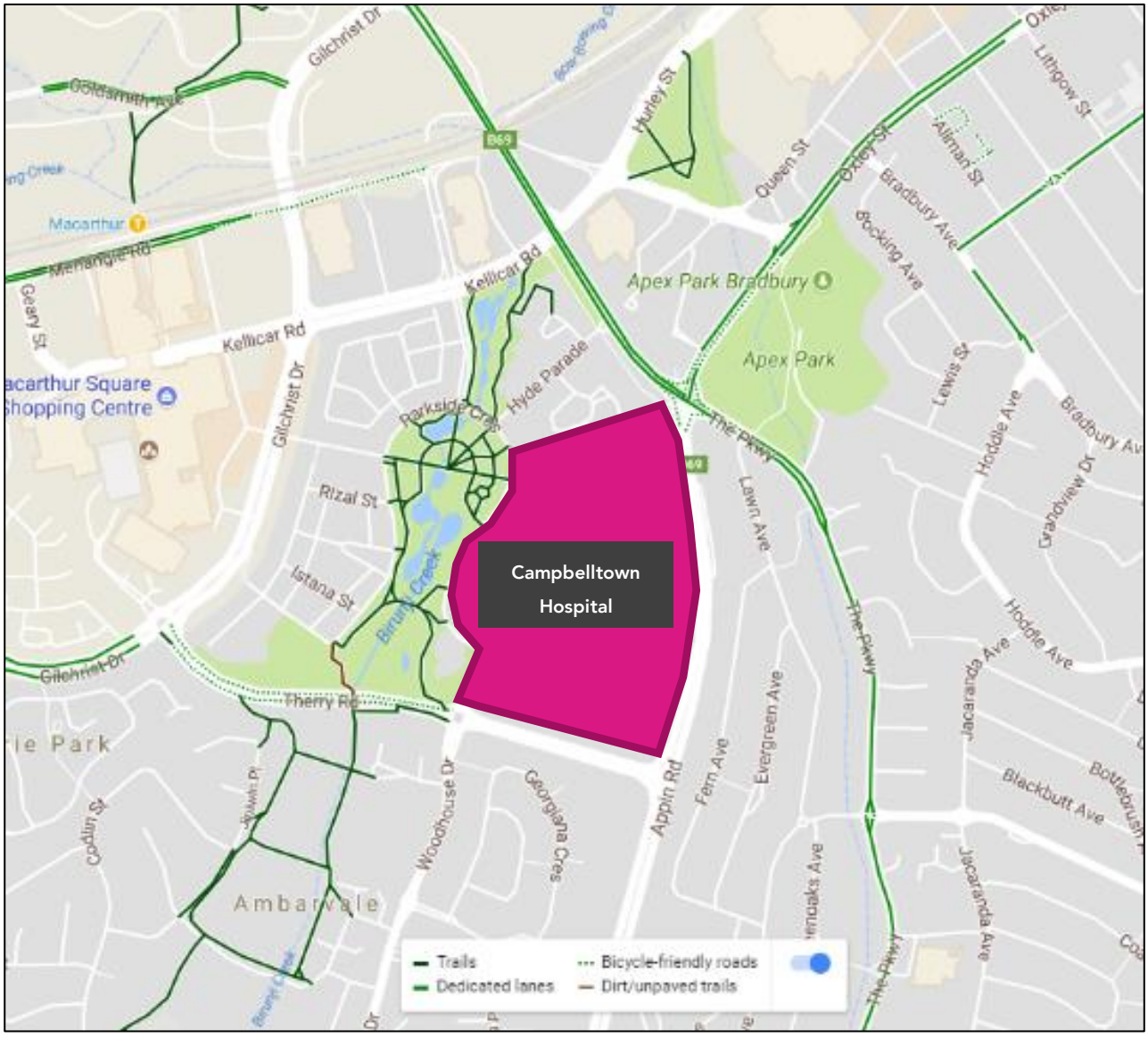


Figure 16 – Bicycle routes near Campbelltown Hospital

6. Development Proposal

6.1 Campbelltown Hospital Redevelopment Context

Following the Stage 1 redevelopment of Campbelltown Hospital which was completed in January 2016, is the Stage 2 redevelopment, a $632 million upgrade due for completion in 2024. The scope of this SSD (State Significant Development) involves:

- A new left-in/ left-out connection to Appin Road;
- A new left-in/ left-out connection to Therry Road;
- Removal of on-grade parking for 447 vehicles;
- New on-grade car parking for 201 vehicles; and
- Amendment of the ambulance / emergency department car parking.

The staging of the redevelopment is as follows:

- Commence Stage 2A – Enabling and Early Works October 2018
- Complete Stage 2A – Enabling and Early Works August 2019
- Commence Stage 2B – Main Works Preparation December 2018
- Complete Stage 2B – Main Works Preparation August 2019
- Commence Stage 2C – Main Works August 2019
- Complete Stage 2C – Main Works June 2022

Construction of the multi-deck car park is subject to a separate DA and construction of other permanent on-grade car parking is subject to a separate REF (The assessment of this component has been addressed in a previous Traffic Report prepared by ptc.[1])

A plan view of the redevelopment is provided in Figure 17. At this time, the concept plan is in its primary stage and may be redefined following discussions with the key major stakeholders (e.g. RMS, DoP, Campbelltown Council) and allocation of budget.

6.1.1 Appin Road Relocation

The Appin Road left-in / left-out access will be relocated approximately 90m to the south. The layout will be modified from the existing arrangement of a low-angle slip lane entry and high-angle exit to low-angle slip lanes for both entry and exit. This results in the provision of a 90m deceleration lane for entry and 90m acceleration lane for exit, enabling vehicles to access the Hospital at Appin Road without causing undue delay for through-bound vehicles along Appin Road.

The relocation of the access point further south also provides greater distance between this intersection and the signalised intersection to the north, Appin Road / Narellan Road, providing additional protection to this left-in / left-out intersection in the event of excessive queuing along the southern arm of the signalised intersection to the north.

[1] Campbelltown Hospital Redevelopment Stage 2 - Parking and Traffic Impact Assessment, 15 December 2017

In addition, the unused construction road adjacent to the existing Appin Road access will also be closed off as part of this proposal.

6.1.2 New Therry Road Access

As part of the proposal, a new left-in / left-out access is proposed along Therry Road, approximately halfway between the existing Therry Road roundabout and Therry Road / Appin Road intersection. The proposed arrangement is a T-junction with stop sign control for exiting vehicles. This is appropriate given the lower speed limit on Therry Road (60km/h compared to the 80km/h on Appin Road) which aids in gap finding and reduced vehicular conflict.

This new access will result in a reduction of vehicle volumes utilising the Therry Road roundabout and aid in reducing delays and queuing in the roundabout especially during the PM peak period. This is because this new access provides good accessibility for the two on-grade car parks at the south of the Hospital, encouraging drivers to use this access, thereby reducing the strain on the existing roundabout. Another added benefit is that exiting vehicles are placed into the midblock of Therry Road rather that at the roundabout which is much more sensitive to disruptions.

This option is also superior to the provision of a slip lane exit at the Therry Road roundabout as providing two individual access points rather than branching off a common road results in greater performance isolation. That is, in the slip lane scenario, if the through traffic queue extends beyond the slip lane entrance then the performance of the slip lane is affected, whereas with two access locations, the impact of queuing on one is unlikely to impact the other.

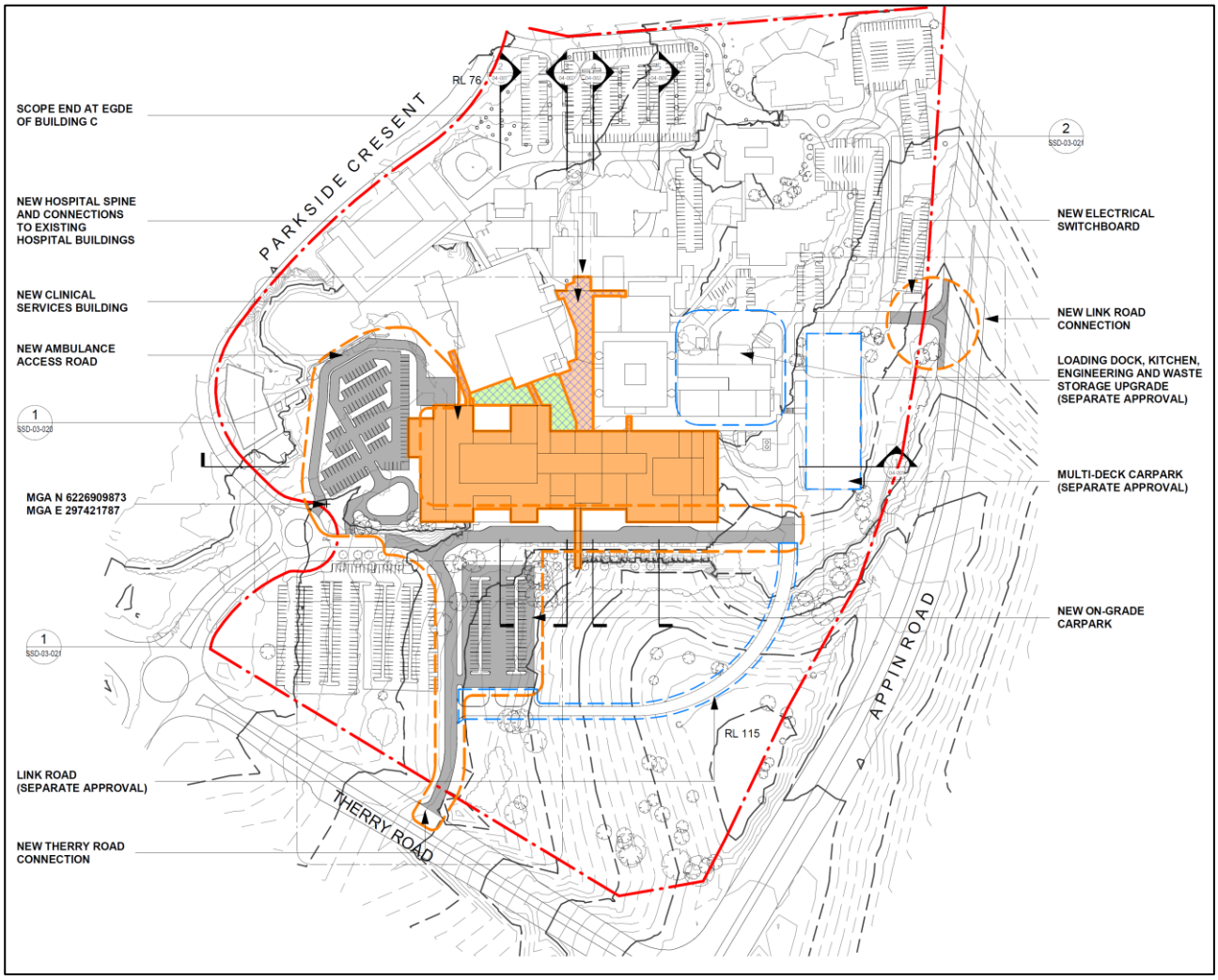


Figure 17 – Indicative Hospital Redevelopment Overview

The proposed Main Hospital development will result in increased Full time Equivalent staff, patients and their visitors. To facilitate the additional staff and visitors, a multi-deck car park and on-grade car parks will be constructed within the hospital campus. The methodology undertaken in this report in regards to traffic generation relates to the contribution of the multi-deck and on-grade car parks at the Hospital due to the net increase in parking provision as a result of these car parks. Forecast traffic generation is projected from the increase in parking as discussed in Section 8.

7. Parking Provision

7.1 Existing Car Parking Supply

7.1.1 Existing On-Campus Car Parking

The following table and associated figure summarises the capacity of the existing car parks on campus, with a total supply of 1280 spaces.

Table 7 – Existing On-Campus Car Parking Supply

Map Code	Car Park	Public Bays	Staff/Special Bays	Total Bays
CP1	Birunji	5	77	**82**
CP2 Staff	Cancer Therapy Centre	0	196	**196**
CP2 Public	Cancer Therapy Centre	42	2	**44**
CP3	Block C	20	0	**20**
CP4A	Waratah House	0	15	**15**
CP4	Waratah House	0	22	**22**
CP5A	Engineering Office	0	6	**6**
CP5	Staff Car Park 2	0	248	**248**
CP6	Visitor Car Park 2	118	3	**121**
CP7A	Main Entrance	2	0	**2**
CP7	Staff Car Park 1 (VMO)	0	38	**38**
CP8A	In front of Emergency	10	0	**10**
CP8	Visitor Car Park 1	195	2	**197**
CP9	Staff Car Park 3	0	257	**257**
Drug	Drug Advisory Building	9	13	**22**
Total		401	879	**1280**

Figure 18 – Existing Car Parking

7.1.2 Existing Off-Campus Car Parking

The following table summarises the current off-campus parking within a 500m radius of the Hospital. The total supply comprises approximately 621 spaces (564 on-street bays and 57 off-street bays).

Table 8 – Existing Off-Campus Car Parking Supply

Location	Bay Type	Restricted Bays	Unrestricted Bays	Total Bays
Off-Street Car Parks				
Parkside Car Park 2	3P	20	N/A	20
Parkside Car Park 3	3P	24	N/A	24
Parkside Car Park 4	1/2P	13	N/A	13
Subtotal Off-Street Bays		**57**	**N/A**	**57**
On-Street Bays				
Parkside Cres East	3P 6.30am-3.30pm Mon-Fri	96	N/A	96
Parkside Cres West	3P and Unrestricted	27	129	156
Residential Area to the west of Parkside Cres	Unrestricted	N/A	140	140
Residential Area to the west of Centennial Dr	Unrestricted	N/A	93	93
Hyde Parade	2P 8am-6pm Mon-Fri, 8am-1pm Sat	N/A	29	29
Centennial Dr	3P and Unrestricted	36	14	50
Subtotal On-Street Bays		**159**	**405**	**564**
Total (all bays)		**216**	**405**	**621**

7.2 Parking Demand

7.2.1 Existing Parking Demand

The occupancy profile for the Hospital campus (outlined in yellow) over a "typical" weekday is illustrated in the following heatmaps. Green, being occupancy of less than 50%, Amber occupancy between 50% - 85% and Red occupancy greater than 85%. A detailed analysis of the occupancy profile for the Hospital campus has been conducted by **ptc.** and provided in the *Parking Demand Study and Traffic Assessment Report* (October 2017).

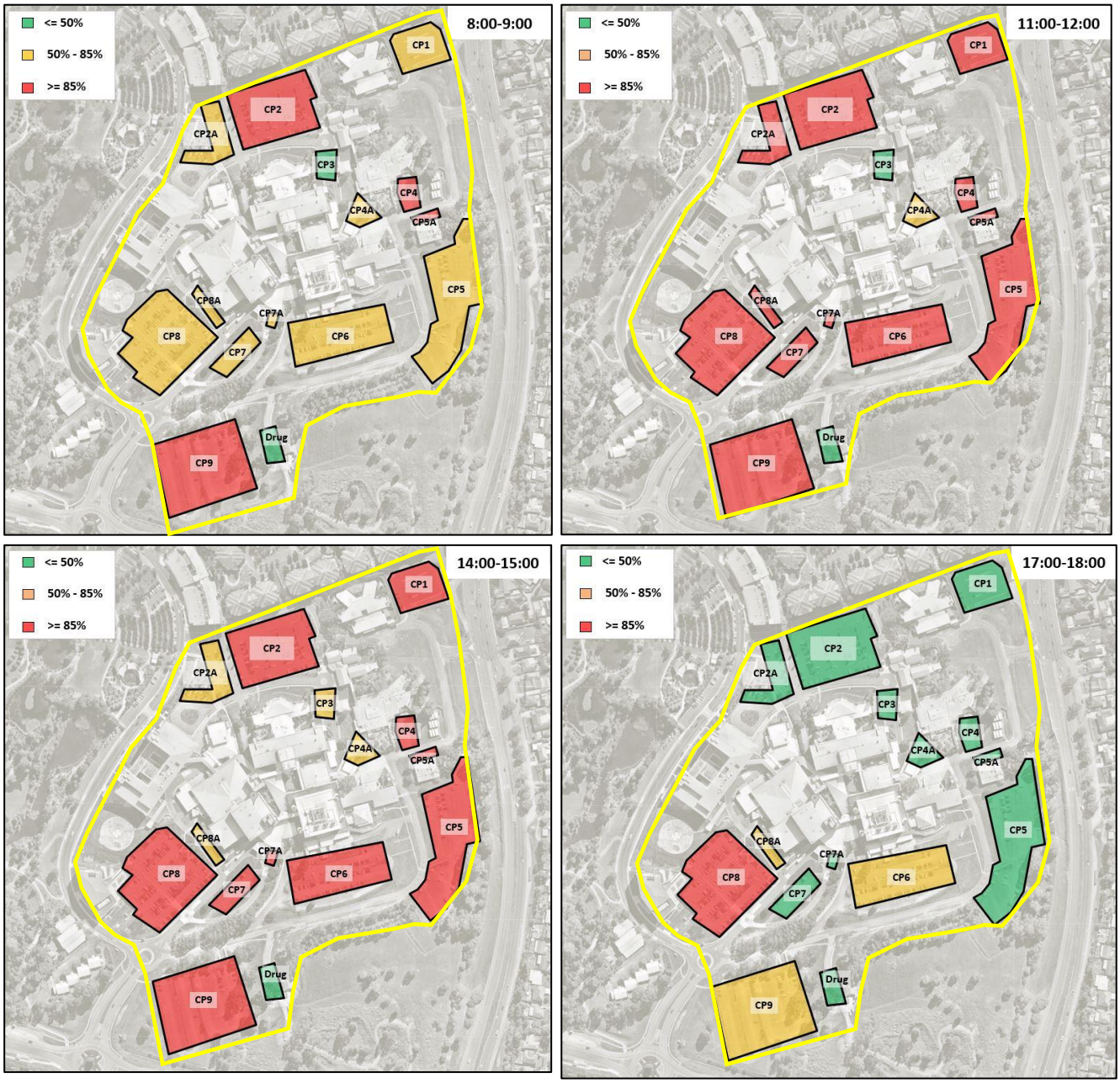


Figure 19 – Parking profile "typical" weekday

The car park occupancy profile is shown graphically below.

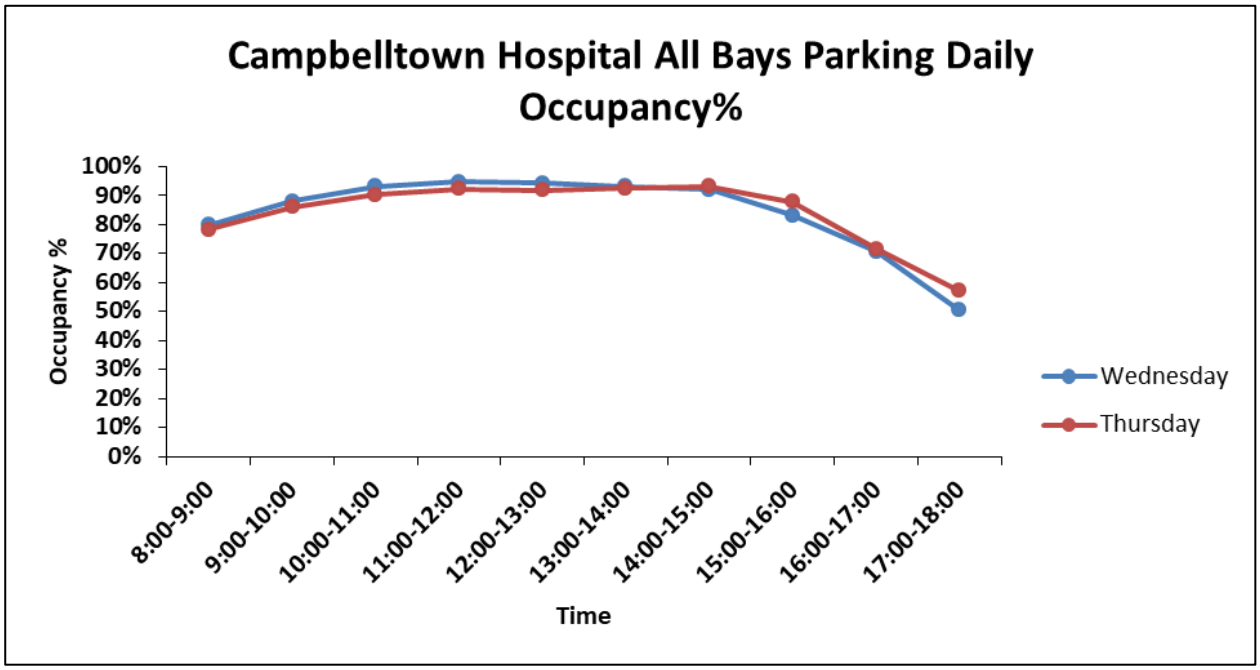


Figure 20 – Car Park Occupancy Profile Chart

7.2.2 Future Parking Demand

The estimation of future parking demand at Campbelltown Hospital has been conducted by **ptc.** utilising information provided by the Hospital, Health Infrastructure (HI) and Nepean Blue Mountains Local Health District (NBMLHD).

In addition, **ptc.** carried out the following surveys:

- Staff – via online methodology;
- Outpatients and visitors – via face to face interviews, on 2nd & 3rd November 2016;

The estimated future parking numbers were calculated based on various assumptions. A summary of the estimated current and future parking demand, is summarised in Table 9. A detailed analysis has been provided in the comprehensive *Parking Demand Study & Traffic Assessment*, prepared by **ptc.** on 10 October 2017.

Table 9 – Summary of Estimated Current & Future Parking Demand & Supply

Total Parking Supply/Demand Analysis	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
On Campus Supply				
Total On Campus Supply (without additional parking provision)	1280	1280	1280	1280
Demand				
Staff	975	1355	1607	1843
Public	231	324	423	503
LHD Controlled – Fleet Vehicles	4	6	8	9
Other users	88	112	135	158
Total Demand	1298	1797	2173	2513
Breakdown of Total Demand:				
General Hospital Only		1394	1685	1953
Paediatrics Only		218	236	256
Mental Health Only		185	252	303
Total		1797	2173	2513
Total On Campus Surplus/(Shortfall)	**(18)**	**(517)**	**(893)**	**(1233)**

The demand forecast indicates the need for additional parking in the future with an estimated future requirement as follows[2]:

- 2021/2022: 1797 spaces
- 2026/2027: 2173 spaces
- 2031/2032: 2513 spaces

[2] Existing supply plus forecast shortfall

7.3 Proposed Car Parking Provisions

As part of a separate DA, a multi-deck car park is to be provided along the eastern edge of the Hospital (see blue coloured car park in Figure 21). As part of a separate REF, car parks 5 and 5A (refer to Figure 4) are to be demolished and new on-grade car parking is to be provided (see pink car parks in Figure 21). These projects are forecast to be completed prior to the completion of the SSD works.

A summary of this car parking provision (which is outside the scope of the SSD) is provided in Table 10.

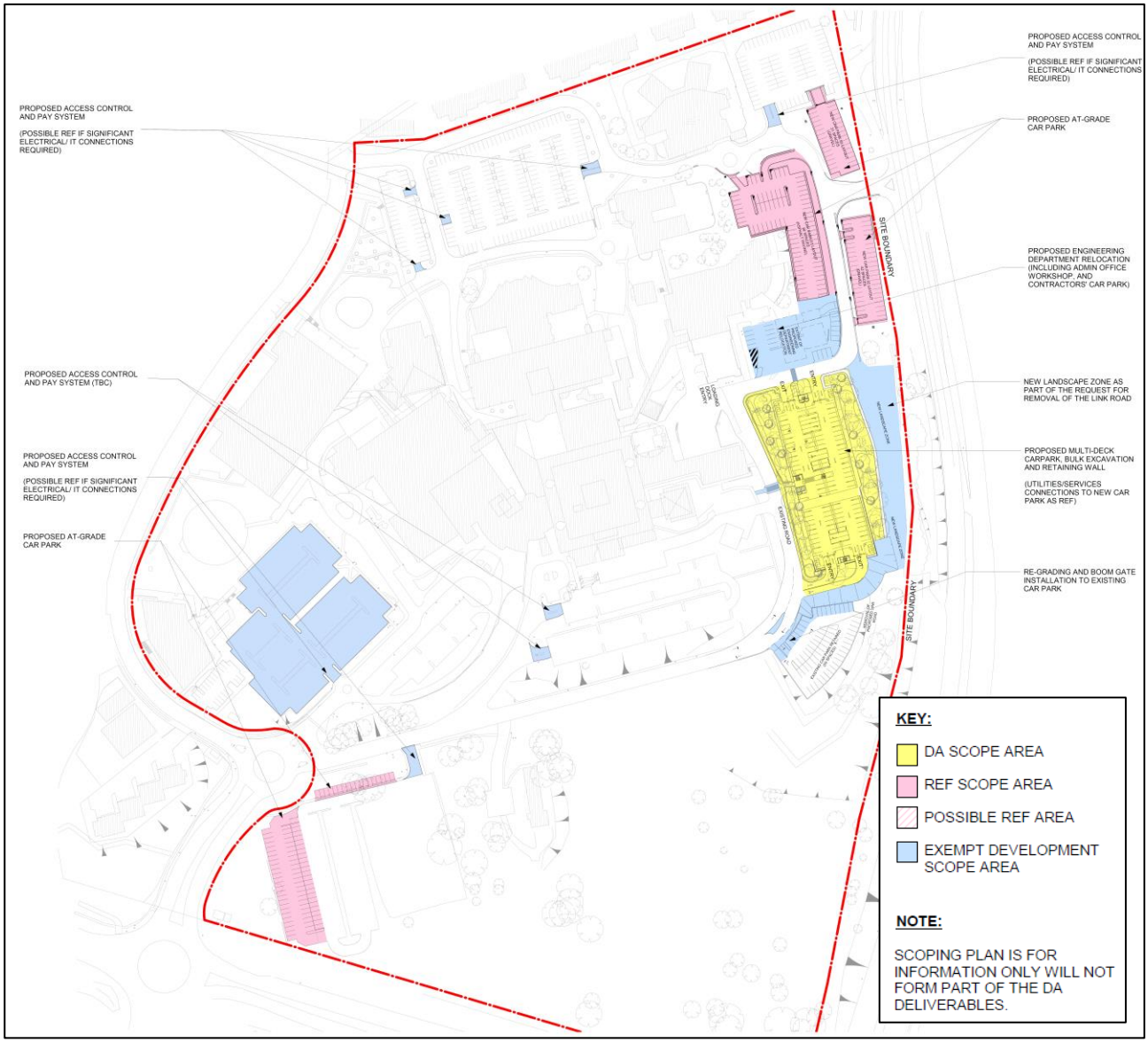


Figure 21 - Proposed multi-deck and on-grade car park facilities (outside the scope of the SSD) to accompany Campbelltown Hospital Redevelopment

Table 10 – Proposed Parking Provision that is outside the scope of the SSD

Car Park Facility	Number of parking spaces
Multi-Deck Car Park	+799
On-Grade Car Parks gain	+245
On-Grade Car Parks loss	-210
Net Increase	+834

As part of the SSD scope, there is a proposed removal of 447 spaces and construction of on-grade car parking providing 201 spaces (i.e. net decrease of 246 spaces). Thus, the parking provision following the completion of the SSD works is as follows:

Table 11 – Proposed Parking Provision (Overall)

Car Park Facility	Number of parking spaces
Existing	1280
SSD scope	-246
Outside SSD scope	+834
Total	1868

Therefore, the total parking will be 1,868 spaces, representing a 588 space increase from the existing 1,280 spaces. This meets the forecast demand of 1,797 spaces by 2021/2022.

7.4 Proposed bicycle parking provision

As stated in Section 5.5.2, bicycle racks are currently provided in the Hospital campus which accommodates 10 spaces.

Campbelltown Council DCP does not specify a set rate for bicycle parking in Hospitals (only residential developments). As such, bicycle parking will be provided on a merit basis, keeping in mind that current utilisation of cycling as a mode of transport is very low (see Section 5.5.2).

Provision of bicycle parking and associated EOTF should be conducted in a manner so as to provide a nominal amount of parking without limiting future expansion of bicycle parking and EOTF on the basis that greater amenity could encourage greater uptake of cycling.

Bicycle parking will comply with AS2890.3.

7.5 Emergency Vehicle Parking Arrangements

As part of the proposed redevelopment, 7 ambulance parking bays will be provided. The new ambulance parking will be provided adjacent to the new clinical services building via a new ambulance access road (see Figure 17)

Greater details as to access and circulation is provided in Section 9.

8. Traffic Impact Assessment

8.1 Existing Traffic Conditions

In order to determine the existing traffic activity associated with the Hospital, two forms of traffic surveys have been undertaken at key locations and the Hospital accesses – automatic tube counts and intersection surveys. The traffic surveys are discussed in the following sections. In addition, SCATs count data has been obtained from the RMS to determine existing traffic activity at the Therry Road / Appin Road intersection.

8.1.1 Tube Counts

As discussed in Section 5.2, Tube counts have been undertaken at 12 locations around the Hospital for the period from 16 July – 22 July 2017. The tube count locations are illustrated in Figure 22. The average annual daily traffic (AADT) recorded during this period is also presented in Figure 23.

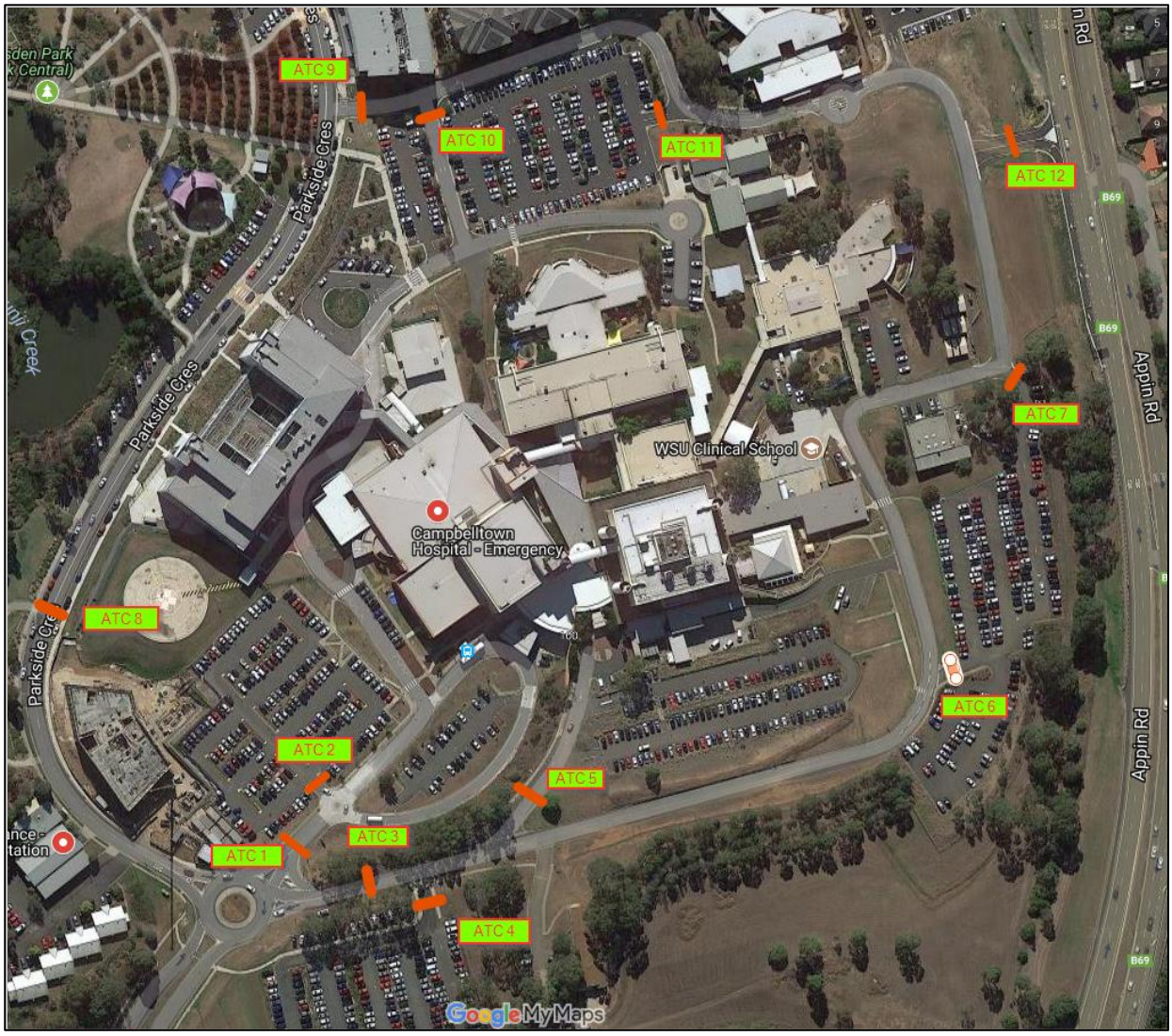


Figure 22 – Tube Count Locations

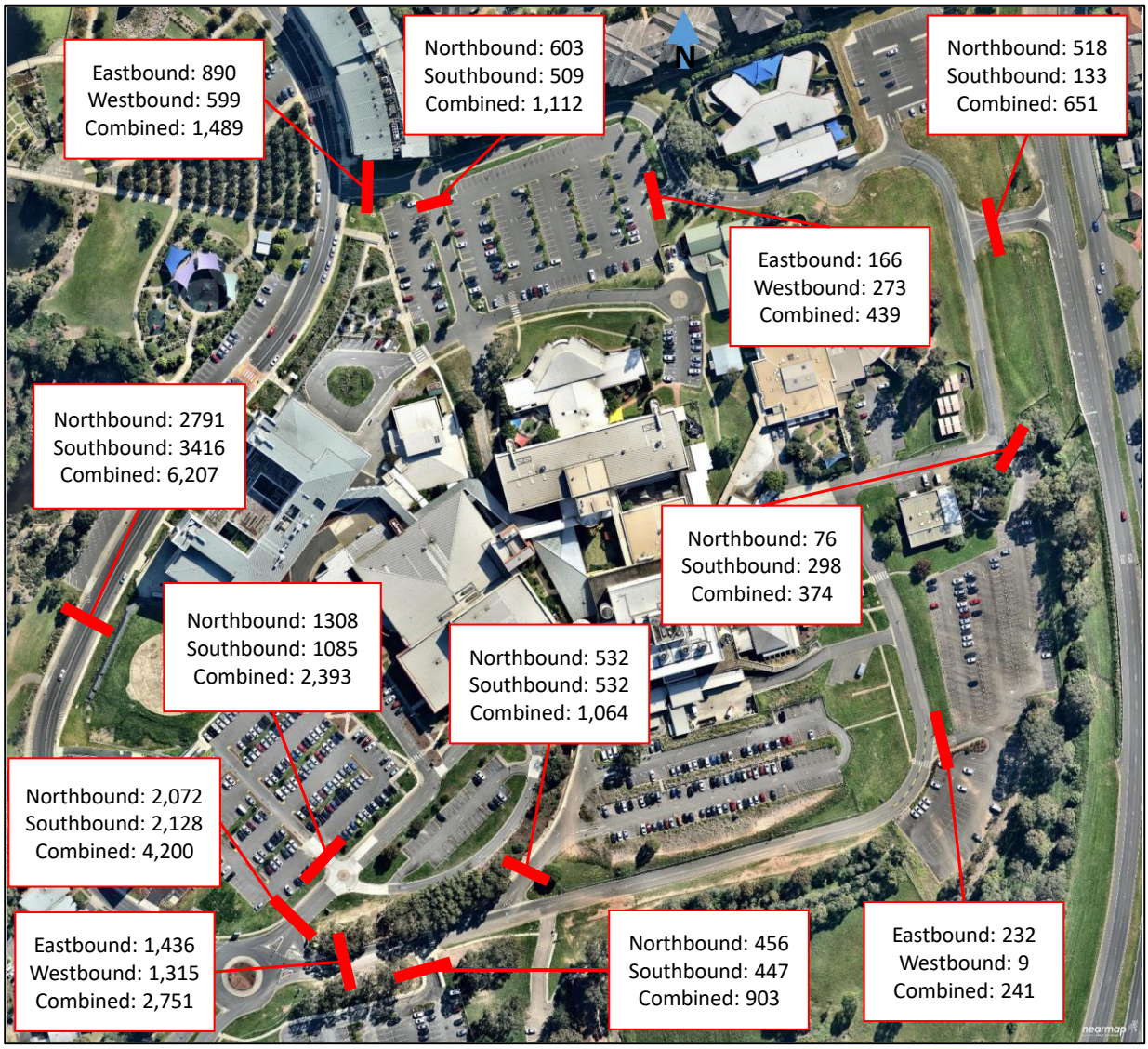


Figure 23 – Average Annual Daily Traffic (AADT)

The Hospital AM and PM peak periods have been calculated based on the Weekday Average Traffic Volumes, which is represented graphically in Figure 24. It is noted that only ATC1, ATC3, ATC9 & ATC12 have been considered in the analysis to incorporate the inbound and outbound traffic behaviour.

The results indicate that the peak periods of the Hospital are:

- AM peak: 7.00am – 8.00am
- PM peak: 3.30pm – 4.30pm

This is illustrated in Figure 24.

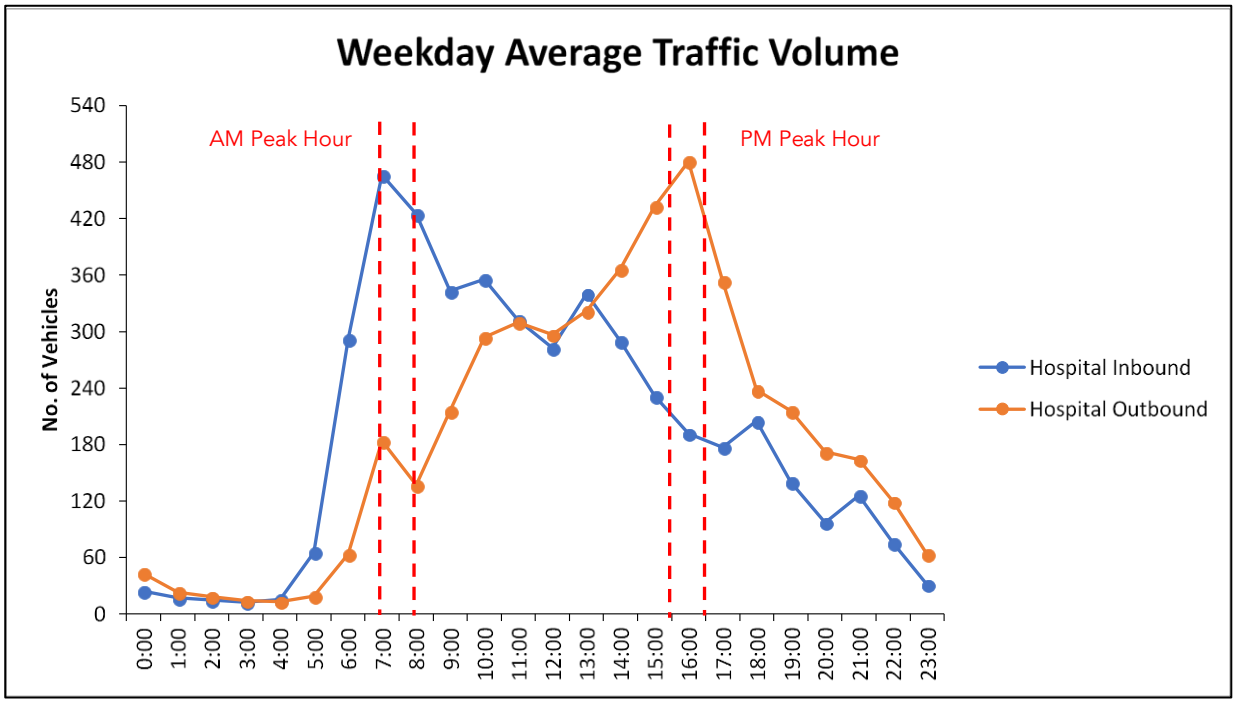


Figure 24 – 7-Day Average of Inbound & Outbound Traffic Volume

8.1.2 Intersection Survey

Intersection surveys have been undertaken at key intersections and access points, surrounding the Hospital. These were conducted on two separate days, 20th July 2017 and 8th November 2017 (non-school holiday periods). The following intersections have been surveyed:

Thursday 20th July 2017 (6:30am – 9:30am & 3:30pm – 6:30pm)[3]:

- Parkside Crescent Access – Priority controlled left-in / left-out T-junction
- Parkside Crescent / Central Road Roundabout – Priority controlled roundabout

Wednesday 8th November 2017 (6:30am – 9:30am & 3:30pm – 6:30pm)

- Therry Road / Central Road Roundabout – Priority controlled roundabout
- Appin Road Access – Priority controlled left-in / left-out T-junction

In addition, SCATs count data has been obtained, from the RMS, for the Therry Road/Appin Road intersection for 20/07/2017. Due to the layout of this intersection, where each lane in the intersection (for every approach) permits only one movement, intersection counts can be derived from the SCATs data. Figure 25 presents the location of the analysed intersections and Figure 26 - Figure 29 present the existing intersection counts[4].

[3] Traffic data extracted from the survey conducted for the previous **ptc.** traffic report, *Parking Demand & Traffic Assessment,* 10 October 2017

[4] LT: left turn, T: through movement, RT: right turn, EB: eastbound, WB: westbound

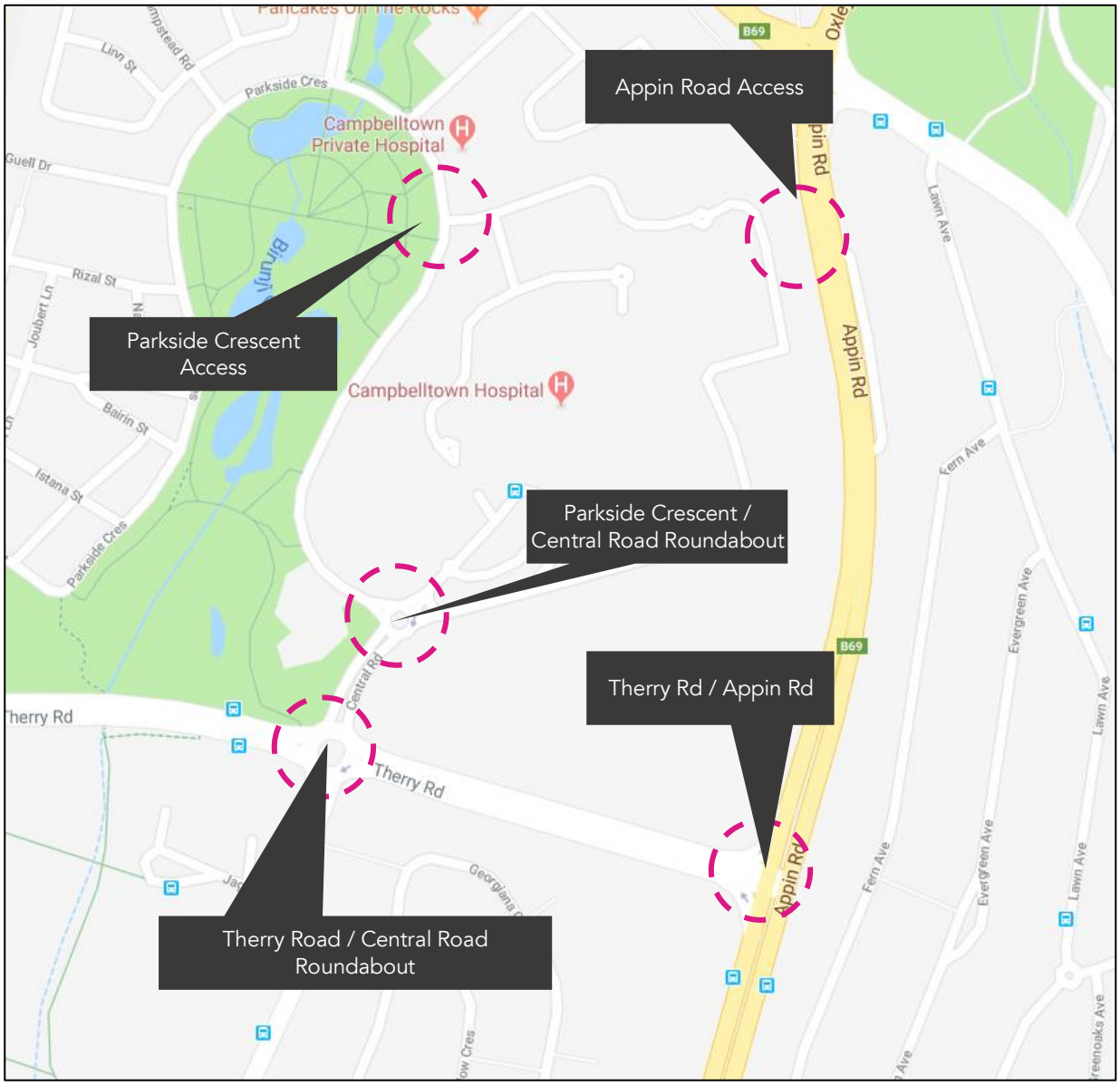


Figure 25 – Key Intersections

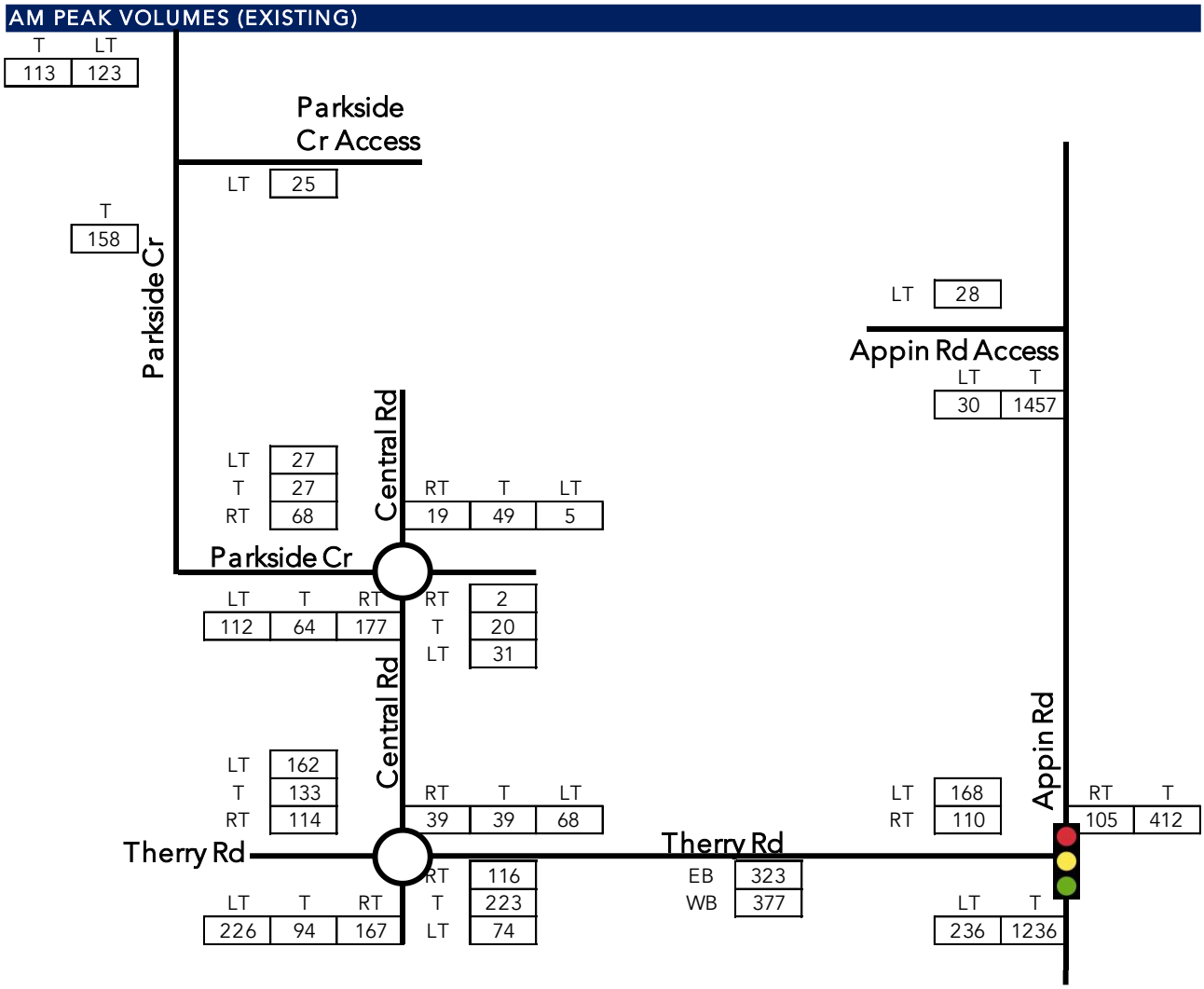


Figure 26 – Intersection Counts for AM Peak (Light vehicles, Existing)[5]

[5] Through movement traffic volumes between the Therry Road / Central Road Roundabout and the Therry Road / Appin Road intersection is calculated as the average of the flows between these two intersections as they were surveyed on different dates

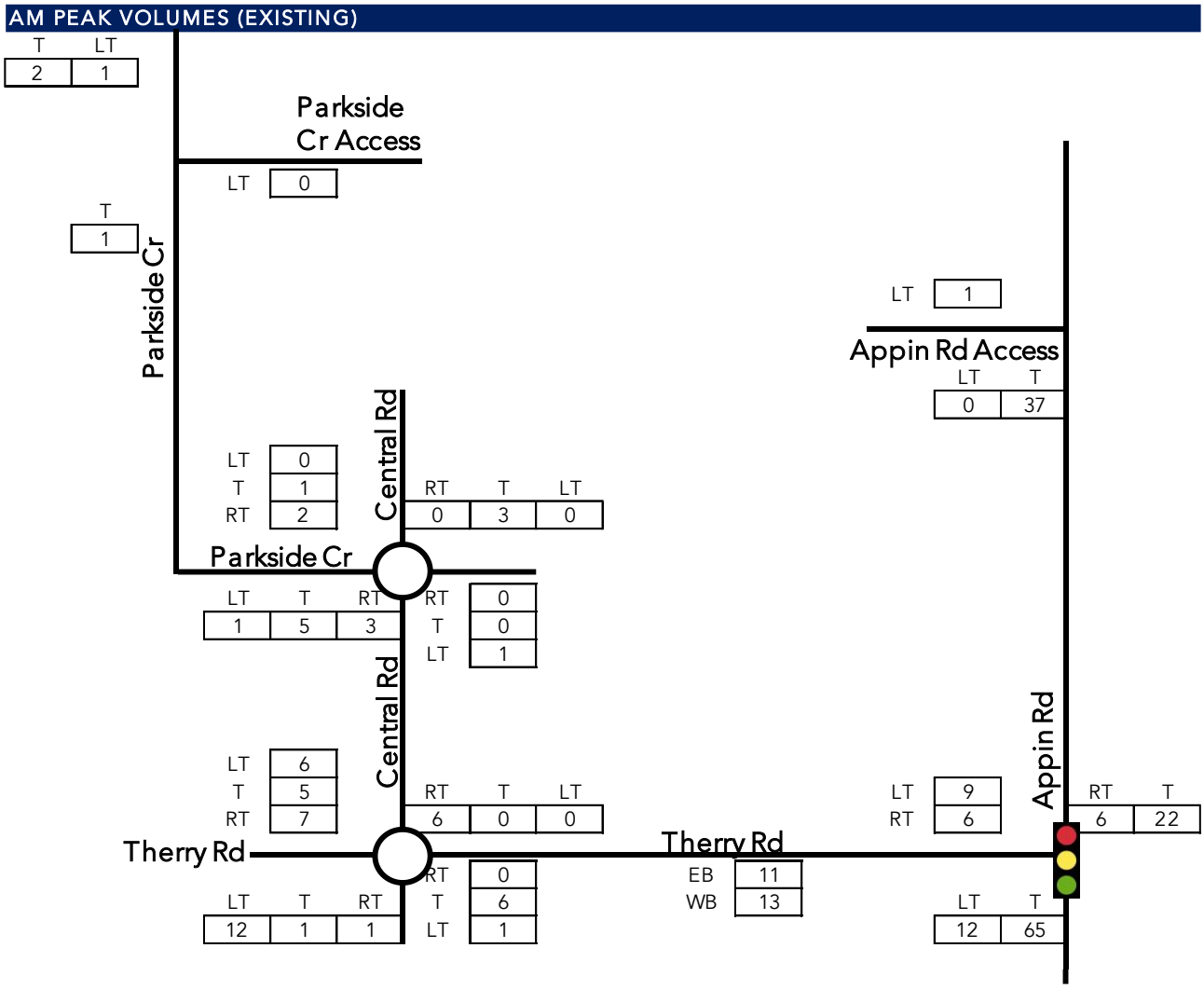


Figure 27 – Intersection Counts for AM Peak (Heavy vehicles, Existing)[6]

[6] Through movement traffic volumes between the Therry Road / Central Road Roundabout and the Therry Road / Appin Road intersection is calculated as the average of the flows between these two intersections as they were surveyed on different dates

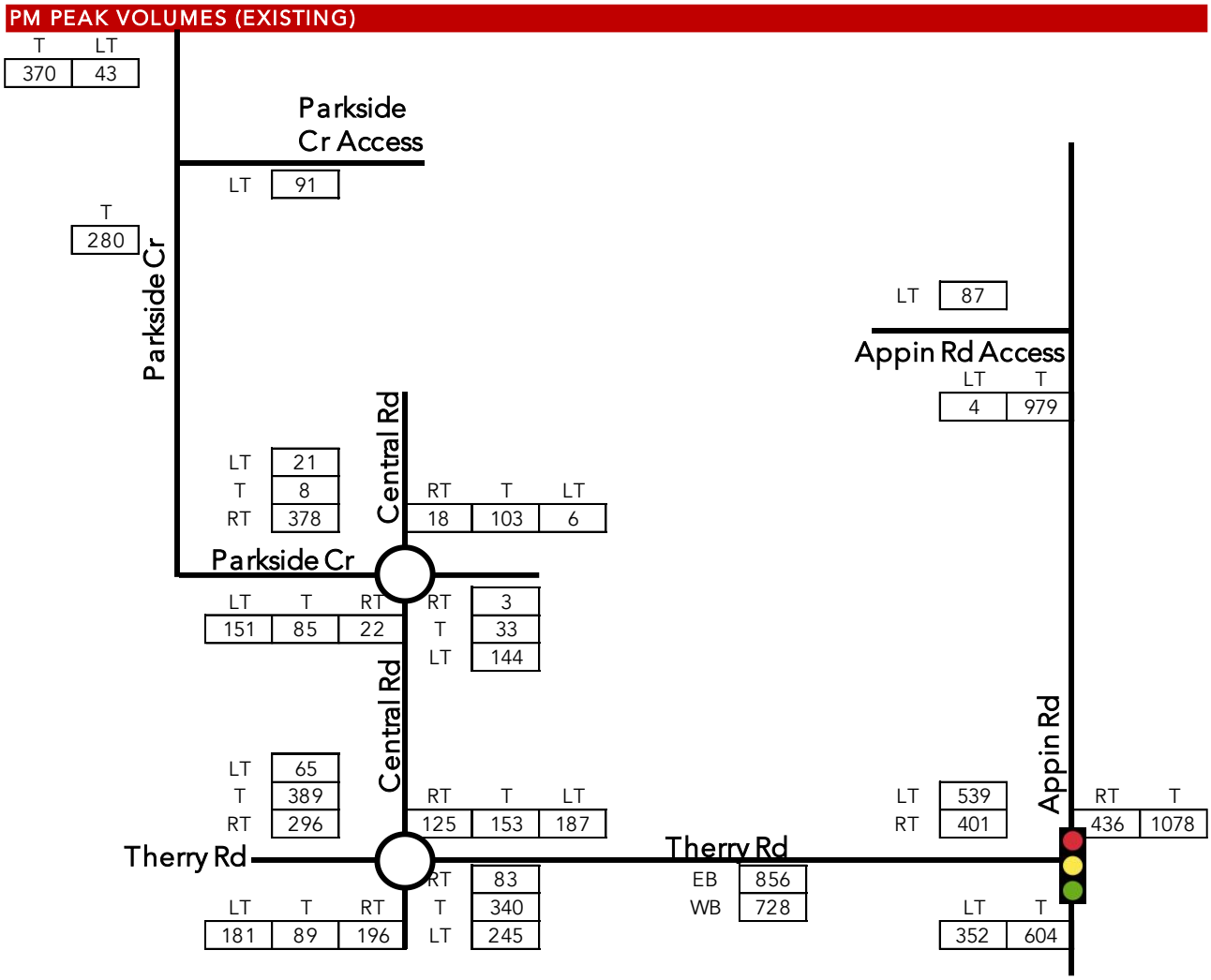


Figure 28 – Intersection Counts for PM Peak (Light vehicles, Existing)[7]

[7] Through movement traffic volumes between the Therry Road / Central Road Roundabout and the Therry Road / Appin Road intersection is calculated as the average of the flows between these two intersections as they were surveyed on different dates

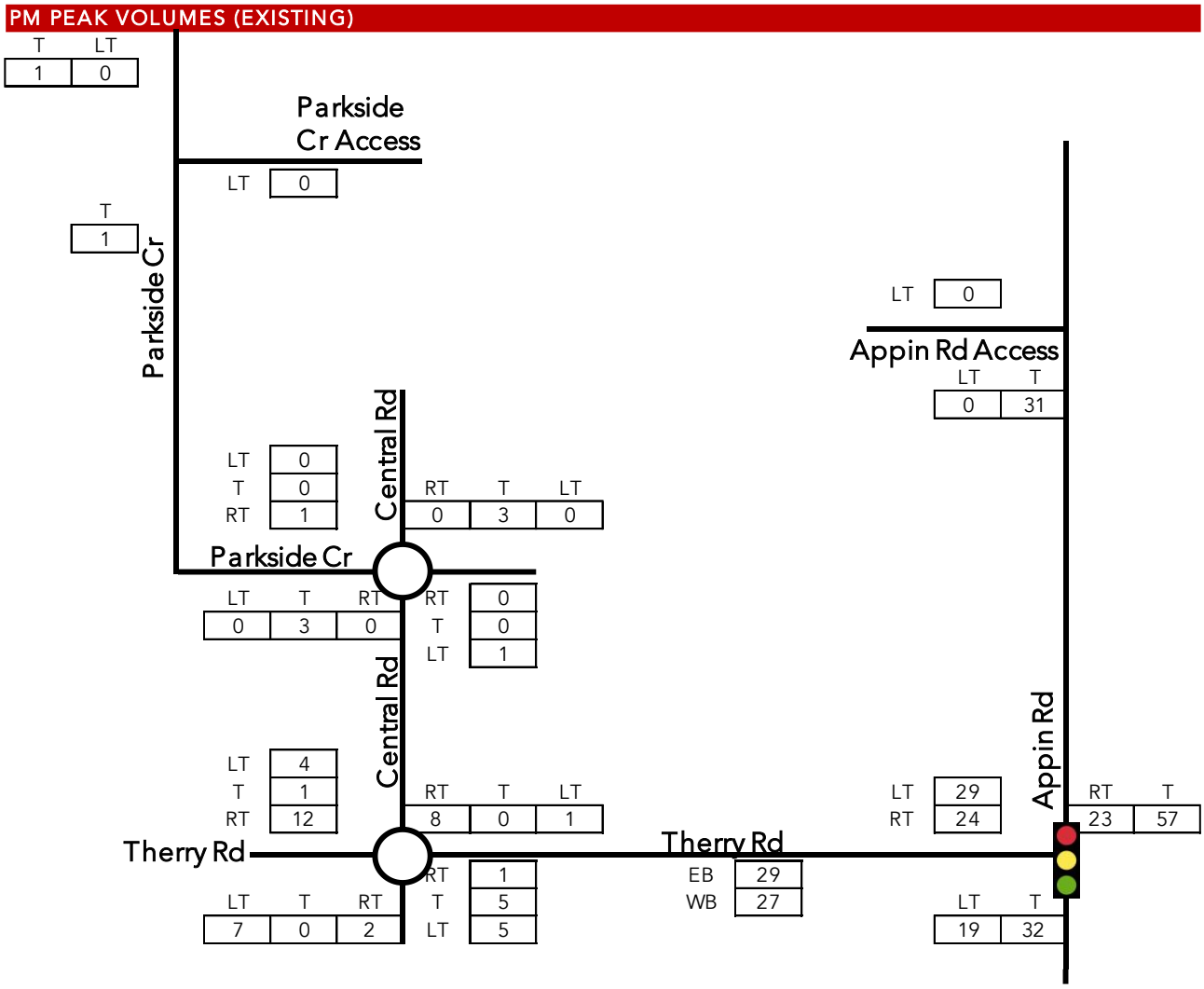


Figure 29 – Intersection Counts for PM Peak (Heavy vehicles, Existing)[8]

8.2 Proposed Traffic Generation

Generally, the traffic activity associated with a future use can be determined through reference to published data, or data collected at a similar facility. For example, the data provided in the RMS Guide to Traffic Generating Development or *TDT* 2013/04a would be applied, to calculate the post-development traffic volume. However, based on the existing conditions and parking demand data that is available, the amount of traffic generation to and from the hospital is largely governed by the number of parking provided within the Hospital campus. The post-development traffic generation is calculated in the table below.

[8] Through movement traffic volumes between the Therry Road / Central Road Roundabout and the Therry Road / Appin Road intersection is calculated as the average of the flows between these two intersections as they were surveyed on different dates

Table 12 – Proposed Traffic Generation

	Net increase in car parking	Period	Total future traffic generation
Proposed Development	588	AM	470
		PM	470

It is expected that not all 588 vehicles will require access to the Hospital during the AM & PM peak periods, Hence, a 20% reduction (i.e. 80% of the net increase in parking or 476 vehicles) would be a more suitable reflection of the anticipated future traffic generation. This is in line with parking occupancy survey data as per Figure 30, which is a replication of the earlier occupancy profile chart in Figure 20. The survey data shows the overall car parking occupancy across the entire Hospital is 80% by 8:00am.

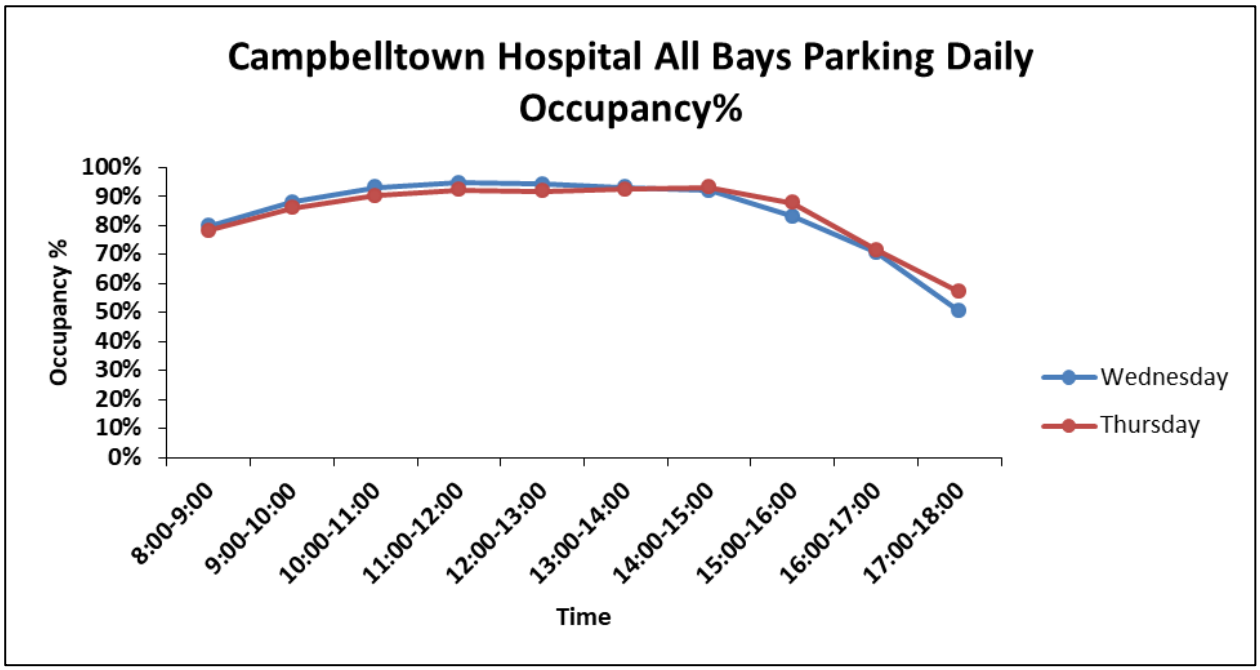


Figure 30 – Car Park Occupancy Profile Chart

Therefore, the use of 80% of increased car parking provision for the net traffic generation is very conservative as it assumes that this 80% is generated within the peak hour (i.e. from 7:00am-8:00am). In reality, cars have been observed to park in the Hospital prior to 7am. In addition, the survey data also shows a gradual decrease in occupancy during the PM peak period, rather than a congregated departure from the Hospital campus. Hence, the use of 80% of net parking capacity for the PM peak traffic generation is also very conservative.

8.3 Trip Distribution

As mentioned in Section 8.1.1, the AM and PM peak periods have been calculated to be 7.00am-8.00am & 3.30pm-4.30pm respectively. The peak periods have been calculated based on the weekday average traffic volume, gathered from the tube counts. The intersection modelling incorporates these peak periods.

It is assumed that in the AM peak, 70% of trips are inbound and 30% are outbound, whilst in the PM peak 30% of trips are inbound and 70% are outbound. This assumption is verified by the tube count data which illustrates the

number of inbound and outbound vehicle trips during the AM and PM peak hours. Detailed tube count data is provided in Attachment 1.

Table 13 – Existing Inbound and Outbound Distribution – Used for verification of inbound/outbound split

Period	Inbound[9]	Outbound	% Inbound	% Outbound
AM	467	184	72%	28%
PM	191	481	28%	72%

This results in the following future inbound and outbound traffic volume (shown in Table 14).

Table 14 – Inbound and Outbound Traffic Volume

Total future traffic generation	Period	Inbound[10]	Outbound
470	AM	329	141
470	PM	141	329

As part of the proposal, an additional access is proposed on Therry Road as a left-in / left-out priority intersection. The following assumptions are proposed for the inbound and outbound traffic distribution at the four Hospital access points:

Table 15 – Access Distribution

Access	AM Inbound	PM Inbound	AM Outbound	PM Outbound
Parkside Cr	10%	15%	5%	5%
Therry Rd Roundabout	55%	55%	35%	35%
Therry Rd Left-in/Left-out	10%	10%	20%	20%
Appin Rd	25%	20%	40%	40%

The traffic distribution has been calculated based on the existing inbound and outbound traffic distribution of the Hospital[11]. It is noted that the tube count results indicate a significantly lower inbound and outbound traffic utilising the access point off Appin Road (currently 7%, see Section 5.2). However, it is anticipated that the construction of the multi-deck car park and on-grade car parks will result in a higher usage of the Appin Road Access, due to its close proximity to the arterial road network. As such, the Appin Road access and egress percentages have been increased from 7% to 25% inbound / 40% outbound for the AM peak and 20% inbound / 40% outbound for the PM peak.

[9] Inbound and Outbound traffic volumes have been calculated based on ATC1, ATC3, ATC9 and ATC12

[10] 470 x 70% = 329 AM inbound trips, 470 x 30% = 141 AM outbound trips. Vice versa for PM peak.

[11] Tube counts ATC1, ATC3, ATC9, ATC12. See Section 8.1.1

For the new Therry Road access, it is envisaged that the inbound flow will be low as vehicles are able to access the adjacent car park using the existing roundabout access and the primary users of this access would be those intending to park closer to the southern end of this car park. Hence, a trip distribution percentage of 10% is adopted. For the outbound movement, there is expected to be greater volumes as this access is likely to serve the majority of vehicles intending to head south along Appin Road. Users of the multi-deck car park heading south are likely to exit via this new access rather than take the longer route through the existing roundabout. Therefore, a trip distribution percentage of 20% is adopted.

8.4 Trip Assignment

Figure 31 and Figure 32 present the trip assignment for the future development scenario[12]. The percentages at each intersection represent the turning proportions of vehicles at each approach (e.g. LT 20%, T 80% means that 20% vehicles approaching the intersection from that direction will be expected to turn left, and the other 80% will continue through). Blue colouring represents the inbound movements and red colouring represents the outbound movements. Table 16 summarises in the inbound and outbound assumptions for each of the intersections.

[12] LT: left turn, T: through movement, RT: right turn

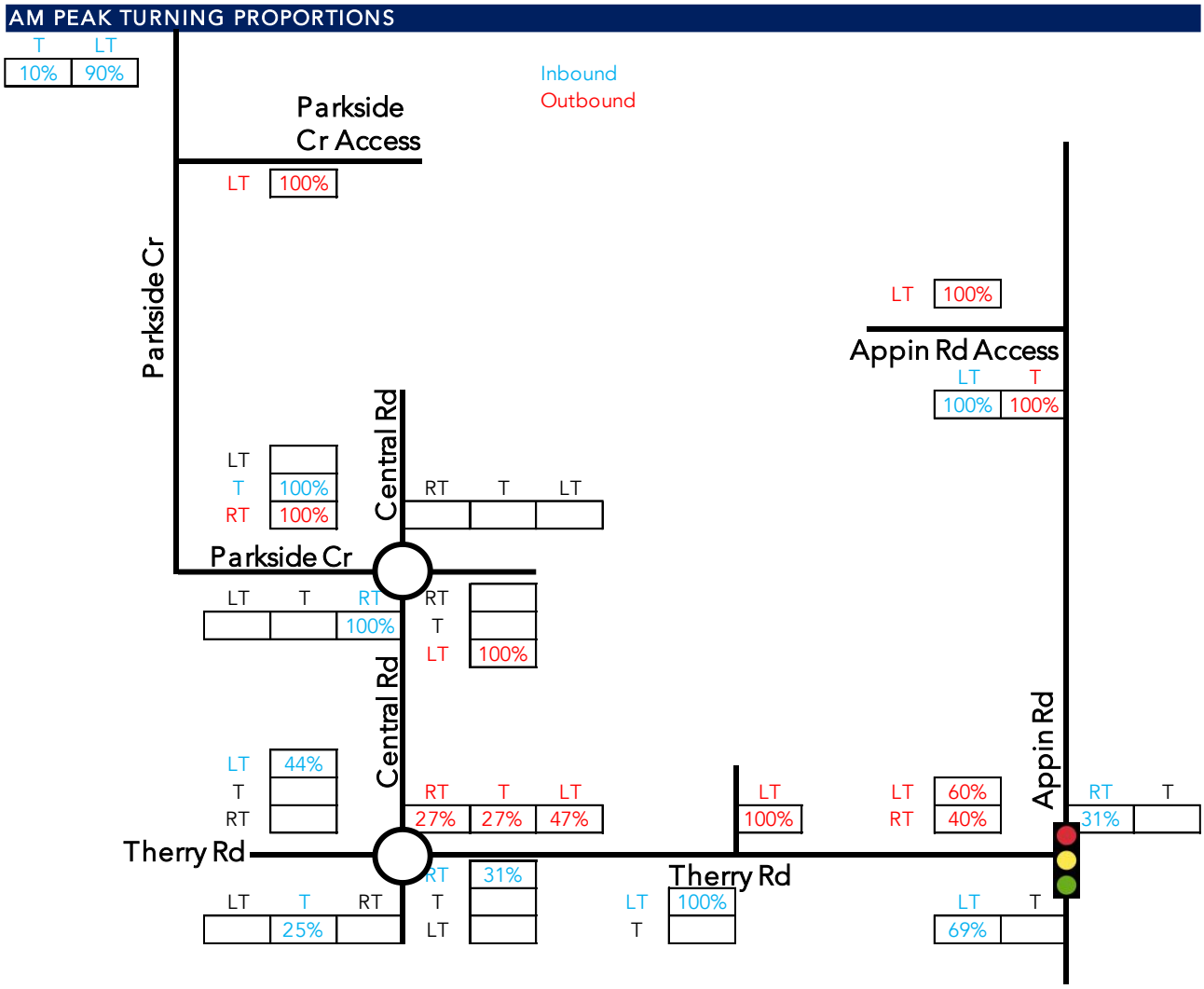


Figure 31 – AM Peak Trip Assignment (development scenario)

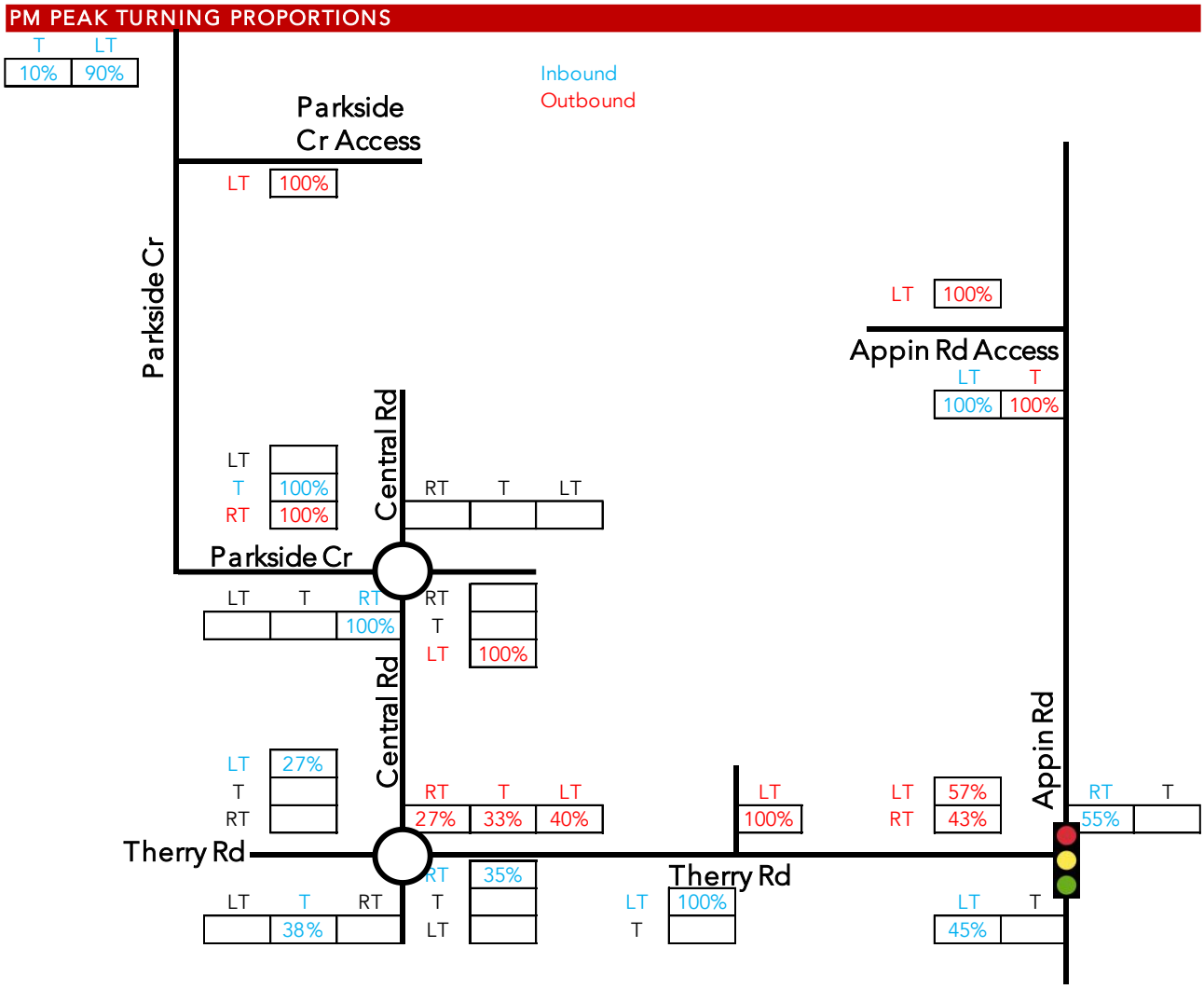


Figure 32 – PM Peak Trip Assignment (development scenario)

Table 16 – Intersection Inbound/Outbound Development Trip Movement Assumptions

Intersection	Inbound	Outbound
Parkside Cr / NW Entry	Entry is only possible via a left turn from the north approach due to the existing median island preventing a right turn entry. The majority (90%) will turn left here, and the remainder (10%) will continue to the Parkside Cr / Central Rd Roundabout for entry.	All vehicles will be turning left to exit the Hospital. The existing median island prevents vehicles turning right to/from Parkside Crescent.
Parkside Cr / Central Rd Roundabout	South approach: all vehicles from this approach will turn right to access all of the car parks. West approach: all vehicles will continue straight through the roundabout to access all of the car parks.	West approach: The large majority of outbound vehicles will intend to access Therry Road hence adoption of 100% right turn. East approach: The large majority of outbound vehicles will intend to access Therry Road hence adoption of 100% left turn. There will be

Intersection	Inbound	Outbound
		some through movement to access the residences along Parkside Cr but this is considered negligible.
Therry Rd / Central Rd Roundabout	The inbound movement proportions (LT from Therry Road (west), through from Woodhouse Drive, RT from Therry Road (east)) will follow the existing distribution as per survey data.	The outbound movement proportions (LT, through, RT from Central Road) will follow the existing distribution as per survey data.
Therry Rd Left-in / Left-out Access (new)	Entry is only possible via a left turn from the west approach, i.e. Therry Road (west).	Exit is only possible via a left turn onto Therry Road.
Appin Rd Access (NE Entry)	Entry is only possible via a left turn from the south approach, i.e. Appin Road (south).	Exit is only possible via a left turn onto Appin Road.
Therry Rd / Appin Rd	The inbound movement proportions (LT from Appin Road (south) and RT from Appin Road (north)) will follow the existing distribution as per survey data.	The outbound movement proportions (LT and RT from Therry Road) will follow the existing distribution as per survey data.

Based on these assumptions, the forecast traffic generation at the key intersections are displayed in Figure 33 and Figure 34. Note that the bolded numbers are linked to another value and are a result of the vehicles traversing multiple intersections to reach the entry/exit. For example, in the AM peak, the 83 vehicle trips heading north up Appin Road are calculated as a result of the 83 left-turn movements for the Appin Road Access entry.

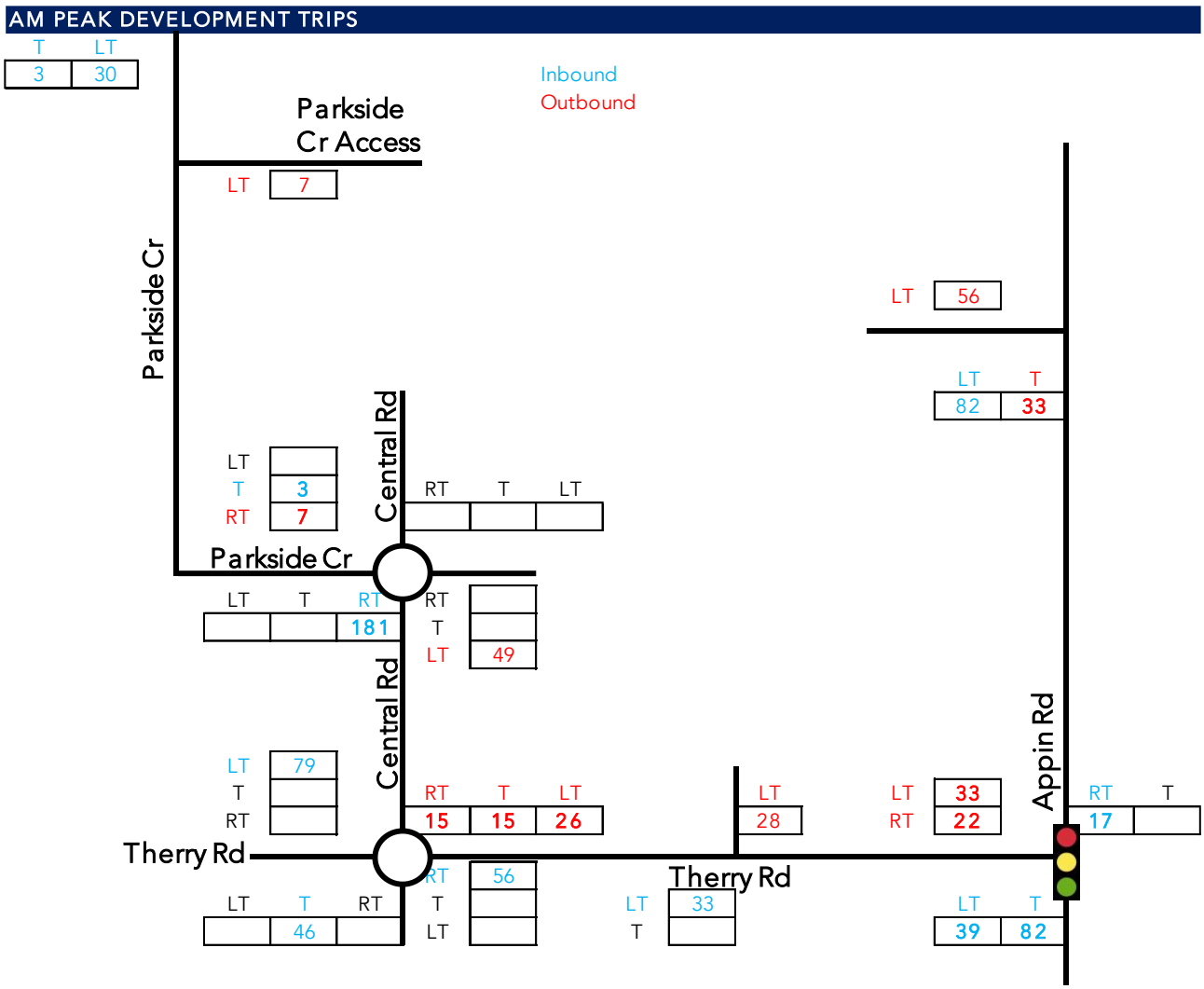


Figure 33 – Forecast Development AM Peak Traffic Volume

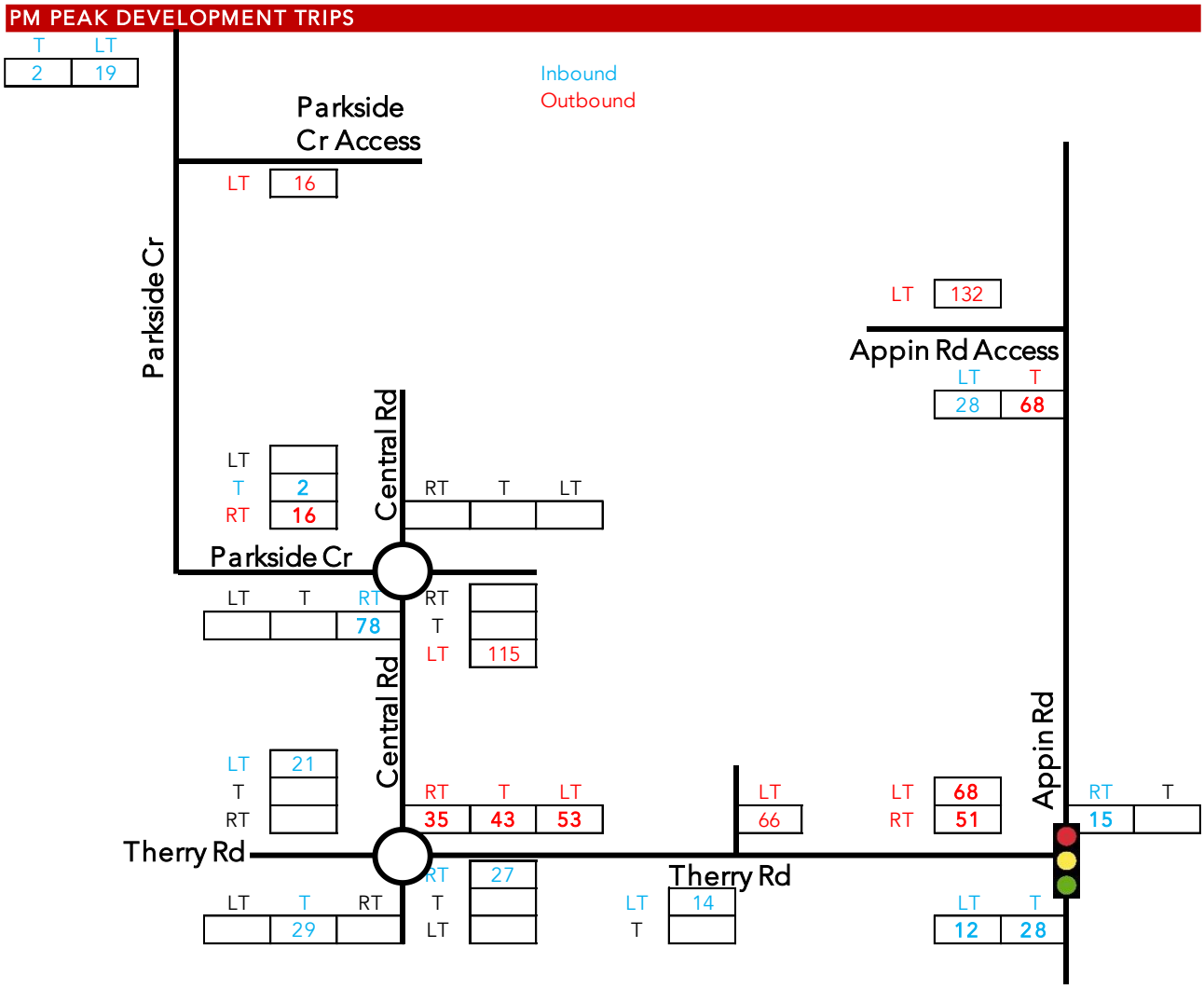


Figure 34 – Forecast Development PM Peak Traffic Volume

8.5 SIDRA Analysis

The surveyed intersections have been modelled with SIDRA Intersection 8.0 software, a micro-analytical tool for individual intersections and whole-network modelling. SIDRA provides a number of performance indicators, outlined below:

- Degree of Saturation – The total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation. (e.g. 0.8=80% saturation)
- Average Delay- The average delay encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- Level of Service (LoS) - This is a categorization of average delay, intended for simple reference. The RMS adopts the following bands:
- 95% Queue Lengths (Q95) – is defined to be the queue length in metres that has only a 5-percent probability of being exceeded during the analysis time period. It transforms the average delay into measurable distance units.

Level of Service is a good indicator of overall performance for individual intersections, with each level summarised in Table 17.

Table 17 – Intersection Performance - Levels of Service

Level of Service	Average Delay (secs/vehicle)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Extra capacity required	Extreme delay, major treatment required

A SIDRA analysis has been completed based upon survey data and development traffic generation assumptions for the following key intersections:

- Therry Road / Central Road Roundabout
- Parkside Crescent / Central Road Roundabout
- Parkside Crescent Access
- Appin Road Access
- Therry Road / Appin Road

- Therry Road Access (new access)

For all future scenarios, a growth rate of 1% p.a. has been applied over a period of 8 years.

The full movement summary output from SIDRA is provided in Attachment 2.

The SIDRA results of the existing and development traffic are displayed in Table 18.

Table 18 – Summary of Existing and Future Traffic Conditions

Intersection	Time	Period	Level of Service	Degree of Saturation (v/c)	Average Delay (s)	95% Queue Length (m)
Therry Road / Central Road Roundabout	AM Peak	Existing	LOS A	0.421	8.2	16.5
		Development	LOS A	0.488	9.0	21.3
	PM Peak	Existing	LOS B	0.767	16.3	45.7
		Development	LOS B	0.876	20.3	67.7
Parkside Crescent / Central Road Roundabout	AM Peak	Existing	LOS A	0.264	5.3	11.4
		Development	LOS A	0.402	6.2	20.9
	PM Peak	Existing	LOS A	0.338	6.2	15.3
		Development	LOS A	0.410	7.0	19.7
Parkside Crescent Access	AM Peak	Existing	LOS A	0.159	2.0	5.2
		Development	LOS A	0.193	2.3	6.6
	PM Peak	Existing	LOS A	0.235	1.2	2.6
		Development	LOS A	0.265	1.4	4.0
Appin Road Access	AM Peak	Existing	LOS A	0.406	0.5	1.5
		Development	LOS A	0.438	0.7	0.0
	PM Peak	Existing	LOS A	0.275	0.5	3.3
		Development	LOS A	0.310	1.0	0.0
Therry Road / Appin Road	AM Peak	Existing	LOS A	0.769	14.3	151.1
		Development	LOS B	0.862	18.6	207.5
	PM Peak	Existing	LOS B	0.834	17.8	104.7
		Development	LOS B	0.896	25.8	166.5
Therry Road new access	AM Peak	Existing	N/A	N/A	N/A	N/A
		Development	LOS A	0.114	0.5	0.7
	PM Peak	Existing	N/A	N/A	N/A	N/A
		Development	LOS A	0.263	0.5	2.6

8.5.1 Therry Road / Woodhouse Drive / Central Road Roundabout

The existing Level of Service at this roundabout is a LoS A in the AM peak and B in the PM peak. Modelling shows that intersection operating well, with significant spare capacity. A site visit, however, found that during the PM peak there is a tendency for queuing along the northern arm (i.e. Central Road) due to the sudden outflow of vehicles as staff finish their shifts (approximately around 5pm). This queue is generally dynamic and is a slow movement of vehicles rather than a static queue whereby vehicles are stationary for long periods of time. During the site visit, it was noted that this queuing formed and dispersed quickly and did not display any sustained periods of delay.

Under the future scenario, the Level of Service of the roundabout is maintained at an A and B in the AM and PM peaks respectively. The 95th percentile queue increases, however, is not long enough to impact upon the circulation of the upstream roundabout (i.e. Central Road / Parkside Crescent roundabout). This is due to a portion of the exiting traffic assigned to the proposed future access on Therry Road, thereby alleviating the pressure on the roundabout and reducing the likelihood of queuing occurring.

8.5.2 Central Road / Parkside Crescent Roundabout

The level of service at the Parkside Crescent roundabout pre and post-development remains at a LoS A. It is noted that each performance measure increases marginally for both the AM and PM peaks, and are considered to be minor. Post development there will be approximately 60% spare capacity in the AM peak and 59% spare capacity in the PM peak. The traffic impact at this intersection as a result of the development is considered minor.

8.5.3 Parkside Crescent / Hospital Access

The level of service at the intersection between Parkside Crescent and the north-western hospital access also remains at a LoS A, post-development for both the AM and PM peak. Each of the performance measures increase marginally, for both the AM and PM peaks, and are considered to be minor. Post development there will be approximately 81% spare capacity in the AM peak and 73% spare capacity in the PM peak. The traffic impact at this intersection as a result of the development is considered minor.

8.5.4 Appin Road Access

The level of service at the between Appin Road access also remains at a LoS A, post development for both the AM and PM peak period and. Each of the performance measures increases marginally for both the AM and PM peaks, and are considered to be acceptable. Post-development there will be approximately 56% spare capacity in the AM peak and 69% spare capacity in the PM peak.

In addition, the conversion of the exit from a high angle slip lane (with a STOP control) to a low angle slip lane (with a GIVEWAY control) will further improve egress by limiting the delays whereby successive exiting vehicles need to stop prior to joining Appin Road (they now will accelerate down the provided acceleration lane and merge in with the traffic along Appin Road).

The relocation of the access towards the south will also provide a greater distance between the access and in adjacent intersection up north, Narellan Road / Oxley Street / The Parkway. This is beneficial in the sense that it provides a greater buffer from potential queuing impacts from the Narellan Road / Oxley Street / The Parkway intersection.

8.5.5 Therry Road / Appin Road

The level of service at the intersection between Therry Road and Appin Road increases from a LoS A to LoS B for the AM peak period and remains at a LoS B, post development for PM peak period. Each of the performance

measures increases marginally for both the AM and PM peaks, and are considered to be acceptable. Post-development there will be approximately 14% spare capacity in the AM peak and 10% spare capacity in the PM peak. The traffic impact at this intersection as a result of the development is considered minor. This intersection is close to capacity; however, this is expected as it is the interface for a State Road and Regional Road and services significant volumes of regional traffic.

8.5.6 Therry Road Left-in / Left-out access (new access)

The new Therry Road access is expected to perform very well, displaying a LoS A for both the AM and PM development scenarios. There is ample spare capacity in the intersections with an expected 89% and 74% spare capacity in the AM and PM peaks, respectively. Furthermore, this access will reduce the traffic utilising the Therry Road roundabout, balancing the volumes amongst the entries and reducing overall delays and queuing.

In summary, the proposed development is unlikely to result in any significant traffic impact upon the local traffic conditions. All surveyed intersections are expected to operate well, post-development, displaying Levels of Service B or better.

9. Access and Car Park Assessment

The following section presents an assessment of the proposed redevelopment with reference to key traffic, parking and pedestrian considerations in accordance to the relevant standards and industry best practice. This section is to be read in conjunction with the architectural plans provided by Billard Leece Partnership Pty Ltd.

9.1 On-grade Car Parks

As part of the SSD, additional on-grade parking accommodating 201 spaces will be provided towards the southern (84 spaces) and western sides (117 spaces) of the Hospital (refer to Figure 35). Access to the on-grade car park towards the west will be via the Central Road / Parkside Crescent roundabout. The southern on-grade car park will have access via the main internal road connecting to the Central Road / Parkside Crescent roundabout and also to the new Therry Road entrance. These car parks have been designed to align with the future internal road network to reduce conflicts and queuing that would impact the main circulation paths.

9.2 Car Park Arrangement and Accessible Parking

The car park arrangement in terms of bay and aisle dimensions will be assessed with the requirements as stipulated in the Australian Standards AS2890.1:2004 (Off-Street Car Parking) and AS2890.6:2009 (Off-Street Parking for People with Disability). The proposal will provide car spaces and accessible spaces with 2.6m in width, 5.4m in length, and aisle widths of 5.8m, in line with Class 3 parking (high turnover). Accessible spaces will be provided with adjacent shared bays measuring 2.4m x 5.4m.

In line with this, the car park arrangements satisfy the requirements as stipulated within the Australian Standards.

9.3 Future Internal Road Layout

The future road layout within the Hospital has been established based on the following key principals and is illustrated in Figure 35:

- Ease of vehicular access to and from any direction
- Capacity to accommodate the peak traffic flows
- Accommodate and manage the multiple user groups associated with the Hospital
- Simple and flexible to enable easy wayfinding
- Safety of all road users using all forms of transport (particularly pedestrians)

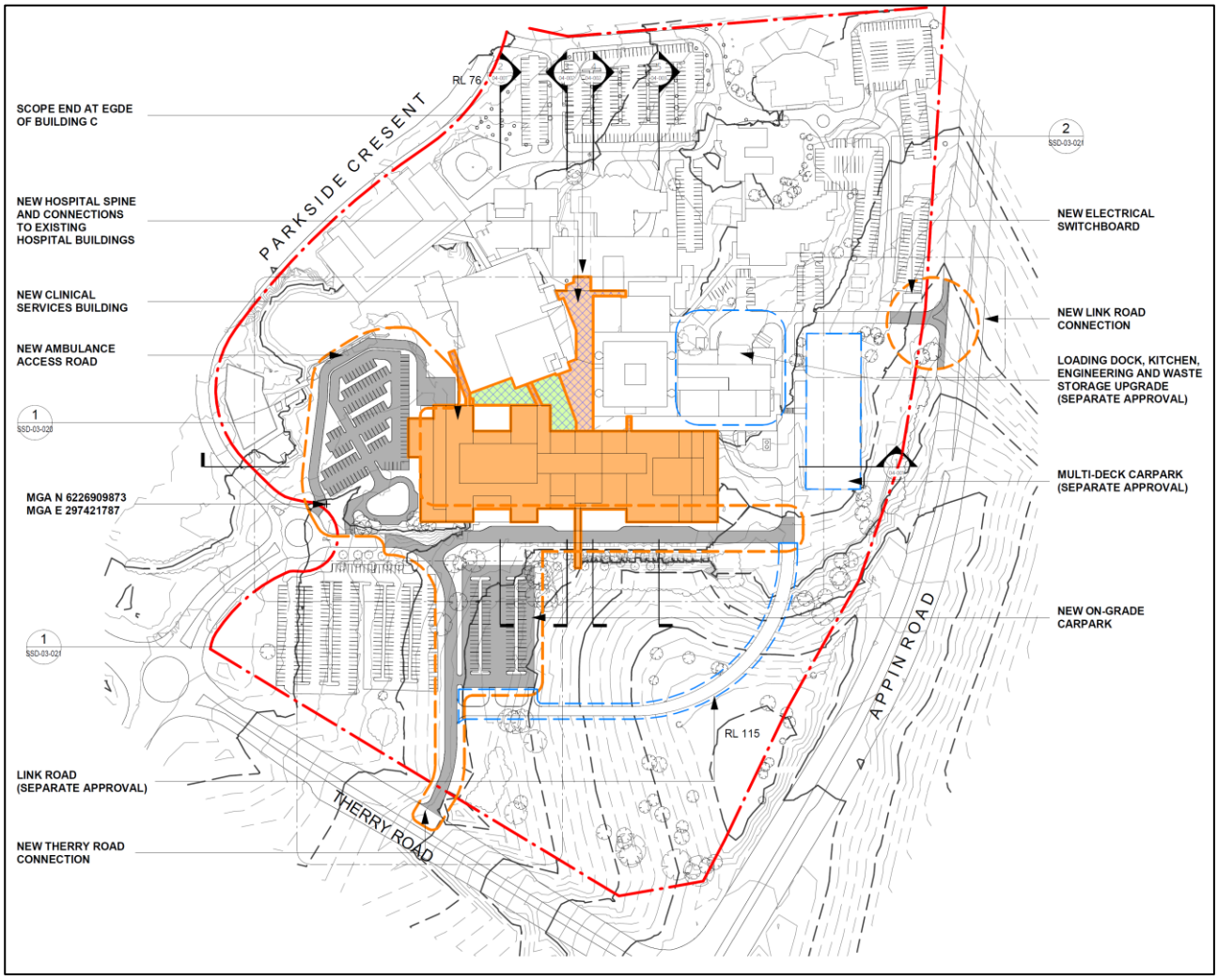


Figure 35 – Proposed Internal Road Layout

9.3.1 Internal Road Layout

The surrounding road network comprises Appin Road and Therry Road, both of which provide a good connection to the wider arterial road network. These roads provide direct access to the north, south and west and it is therefore important that the connections to these roads facilitate access to these directions. At present this is largely achieved via the roundabout intersection at Therry Road and Central Road, although the access on Appin Road provides access from the south and egress to the north.

The proposal provides a new emergency department parking area with emergency department-related parking and drop-off. In addition, an ambulance access road and ambulance only area will be provided alongside the new clinical services building. This will segregate emergency related traffic from the rest of the Hospital traffic, providing a high level of amenity and access to these users.

New drop-off areas will be provided alongside the new Hospital building with the first drop-off area for public use / taxis / car-share and the second for buses only. Separation of the two uses enables buses to get in and out of the Hospital in a timely manner without conflicting with private vehicle drop-off. Towards the end of this new internal road is a roundabout which will allow vehicles up to a bus to turn around. This ensures that existing bus routes and timetables are largely unmodified and access and egress via Therry Road is possible.

A pedestrian footbridge is proposed over the main internal road with the two drop-off areas. This is to allow pedestrians to easily and safety cross from the north to the south and vice-versa without disrupting vehicular flow, and also aids in isolating pedestrian movement from vehicular movement.

The location of the multi-deck car park towards the Appin Road access will likely reduce dependency on the Therry Road roundabout access and further minimise any delays experienced in the morning and evening peak periods.

9.3.2 New Access Locations

As discussed in Section 6.1.1 and Section 6.1.2, a new access point on Therry Road is proposed, providing a direct link for the new on-grade car park to the wider road network. This new intersection is to be a left-in / left-out priority intersection and is designed to service staff and public vehicles.

The provision of this second access point on Therry Road will be anticipated to reduce the strain on the existing roundabout access. This will reduce the queuing that is currently experienced during the evening peak period.

In addition, the Appin Road left-in / left-out access will be relocated further south to better service the multi-deck car park and the remainder of the Hospital. The exit will also be converted from a high-angle slip lane with STOP control to a low-angle slip lane with a GIVEWAY control and acceleration lane. This further reduces delays by enabling egressing vehicles to accelerate along the merge lane and join the Appin Road through traffic, reducing the amount of stopping required and facilitating smoother traffic movement.

The proposed circulation and access arrangement provides regular shaped sites for future expansion opportunities as well as providing the appreciate level of load capacity without the construction of excessive new roads. The construction of new roads is limited and responds to the geography of the site, while improving capacity and maintaining the ability to approach and depart the hospital from any direction.

10. Preliminary Construction Traffic Management Plan (CTMP)

10.1 Objective

It is acknowledged that prior to the Development Approval and an engaged contractor, there are many unknown factors that might affect this Construction Traffic Management Plan (CTMP). As such, this section is presented as a preliminary management plan, to support the development application process by outlining high-level considerations for the construction of the proposal. An updated CTMP will be required and a construction contractor appointed for Construction Certification (CC).

A primary consideration is the timing of the construction works for the Main Works and the multi-deck car park. If construction for both activities occurs simultaneously or with some overlap, a Cumulative Construction Management Plan may be required to assess the combined impacts of the total traffic activity as a result of the construction.

The CTMP associated with the construction activity of the Campbelltown Hospital Redevelopment Project aims to ensure safety of all workers and road users within the vicinity of the construction site, with the following primary objectives:

- To minimise the impact of the construction vehicle traffic on the overall operation of the road network;
- To ensure continuous, safe and efficient movement of traffic (vehicular and pedestrian) for both the general public and construction workers;
- Installation of appropriate advance warning signs to inform users of the changed traffic conditions;
- To provide a description of the construction vehicles and the volume of these construction vehicles accessing the construction site;
- To provide information regarding the changed access arrangement and also a description of the proposed external routes for construction vehicles accessing the site; and
- Establishment of a safe pedestrian environment in the vicinity of the site.

10.2 Construction Activities & Program

10.2.1 General Construction Activity

All construction activities shall be wholly contained within the approved construction compounds, including, but not limited to plant, vehicles, materials, waste, site offices and amenities.

Any hoardings and barriers shall not impact pedestrians, maintain worksite security whilst providing appropriate pedestrian thoroughfare. Providing safe pedestrian visibility near any crossing points will be a key criterion in the hoarding arrangements. Prior to any site establishment works, the hoarding arrangement will obtain approval from the relevant Certifying Authority. Upon completion of any stage, the dismantling of any hoardings or road-signage shall be done in accordance with RMS Traffic Control at Works Sites Manual.

In accordance with Road and Maritime Services (RMS) requirements, all vehicles transporting loose materials will have the entire load covered and/or secured to prevent any items, excess dust or dirt particles depositing onto the roadway during travel to and from the site. All subcontractors must be inducted by the lead contractor to ensure that the procedures are met for all vehicles entering and exiting the construction site. The lead contractors will

monitor the roads leading to and from the site and take all necessary steps to rectify any road deposits caused by site vehicles.

Vehicles operating to, from and within the site shall do so in a manner, which does not create unreasonable or unnecessary noise or vibration. No tracked vehicles will be permitted or required on any paved roads.

10.2.2 Construction Program

The whole hospital redevelopment project will be undertaken in various stages. An indicative construction program and key millstones are outlined as follows:

- Commence Stage 2A – Enabling and Early Works October 2018
- Complete Stage 2A – Enabling and Early Works August 2019
- Commence Stage 2B – Main Works Preparation December 2018
- Complete Stage 2B – Main Works Preparation August 2019
- Commence Stage 2C – Main Works August 2019
- Complete Stage 2C – Main Works June 2022

The following phases, which are not included in this package of works, have the following milestones:

- Stage 1A – On-Grade Carpark to commence in May 2018 and be completed by August 2018
- Stage 1B – Multi Storey Carpark to commence in July 2018 and be completed in October 2019
- Stage 1C – Enabling Works to Existing Buildings to commence in October 2018 and be completed in June 2019.

Due to the overlap of construction activities, a Cumulative Construction Traffic Impact Assessment will be required.

10.3 Hours of Work

Hours of work will be defined by the Development Conditions of Consent provided by DPE.

Notwithstanding, the following hours are proposed, which align with typical Council regulations:

- MON-FRI: 7:00am – 6:00pm with works preparation activities proposed from 6.30am;
- SAT: 7:00am – 3pm;

No work will be permitted on Sundays and public holidays. It is proposed to be able to undertake safety inspections and works preparation from 6:30am on weekdays.

10.4 Construction Workforce

The construction workforce will be made aware that there is minimal on site and street parking. Parking arrangements will be developed with the selected contractor.

10.5 Construction Site Arrangement & Access

10.5.1 Site Arrangement

An indicative construction site plan is provided in Figure 36. Appropriate hoarding/fencing (as specified in Australian Standards and Workcover requirements) will be installed to prevent public and staff access and to maintain security for the various areas of the works.

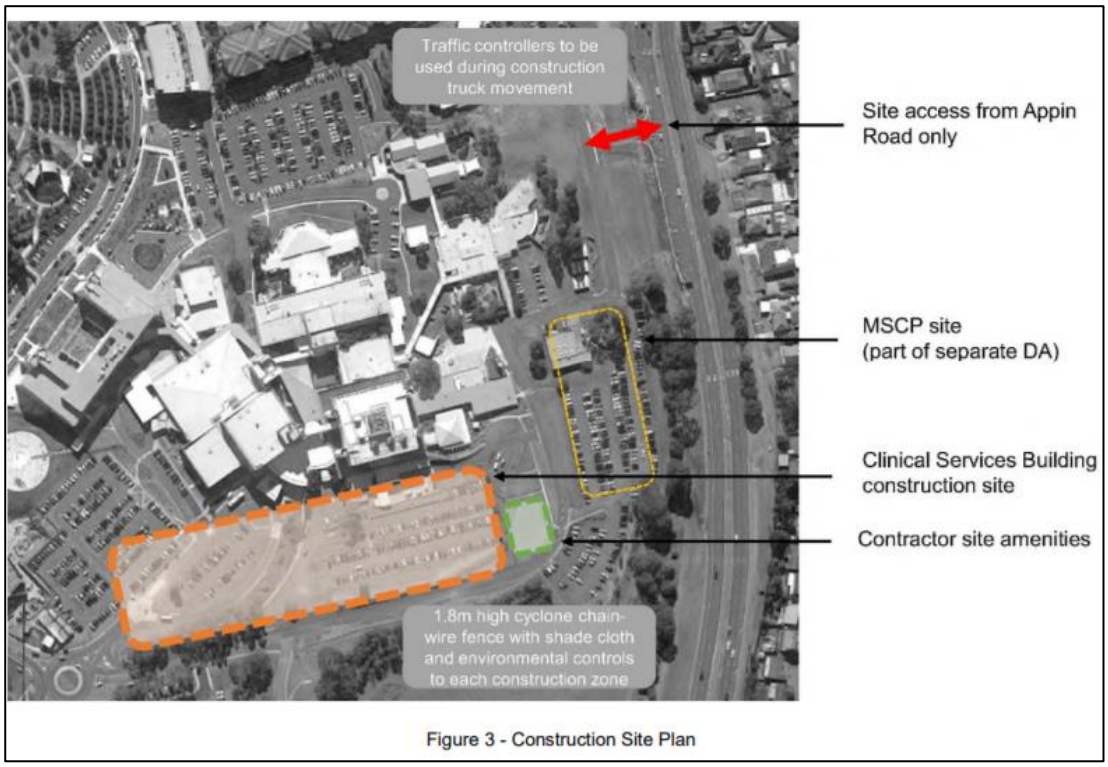


Figure 36 – Indcative Construction Site Plan

10.5.2 Site Access

Vehicles will access the Hospital via the Therry Road roundabout and Appin Road access. Preliminary swept path analyses have been undertaken, demonstrating the ability of vehicles up to a 19m AV accessing the site via the Therry Road roundabout and vehicles up to an 8.4m MRV accessing the site via the Appin Road access (without impeding on the opposing lane). The specific vehicle entrances to each site compound will be determined prior to CC, once contractor input is available.

10.5.3 Cycling and Pedestrian Access

It is unlikely that existing pedestrian access will be impacted by the construction activities. However, if there is an impact, the appropriate precautions and Traffic Control Plan (TCP) plans should be prepared.

10.6 Construction Traffic

10.6.1 Construction Vehicle Types

The proposed works are envisaged to be carried out using a mix of commercial small to heavy rigid vehicles (6.4m SRV to 12.5m HRV) including utes, tip trucks, concrete agitators, concrete pumps, etc. Articulated vehicles including 'truck & dogs' (18m) and 19m semi-trailers are also anticipated to be used for material collections and deliveries.

It is also anticipated that some special oversize vehicles will be required, such as a crane. These vehicles will be subject to an access permit application to the National Heavy Vehicle Regulator (NHVR).

10.6.2 Traffic Generation

Construction traffic generation for the Main Works will coincide with the multi-deck car park works. Construction traffic impacts will need to be assessed based upon the cumulative amount of construction traffic. As the construction vehicle routes are similar, an assessment of the construction traffic generation considering the combined trip generation of the Stage 2 Main Works and other works within the Hospital should be undertaken.

The peak hour and daily construction vehicle movements to and from the site is unknown at this stage.

10.6.3 Construction Vehicle Routes

The indicative construction vehicle route is provided in Figure 37. This path enables access from the north and south and egress to the north. The preferred construction vehicle access is off Appin Road which can accommodate two-way movement for vehicles up to an 8.4m MRV without vehicle movements affecting opposing lanes. Access for vehicles up to a 19m AV is possible with encroachment into opposing lanes (see swept paths provided in Attachment 3).

Secondary construction vehicle access is possible via Therry Road, with swept path analysis indicating the ability of vehicles up to a 19m AV accessing and egressing the site. This also enables an egress path down towards the south, if required, by exiting onto Therry Road and then turning right into Appin Road.

Upon engagement of a construction contractor, this proposed route is intended to be revisited and revised based on specific vehicle requirements and contractor advice.

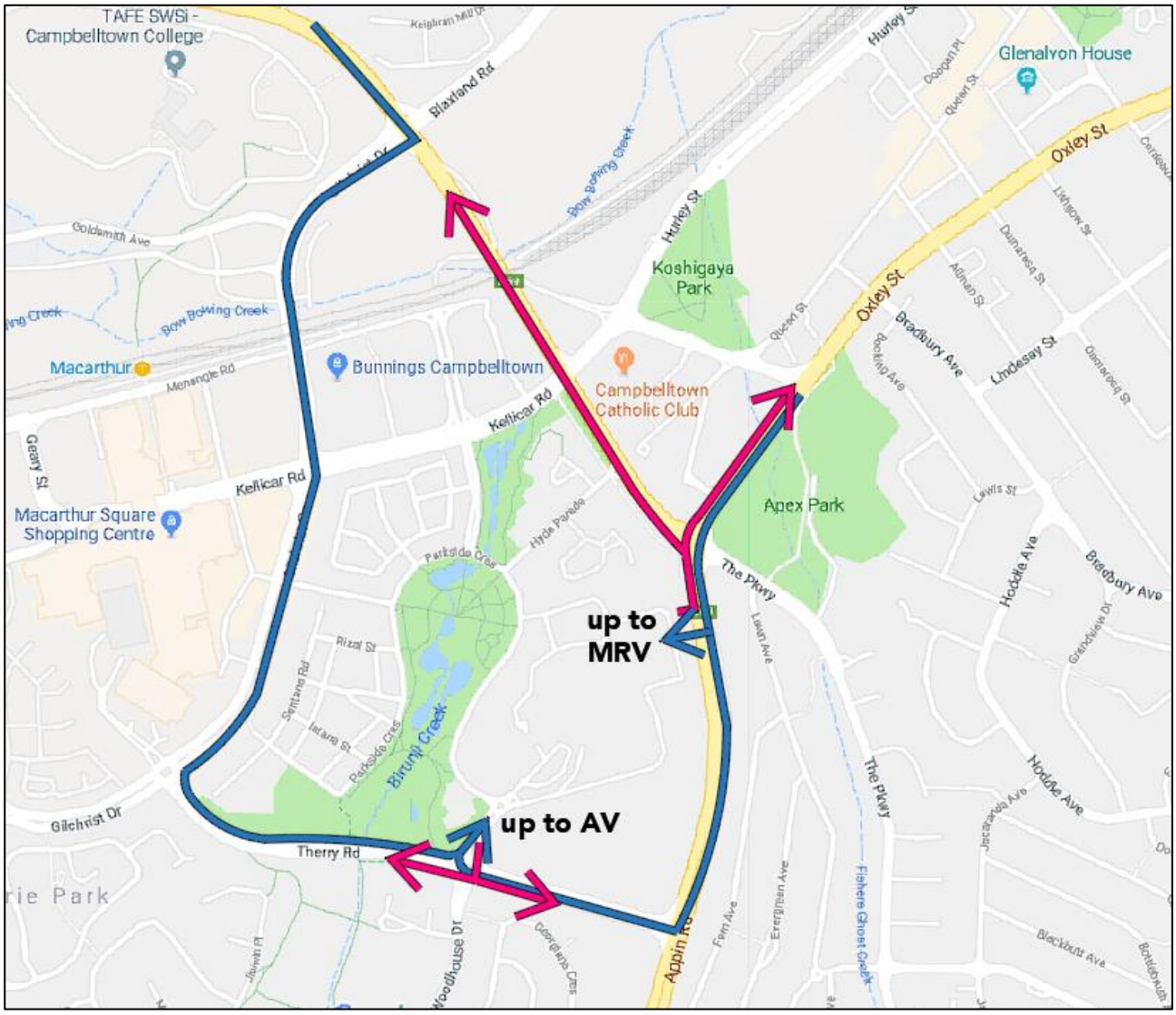


Figure 37 – Indicative Construction Vehicle Route

10.6.4 Works Zones

No Works Zone is proposed at this stage; however, if a Works Zone is required on a public road, the appropriate work zone applications shall be lodged with Campbelltown Council.

10.6.5 Road Occupancies

No lane or road closure is proposed at this stage. In the event that works do require a lane or road closure, the proponent shall submit a Road Occupancy Licence (ROL) application to the Transport Management Centre (TMC) for approval, prior to carrying out the associated works. The proponent recognises that a minimum of 10 days is required for the assessment of an ROL and will manage this accordingly.

10.7 Construction Impacts & Stakeholders

10.7.1 Impacts

It is anticipated that construction impacts will be minimal, as construction activities appear to be readily capable of occurring wholly within the proposed work compounds, without the need to modify the external road network, and with minimal interference with the internal roads and facilities of Campbelltown Hospital. Moreover, all routes are anticipated to minimise use of local roads, limiting as far as is practicable, interfacing between heavy vehicles and other road users. Various routes surrounding the site have been swept-path tested (in accordance with AS2890.2:2002) with 19m semi-trailer vehicles for feasibility in the Traffic Impact Assessment for the multi-deck car park. These swept paths have been included in Attachment 3.

In light of the above, although the volume of light and heavy vehicles will increase within the immediate road network, these increases are not expected to create any major traffic-related impacts to the road users and local population around the site.

It is anticipated that the increased volume of heavy vehicles in the internal road network may create some delays or hazards to internal road users if not properly managed. A traffic control plan may be required with traffic controllers engaged to safely coordinate traffic. It is advised that the Project Manager maintain constant communication with the Hospital, to coordinate activity between the two sites.

In addition, the cumulative influence, if any, of construction vehicles at the Main Works site and the multi-deck car park site should also be considered and if need be, require mitigation measures which would be included in the updated CTMP for the Construction Certificate stage.

10.7.2 Cumulative Impacts

ptc. has contacted Campbelltown Hospital and the Department of Planning who have indicated no significant developments within the vicinity of the Hospital. In addition, the Greater Macarthur Growth Area Infrastructure schedule[13] does not indicate any major developments near the Hospital within the immediate future. Hence, the cumulative construction traffic impacts will only result from other works (i.e. multi story car park) within the Hospital.

10.7.3 Stakeholders

Stakeholders should be identified, and informed of the proposed works, potential timing, and possible impacts. These details will be better understood upon further development progression and engagement of a contractor. Some of the initial stakeholders are listed in the following section.

- Campbelltown Hospital (Proponent);
- Department of Planning & Environment (Approval Authority);
- Campbelltown City Council;
- Roads & Maritime Services (RMS);
- State Transit Authority (STA);

[13] http://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Greater-Macarthur-Growth-Area/Infrastructure-schedule

- Chamber of Commerce

10.8 Traffic Control Measures

No traffic control plan is required at this stage – in the event that an activity requires a TCP, it shall be developed in accordance with the Australian Standards and the RMS Traffic Control at Works Sites Guidelines.

Any traffic controllers engaged on-site shall be accredited by RMS, and act in accordance with RMS Conditions, including:

- No stopping of traffic on public streets; and
- No stopping of pedestrians in anticipation of truck movements. Pedestrians may only be held for short periods, for their safety, whilst a truck is entering or leaving the site.

No marshalling or queuing of trucks shall be permitted on the public road.

10.9 Contractor Parking

Employees and sub-contractors will be encouraged to use public and active transport to access the site and not park on public roads. As part of the induction program, contractors and sub-contractors will be advised during their site inductions that there is no parking within the Campbelltown Hospital site, or within the adjacent streets. To minimise impact on street parking, contractors and sub-contractors will be encouraged to use public transport or to car pool.

To support alternative travel, secure areas could be made available within the work compounds for tradesmen and staff to store equipment, overnight, making light travel via alternative modes more viable.

10.10 Work Site Security

The works site shall be fully bounded with barriers to prevent pedestrian access. When not in use, the site shall be appropriately secured.

10.11 Induction

All staff and subcontractors engaged on site will be required to undergo a site induction. The induction will include permitted access routes to and from the construction site for all vehicles, as well as standard environmental, OH&S, driver protocols and emergency procedures. Additionally, the lead contractor will advise workers of public transport and car-pooling opportunities.

10.12 Emergency Vehicle Access

The proposed works are not anticipated to involve any closure of local roads. Any emergency vehicles requiring to access the project site will have unobstructed access.

10.13 Occupational/Work Health and Safety

Any workers required to undertake works or traffic control within the public domain shall be suitably trained and covered by adequate and appropriate insurances. All traffic control personnel will be required to hold RMS accreditation in accordance with Section 8 of Traffic Control at Worksites.

10.14 Contact Details for On-Site Enquiries & Site Access

A contractor has not been engaged at this stage.

11. Summary & Conclusion

ptc. has been engaged by Health Infrastructure to prepare a Traffic Impact Assessment to accompany the Development Application to Campbelltown City Council for the Main Works of the Stage 2 redevelopment of Campbelltown Hospital. This is expected to expand emergency, critical care, mental health inpatient and paediatric services.

As part of this works there will be a net decrease of 246 spaces. In conjunction with other works, outside the scope of the SSD, which will provide additional parking (834 spaces), there will be an overall net gain of 588 car parking spaces. This increases the existing car parking provision from 1280 to 1868.

With reference to forecasted parking provision, a review of the potential traffic generation of the site and corresponding analysis of the surrounding road network is performed in SIDRA. The proposed development will result in an AM and PM peak hour trip generation of 470 vehicles. This was determined through assessment of the net increase in parking spaces as a result of the future construction of the multi-deck car park, demolition of existing car parks, and construction of on-grade car parks. SIDRA results show that the development related traffic impact on the surrounding road network can easily be accommodated with minor impacts on the adjoining State and Regional Roads. An additional left-in/ left-out access is proposed on Therry Road to accommodate the increased Hospital-related traffic, which would otherwise be expected to generate additional queuing along Central Road in the PM peak.

An analysis of the future internal road layout is also discussed in the report. The redesign of the internal road, set-down areas, and ambulance access results in improved access to the multi-deck car park, greater flexibility for staff and public access, improved capacity of the internal roads, and potential for future expansion opportunities. This proposal will result in the addition on a left-in / left-out access on Therry Road and the relocation of the Appin Road access further south.

The parking and vehicular access arrangements for light vehicles and service vehicles have been designed in accordance with reference to AS2890.1, AS2890.2, AS2890.6, and Campbelltown DCP. Access and circulation have been further demonstrated through swept path assessments.

A preliminary CTMP has been included in this Traffic Impact Assessment to outline the construction traffic measures to improve site safety to the public and workers. Under the indicative construction program, there will be an overlap between the works as part of the SSD and other works within the Hospital (Multi deck car park). Therefore, a Cumulative CTMP will be required. It is envisaged that the detailed CTMP will be continually reviewed and amended if required, due to changes in design, or additional requirements of DPE, Council, RMS or any other authority requirements.

Attachment 1 Tube Count Data

Time	ATC1		ATC3		ATC9		ATC12	
	Inbound	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**
0:00	21	31	2	6	2	3	4	0
1:00	15	18	2	3	0	1	1	0
2:00	11	16	2	1	1	1	2	1
3:00	8	11	2	1	2	2	0	0
4:00	8	11	5	1	2	1	0	0
5:00	16	12	23	4	15	1	2	11
6:00	61	46	146	11	72	4	3	13
7:00	108	86	209	49	124	24	25	26
8:00	138	73	161	28	108	23	13	18
9:00	140	122	121	36	75	37	21	7
10:00	159	154	119	65	71	52	23	6
11:00	140	146	105	87	62	50	27	6
12:00	137	142	82	80	56	47	27	7
13:00	141	148	108	94	83	45	35	8
14:00	144	151	82	120	57	51	45	6
15:00	124	131	59	180	44	69	54	5
16:00	114	131	44	194	28	79	77	5
17:00	119	131	33	128	21	41	53	4
18:00	138	143	47	53	18	15	27	2
19:00	101	121	24	59	13	16	19	2
20:00	73	114	15	36	7	10	12	2
21:00	68	86	35	43	20	11	24	3
22:00	61	68	7	26	6	10	16	1
23:00	26	37	1	12	4	5	8	0

Attachment 2 SIDRA Analysis

MOVEMENT SUMMARY

Site: 101 [TherryCentralExistingAM]

Network: N101 [Exisiting AM]

AM Peak Existing
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Woodhouse Drive														
1	L2	280	5.0	280	5.0	0.389	7.1	LOS A	2.0	14.8	0.63	0.77	0.64	52.8
2	T1	112	1.1	112	1.1	0.421	7.1	LOS A	2.3	16.5	0.65	0.82	0.68	40.6
3	R2	198	0.6	198	0.6	0.421	12.7	LOS A	2.3	16.5	0.65	0.82	0.68	40.6
3u	U	4	0.0	4	0.0	0.421	15.1	LOS B	2.3	16.5	0.65	0.82	0.68	51.7
Approach		593	2.8	593	2.8	0.421	9.0	LOS A	2.3	16.5	0.64	0.79	0.66	48.2
East: Therry Road (E)														
4	L2	88	1.3	88	1.3	0.272	5.2	LOS A	1.4	9.9	0.46	0.53	0.46	52.1
5	T1	269	2.6	269	2.6	0.272	5.2	LOS A	1.4	9.8	0.46	0.57	0.46	54.9
6	R2	136	0.0	136	0.0	0.272	10.8	LOS A	1.4	9.8	0.46	0.63	0.46	44.3
6u	U	1	0.0	1	0.0	0.272	13.2	LOS A	1.4	9.8	0.46	0.63	0.46	44.3
Approach		495	1.7	495	1.7	0.272	6.7	LOS A	1.4	9.9	0.46	0.58	0.46	52.5
North: Central Road														
7	L2	80	0.0	80	0.0	0.131	5.5	LOS A	0.6	4.3	0.57	0.63	0.57	29.7
8	T1	46	0.0	46	0.0	0.131	5.1	LOS A	0.6	4.3	0.58	0.69	0.58	47.1
9	R2	53	13.3	53	13.3	0.131	11.0	LOS A	0.6	4.5	0.58	0.71	0.58	49.8
9u	U	1	0.0	1	0.0	0.131	12.5	LOS A	0.6	4.5	0.58	0.71	0.58	27.9
Approach		180	3.9	180	3.9	0.131	7.1	LOS A	0.6	4.5	0.57	0.67	0.57	44.9
West: Therry Road (W)														
10	L2	198	3.6	198	3.6	0.354	7.3	LOS A	2.0	14.8	0.66	0.73	0.66	49.5
11	T1	162	3.6	162	3.6	0.354	7.2	LOS A	2.0	14.8	0.66	0.77	0.66	47.5
12	R2	142	5.8	142	5.8	0.354	13.0	LOS A	2.0	14.9	0.66	0.79	0.66	51.5
12u	U	2	50.0	2	50.0	0.354	17.4	LOS B	2.0	14.9	0.66	0.79	0.66	53.4
Approach		505	4.4	505	4.4	0.354	8.9	LOS A	2.0	14.9	0.66	0.76	0.66	49.7
All Vehicles		1773	3.1	1773	3.1	0.421	8.2	LOS A	2.3	16.5	0.59	0.71	0.60	49.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [TherryCentralFutureAM]

Network: N101 [Future AM]

AM Peak Future
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Woodhouse Drive														
1	L2	266	5.1	266	5.1	0.389	7.5	LOS A	2.0	15.0	0.66	0.80	0.68	52.4
2	T1	155	0.7	155	0.7	0.488	8.2	LOS A	3.0	21.3	0.70	0.90	0.80	40.1
3	R2	187	0.6	187	0.6	0.488	13.9	LOS A	3.0	21.3	0.70	0.90	0.80	40.1
3u	U	3	0.0	3	0.0	0.488	16.2	LOS B	3.0	21.3	0.70	0.90	0.80	51.4
Approach		612	2.6	612	2.6	0.488	9.7	LOS A	3.0	21.3	0.68	0.86	0.75	47.3
East: Therry Road (E)														
4	L2	83	1.3	83	1.3	0.295	5.3	LOS A	1.5	10.9	0.48	0.55	0.48	49.6
5	T1	255	2.5	255	2.5	0.295	5.3	LOS A	1.5	10.8	0.48	0.58	0.48	53.7
6	R2	189	0.0	189	0.0	0.295	10.9	LOS A	1.5	10.8	0.48	0.67	0.48	35.4
6u	U	1	0.0	1	0.0	0.295	13.3	LOS A	1.5	10.8	0.48	0.67	0.48	35.4
Approach		528	1.4	528	1.4	0.295	7.4	LOS A	1.5	10.9	0.48	0.61	0.48	49.1
North: Central Road														
7	L2	103	0.0	103	0.0	0.163	5.9	LOS A	0.8	5.6	0.59	0.65	0.59	29.7
8	T1	59	0.0	59	0.0	0.163	5.5	LOS A	0.8	5.6	0.59	0.70	0.59	47.1
9	R2	65	9.7	65	9.7	0.163	11.3	LOS A	0.8	5.8	0.59	0.72	0.59	50.2
9u	U	1	0.0	1	0.0	0.163	13.1	LOS A	0.8	5.8	0.59	0.72	0.59	28.1
Approach		228	2.8	228	2.8	0.163	7.4	LOS A	0.8	5.8	0.59	0.68	0.59	45.0
West: Therry Road (W)														
10	L2	271	2.3	271	2.3	0.434	8.9	LOS A	2.8	20.1	0.74	0.85	0.80	47.8
11	T1	154	3.4	154	3.4	0.434	8.9	LOS A	2.8	20.1	0.75	0.87	0.80	45.8
12	R2	135	5.5	135	5.5	0.434	14.7	LOS B	2.8	20.5	0.75	0.88	0.80	50.8
12u	U	2	50.0	2	50.0	0.434	19.6	LOS B	2.8	20.5	0.75	0.88	0.80	52.8
Approach		561	3.6	561	3.6	0.434	10.3	LOS A	2.8	20.5	0.75	0.86	0.80	48.2
All Vehicles		1929	2.6	1929	2.6	0.488	9.0	LOS A	3.0	21.3	0.63	0.77	0.67	47.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [TherryCentralExistingPM]

Network: N102 [Existing PM]

PM Peak Existing
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Woodhouse Drive														
1	L2	221	3.7	221	3.7	0.394	9.3	LOS A	2.3	16.3	0.75	0.88	0.81	51.0
2	T1	105	0.0	105	0.0	0.589	11.8	LOS A	4.5	31.3	0.84	1.02	1.08	35.7
3	R2	233	1.0	233	1.0	0.589	17.5	LOS B	4.5	31.3	0.84	1.02	1.08	35.7
3u	U	1	0.0	1	0.0	0.589	19.8	LOS B	4.5	31.3	0.84	1.02	1.08	47.2
Approach		560	1.9	560	1.9	0.589	13.2	LOS A	4.5	31.3	0.80	0.97	0.97	43.6
East: Therry Road (E)														
4	L2	294	2.0	294	2.0	0.726	16.5	LOS B	6.4	45.7	0.84	1.07	1.30	43.1
5	T1	406	1.4	406	1.4	0.726	16.4	LOS B	6.4	45.6	0.84	1.08	1.30	47.4
6	R2	99	1.2	99	1.2	0.726	22.0	LOS B	6.4	45.6	0.84	1.08	1.30	35.0
6u	U	1	0.0	1	0.0	0.726	24.3	LOS B	6.4	45.6	0.84	1.08	1.30	35.0
Approach		800	1.6	800	1.6	0.726	17.1	LOS B	6.4	45.7	0.84	1.07	1.30	44.9
North: Central Road														
7	L2	221	0.5	221	0.5	0.767	22.9	LOS B	6.2	43.6	0.93	1.20	1.61	13.4
8	T1	180	0.0	180	0.0	0.767	22.5	LOS B	6.2	43.6	0.92	1.21	1.61	31.8
9	R2	156	6.0	156	6.0	0.767	28.6	LOS C	6.1	44.3	0.92	1.21	1.61	37.5
9u	U	1	0.0	1	0.0	0.767	30.0	LOS C	6.1	44.3	0.92	1.21	1.61	14.9
Approach		559	1.9	559	1.9	0.767	24.4	LOS B	6.2	44.3	0.92	1.20	1.61	29.3
West: Therry Road (W)														
10	L2	81	5.8	81	5.8	0.634	10.6	LOS A	5.9	41.6	0.83	0.93	1.02	46.7
11	T1	459	0.3	459	0.3	0.634	10.2	LOS A	5.9	41.6	0.83	0.93	1.02	46.0
12	R2	362	3.9	362	3.9	0.634	16.1	LOS B	5.9	42.2	0.83	0.97	1.03	48.7
12u	U	1	0.0	1	0.0	0.634	18.3	LOS B	5.9	42.2	0.83	0.97	1.03	52.2
Approach		904	2.2	904	2.2	0.634	12.6	LOS A	5.9	42.2	0.83	0.95	1.03	47.4
All Vehicles		2822	1.9	2822	1.9	0.767	16.3	LOS B	6.4	45.7	0.85	1.04	1.21	42.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [TherryCentralFuturePM]

Network: N101 [Future PM]

PM Peak Future

Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Woodhouse Drive														
1	L2	209	3.5	209	3.5	0.393	9.6	LOS A	2.2	16.2	0.76	0.89	0.83	50.7
2	T1	129	0.0	129	0.0	0.644	13.4	LOS A	5.2	36.4	0.87	1.06	1.19	34.6
3	R2	221	1.0	221	1.0	0.644	19.1	LOS B	5.2	36.4	0.87	1.06	1.19	34.6
3u	U	1	0.0	1	0.0	0.644	21.4	LOS B	5.2	36.4	0.87	1.06	1.19	46.1
Approach		561	1.7	561	1.7	0.644	14.2	LOS A	5.2	36.4	0.83	1.00	1.06	42.5
East: Therry Road (E)														
4	L2	279	1.9	279	1.9	0.773	20.3	LOS B	7.9	56.1	0.95	1.20	1.60	36.2
5	T1	384	1.4	384	1.4	0.773	20.1	LOS B	7.9	56.0	0.95	1.20	1.60	42.4
6	R2	123	0.9	123	0.9	0.773	25.8	LOS B	7.9	56.0	0.95	1.20	1.60	22.9
6u	U	1	0.0	1	0.0	0.773	28.1	LOS B	7.9	56.0	0.95	1.20	1.60	22.9
Approach		787	1.5	787	1.5	0.773	21.1	LOS B	7.9	56.1	0.95	1.20	1.60	38.4
North: Central Road														
7	L2	265	0.4	265	0.4	0.876	31.8	LOS C	9.5	67.0	0.97	1.40	2.14	10.5
8	T1	226	0.0	226	0.0	0.876	31.5	LOS C	9.5	67.0	0.97	1.40	2.14	27.3
9	R2	185	4.5	185	4.5	0.876	37.6	LOS C	9.5	67.7	0.97	1.41	2.14	33.4
9u	U	1	0.0	1	0.0	0.876	39.3	LOS C	9.5	67.7	0.97	1.41	2.14	12.1
Approach		678	1.4	678	1.4	0.876	33.3	LOS C	9.5	67.7	0.97	1.40	2.14	24.9
West: Therry Road (W)														
10	L2	99	4.3	99	4.3	0.646	11.4	LOS A	6.1	43.1	0.86	0.97	1.09	45.8
11	T1	435	0.2	435	0.2	0.646	11.1	LOS A	6.1	43.1	0.86	0.98	1.09	45.0
12	R2	344	4.0	344	4.0	0.646	17.0	LOS B	6.1	43.7	0.86	1.01	1.09	48.1
12u	U	1	0.0	1	0.0	0.646	19.2	LOS B	6.1	43.7	0.86	1.01	1.09	51.7
Approach		879	2.2	879	2.2	0.646	13.5	LOS A	6.1	43.7	0.86	0.99	1.09	46.6
All Vehicles		2905	1.7	2905	1.7	0.876	20.3	LOS B	9.5	67.7	0.90	1.15	1.47	38.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [CentralParksideExistingAM]

Network: N101 [Exisiting AM]

AM Peak Existing
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Hospital Access (E)														
4a	L1	34	3.1	34	3.1	0.049	3.4	LOS A	0.2	1.7	0.31	0.48	0.31	43.6
6a	R1	21	0.0	21	0.0	0.049	7.0	LOS A	0.2	1.7	0.31	0.48	0.31	43.6
6b	R3	2	0.0	2	0.0	0.049	8.8	LOS A	0.2	1.7	0.31	0.48	0.31	47.8
6u	U	1	0.0	1	0.0	0.049	9.7	LOS A	0.2	1.7	0.31	0.48	0.31	48.3
Approach		58	1.8	58	1.8	0.049	5.0	LOS A	0.2	1.7	0.31	0.48	0.31	44.0
NorthEast: Hospital Access (NE)														
24b	L3	5	0.0	5	0.0	0.077	3.9	LOS A	0.4	2.8	0.43	0.53	0.43	45.9
25	T1	55	5.8	55	5.8	0.077	4.5	LOS A	0.4	2.8	0.43	0.53	0.43	43.0
26	R2	20	0.0	20	0.0	0.077	8.6	LOS A	0.4	2.8	0.43	0.53	0.43	43.0
26u	U	1	0.0	1	0.0	0.077	10.4	LOS A	0.4	2.8	0.43	0.53	0.43	47.9
Approach		81	3.9	81	3.9	0.077	5.5	LOS A	0.4	2.8	0.43	0.53	0.43	43.4
NorthWest: ParkSideCres (NW)														
27	L2	28	0.0	28	0.0	0.123	4.3	LOS A	0.6	4.6	0.43	0.59	0.43	45.2
27a	L1	29	3.6	29	3.6	0.123	4.1	LOS A	0.6	4.6	0.43	0.59	0.43	45.8
29	R2	74	2.9	74	2.9	0.123	8.6	LOS A	0.6	4.6	0.43	0.59	0.43	40.9
29u	U	1	0.0	1	0.0	0.123	10.3	LOS A	0.6	4.6	0.43	0.59	0.43	40.9
Approach		133	2.4	133	2.4	0.123	6.7	LOS A	0.6	4.6	0.43	0.59	0.43	43.6
SouthWest: Central Rd (SE)														
30	L2	119	0.9	119	0.9	0.264	3.2	LOS A	1.6	11.4	0.19	0.48	0.19	30.5
31	T1	73	7.2	73	7.2	0.264	3.2	LOS A	1.6	11.4	0.19	0.48	0.19	45.8
32a	R1	189	1.7	189	1.7	0.264	6.6	LOS A	1.6	11.4	0.19	0.48	0.19	45.4
32u	U	1	0.0	1	0.0	0.264	9.2	LOS A	1.6	11.4	0.19	0.48	0.19	30.5
Approach		382	2.5	382	2.5	0.264	4.9	LOS A	1.6	11.4	0.19	0.48	0.19	43.8
All Vehicles		654	2.6	654	2.6	0.264	5.3	LOS A	1.6	11.4	0.28	0.51	0.28	43.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [CentralParksideFutureAM]

Network: N101 [Future AM]

AM Peak Future
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Hospital Access (E)														
4a	L1	87	1.2	87	1.2	0.096	4.0	LOS A	0.5	3.5	0.35	0.49	0.35	46.9
6a	R1	22	0.0	22	0.0	0.096	7.7	LOS A	0.5	3.5	0.35	0.49	0.35	46.9
6b	R3	2	0.0	2	0.0	0.096	9.6	LOS A	0.5	3.5	0.35	0.49	0.35	49.9
6u	U	1	0.0	1	0.0	0.096	10.6	LOS A	0.5	3.5	0.35	0.49	0.35	50.3
Approach		113	0.9	113	0.9	0.096	4.9	LOS A	0.5	3.5	0.35	0.49	0.35	47.1
NorthEast: Hospital Access (NE)														
24b	L3	5	0.0	5	0.0	0.096	5.1	LOS A	0.5	3.7	0.58	0.62	0.58	45.3
25	T1	58	5.5	58	5.5	0.096	5.8	LOS A	0.5	3.7	0.58	0.62	0.58	42.1
26	R2	21	0.0	21	0.0	0.096	9.9	LOS A	0.5	3.7	0.58	0.62	0.58	42.1
26u	U	1	0.0	1	0.0	0.096	11.7	LOS A	0.5	3.7	0.58	0.62	0.58	47.3
Approach		85	3.7	85	3.7	0.096	6.9	LOS A	0.5	3.7	0.58	0.62	0.58	42.5
NorthWest: ParkSideCres (NW)														
27	L2	31	0.0	31	0.0	0.165	5.7	LOS A	0.9	6.6	0.58	0.69	0.58	44.7
27a	L1	35	3.0	35	3.0	0.165	5.4	LOS A	0.9	6.6	0.58	0.69	0.58	45.7
29	R2	85	2.5	85	2.5	0.165	10.0	LOS A	0.9	6.6	0.58	0.69	0.58	40.1
29u	U	1	0.0	1	0.0	0.165	11.7	LOS A	0.9	6.6	0.58	0.69	0.58	40.1
Approach		152	2.1	152	2.1	0.165	8.1	LOS A	0.9	6.6	0.58	0.69	0.58	43.1
SouthWest: Central Rd (SE)														
30	L2	126	0.8	126	0.8	0.402	3.6	LOS A	2.9	20.9	0.23	0.52	0.23	29.6
31	T1	77	6.8	77	6.8	0.402	3.7	LOS A	2.9	20.9	0.23	0.52	0.23	45.3
32a	R1	392	0.8	392	0.8	0.402	7.0	LOS A	2.9	20.9	0.23	0.52	0.23	47.4
32u	U	1	0.0	1	0.0	0.402	9.8	LOS A	2.9	20.9	0.23	0.52	0.23	29.6
Approach		596	1.6	596	1.6	0.402	5.9	LOS A	2.9	20.9	0.23	0.52	0.23	45.7
All Vehicles		945	1.8	945	1.8	0.402	6.2	LOS A	2.9	20.9	0.33	0.55	0.33	45.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [CentralParksideExistingPM]

Network: N102 [Existing PM]

PM Peak Existing
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Hospital Access (E)														
4a	L1	153	0.7	153	0.7	0.221	5.9	LOS A	1.3	9.2	0.65	0.69	0.65	42.5
6a	R1	35	0.0	35	0.0	0.221	9.6	LOS A	1.3	9.2	0.65	0.69	0.65	42.5
6b	R3	3	0.0	3	0.0	0.221	11.3	LOS A	1.3	9.2	0.65	0.69	0.65	47.2
6u	U	2	0.0	2	0.0	0.221	12.2	LOS A	1.3	9.2	0.65	0.69	0.65	47.6
Approach		193	0.5	193	0.5	0.221	6.7	LOS A	1.3	9.2	0.65	0.69	0.65	42.7
NorthEast: Hospital Access (NE)														
24b	L3	6	0.0	6	0.0	0.147	3.0	LOS A	0.8	5.8	0.46	0.56	0.46	45.9
25	T1	112	2.8	112	2.8	0.147	5.4	LOS A	0.8	5.8	0.46	0.56	0.46	43.1
26	R2	19	0.0	19	0.0	0.147	9.6	LOS A	0.8	5.8	0.46	0.56	0.46	43.1
26u	U	1	0.0	1	0.0	0.147	11.4	LOS A	0.8	5.8	0.46	0.56	0.46	47.9
Approach		138	2.3	138	2.3	0.147	5.9	LOS A	0.8	5.8	0.46	0.56	0.46	43.4
NorthWest: ParkSideCres (NW)														
27	L2	22	0.0	22	0.0	0.338	3.7	LOS A	2.2	15.3	0.36	0.60	0.36	44.4
27a	L1	8	0.0	8	0.0	0.338	3.4	LOS A	2.2	15.3	0.36	0.60	0.36	45.0
29	R2	399	0.3	399	0.3	0.338	8.0	LOS A	2.2	15.3	0.36	0.60	0.36	39.6
29u	U	6	0.0	6	0.0	0.338	9.7	LOS A	2.2	15.3	0.36	0.60	0.36	39.6
Approach		436	0.2	436	0.2	0.338	7.7	LOS A	2.2	15.3	0.36	0.60	0.36	40.2
SouthWest: Central Rd (SE)														
30	L2	159	0.0	159	0.0	0.205	3.3	LOS A	1.2	8.7	0.23	0.42	0.23	32.3
31	T1	93	3.4	93	3.4	0.205	3.3	LOS A	1.2	8.7	0.23	0.42	0.23	46.8
32a	R1	23	0.0	23	0.0	0.205	6.6	LOS A	1.2	8.7	0.23	0.42	0.23	46.4
32u	U	6	0.0	6	0.0	0.205	9.3	LOS A	1.2	8.7	0.23	0.42	0.23	32.3
Approach		281	1.1	281	1.1	0.205	3.7	LOS A	1.2	8.7	0.23	0.42	0.23	42.8
All Vehicles		1047	0.8	1047	0.8	0.338	6.2	LOS A	2.2	15.3	0.39	0.56	0.39	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [CentralParksideFuturePM]

Network: N101 [Future PM]

PM Peak Future
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Hospital Access (E)														
4a	L1	283	0.4	283	0.4	0.394	7.2	LOS A	2.7	18.7	0.76	0.78	0.76	44.0
6a	R1	37	0.0	37	0.0	0.394	10.9	LOS A	2.7	18.7	0.76	0.78	0.76	44.0
6b	R3	3	0.0	3	0.0	0.394	12.8	LOS A	2.7	18.7	0.76	0.78	0.76	48.2
6u	U	2	0.0	2	0.0	0.394	13.7	LOS A	2.7	18.7	0.76	0.78	0.76	48.6
Approach		325	0.3	325	0.3	0.394	7.7	LOS A	2.7	18.7	0.76	0.78	0.76	44.2
NorthEast: Hospital Access (NE)														
24b	L3	6	0.0	6	0.0	0.173	3.5	LOS A	1.0	7.3	0.63	0.66	0.63	45.4
25	T1	118	2.7	118	2.7	0.173	6.3	LOS A	1.0	7.3	0.63	0.66	0.63	42.2
26	R2	20	0.0	20	0.0	0.173	10.5	LOS A	1.0	7.3	0.63	0.66	0.63	42.2
26u	U	1	0.0	1	0.0	0.173	12.3	LOS A	1.0	7.3	0.63	0.66	0.63	47.4
Approach		145	2.2	145	2.2	0.173	6.8	LOS A	1.0	7.3	0.63	0.66	0.63	42.5
NorthWest: ParkSideCres (NW)														
27	L2	23	0.0	23	0.0	0.410	4.4	LOS A	2.8	19.7	0.50	0.65	0.50	44.1
27a	L1	11	0.0	11	0.0	0.410	4.1	LOS A	2.8	19.7	0.50	0.65	0.50	45.5
29	R2	440	0.2	440	0.2	0.410	8.7	LOS A	2.8	19.7	0.50	0.65	0.50	39.2
29u	U	6	0.0	6	0.0	0.410	10.5	LOS A	2.8	19.7	0.50	0.65	0.50	39.2
Approach		480	0.2	480	0.2	0.410	8.4	LOS A	2.8	19.7	0.50	0.65	0.50	39.9
SouthWest: Central Rd (SE)														
30	L2	168	0.0	168	0.0	0.273	3.5	LOS A	1.8	12.6	0.26	0.47	0.26	31.1
31	T1	98	3.2	98	3.2	0.273	3.6	LOS A	1.8	12.6	0.26	0.47	0.26	46.2
32a	R1	106	0.0	106	0.0	0.273	7.0	LOS A	1.8	12.6	0.26	0.47	0.26	49.8
32u	U	6	0.0	6	0.0	0.273	9.7	LOS A	1.8	12.6	0.26	0.47	0.26	31.1
Approach		379	0.8	379	0.8	0.273	4.6	LOS A	1.8	12.6	0.26	0.47	0.26	44.7
All Vehicles		1329	0.6	1329	0.6	0.410	7.0	LOS A	2.8	19.7	0.51	0.63	0.51	42.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: 101 [ParkSideAccessIntExistingAM]

Network: N101 [Exisiting AM]

AM Peak Existing
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: ParksideCres (S)														
2	T1	167	0.6	167	0.6	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		167	0.6	167	0.6	0.086	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
East: Access Int (E)														
4	L2	26	0.0	26	0.0	0.019	6.0	LOS A	0.1	0.5	0.26	0.54	0.26	49.5
Approach		26	0.0	26	0.0	0.019	6.0	LOS A	0.1	0.5	0.26	0.54	0.26	49.5
North: ParksideCres (N)														
7	L2	131	0.8	131	0.8	0.159	5.6	LOS A	0.7	5.2	0.13	0.29	0.13	52.6
8	T1	121	1.7	121	1.7	0.159	0.2	LOS A	0.7	5.2	0.13	0.29	0.13	38.3
Approach		252	1.3	252	1.3	0.159	3.0	NA	0.7	5.2	0.13	0.29	0.13	50.1
All Vehicles		445	0.9	445	0.9	0.159	2.0	NA	0.7	5.2	0.09	0.20	0.09	50.0

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

MOVEMENT SUMMARY

Site: 101 [ParkSideAccessIntFutureAM]

Network: N101 [Future AM]

AM Peak Future
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: ParksideCres (S)														
2	T1	177	0.6	177	0.6	0.091	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		177	0.6	177	0.6	0.091	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
East: Access Int (E)														
4	L2	36	0.0	36	0.0	0.026	6.1	LOS A	0.1	0.7	0.27	0.55	0.27	49.4
Approach		36	0.0	36	0.0	0.026	6.1	LOS A	0.1	0.7	0.27	0.55	0.27	49.4
North: ParksideCres (N)														
7	L2	169	0.6	169	0.6	0.193	5.6	LOS A	0.9	6.6	0.14	0.31	0.14	52.2
8	T1	132	1.6	132	1.6	0.193	0.2	LOS A	0.9	6.6	0.14	0.31	0.14	37.3
Approach		301	1.0	301	1.0	0.193	3.2	NA	0.9	6.6	0.14	0.31	0.14	50.0
All Vehicles		514	0.8	514	0.8	0.193	2.3	NA	0.9	6.6	0.10	0.22	0.10	49.9

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

MOVEMENT SUMMARY

Site: 101 [ParkSideAccessIntExistingPM]

Network: N102 [Existing PM]

PM Peak Existing
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: ParksideCres (S)														
2	T1	296	0.4	296	0.4	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		296	0.4	296	0.4	0.152	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
East: Access Int (E)														
4	L2	96	0.0	96	0.0	0.090	7.2	LOS A	0.3	2.4	0.45	0.67	0.45	48.4
Approach		96	0.0	96	0.0	0.090	7.2	LOS A	0.3	2.4	0.45	0.67	0.45	48.4
North: ParksideCres (N)														
7	L2	45	0.0	45	0.0	0.235	5.6	LOS A	0.4	2.6	0.04	0.06	0.04	56.2
8	T1	391	0.3	391	0.3	0.235	0.0	LOS A	0.4	2.6	0.04	0.06	0.04	53.3
Approach		436	0.2	436	0.2	0.235	0.6	NA	0.4	2.6	0.04	0.06	0.04	54.5
All Vehicles		827	0.3	827	0.3	0.235	1.2	NA	0.4	2.6	0.07	0.11	0.07	50.7

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

MOVEMENT SUMMARY

Site: 101 [ParkSideAccessIntFuturePM]

Network: N101 [Future PM]

PM Peak Future
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: ParksideCres (S)														
2	T1	314	0.3	314	0.3	0.161	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		314	0.3	314	0.3	0.161	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
East: Access Int (E)														
4	L2	119	0.0	119	0.0	0.115	7.4	LOS A	0.4	3.1	0.47	0.69	0.47	48.3
Approach		119	0.0	119	0.0	0.115	7.4	LOS A	0.4	3.1	0.47	0.69	0.47	48.3
North: ParksideCres (N)														
7	L2	68	0.0	68	0.0	0.265	5.6	LOS A	0.6	4.0	0.05	0.08	0.05	55.8
8	T1	416	0.3	416	0.3	0.265	0.1	LOS A	0.6	4.0	0.05	0.08	0.05	51.3
Approach		484	0.2	484	0.2	0.265	0.8	NA	0.6	4.0	0.05	0.08	0.05	53.5
All Vehicles		917	0.2	917	0.2	0.265	1.4	NA	0.6	4.0	0.09	0.13	0.09	50.5

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

MOVEMENT SUMMARY

Site: 101 [AppinAccessIntExistingAM]

Network: N101 [Exisiting AM]

AM Peak Existing
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Road (s)														
1	L2	32	0.0	32	0.0	0.017	13.6	LOS A	0.0	0.0	0.00	0.86	0.00	48.0
2	T1	1573	2.5	1573	2.5	0.406	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1604	2.4	1604	2.4	0.406	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.4
West: Hospital Access														
10	L2	31	3.4	31	3.4	0.055	7.6	LOS A	0.2	1.5	0.62	0.95	0.62	11.4
Approach		31	3.4	31	3.4	0.055	7.6	LOS A	0.2	1.5	0.62	0.95	0.62	11.4
All Vehicles		1635	2.4	1635	2.4	0.406	0.5	NA	0.2	1.5	0.01	0.03	0.01	55.1

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

MOVEMENT SUMMARY

Site: 101v [AppinAccessIntFutureAM]

Network: N101 [Future AM]

AM Peak Future
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Road (s)														
1	L2	120	0.0	120	0.0	0.064	6.9	LOS A	0.0	0.0	0.00	0.47	0.00	53.5
2	T1	1701	2.4	1701	2.4	0.438	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1821	2.3	1821	2.3	0.438	0.5	NA	0.0	0.0	0.00	0.03	0.00	59.2
West: Hospital Access														
10	L2	93	1.1	93	1.1	0.050	5.1	LOS A	0.0	0.0	0.00	0.40	0.00	39.8
Approach		93	1.1	93	1.1	0.050	5.1	NA	0.0	0.0	0.00	0.40	0.00	39.8
All Vehicles		1914	2.2	1914	2.2	0.438	0.7	NA	0.0	0.0	0.00	0.05	0.00	57.8

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

MOVEMENT SUMMARY

Site: 101 [AppinAccessIntExistingPM]

Network: N102 [Existing PM]

PM Peak Existing
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Road (s)														
1	L2	4	0.0	4	0.0	0.002	13.6	LOS A	0.0	0.0	0.00	0.86	0.00	48.0
2	T1	1063	3.1	1063	3.1	0.275	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1067	3.1	1067	3.1	0.275	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
West: Hospital Access														
10	L2	93	1.1	93	1.1	0.116	5.2	LOS A	0.5	3.3	0.53	0.94	0.53	11.6
Approach		93	1.1	93	1.1	0.116	5.2	LOS A	0.5	3.3	0.53	0.94	0.53	11.6
All Vehicles		1160	2.9	1160	2.9	0.275	0.5	NA	0.5	3.3	0.04	0.08	0.04	44.7

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

MOVEMENT SUMMARY

Site: 101v [AppinAccessIntFuturePM]

Network: N101 [Future PM]

PM Peak Future
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Road (s)														
1	L2	34	0.0	34	0.0	0.018	6.1	LOS A	0.0	0.0	0.00	0.44	0.00	54.3
2	T1	1199	2.9	1199	2.9	0.310	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1233	2.8	1233	2.8	0.310	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
West: Hospital Access														
10	L2	238	0.4	238	0.4	0.127	5.0	LOS A	0.0	0.0	0.00	0.40	0.00	37.5
Approach		238	0.4	238	0.4	0.127	5.0	NA	0.0	0.0	0.00	0.40	0.00	37.5
All Vehicles		1471	2.4	1471	2.4	0.310	1.0	NA	0.0	0.0	0.00	0.07	0.00	54.4

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

MOVEMENT SUMMARY

Site: 101 [TherryAppinExistingAM]

Network: N101 [Exisiting AM]

AMExisting
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Rd (S)														
1	L2	261	4.8	261	4.8	0.145	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.0
2	T1	1369	5.0	1369	5.0	0.769	18.5	LOS B	20.7	151.1	0.89	0.84	0.95	37.7
Approach		1631	5.0	1631	5.0	0.769	16.4	LOS B	20.7	151.1	0.75	0.79	0.79	39.4
North: Appin Rd (N)														
8	T1	457	5.1	457	5.1	0.163	2.8	LOS A	2.3	16.4	0.31	0.26	0.31	57.4
9	R2	117	5.4	117	5.4	0.287	15.4	LOS B	1.9	13.7	0.75	0.74	0.75	40.3
Approach		574	5.1	574	5.1	0.287	5.4	LOS A	2.3	16.4	0.40	0.36	0.40	54.7
West: Therry Rd (W)														
10	L2	186	5.1	186	5.1	0.104	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	48.4
12	R2	122	5.2	122	5.2	0.401	40.9	LOS C	2.2	15.8	0.98	0.75	0.98	33.2
Approach		308	5.1	308	5.1	0.401	19.6	LOS B	2.2	15.8	0.39	0.61	0.39	38.0
All Vehicles		2513	5.0	2513	5.0	0.769	14.3	LOS A	20.7	151.1	0.63	0.67	0.65	43.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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
P3	North Full Crossing	1	29.3	LOS C	0.0	0.0	0.91	0.91
P4	West Full Crossing	1	17.2	LOS B	0.0	0.0	0.70	0.70
All Pedestrians		2	23.2	LOS C			0.81	0.81

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: 101 [TherryAppinFutureAM]

Network: N101 [Future AM]

AMFuture

Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Rd (S)														
1	L2	318	4.3	318	4.3	0.176	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.0
2	T1	1538	4.7	1538	4.7	0.862	26.0	LOS B	28.5	207.5	0.96	1.01	1.15	32.7
Approach		1856	4.7	1856	4.7	0.862	22.5	LOS B	28.5	207.5	0.80	0.93	0.95	34.9
North: Appin Rd (N)														
8	T1	484	5.0	484	5.0	0.173	2.8	LOS A	2.4	17.6	0.31	0.27	0.31	57.4
9	R2	141	4.5	141	4.5	0.366	17.7	LOS B	2.6	19.1	0.83	0.77	0.83	38.3
Approach		625	4.9	625	4.9	0.366	6.2	LOS A	2.6	19.1	0.43	0.38	0.43	53.9
West: Therry Rd (W)														
10	L2	233	4.5	233	4.5	0.129	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	41.0
12	R2	153	4.1	153	4.1	0.494	41.3	LOS C	2.7	19.6	0.99	0.76	0.99	29.4
Approach		385	4.4	385	4.4	0.494	19.8	LOS B	2.7	19.6	0.39	0.62	0.39	32.2
All Vehicles		2866	4.7	2866	4.7	0.862	18.6	LOS B	28.5	207.5	0.66	0.77	0.76	39.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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
P3	North Full Crossing	1	29.3	LOS C	0.0	0.0	0.91	0.91
P4	West Full Crossing	1	17.2	LOS B	0.0	0.0	0.70	0.70
All Pedestrians		2	23.2	LOS C			0.81	0.81

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: 101 [TherryAppinExistingPM]

Network: N102 [Existing PM]

PMExisting
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Rd (S)														
1	L2	391	5.1	391	5.1	0.218	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.0
2	T1	669	5.0	669	5.0	0.834	39.2	LOS C	14.3	104.7	1.00	0.99	1.25	26.6
Approach		1060	5.1	1060	5.1	0.834	26.8	LOS B	14.3	104.7	0.63	0.82	0.79	32.4
North: Appin Rd (N)														
8	T1	1195	5.0	1195	5.0	0.460	6.1	LOS A	10.6	77.1	0.49	0.44	0.49	54.6
9	R2	483	5.0	483	5.0	0.635	15.5	LOS B	8.2	60.2	0.84	0.82	0.84	40.2
Approach		1678	5.0	1678	5.0	0.635	8.8	LOS A	10.6	77.1	0.59	0.55	0.59	51.4
West: Therry Rd (W)														
10	L2	598	5.1	598	5.1	0.334	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	48.4
12	R2	447	5.6	447	5.6	0.810	46.3	LOS D	10.0	73.5	1.00	0.94	1.27	31.4
Approach		1045	5.3	1045	5.3	0.810	23.1	LOS B	10.0	73.5	0.43	0.70	0.54	36.2
All Vehicles		3783	5.1	3783	5.1	0.834	17.8	LOS B	14.3	104.7	0.56	0.67	0.63	42.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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
P3	North Full Crossing	1	34.2	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	1	34.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		2	34.2	LOS D			0.93	0.93

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: 101 [TherryAppinFuturePM]

Network: N101 [Future PM]

PMFuture
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Appin Rd (S)														
1	L2	426	4.9	426	4.9	0.238	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.0
2	T1	739	4.8	739	4.8	0.896	58.1	LOS E	22.8	166.5	1.00	1.06	1.30	21.0
Approach		1165	4.9	1165	4.9	0.896	38.9	LOS C	22.8	166.5	0.63	0.86	0.82	26.8
North: Appin Rd (N)														
8	T1	1266	5.0	1266	5.0	0.505	9.9	LOS A	16.9	123.4	0.55	0.50	0.55	51.6
9	R2	527	4.8	527	4.8	0.722	24.6	LOS B	16.2	118.1	0.90	0.88	0.96	33.6
Approach		1794	4.9	1794	4.9	0.722	14.2	LOS A	16.9	123.4	0.65	0.61	0.67	47.2
West: Therry Rd (W)														
10	L2	705	4.6	705	4.6	0.392	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	40.9
12	R2	527	5.0	527	5.0	0.887	62.9	LOS E	22.2	161.8	0.97	0.98	1.31	23.4
Approach		1233	4.8	1233	4.8	0.887	30.2	LOS C	22.2	161.8	0.41	0.72	0.56	26.6
All Vehicles		4192	4.9	4192	4.9	0.896	25.8	LOS B	22.8	166.5	0.58	0.71	0.68	35.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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
P3	North Full Crossing	1	47.3	LOS E	0.0	0.0	0.93	0.93
P4	West Full Crossing	1	43.7	LOS E	0.0	0.0	0.89	0.89
All Pedestrians		2	45.5	LOS E			0.91	0.91

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

MOVEMENT SUMMARY

Site: 101 [TherryLeftInLeftOutFutureAM]

Network: N101 [Future AM]

AM Peak Future
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival 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: Therry Rd (E)														
5	T1	435	3.1	435	3.1	0.114	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		435	3.1	435	3.1	0.114	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
North: Access														
7	L2	29	0.0	29	0.0	0.029	9.4	LOS A	0.1	0.7	0.27	0.87	0.27	46.9
Approach		29	0.0	29	0.0	0.029	9.4	LOS A	0.1	0.7	0.27	0.87	0.27	46.9
West: Therry Rd (W)														
10	L2	35	0.0	35	0.0	0.107	5.6	LOS A	0.0	0.0	0.00	0.10	0.00	58.5
11	T1	372	3.1	372	3.1	0.107	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	57.6
Approach		406	2.8	406	2.8	0.107	0.5	NA	0.0	0.0	0.00	0.05	0.00	57.8
All Vehicles		871	2.9	871	2.9	0.114	0.5	NA	0.1	0.7	0.01	0.05	0.01	57.6

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

MOVEMENT SUMMARY

Site: 101 [TherryLeftInLeftOutFuturePM]

Network: N101 [Future PM]

PM Peak Future
Site Category: (None)
Stop (Two-Way)

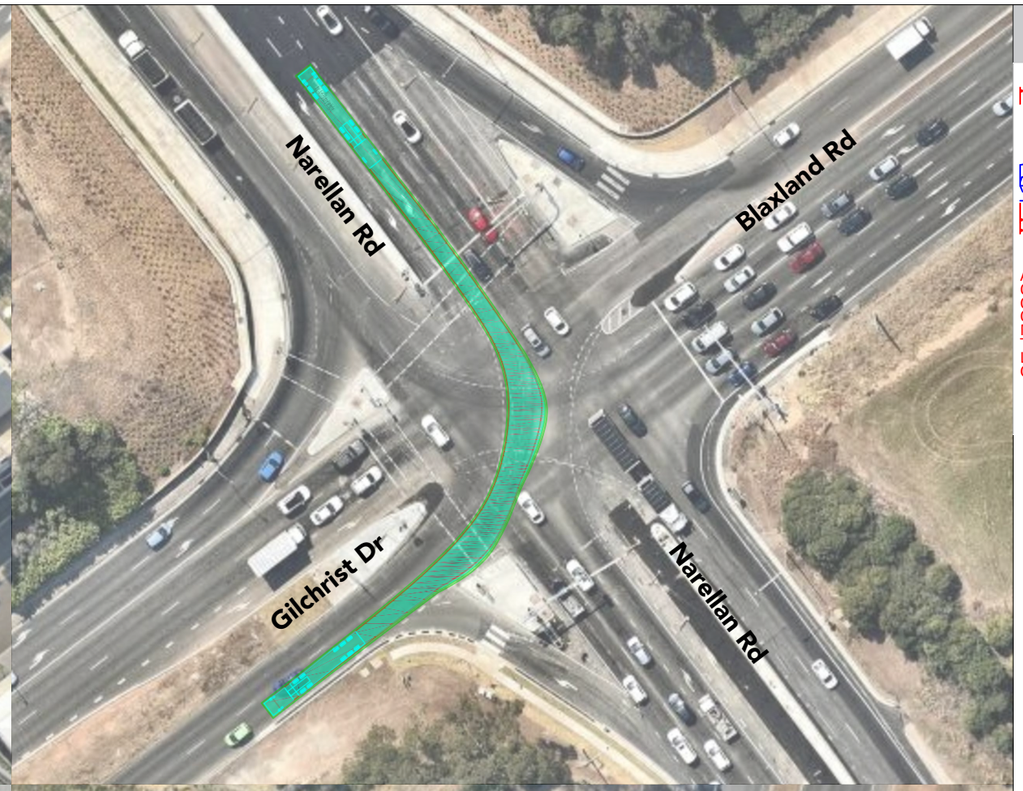
Movement Performance - Vehicles

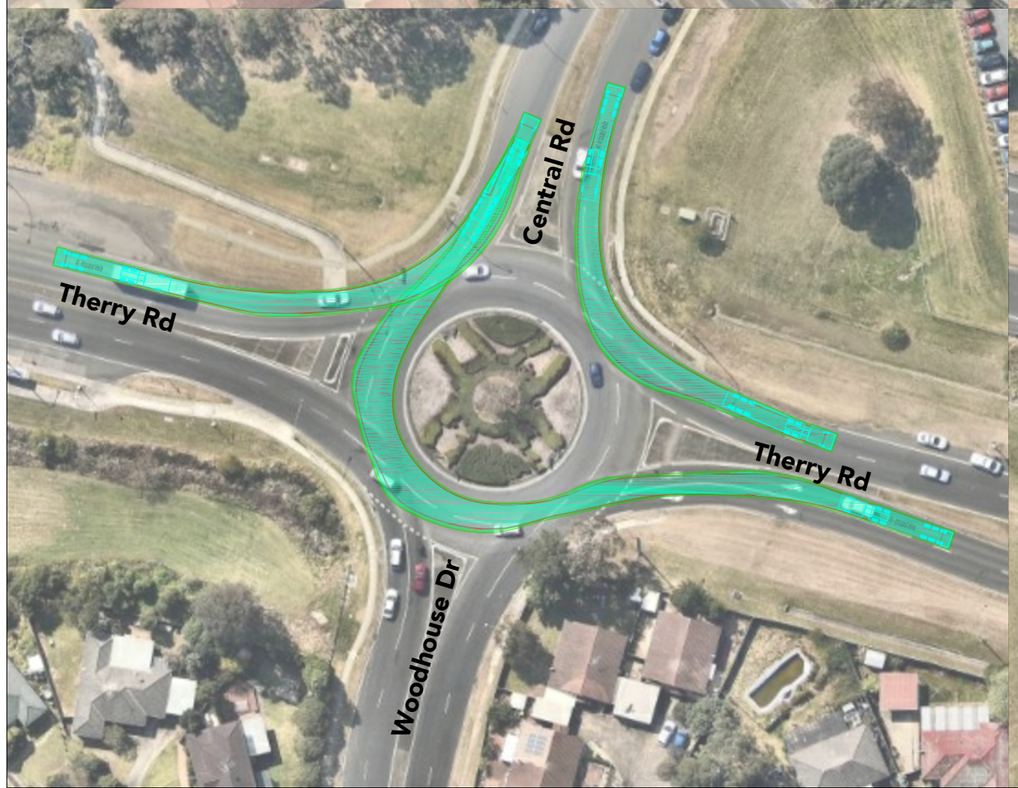
Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Therry Rd (E)														
5	T1	842	3.5	842	3.5	0.221	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		842	3.5	842	3.5	0.221	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
North: Access														
7	L2	69	0.0	69	0.0	0.105	11.9	LOS A	0.4	2.6	0.51	0.96	0.51	44.7
Approach		69	0.0	69	0.0	0.105	11.9	LOS A	0.4	2.6	0.51	0.96	0.51	44.7
West: Therry Rd (W)														
10	L2	15	0.0	15	0.0	0.263	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
11	T1	986	3.2	986	3.2	0.263	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach		1001	3.2	1001	3.2	0.263	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.5
All Vehicles		1913	3.2	1913	3.2	0.263	0.5	NA	0.4	2.6	0.02	0.04	0.02	57.8

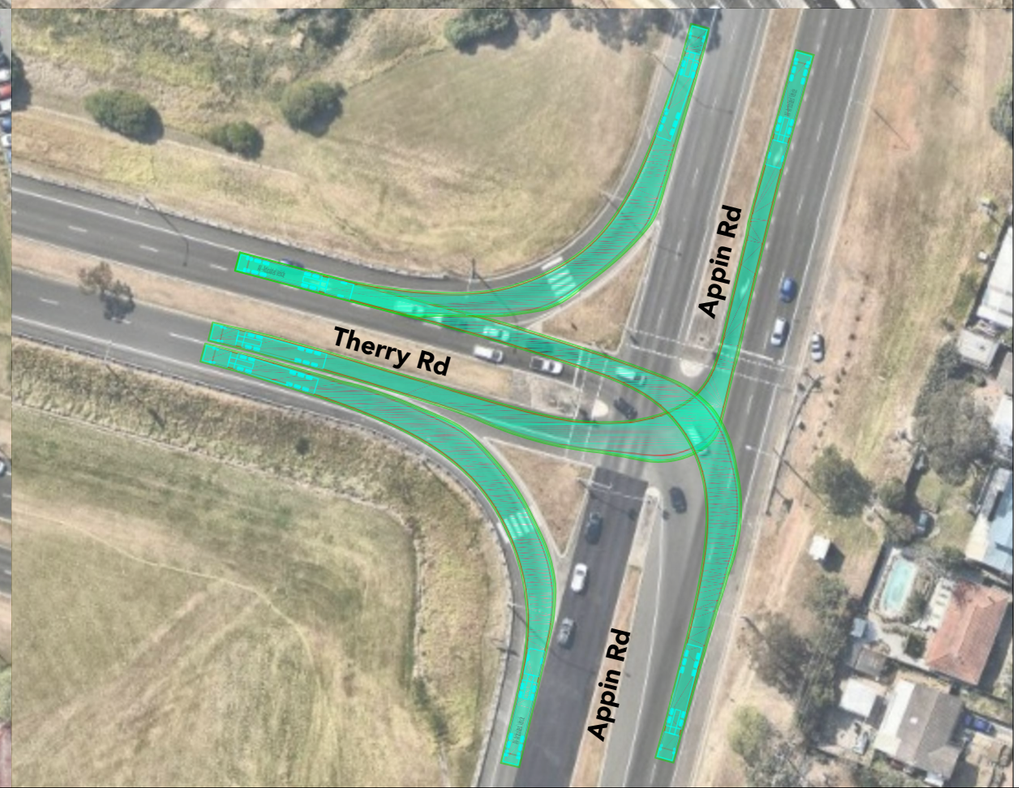
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and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

Attachment 3 Swept Path Assessment

180605 - Construction Routes Diagrams.dwg

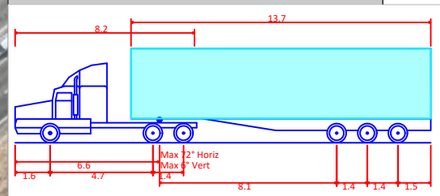






COMMENTS

A3



AV - Articulated Vehicle

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

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REV	DATE	COMMENT	DRAWN	REVIEWED
1	08/12/17	FOR INFORMATION	CS	AM

PROJECT:
CTMP for Campbelltown Hospital Redevelopment (Stage 2)

DRAWING TITLE:
Swept Paths Analysis

CLIENT: **Health Infrastructure**
DRG. #: **PTC-001**
PROJECT #: **T2-2266**
SCALE: **1:1000**

REV: **1**