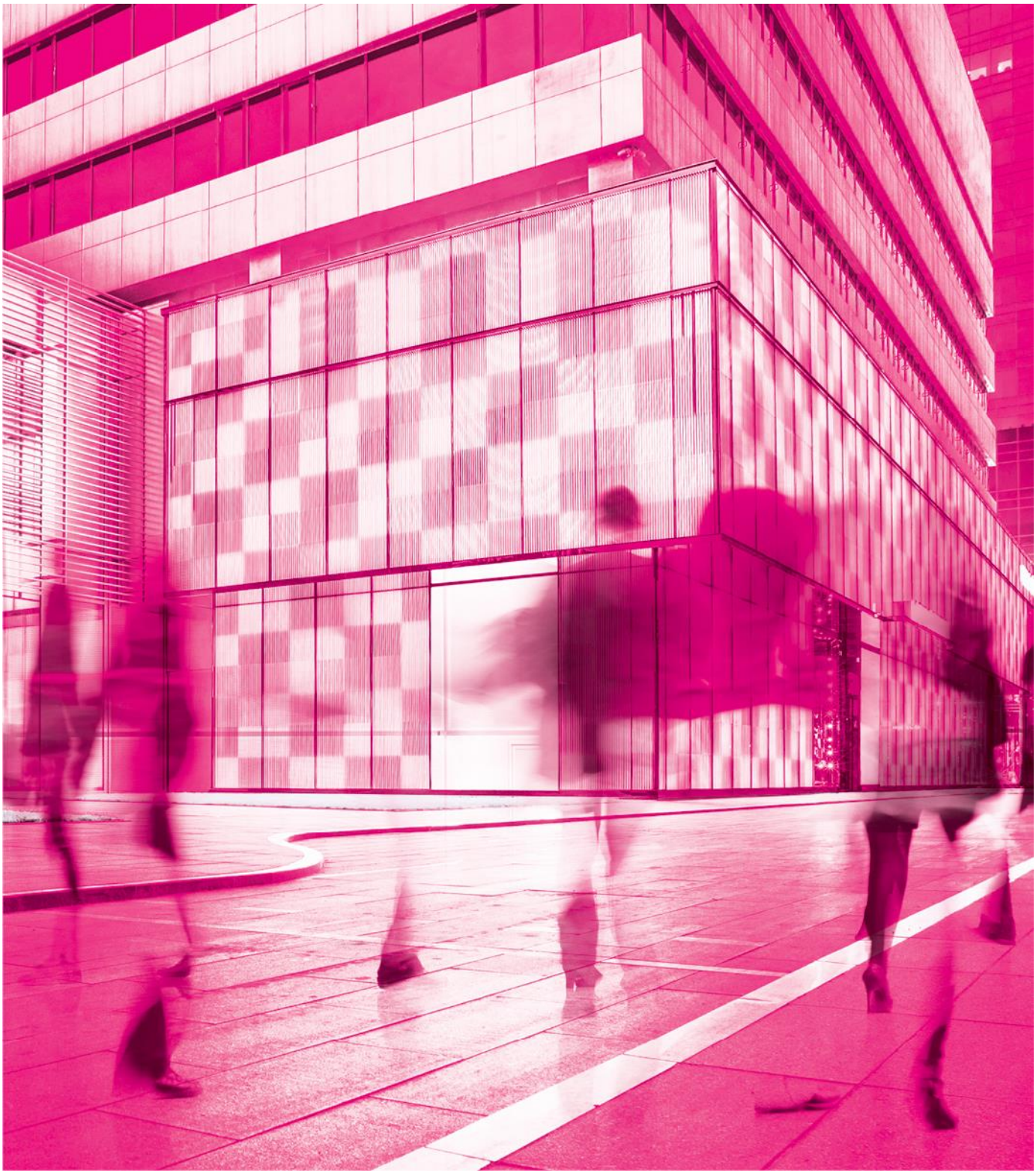

traffic impact assessment;

Nepean Hospital and Integrated Ambulatory Services Redevelopment – Concept and Stage 1 SSDA

For Health Infrastructure

20 December 2017

parking;
traffic;
civil design;
communication;

ptc.

Document Control

Nepean Hospital and Integrated Ambulatory Services Redevelopment – Concept and Stage 1 SSDA, Traffic impact assessment

Issue	Date	Issue Details	Author	Reviewed
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Contents

1. Executive Summary

ptc. has been engaged to assess the parking & traffic implications of the proposed Nepean Hospital and Integrated Ambulatory Services Redevelopment – Concept and Stage 1 SSDA, which will a new hospital tower development (TB1). In summary, ptc. concludes the following:

- The Hospital is a major contributor to the local character of the area, and a key strategic site in the growth of the Penrith region. In order to manage and benefit from the considerable growth of the Penrith region, the Nepean Hospital has proposed a major redevelopment project, to align with Penrith City Council's objectives;
- The Hospital redevelopment will enable the hospital to accommodate an additional 161,461 outpatient occasions of service per annum, 30,257 Emergency Department presentations per annum, 278 inpatient beds and 1,115 students per annum by 2027;
- The subject Tower Building 1 (TB1) will contribute to meeting the above growth;
- To accommodate the increased parking demands associated with the overall Nepean Redevelopment Program, a Multi-Storey Car Park (MLCP) has been designed and approved within the hospital campus. The MLCP was designed in the context of the overall Nepean Redevelopment Program, of this (TB1) forms only one component.
- The traffic implications associated with the Nepean Redevelopment Program have been assessed within the DA for the MLCP.
- The development will provide additional 500 car parking spaces in 2021/22, which entirely meets the demand generated by the redevelopment.

In light of this assessment, it the proposal is endorsed in the context of traffic and parking, on the basis that recommendations under the MLCP traffic assessment are properly investigated and implemented as necessary.

2. Introduction

2.1 Introduction

ptc. has been engaged by Health Infrastructure NSW (HI) to prepare a Traffic Impact Assessment (TIA) for the proposed 'Tower Building 1' (TB1), which is one part of the overall Nepean Hospital Redevelopment program. This assessment accompanies the State Significant Development (SSD) and will be presented to the Department of Planning & Environment (DPE).

The purpose of this assessment is to assess the traffic, parking and transport implications associated with the proposed TB1.

The location of this site is outlined in Figure 1.

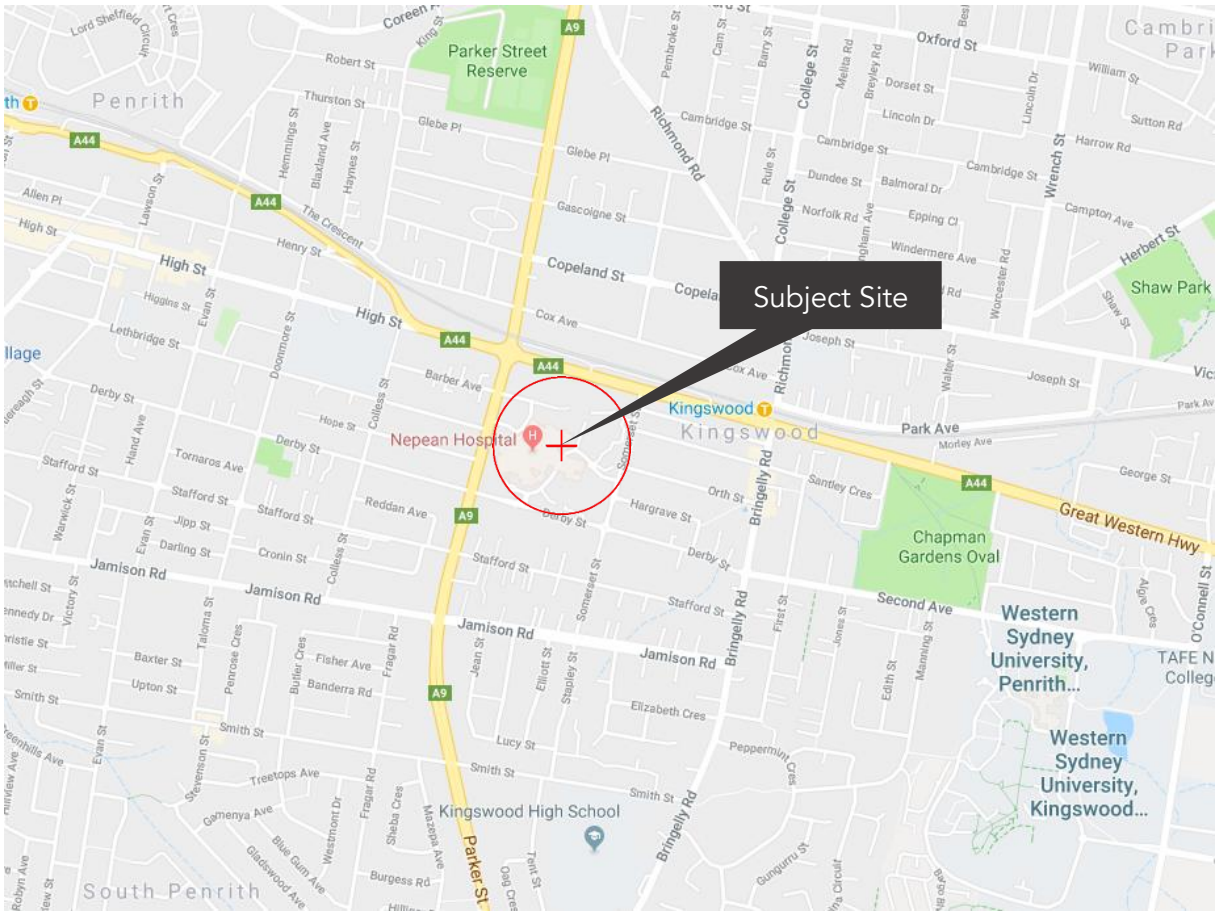

Figure 1 – Site Location (Source: Google Maps 2017)

2.2 Purpose of this Report

This report has been prepared to present the traffic and parking associated with the proposal.

This report presents the following considerations in relation to the construction traffic management plan;

Section 1 - Executive Summary;

Section 2 - Introduction of the project;

Section 3 - Background information, including a description of the site and current use;

Section 4 - A description of the road network serving the development site, the existing transportation options and active transport facilities;

Section 5 - A description of the proposed development,

Section 6 - A description of the proposed parking provision;

Section 7 - Determination of the traffic activity associated with the development proposal, and the adequacy of the surrounding road network, including recommendations in relation to any required road upgrades.

Section 8 - Assessment of the proposed parking, access and circulation arrangements,

Section 9 - Summary & Conclusion

3. Background

3.1 Site Context

The proposal relates to the following lot:

- Lot No. 1, DP1114090 (138,952m^2).

The site is located in Kingswood, which is approximately 60km west of the Sydney CBD. The Nepean Hospital is located approximately 3km to the east of the Penrith City Centre and south-east of Penrith Railway Station. The Penrith's City Centre hosts a population of approximately 198,000 within the Penrith Local Government Area (LGA), which has experienced growth of approximately 11.9% between 2006 and 2015 according to ABS Census Data. It is expected that this growth will continue into the future.

The Hospital campus is bordered by the Great Western Highway in the north, Parker Street to the west, Derby Street to the south and Somerset Street to the east, outlined in Figure 2.

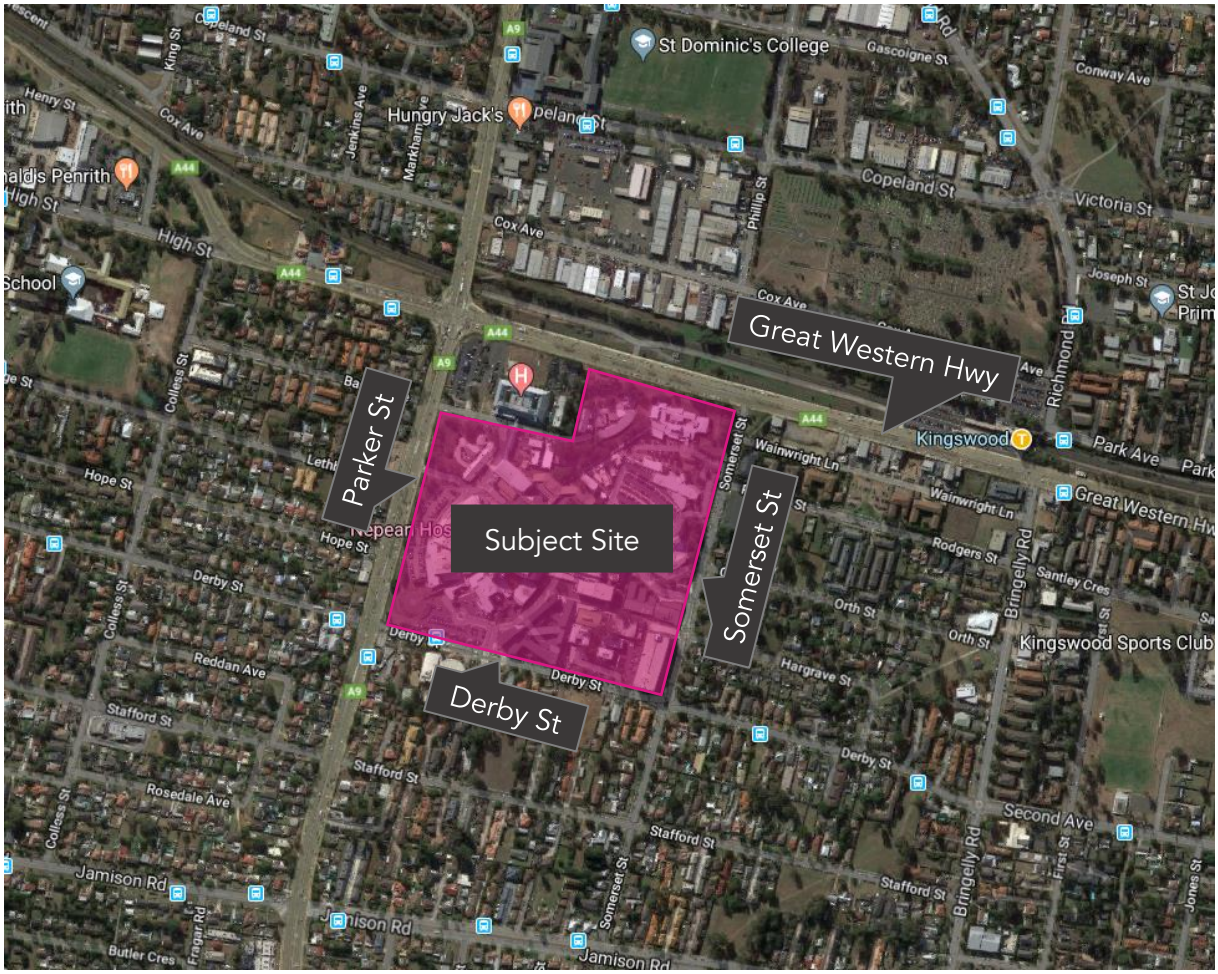

Figure 2 – Aerial View of the Subject Site (Source: Google Maps)

3.1.1 Existing Surrounding Land Use

In the context of the surrounding land use, the Hospital's area is classified as an Infrastructure Zone (SP2) and is surrounded by a variety of different land uses:

- The west of the hospital is characterised by Medium (R3) and High (R4) Density Residential housings;
- Immediately to the east and south of the hospital is a Mixed Use (B4) area, followed by Medium (R3) and High (R4) Density Residential housings and the Chapman Gardens Oval, zoned as Public Recreation (R1);
- To the north-east of the Hospital lies a General Industrial (IN1) area, accommodating railway tracks, the Kingswood Railway station and several automotive outlets along the Great Western Highway. Behind these is the Kingswood Cemetery, zoned as Special Activities (SP1).

Figure 3 shows the surrounding land use.

Figure 3 – Surrounding Land Use (Source: NSW Planning Portal 2017)

3.1.2 Future Surrounding Land Use

In 2007, the NSW Department of Planning and Penrith City Council published the Penrith City Centre Plan, which outlines the foundation to ensure the rapid growth of the Western Sydney hub will be accommodated for within a 25 year period. The City Centre Plan aligns with the key objectives of the Council's vision for Penrith to ensure growth into a "prosperous, vibrant and attractive city".

The City Centre Plan identifies development opportunities in the context of the expected growth in population of 10,000 new residents and 10,000 new jobs within the City Centre.

The key initiatives identified within City Centre Plan include:

- Promoting office development in the commercial core;
- Promoting Government office accommodation options for the city centre;
- Investigating options for the development of the city park;
- Developing strategies to improve the educational facilities within the city centre; and
- Improving the accessibility within the city centre by investigating new transport options and planning for the necessary infrastructure.

In 2011, the Penrith Business Alliance (PBA) published the Penrith Health and Education Precinct Strategic Vision. The document aims to create local jobs by growing the skills base of the area as well as attract new investment to Penrith through the delivery of projects focused in four key areas:

- World leading health services;
- Education and training, related to health and wellbeing;
- Research, in medicine and preventative health; and
- Business opportunities, related to health, medicine and wellbeing.

Consequently, the proposed Nepean Hospital Redevelopment is consistent with the objectives relevant to the Penrith Health and Education Precinct Strategic Vision, which will promote future government and non-government investment and development in the region's health sector.

3.2 Current Site Use

Nepean Hospital is part of the Nepean Blue Mountains Local Health District, providing public health services to the Western Sydney region. The area is served by a number of hospitals including Hawkesbury Hospital, Springwood Hospital, Blue Mountains Hospital and Lithgow Hospital.

The Hospital is the principal referral hospital and regional trauma centre for Western Sydney and provides a diverse range of services including emergency, intensive care, cancer care, cardiology, community health, drug & alcohol, medical imaging, mental health, sexual health, rehabilitation, pharma & allied health, and surgical services (including dental, neurosurgery, orthopaedic, plastic& reconstructive, thoracic, breast & endocrine, ENT, urology and vascular).

The Hospital is also a teaching hospital of the University of Sydney. Medical, nursing and allied health students are placed at the hospital for practical terms.

The existing Hospital Campus map is presented overleaf:

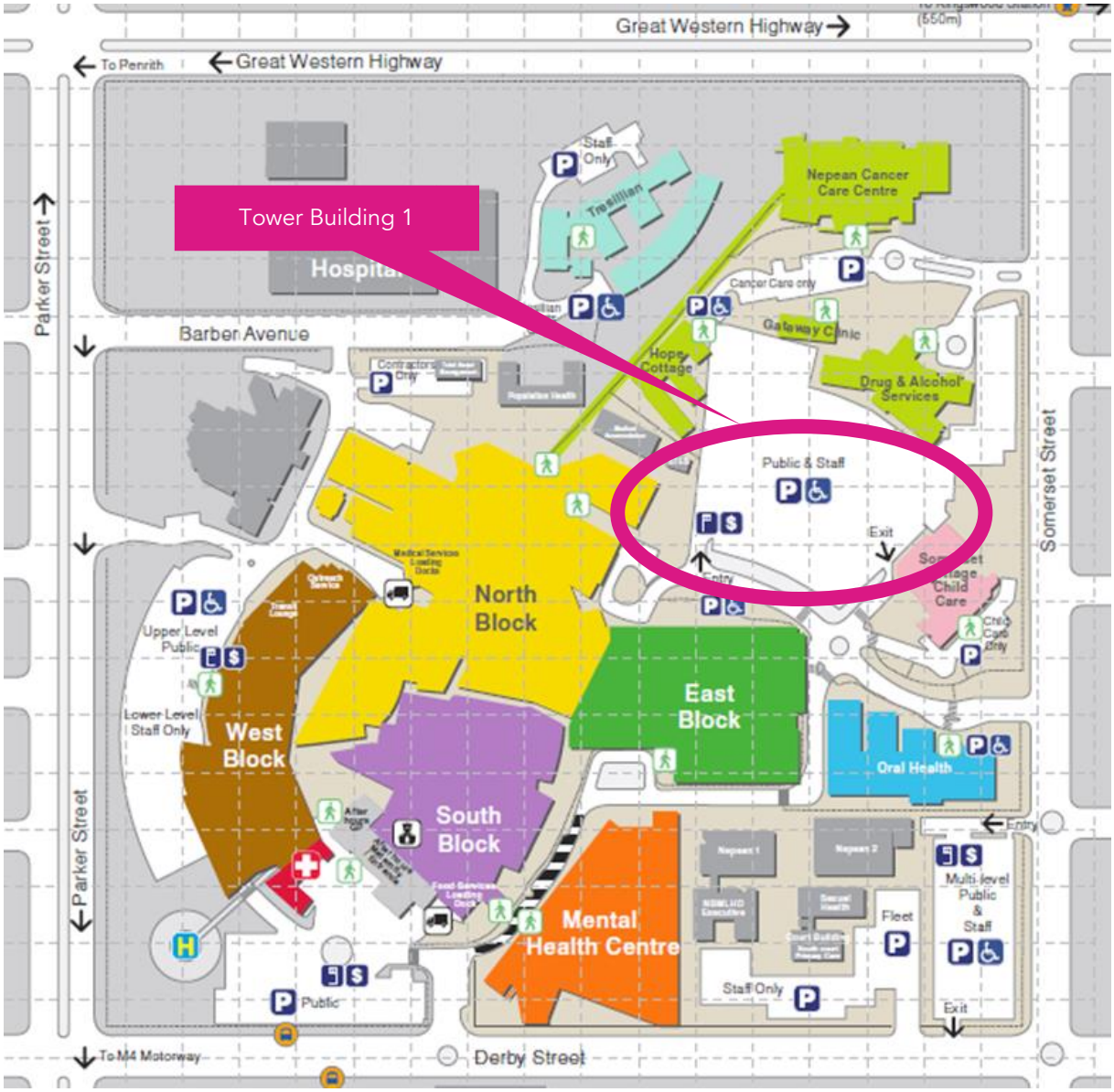

Figure 4 – Existing Hospital Campus Map (Source: NSW Health)

4. Existing Transportation Facilities

4.1 Road Hierarchy

The Hospital is served by a regional and local road network, which provides ready access to the City Centre and the surrounding region, while the Great Western Highway and Parker Street provide the primary connection to the Sydney CBD. The road network in this area is also comprised of State and Regional roads, as well as local roads providing access to the surrounding land uses.

The surrounding road network is illustrated in Figure 5.

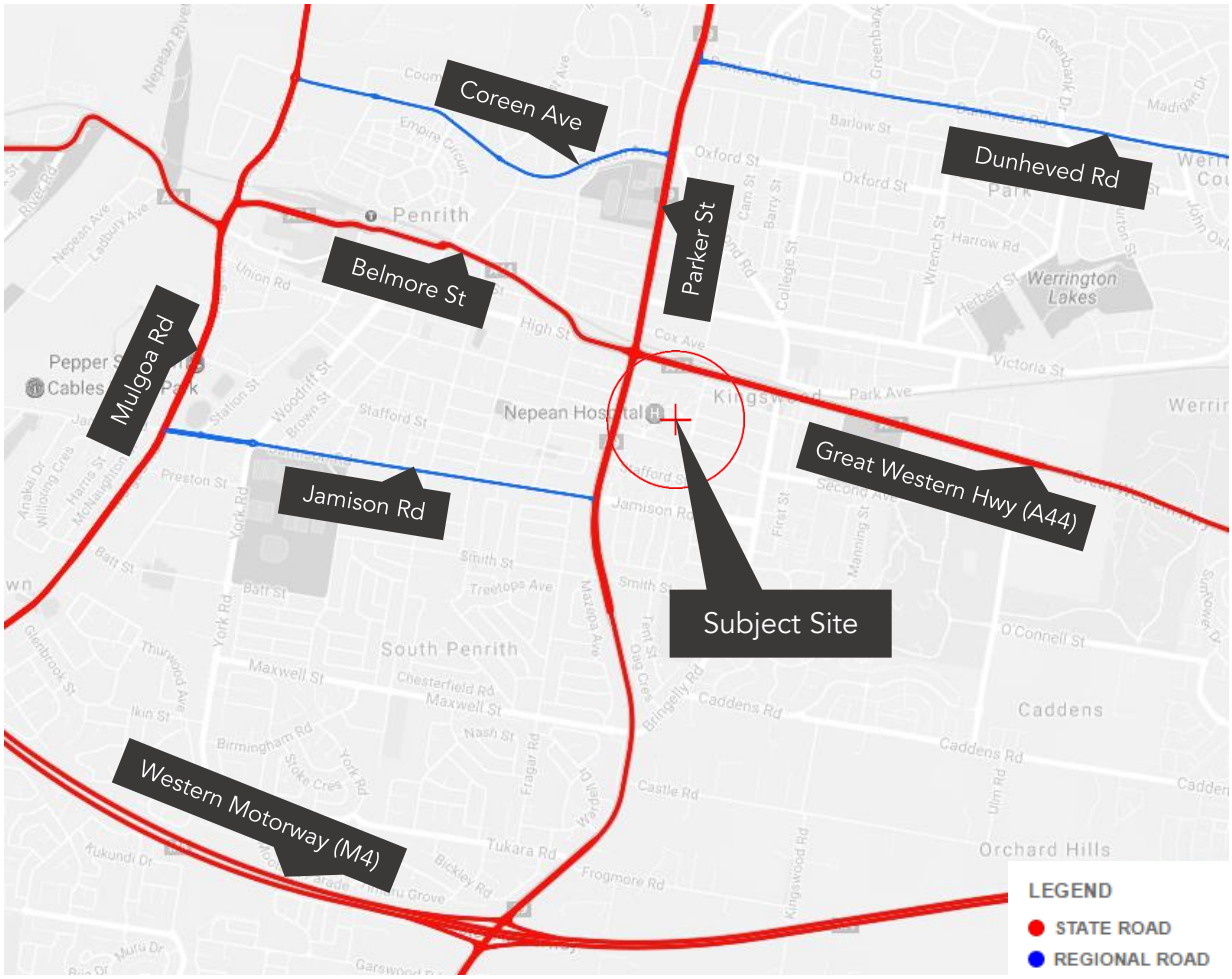

Figure 5 – Road Hierarchy (Source: RMS Road Hierarchy Review)

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 serving the site includes:

Great Western Highway	
Road Classification	State Road
Alignment	East – West
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	22.5 metres
Speed Limit	60kph
School Zone	No
Parking Controls	Eastbound: unrestricted parking on the outer most lane; Westbound: partially unrestricted parking on the outer most lane, partially 'No Stopping'
Forms Site Frontage	Yes

Figure 6 – Streetview of Great Western Highway, Eastbound (Source: Google)

Parker Street	
Road Classification	State Road
Alignment	North – South
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	22.5 metres
Speed Limit	70kph
School Zone	No
Parking Controls	Southbound: unrestricted parking on the outer most lane; Northbound: partially unrestricted parking on the outer most lane, partially 'No Stopping'.
Forms Site Frontage	Yes

Figure 7 – Streetview of Parker Street, Northbound (Source: Google)

Derby Street	
Road Classification	Local Road
Alignment	East – West
Number of Lanes	1 lane in each direction
Carriageway Type	Un-divided
Carriageway Width	12 metres
Speed Limit	50kph
School Zone	No
Parking Controls	Eastbound: partially 'No Stopping' and 'Bus Zone' areas, partially free 2 hour parking; Westbound: partially 'Bus Zone' and free 15 min parking, partially free 4 hour parking.
Forms Site Frontage	Yes

Figure 8 – Streetview of Dorby Street, Eastbound (Source: Google)

Somerset Street	
Road Classification	Local Road
Alignment	North – South
Number of Lanes	1 lane in each direction
Carriageway Type	Un-divided
Carriageway Width	12 metres
Speed Limit	50kph
School Zone	No
Parking Controls	Free 2 hour parking northbound and 4 hour parking southbound
Forms Site Frontage	Yes

Figure 9 – Streetview of Somerset Street, Northbound (Source: Google)

Barber Avenue	
Road Classification	Local Road
Alignment	East – West
Number of Lanes	One lane for 2-way traffic
Carriageway Type	Un-Divided
Carriageway Width	9 metres
Speed Limit	50kph
School Zone	No
Parking Controls	Free 2 hour parking on the southern road side, 'No Stopping' on the northern road side
Forms Site Frontage	Yes

Figure 10 – Streetview of Barber Avenue, Eastbound (Source: Google)

4.2 Vehicular Access to the Site

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 inbound vehicle routes to the Hospital are as follows, and the existing vehicle access locations are presented in Figure 11.

- Route 1: West – Inbound vehicles travel along the Great Western Highway, then onto Parker Street to access the Hospital either via Barber Street or the Hospital Entrance; 29% of Hospital arrivals originate from this direction.
- Route 2: North – There is no vehicular access along the northern boundary of the Hospital precinct.
- Route 3: South – Inbound vehicles travelling along Derby Street can access the Hospital via the Sydney Medical School entrance or utilise the off-street car park within the campus; 30% of the Hospital arrivals originate from this direction.
- Route 4: East – Inbound vehicles travelling along Somerset Street are able to access the Hospital via the Hospital entrances at Somerset Street north of Hargrave Street and Somerset Street north of Rodgers Street, as well as via the multi-level car park entry off Somerset Street; 41% of Hospital arrivals originate from this direction.

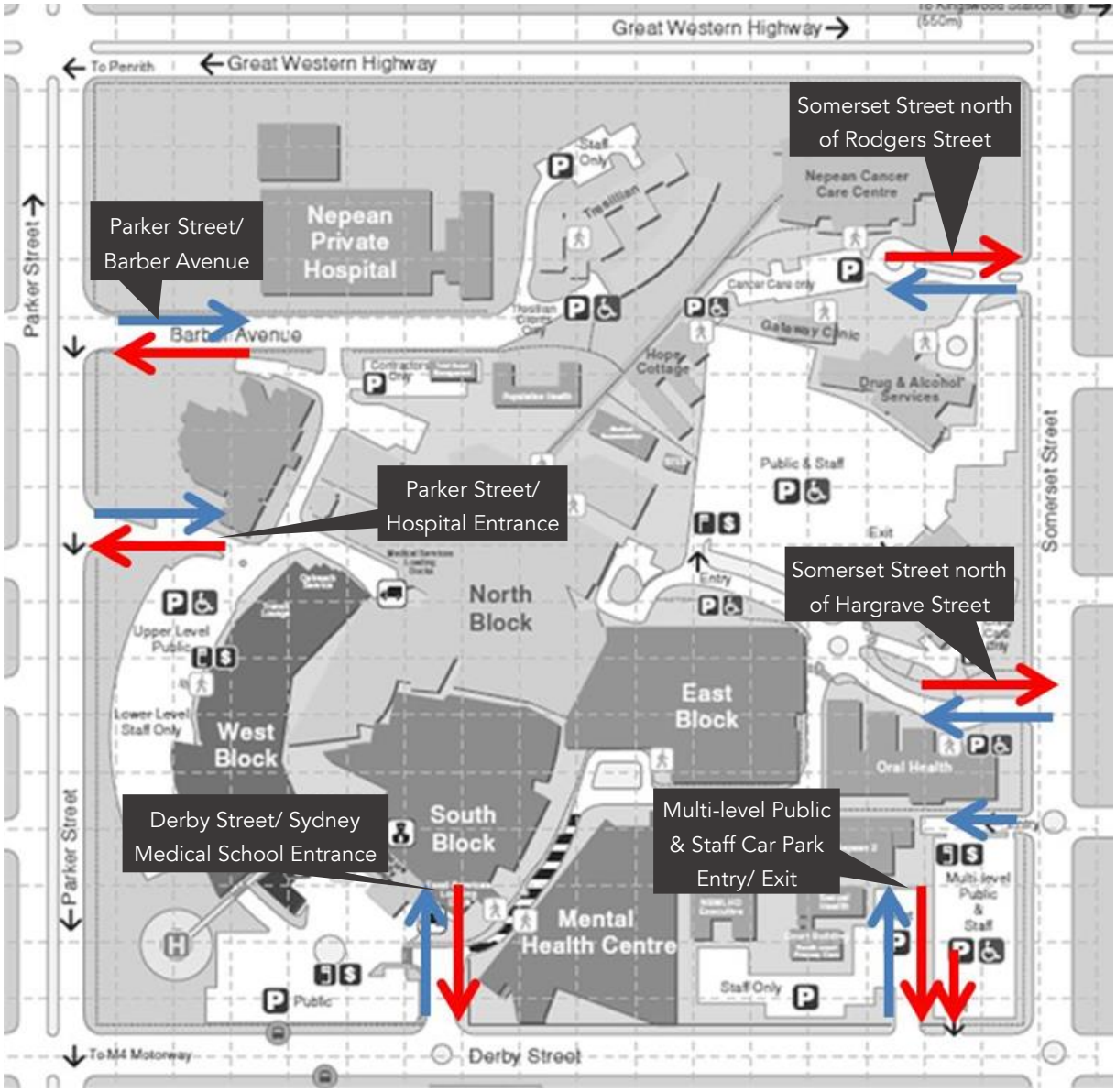

Figure 11 – Existing Vehicle Access Locations

4.3 Existing Parking Facilities

As per the Parking Demand report prepared by **ptc.** in December 2016 for the parking supply and demand within the Nepean Hospital Precinct, the existing parking facilities within the hospital precinct are shown in Figure 12.

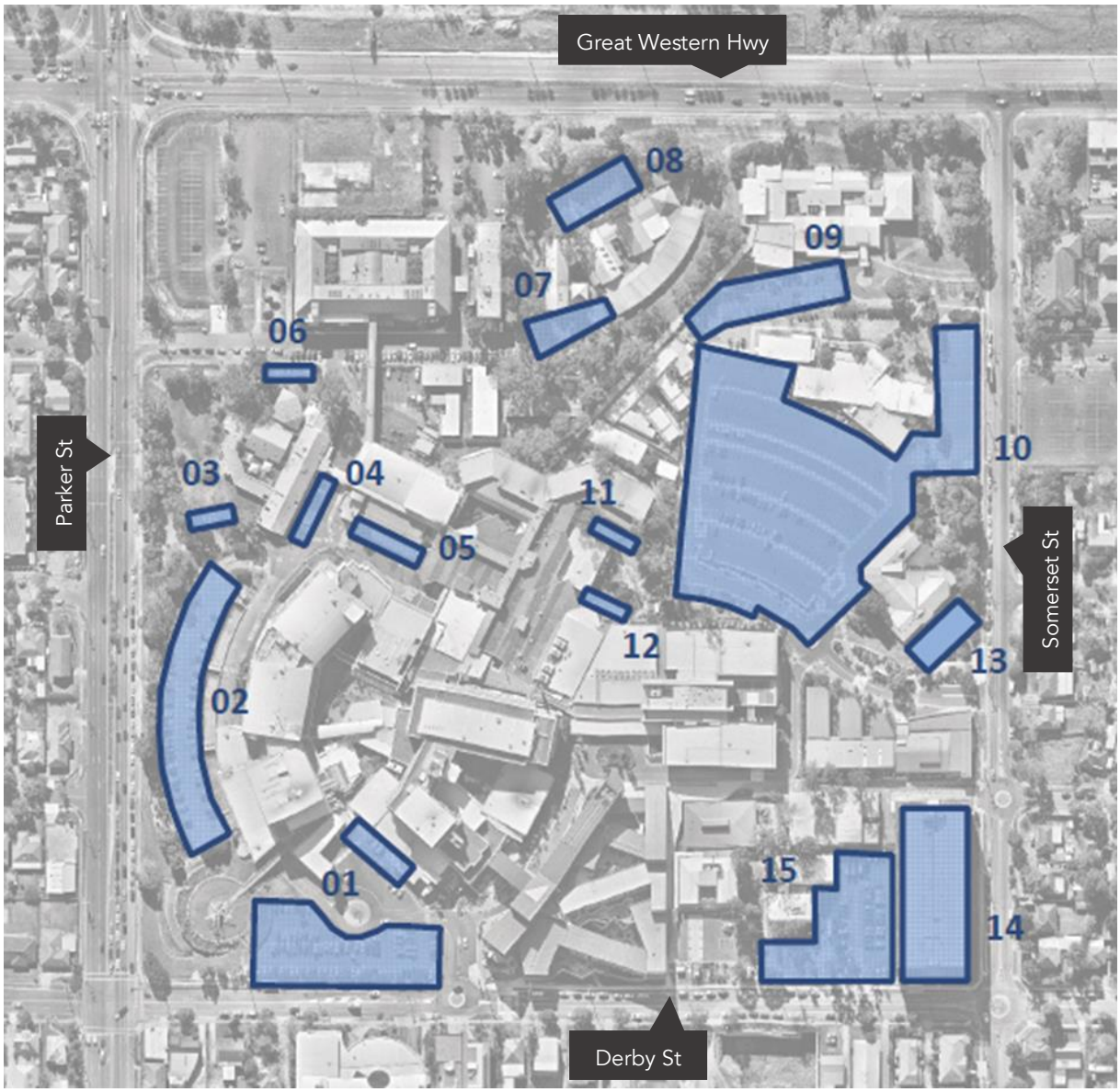

Figure 12 – Existing Parking Provisions

The study identified the existing parking supply and demand associated with the Hospital, which is shown in detail in Table 1:

Table 1 – Parking Supply Breakdown

Car Park	Staff Allocated Spaces	Public Spaces	Shared Public / Staff Spaces	**Total Spaces**
1	7	86	-	**93**
2	169	93	-	**262**
3	6	-	-	**6**
4	-	9	-	**9**
5	Loading Dock			**-**
6	12	-	-	**12**
7	Tresillian Family Care Centre			**-**
8	Tresillian Family Care Centre			**-**
9	10	37	-	**47**
10	44	-	290	**334**
11	-	3	-	**3**
12	-	9	-	**9**
13	Child Care Centre			**-**
14	46	-	612	**658**
15	76	-	-	**76**
Total:	**370**	**237**	**902**	**1509**[1]

In summary, the study identified the following existing parking supply associated with the Hospital:

- Existing on-campus supply = 1,509 spaces (including parking at the MLCP (14, 15) and excludes drop-off/pick-up and 15 minute spaces)
- Existing off-campus supply = 1,080 spaces within the local road network (within a 500 metre radius).

There are several types of parking facilities within the Hospital Campus, which are summarised below:

- Staff/ allocated Parking: 370 spaces
- Public Parking: 237 spaces
- Shared Public/ Staff Spaces: 902 spaces

The majority of parking provision is located within at-grade car parks surrounding the Hospital buildings, with 658 spaces accommodated within the multi-storey car park located in the south-eastern part of the Campus (14, 15).

[1] Includes emergency vehicle bays, courier bays etc. When these are excluded, the total bays generally useable by staff and public is 1,495

4.4 Public Transport

A number of public transport options are available in the vicinity of the site in the form of buses and rail. The NSW Planning Guidelines for Walking and Cycling 2004 (the Guide) suggests a distance of 400mm as a walkable catchment to access local amenities. The Guide also recommends that an 800m catchment is an acceptable, walkable distance if the development is within an area with public transport links. Furthermore, the document also suggests a distance of 1500m is a suitable catchment for cycling for accessibility to public transport facilities and local amenities.

4.4.1 Rail

The closest station, Kingswood Railway Station, is located approximately 1km (walking distance) from the main Hospital entry, which is considered to be within reasonable walking distance.

The station is on the T1 Western Line, from Emu Plains and Richmond to the City. Services operate every 5 – 15 minutes during peak hours, with services operating from 3.16am to 11.36pm.

The distance from the Hospital, the availability of taxi links from the station to the Hospital as well as the relative frequency of services could make heavy rail a reasonably attractive mode share option for hospital staff and visitors, subject to the availability of a convenient railway station close to their home location.

4.4.2 Bus Services (Private and Public)

The Hospital Precinct is serviced by the bus routes presented in Table 2. There are two bus stops located on the southern boundary of the Hospital Precinct and two bus stops on Great Western Hwy, as indicated in Figure 13.

The Hospital is relatively well serviced by bus, with a number of routes and regular services (every 30 mins on weekdays), and therefore provides an alternative mode share option for hospital staff and visitors, subject to the availability of convenient bus stops close to their home location.

Table 2 – Bus Service Summary

Route No.	Coverage	Frequency
677	Richmond to Penrith	Weekdays: Services every 60 minutes in the morning peak and 2 services in the evening peak Weekends: 2 services, at 9:31am and 5:14pm
774	Mount Druitt to Penrith	Weekdays: Services every 30 minutes, between 6:25am and 11:36pm Weekends: Services every 1 hour, between 7:33am and 10:20pm
775	Mount Druitt to Penrith	Weekdays: Services every 30 minutes, between 5:21am and 10:56pm Weekends: Services every 1 hour, between 7:33am and 10:20pm
776	Mount Druitt to Penrith	Weekdays: Services every 30 minutes, between 5:36am and 10:20pm Weekends: Services every 1 hour, between 8:14am and 11:03pm
780	Mount Druitt to Penrith	Weekdays: Services every 15-30 minutes, between 5:18am and 10:10pm Weekends: Services every 30-60 minutes, between 6:31am and 9:31pm
789	Luddenham to Penrith	Weekdays: 2 services every weekday, at 7:54am and 4:30pm Weekends: No services

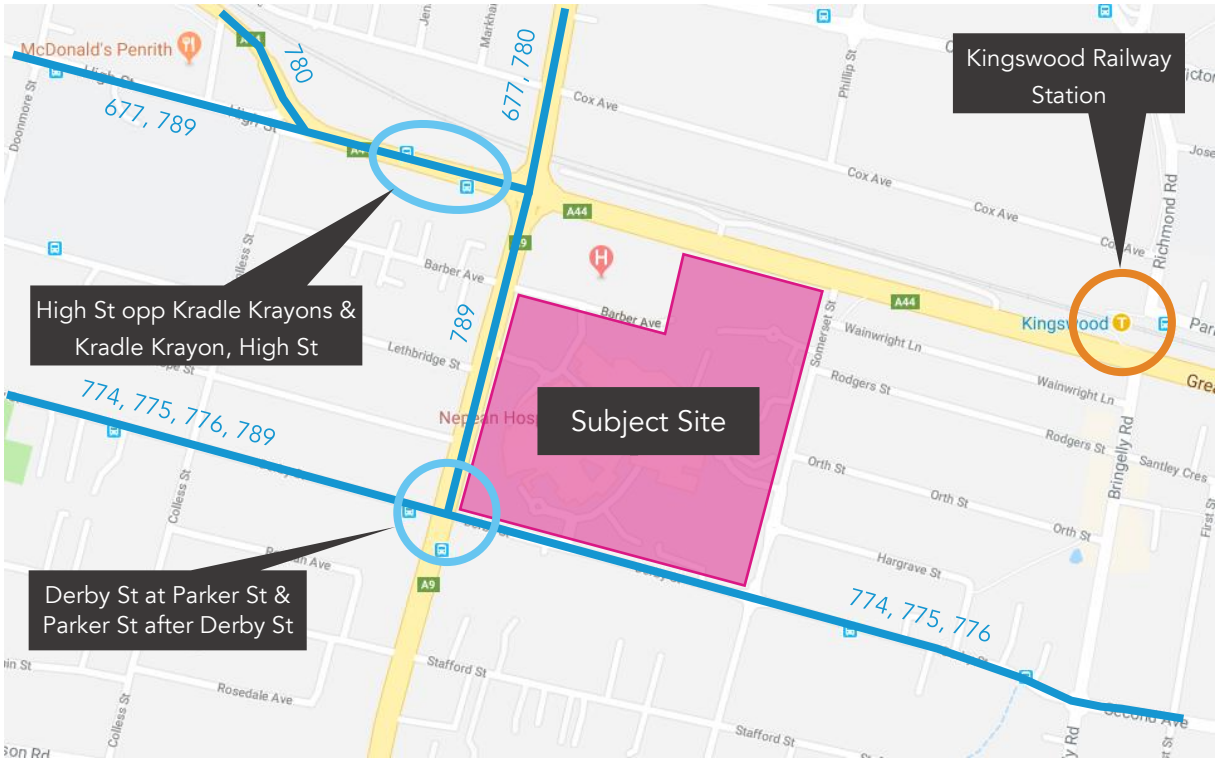

Figure 13 – Local Bus Services Map

4.5 Active Transport

In addition to public transport, the locality has also been assessed for its active transport potential.

4.5.1 Bicycle Network

It is noted that the cycling infrastructure in the Penrith region is relatively underdeveloped, with no dedicated bicycle paths in the vicinity of the Hospital. However, the surrounding road network makes cycling and motorcycling a viable method of travel.

Despite the relatively level topography surrounding the site, cycling is only likely to be an attractive mode share for staff that live within a relatively close distance.

4.5.2 Pedestrian Facilities

The pedestrian infrastructure is well developed in the vicinity of the hospital, with footpaths on both sides of the surrounding roads, signalised pedestrian crossings, zebra crossings, appropriate signage and markings. In addition to this, the topography of the area is relatively flat. However, as with cycling, walking is only likely to be an attractive option for staff who live relatively close to the Hospital.

The campus is surrounded by a reasonable volume of low-density residential developments, apart from the area to the north of the Great Western Highway, which is predominantly light industrial and bulky goods.

5. Development Proposal

5.1 Hospital Redevelopment Context

Over the next 10 years, Nepean Hospital will undergo redevelopment to provide additional services to support the local and regional health demand requirements within the Sydney's Western region. The additional services within the Hospital will have approximately two fold effect: firstly they will have the potential to increase traffic activity and demand for parking spaces; secondly, the new infrastructure will be displacing existing parking, thus reducing the available on-site parking supply.

HI aims to address these issues through the provision of additional parking in a new recently approved multi-storey car park within the Hospital campus, as well as infrastructure upgrades and initiatives to reduce car usage as a proportion of the staff and visitor travel mode. These plans are based on the new master plan prepared by BVN Architects for the horizon years 2021/22 & 2026/27.

The hospital redevelopment will enable the hospital to accommodate an additional 161,461 outpatient occasions of service per annum, 30,257 Emergency Department presentations per annum, 278 inpatient beds and 1,115 students per annum by 2027. A more detailed scope of the expansion is summarised in Table 3.

TB1 will comprise a large proportion of the proposed expansion figures outlined below.

Table 3 – Scope of Hospital Expansion

		Current	2021/22	2026/27
Staff (Clinical & Administration)	FTE	3457	4043	4451
	Weekdays			
	Day Shift	1867	2184	2404
	Afternoon	429	502	552
	Night	227	266	292
	Weekend shift			
	Day Shift	691	808	808
	Afternoon	159	186	186
	Night	84	98	98
VMO's	Weekdays	108	126	139
Retail Staff	Weekdays	7	8	10
Out Patients	Weekdays	1402	1634	1916
Inpatient Beds		486	721	764
Visitors		577	856	907
Emergency Dept.	Weekday Avg. Presentations	192	229	274
Education & Training	Students in weekday (Peak)	34	41	48
Fleet Vehicles	Weekday (Spaces)	29	35	41
Volunteers	Average on Weekdays	35	42	49

5.2 Proposal: Tower Building 1

The subject TB1 Development falls within the scope of the overall Nepean Hospital Redevelopment. To accommodate the parking demands of the overall Redevelopment project, inclusive of the TB1, a Multi-Level Car Park (MLCP) with a capacity of 627 spaces and rooftop helipad (Figure 14) was recently approved under a separate DA. In addition to a parking demand assessment, the traffic impacts of a fully occupied MLCP were reviewed in the context of the local road network under the MLCP DA.

It is anticipated that the construction of the MLCP is due to be completed during the first quarter of 2019, whilst the construction of TB1 is scheduled to be undertaken from the third quarter of 2018 – April 2021. Following the completion of both the MLCP and TB1, the helipad will be relocated at the top of the TB1 (Figure 15) increasing the MLCP capacity to 735 spaces.

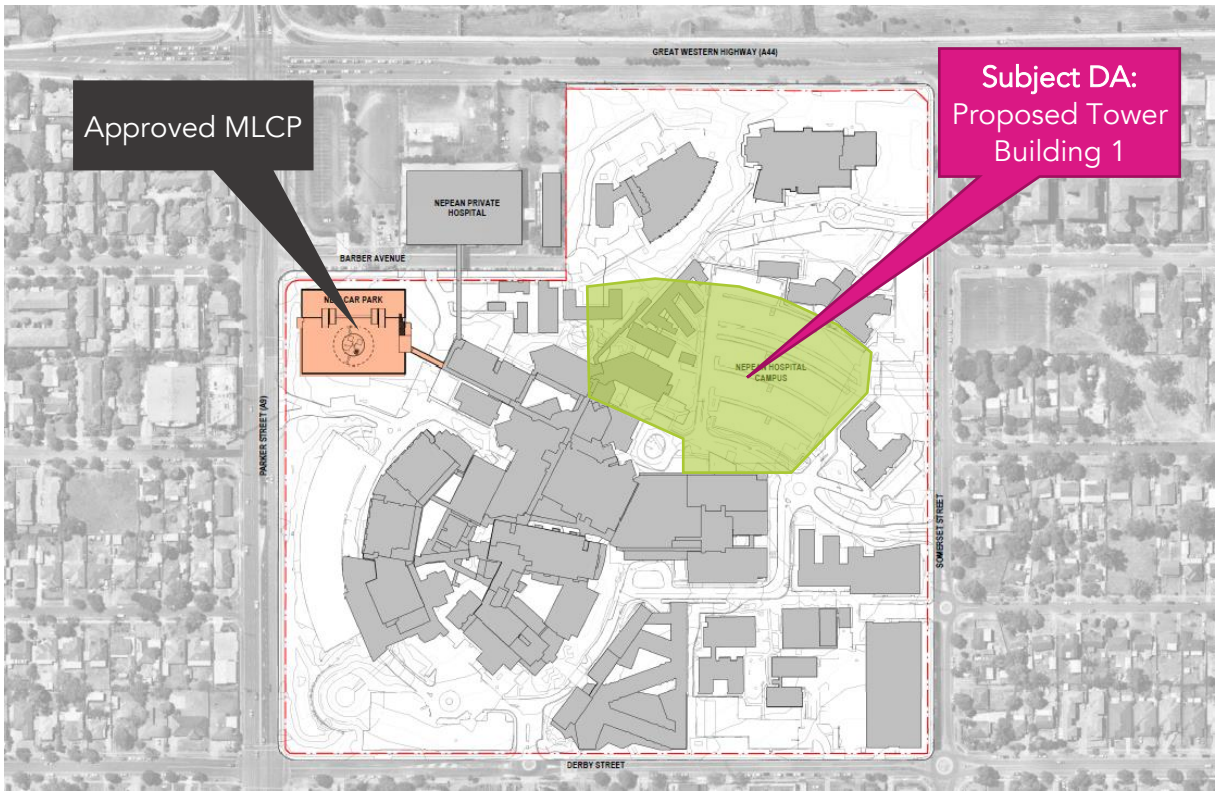

Figure 14 – Hospital Redevelopment Overview

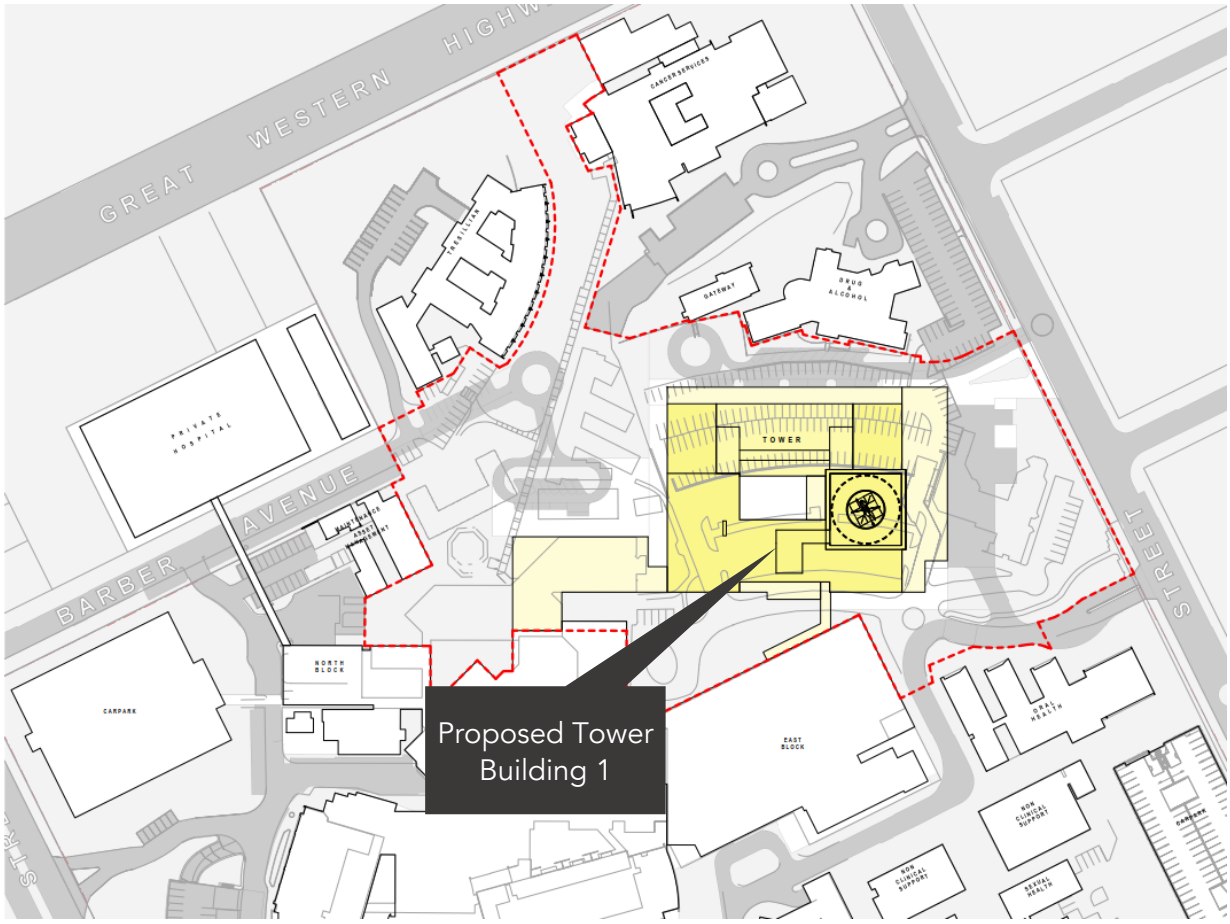

Figure 15 - Proposed Site Plan

6. Parking Provision

6.1 Car Parking

The proposed TB1 does not include on-site parking. Rather, the parking demand associated with TB1 have been assessed and met within the MLCP DA, which was designed and approved to accommodate the future developments associated with the Nepean Hospital Redevelopment program.

As stated earlier, MLCP is due to be completed by March 2019. The MLCP will accommodate 627 spaces and a temporary rooftop helipad. Following the development of TB1, the helipad will be relocated to the roof of TB1. This will enable the conversion of the upper levels of the car park, resulting in a net gain of further 108 spaces, providing a total parking provision of 735 spaces within the MLCP.

The development of the hospital will involve the displacement and rearrangement of at-grade parking in addition to the completed MLCP. Following the completion of TB1, the MLCP and the at-grade parking, the campus will accommodate a total of 2,009 parking spaces for including staff, patients, visitors, couriers & emergency vehicles. This represents a net increase of 500 spaces over the current provision.

During December 2016 **ptc.** undertook a parking demand study for the hospital. The methodology used to estimate the parking demand is outlined in Figure 16. This methodology is familiar to HI as it has been used to estimate parking demand at a number of hospital sites. It has been acknowledged that no two sites are identical; therefore our general methodology is tailored to the requirements of each specific site.

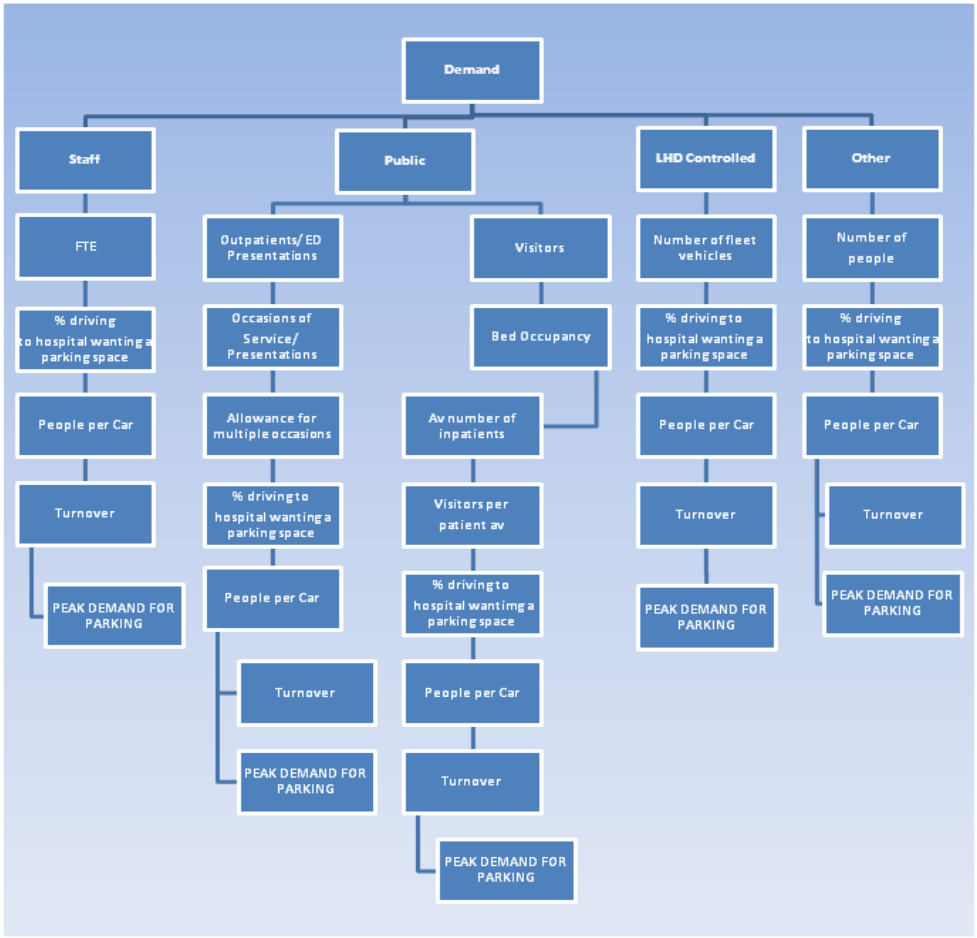

Figure 16 – Parking demand estimate methodology overview

In order to estimate the current and future parking demand at the Hospital, ptc. was provided with certain information by the Hospital, HI and 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;
- Car park occupancy and length of stay surveys of the entire car parking, on 2nd & 3rd November 2016;
- Parking supply and demand surveys within the Relevant Parking Zone (typically 500m from the approximate centre of the Hospital campus);
- Site visit and surveys (on Tuesday 18th October 2016) to audit the campus parking supply, review the site generally, and review the transport environment and Relevant Parking Zone.

Information reviewed in order to obtain an understanding of the parking demand generators at the Hospital included:

Staff numbers (FTE)	Available nearby on-street parking
Visiting Medical Officers (VMOs)	Other off-street parking in the area (if any)
Overnight bed numbers and occupancy %	External parking demand drivers (if any)
Outpatient Service Events	Staff, outpatient and visitor survey responses
Emergency Department Presentations	Results of the on-campus car park surveys (occupancy)
Education & Training (including students)	Parking data reports issued by Secure Parking
Retail & Volunteer staff	

Following the processing of the collected data, and a review of on-campus and on-street parking usage, the parking study derived an overall demand that was then projected based on future growth scenarios. Table 33 of the Parking Demand Study[2] estimates that the increase in parking following the development of TB1 will be entirely accommodated within the campus, due to the construction of the approved MLCP (i.e. no net impact in the on-street parking demand).

Total Parking Supply/Demand Analysis	Current	Post Development
On Campus Supply		
Total On Campus Supply	1509	2009
Demand		
Staff	1,740	1,967
Public	409	501
LHD Controlled – Fleet Vehicles	29	35
Other users	70	82
Total Demand	**2,248**	**2,585**

[2] Car Park Demand Study for Nepean Hospital prepared by **ptc.** dated 29/03/2017

7. Traffic Impact Assessment

7.1 Staff and Visitor Vehicles

Typically, an addition to a hospital will result in an increase in traffic activity. In the subject case, the traffic activity associated with the TB1 project has been assessed in that the proposed MLCP has been assessed and approved as a separate application. The MLCP project determined the traffic activity based on the generation rate of parking within the campus, which was then applied to the new car park.

The Traffic Impact Assessment for the MLCP development was prepared by ptc.[3] (refer to Attachment 1 for the full report) and stated the following:

- The total vehicular trip would be 1067 (in+out) which is an increase of 421 trips;
- A 1.5% per annum growth of background traffic has been adopted in the traffic model;
- Traffic increase along Parker Street and traffic reduction along Somerset Street due to redistribution of traffic;
- Modal split being 65% hospital & remaining 35% outpatients and visitors; and
- The Sidra modelling has been tested various scenarios as shown in Table 4.

Table 4 - Traffic Modelling Scenarios

Scenario	Year	Network description
S1	2017	As existing – do nothing
S2	2021	As existing – do nothing – 1.5% Growth
S3	2021	As existing + Hospital Development (Phase A)– 1.5% Growth
S4	2026	As existing – do nothing – 1.5% Growth
S5	2026	As existing + Hospital Development (Phase B)– 1.5% Growth

The results of the traffic modelling are summarised in Table 5.

Table 5 - Traffic Modelling Scenarios

Intersection	Peak Period	Existing Scenario S1	Proposed Scenarios S2	S3	S4	S5
1. Great Western Highway / Parker Street	AM	B	B	B	B	B
	PM	B	C	C	C	D
2. Parker Street / Barber Road	AM	A	A	A	A	A
	PM	A	A	A	A	A
3. Parker Street / Hospital Entrance	AM	A	A	A	A	A
	PM	A	A	A	A	A
4. Parker Street / Derby Street	AM	B	B	B	B	C
	PM	D	**E**	**F**	**F**	**F**
	AM	A	A	A	A	A

[3] Traffic and Accessibility Assessment dated 21 September 2017

Intersection	Peak Period	Existing Scenario S1	Proposed Scenarios S2	S3	S4	S5
5. Derby Street / Hospital Entrance (south)	PM	A	A	A	A	A
6. Derby Street / Somerset Street	AM	A	A	A	A	A
	PM	A	A	A	A	A
7. Somerset Street / Hospital Entrance 1 (east)	AM	A	A	A	A	A
	PM	A	A	A	A	A
8. Somerset Street / Hospital Entrance 2 (east)	AM	A	A	A	A	A
	PM	A	A	A	A	A
9. Somerset Street / Great Western Highway	AM	B	B	B	C	B
	PM	D	**F**	**E**	**F**	**F**

Parker Street / Derby Street Intersection

In regards to Parker Street/ Derby Street, the report states that the intersection is currently operating with a Level of Service D, which is reasonable for a regional road intersection during the peak periods, although the Degree of Saturation is over 140%. Typically, this indicates that the intersection is able to manage the demand in favourable conditions, however any slight increase in traffic activity or interruption to traffic flow results in extended delays and a poor performance. This is evident in the modelling results which indicate a Level of Service F in all future scenarios.

The road network model indicates that upgrading the intersection to include additional lanes for the left turning movements from Parker Street from North to the Debry street and restricting the right turn movement from Debry street (east) to the parker street will improve the intersection LOS to LOS C with a degree of saturation of 95% and the delay of 40 sec. The modified layout is shown in Attachment 3.

Given the current Degree of Saturation, it is evident that the intersection upgrades will be required in coming years regardless of the Hospital Redevelopment, and that the additional traffic activity associated with the Project will have very limited impact on the intersection.

Great Western Highway / Somerset Street Intersection

In regard to the Great Western Highway/ Somerset Street intersection, the report states that the road network modelling results indicate that this intersection will operate at Level of Service F in 2021 under the 1.5% growth scenario, without the development traffic. This is caused by the right turning movement from westbound Great Western Highway to Somerset Street. The arrangement of priority junction is not anticipated to operate at the required LOS in future years.

Based on the modelling suggestions, the intersection needs to be signalised by the year 2021 to sustain the LOS well below the LOS D. The model output for this intersection after the signalisation for the ultimate scenario (S5) is turned out as LOS A, with a delay of 8 sec and the cycle time of 30 sec.

7.2 Service Vehicles

As part of the TB1 development, the net increase of service vehicle activity will be minor and unlikely to have any noticeable impact to the adjoining road network.

8. Access and Car Park Circulation

A new access arrangement is proposed via Barber Avenue and Somerset Street as part of the TB1 development.

A drop-off area is proposed on the western side of TB1, which will form an extension to the existing Barber Avenue roadway. The access serving the MLCP will be adjusted to provide access from Barber Avenue so that vehicles can be parked after dropping off a passenger, without needing to pass back on to the road network. This area has been designed to accommodate shuttle / mini-buses.

A new drop off area, with a limited supply of short-stay parking, will be located along the northern side of TB1, which has been design to accommodate the B99 design vehicle.

The vehicular access, circulation, aisle width and car space dimensions will comply with AS 2890.1 & 2890.6. Two-way circulation will be provided inside the car park, pick-up & drop-off and vehicular access points, thus no potential queuing on public roads.

9. Summary & Conclusion

The development proposes construction of the main hospital (TB1).

The assessment of the traffic activity has been considered for the MLCP development which has been approved.

The overall hospital development proposes an additional 500 spaces to the hospital and retaining the existing parking demand to the adjoining public roads. Therefore, no additional on-street parking demand will be generated due to the TB1 development.

Attachment 1– ptc. Traffic Report for the MLCP

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Driving success through valuable advice

Integrated Nepean Hospital and Community Based Services (Penrith)

for NSW Health Infrastructure

Traffic and Accessibility Assessment

21 September 2017

PARKING & TRAFFIC CONSULTANTS

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Document Control

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1 Introduction

1.1 Background and Purpose of Report

Parking and Traffic Consultants (PTC) has been engaged by Health Infrastructure NSW (HI) to prepare a Traffic and Accessibility Assessment of the proposed Nepean Hospital redevelopment, located in Kingswood, at the base of Blue Mountains.

The Hospital provides a wide range of services including:

- Acute interventional medicine (including renal dialysis, aged care, gastroenterology and stoke services)
- Cancer care
- Cardiology
- Community Health
- Drug & Alcohol
- Medical imaging
- Mental Health
- Rehabilitation, Pharmacy & Allied Health
- Sexual Health
- Surgical (including dental, neurosurgery, orthopaedic, plastic & reconstructive, thoracic, breast & endocrine, ENT, urology and vascular
- 24 hour emergency department

Also located on the hospital campus are Tresillian Family Care Centre, Nepean Cancer Care Centre and the Wentworth Centre for Drug and Alcohol Medicine.

The purpose of this Assessment is to assess the traffic, parking and transport implications associated with the proposed redevelopment of the Hospital and associated works, which include the construction of a multi-storey car park and redevelopment of the hospital as per the new master plan prepared by BVN Architects for the horizon years 2021/22 & 2026/27.

This report describes the impact of the proposed works within the existing Hospital for Horizon years 2021/22 & 2026/27 and the surrounding road and parking network.

A summary of the Project at present conditions presented below. Also the development of the project in the horizon years 2021/22 & 2026/27 was also presented. A detailed description of the Project is presented in Section 3 of this Assessment.

		Current	2021/22	2026/27
Staff (Clinical & Administration)	FTE	**3457**	**4043**	**4451**
	Weekdays			
	Day Shift	1867	2184	2404
	Afternoon	429	502	552
	Night	227	266	292
	Weekend shift			
	Day Shift	691	808	808
	Afternoon	159	186	186
	Night	84	98	98
VMO's	Weekdays	108	126	139
Retail Staff	Weekdays	7	8	10
Out Patients	Weekdays	1402	1634	1916
Inpatient Beds		486	721	764
Visitors		577	856	907
Emergency Dept.	Weekday Avg. Presentations	192	229	274
Education & Training	Students in weekday (Peak)	34	41	48
Fleet Vehicles	Weekday (Spaces)	29	35	41
Volunteers	Average on Weekdays	35	42	49

The Hospital Redevelopment will enable the hospital to accommodate an additional 161,461 outpatient occasions of service per annum, 30,257 Emergency Department presentations per annum, 278 inpatient beds and 1,115 students per annum by 2027.

The proposed development work mainly consists of the additional Hospital Building (Main Works) and a Multi-Level Car Parking (MLCP). The complete phasing of the proposed development is divided into two parts as mentioned below:

- **Phase I:** Construction of MLCP for a capacity of 628 Car parks + additional helipad and Construction of Hospital building in CP -10 area (reduction of 279 car parking space)

- **Phase II:** Construction of Additional parking bays (40) in the Emergency vehicle areas and parking in the helipad area (Addition of 108 car parks) and additional 20 car parks in new hospital building area.

Figure 1 - Campus Map (Source: NSW Health)

It should be noted that the Hospital Redevelopment project involves a reduction in the parking provision in CP 10 within the western part of the Hospital campus. The construction of the multi-storey car park on the eastern side of the campus will accommodate the displaced parking, plus the parking relating to the increased activity. In this regard, all new traffic activity will be generated to/from Parkers Street rather than the existing Somerset Street. This will have an impact on the trip distribution behaviour of the commuters.

1.2 Scope of Assessment

This Assessment has been prepared in accordance with the RMS Guide to Traffic Generating Developments to accompany a State Significant Development (SSD) Application (SSDIS_6913) to the NSW Department of Planning in relation to the Integrated Nepean Hospital and Community Based Services (Penrith). It presents the following considerations relating to the Traffic and Accessibility Assessment of the Project:

- **Section 3** - A description of the existing site and the road network serving the Hospital
- **Section 4** - A description of the proposed development
- **Section 5** - A description of the proposed vehicle access and circulation arrangements
- **Section 6** - A description of the proposed parking provision

- **Section 7** - Determination of the traffic activity associated with the development proposal, and the adequacy of the surrounding road network, including recommendations in relation to any required road upgrades
- **Section 8** - Conclusion

For the purposes of this Assessment, the Project site is described as illustrated in Figure 2.

Figure 2 - Project Site Identification

1.3 Key Issues and Objectives of this Study

Over the next 10 years, Nepean Hospital will undergo redevelopment to provide additional services to support the local and regional health demand requirements within the Central Coast region.

Additional services within the Hospital will have approximately two fold effect: firstly they will have the potential to increase traffic activity and demand for parking spaces; secondly, the new infrastructure will be displacing existing parking, thus reducing the available on-site parking supply. The development proposal aims to address these issues through the provision of additional parking in a new multi-storey car park within the Hospital compound, as well as infrastructure upgrades and initiatives to reduce car usage as a proportion of the travel mode.

In preparing this Assessment, we have taken into account the results of a comprehensive Parking Demand Study for the Hospital prepared by PTC in December 2016. As part of the study, an extensive investigation into the travel and parking characteristics of the various users accessing the Hospital was undertaken.

The analysis undertaken in December 2016 indicates that the current parking supply is not sufficient for the expected increase in Hospital services. In this regard, the proposal includes the construction of a multi-storey car park located on eastern side of the hospital compound, which will consolidate the existing parking

displaced by the Hospital Redevelopment, as well accommodating the increased parking demand associated with the Hospital Redevelopment.

In this regard, this Traffic and Parking Assessment addresses the traffic activity associated with the Hospital Redevelopment, adopting the proposed car park as the new origin and destination for the majority of trips.

The primary objective of this Assessment is to assess the impact of traffic activity associated with the proposed Hospital Redevelopment and to determine the extent of mitigating works required to maintain an acceptable operation of the local road network. The Assessment also addresses the accessibility of the Hospital by other means of transport, including improvements to pedestrian movements in the context of a new entrance and improved pedestrian facilities.

2 Existing Conditions

2.1 Nepean Hospital

Nepean Hospital is part of the Nepean Blue Mountains Local Health District, providing public health services to the Western Sydney region. The area is served by a number of hospitals including Hawkesbury Hospital, Springwood Hospital, Blue Mountains Hospital and Lithgow Hospital.

The Hospital is the principal referral hospital and regional trauma centre for Western Sydney and provides a diverse range of services including emergency, intensive care, cancer care, Cardiology, community health, Drug & Alcohol, medical imaging, mental health , sexual health, rehabilitation, pharma & Allied health, and Surgical (including dental, neurosurgery, orthopaedic, plastic& reconstructive, thoracic, breast & endocrine, ENT, urology and vascular).

The Hospital is also a teaching hospital of the University of Sydney. Medical, nursing and allied health students are placed at the hospital for practical terms.

2.2 Location

Penrith is located approximately 60km west of the Sydney CBD. Nepean Hospital is located approximately 3km to the east of the Penrith Civic Centre and south-east of Penrith Railway Station, as shown in Figure 3.

The City Centre hosts a population of approximately 198,000 within the Penrith Local Government Area (LGA), which has experienced growth of approximately 11.9% between 2006 and 2015 according to ABS Census Data.

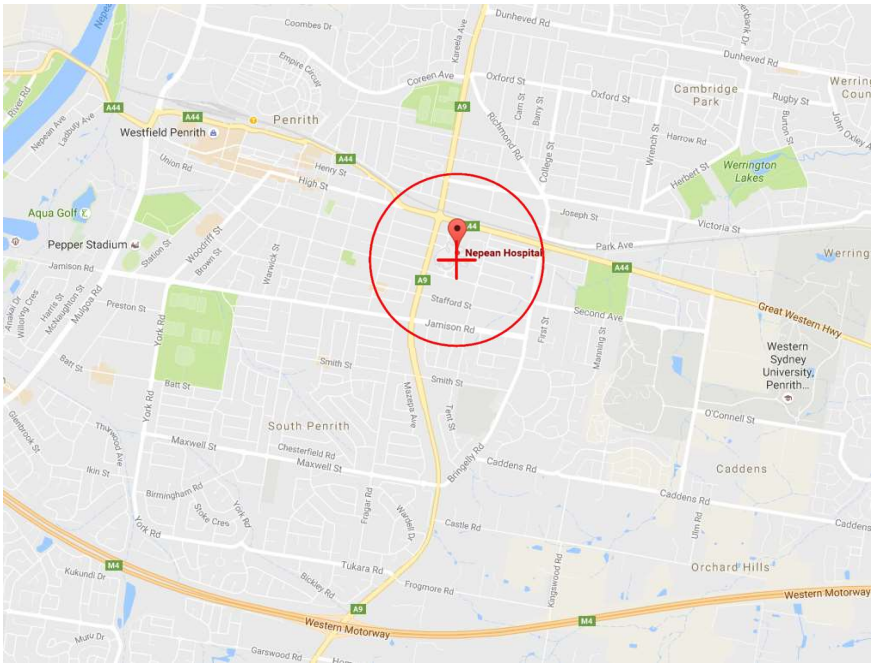


Figure 3 - Site Location

2.3 Land Use Characteristics

2.3.1 The Hospital Precinct

The Hospital is located in the north-east part of Penrith, which generally includes the area identified in Figure 4 below.

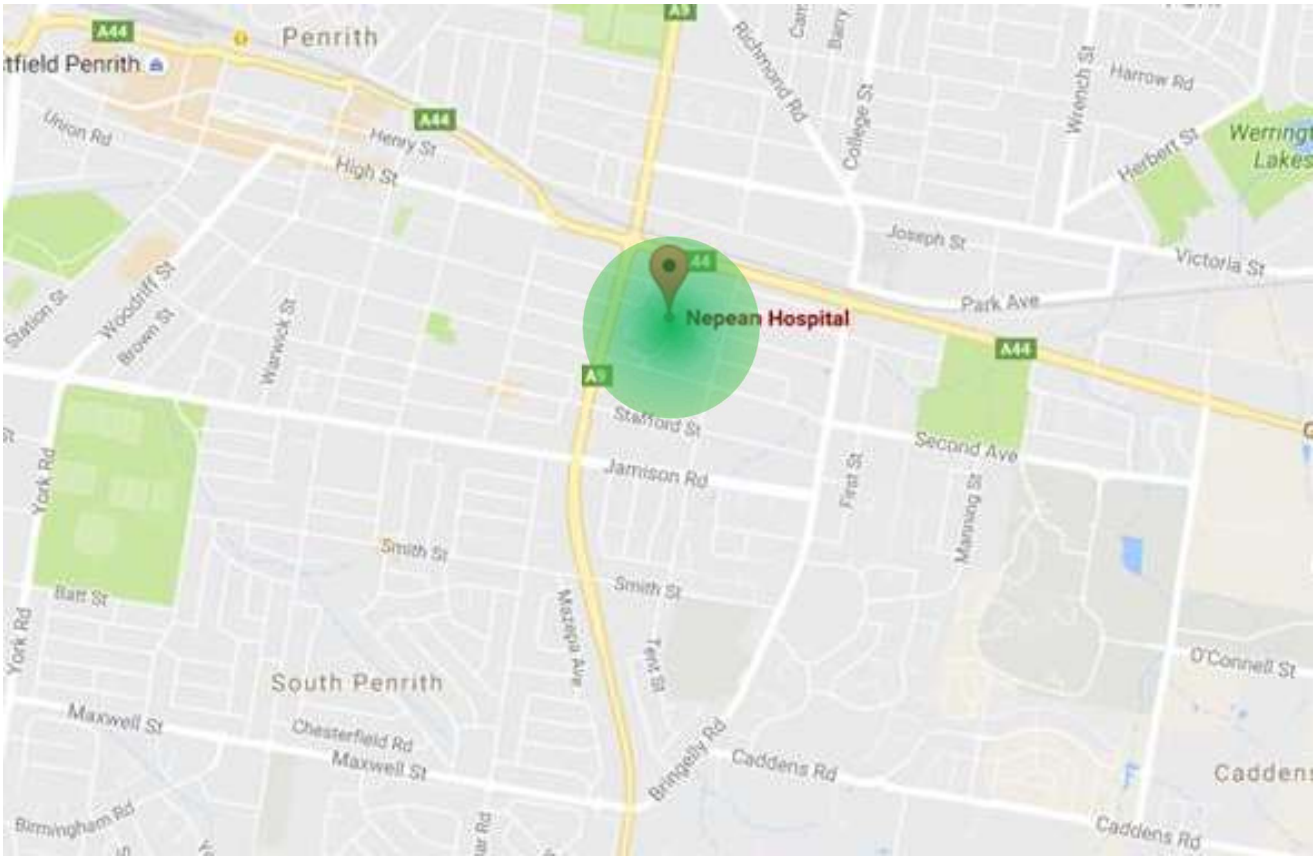


Figure 4 - Hospital Precinct

2.4 The Hospital Campus

The existing Hospital Campus is bordered by Great Western Highway on the northern boundary, Parker Street on the western boundary, Derby Street on the south and Somerset Street on the east. Access to the Hospital is possible from Parker Street (two entrances), Derby Street (one entry) and Somerset street (two entrances). The hotel is divided into four blocks, identified as the North, South, East and West blocks.

The Hospital Campus map is presented below:

Figure 5 - Hospital Campus Map (Source: NSW Health)

2.5 Existing Surrounding Land Use Activities

The context of the Hospital in relation to surrounding land-uses is shown in Figure 6. The road network serving the Hospital is described in Section 2.6 of this Assessment.

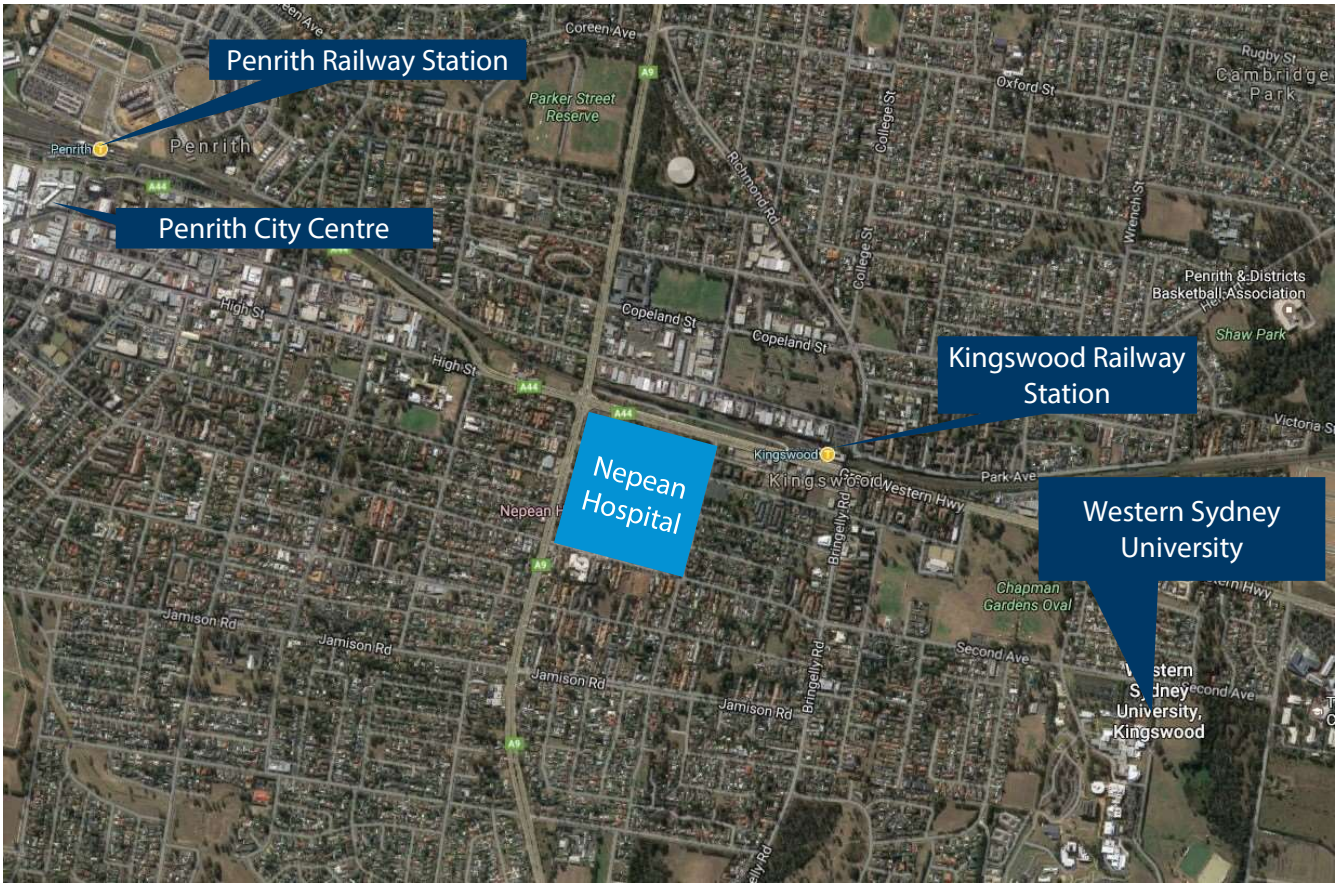


Figure 6 - Nepean Hospital Local Context

The following land uses are located within a 500 metre catchment area of the Nepean Hospital:

- North-east of the Hospital lies Kingswood Railway station and several automotive outlets along the Great Western Highway;
- East and west of the hospital is characterised by low density housing;
- On the southern border of the hospital precinct is the Sydney Medical School, associated with the University of Sydney.

2.5.1 Future Surrounding Land Use Activities

In 2007, the NSW Department of Planning and Penrith City Council published the Penrith City Centre Plan, which outlines the foundation to ensure the rapid growth of the Western Sydney hub will be accommodated for within a 25 year period. The City Centre Plan aligns with the key objectives of the Council's vision for Penrith to ensure growth into a "prosperous, vibrant and attractive city".

The City Centre Plan identifies development opportunities in the context of the expected growth in population of 10,000 new residents and 10,000 new jobs within the City Centre.

The key initiatives identified within City Centre Plan include:

- Promoting office development in the commercial core;
- Promoting Government office accommodation options for the city centre;

- Investigating options for the development of the city park;
- Developing strategies to improve the educational facilities within the city centre; and
- Improving the accessibility within the city centre by investigating new transport options and planning for the necessary infrastructure.

In 2011, the Penrith Business Alliance (PBA) published the Penrith Health and Education Precinct Strategic Vision. The document aims to create local jobs by growing the skills base of the area as well as attract new investment to Penrith through the delivery of projects focused in four key areas:

- World leading health services;
- Education and training, related to health and wellbeing;
- Research, in medicine and preventative health; and
- Business opportunities, related to health, medicine and wellbeing.

Consequently, the proposed Nepean Hospital Redevelopment is consistent with the objectives relevant to the Penrith Health and Education Precinct Strategic Vision, which will promote future government and non-government investment and development in the region's health sector.

2.6 Existing Road Network

The Hospital is served by a regional and local road network, which provides ready access to the City Centre and the surrounding region, while the Great Western Highway and Parker Street provide the primary connection to Sydney and Orchid Hills. The road network in this area is also comprised of State and Regional roads, as well as local roads providing access to the surrounding land-uses.

The Hospital is served by the following State roads:

- North – Great Western Highway
- South – M4 Western Motorway
- West – Parker Street, Mulgoa Road

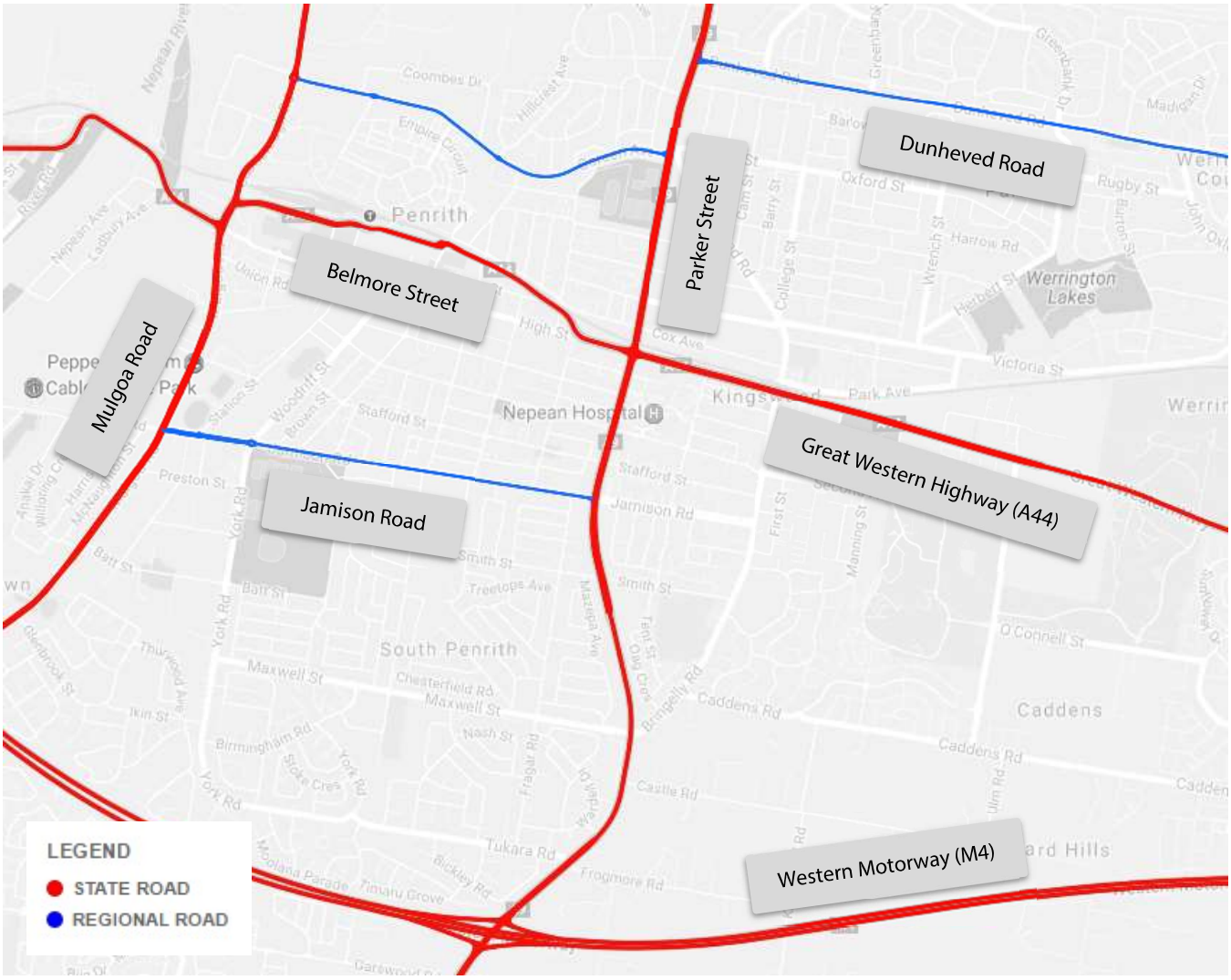


Figure 7 - Road Hierarchy (Source: RMS Road Hierarchy Review, 2017)

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

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

The local road network directly serving the Hospital includes:

Great Western Highway is classified as a State road. It provides an east-west connection along the northern border of the Hospital. The road bisects Parker Street to provide access from the north into the Hospital. Within the vicinity of the Hospital, the carriageway generally carries three lanes of traffic in each direction and has a posted speed limit of 60km/hr.

Parker Street is a State road which provides a north-south connection along the western boundary of the Hospital. The road bisects the Great Western Highway, Barber Avenue and Derby Street providing access to

the Hospital and parking facilities. Within the vicinity of the hospital, the carriageway provides three lanes of traffic in each direction and has a posted speed limit of 70km/hr.

Derby Street is classified as a local road which provides an east-west connection along the southern boundary of the Hospital. Within the vicinity of the hospital, the carriageway provides one lane of traffic in each direction, with parking lanes on either side of the carriageway. The road also has a posted speed limit of 50km/hr.

Somerset Street is a local road which runs along the eastern border of the Hospital, providing a north-south connection between Jamison Road and the Great Western Highway. Within the vicinity of the hospital, the carriageway generally carries one lane of traffic in each direction with associated parking lanes on either side of the carriageway. A posted speed limit of 50km/hr applies.

Barber Avenue is a local road which provides access to the Hospital precinct from Parker Street. The carriageway generally carries one lane of traffic in each direction with a posted speed limit of 50km/hr.

2.7 Vehicle 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 inbound vehicle routes to the Hospital are as follows, and the existing vehicle access locations are presented in Figure 8.

- **Route 1: West** – Inbound vehicles travel along the Great Western Highway, then onto Parker Street to access the Hospital via Barber Street and the Hospital Entrance; 29% of Hospital arrivals originate from this direction.
- **Route 2: North –** There is no vehicular access along the northern boundary of the Hospital precinct.
- **Route 3: South** – Inbound vehicles travelling along Derby Street can access the Hospital via the Sydney Medical School entrance or utilise the off-street car park within the campus; 30% of the Hospital arrivals originate from this direction.
- **Route 4: East** – Inbound vehicles travelling along Somerset Street are able to access the Hospital via the Hospital entrances at Somerset Street north of Hargrave Street and Somerset Street north of Rodgers Street; 41% of Hospital arrivals originate from this direction.

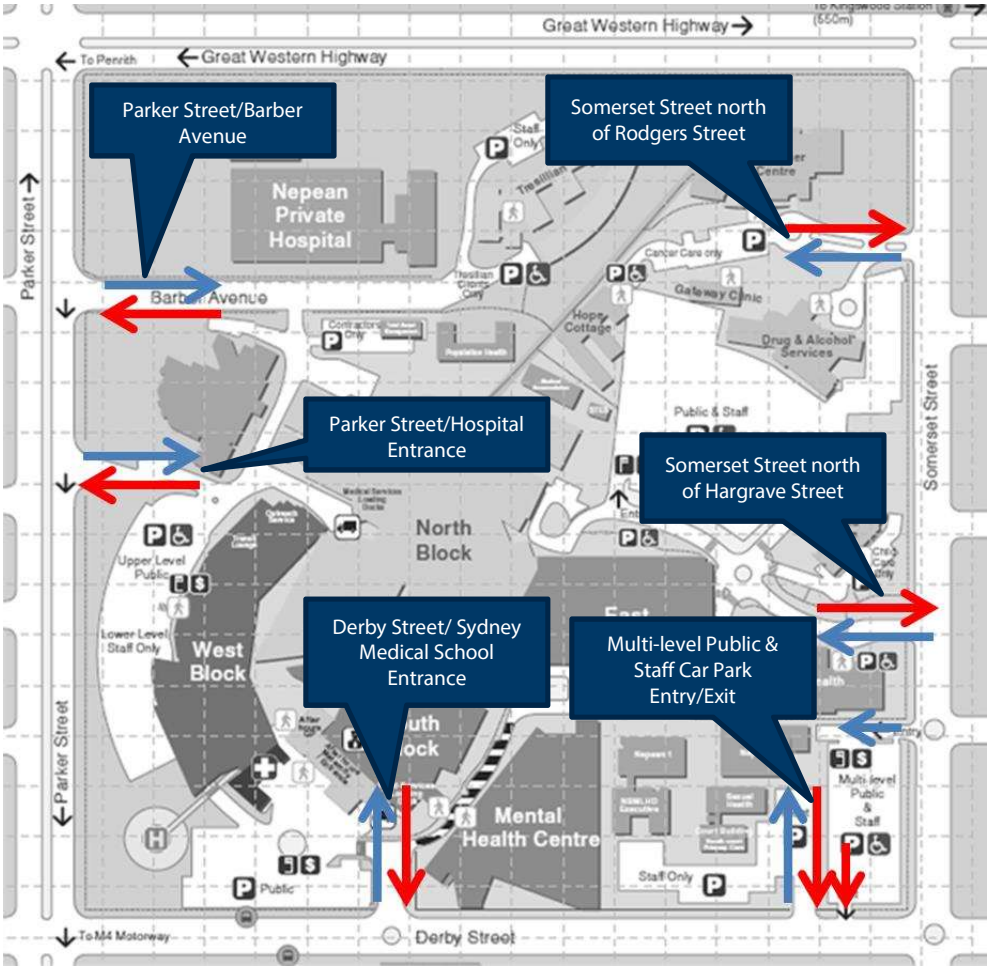


Figure 8 - Existing Vehicle Access Locations

2.8 Existing Traffic Volumes

The modelling and projected traffic activity has been established to include the key morning and afternoon periods, which represents the peak loads and therefore worst case scenarios. Daily traffic volumes are not presented in this Assessment as the road network has been assessed on the basis of the peak traffic activity. This approach has been confirmed as acceptable by RMS.

To identify the existing traffic conditions, video survey counts were undertaken in proximity to the Hospital at the following locations:

1. Great Western Highway /Parker Street
2. Parker Street / Barber Road
3. Parker Street / Hospital Entrance
4. Parker Street/ Derby Street
5. Derby Street / Hospital Entrance (south)
6. Derby Street /Somerset Street
7. Somerset Street / Hospital Entrance 1 (east)
8. Somerset Street / Hospital Entrance 2 (east)
9. Somerset Street / Great Western Highway

Figure 9 - Traffic Modelling Study Area

An initial set of intersection surveys were undertaken on 15th November 2016. These were performed at the following times to record the AM and PM peak activity surrounding the Hospital:

- 7:00am – 10:00am, and
- 3:00pm – 7:00pm.

The traffic survey results indicate that the network peaks occurred at:

- 8:00am – 9:00 am, and
- 3:15pm – 4:15pm.

Based on surveys, the Hospital peak access periods occur at:

- 7:15am – 8:15am, and
- 3:15pm – 4:15pm.

Therefore, these hours have been adopted as the peak periods for the purpose of assessing the impacts of increased traffic resulting from the proposed Hospital development.

2.9 Current Road Network Operation

The performance of the existing road network has been established through the preparation of a Road Network Model using SIDRA modelling software. The model incorporates the surveyed traffic volume data described in Section 2.8 and the existing situation (described as Scenario 1) represents the Base Model. The related future scenarios are described in Section 5.5 of this Assessment. While key findings for the existing scenario are summarised in the following:

- the road network within the study area is generally operating within capacity,

- All of the priority controlled intersections within the study area except the Junction with Great Western Highway and Somerset Street (Junction no: 9) are operating at Level of Service A, whereas the Great Western Highway and Somerset Street Junction is operating at LOS D.

- The roundabouts in the study area (Junction no: 5 & 6) are operating at LOS A with nominal degree of saturation and junction delays.

- The traffic signal controlled intersections are experiencing the delays with a very high degree of saturation in the evening peak period. In the existing condition the intersections are operating at a reasonably good LOS. These intersections are operating with a high degree of saturation. This means that a small increase in demand or interruptions to vehicle flows causes a large increase in delays.

Detailed results including the degree of saturation, average delay and maximum queue lengths for each approach are presented in Attachment 2 of this Report, while a summary of the intersection results at the AM and PM peak are presented in the following tables:

Table 1- Summary of Existing Traffic Conditions (AM Peak)

Intersection	Level of Service	Average Delay	Degree of Saturation
Great Western Highway /Parker Street	B	20.5	0.785
Parker Street / Barber Road	A	6.9	0.039
Parker Street / Hospital Entrance	A	6.8	0.013
Parker Street/ Derby Street	B	22.6	0.662
Derby Street / Hospital Entrance (south)	A	5.7	0.242
Derby Street /Somerset Street	A	6.9	0.282
Somerset Street / Hospital Entrance 1 (east)	A	7.7	0.042
Somerset Street / Hospital Entrance 2 (east)	A	7.3	0.021
Somerset Street / Great Western Highway	B	20.4	0.576

Table 2- Summary of Existing Traffic Conditions (PM Peak)

Intersection	Level of Service	Average Delay	Degree of Saturation
Great Western Highway /Parker Street	B	27.5	1.119
Parker Street / Barber Road	A	7.9	0.090
Parker Street / Hospital Entrance	A	7.7	0.041
Parker Street/ Derby Street	D	52.5	1.431
Derby Street / Hospital Entrance (south)	A	6.1	0.269
Derby Street /Somerset Street	A	7.1	0.401
Somerset Street / Hospital Entrance 1 (east)	A	8.0	0.116
Somerset Street / Hospital Entrance 2 (east)	A	7.8	0.032
Somerset Street / Great Western Highway	D	49.2	0.826

The network model incorporates all intersections within the influence of the Hospital Precinct; where there is an entry/exit to the development exists or anticipated along with the surrounding intersections/

roundabouts. A SIDRA model of the surrounding road network has been undertaken by PTC and indicates that intersections are currently operating at Level of Service A to D during the morning peak and afternoon peak. In terms of Level of Service the intersections exhibit a reasonable result; however it is apparent that queuing occurs on the westbound Highway approach during the afternoon peak. The right turning movement from the westbound Highway is operating at LOS F with the degree of saturation is above 100% which means that any slight increases in the demand cause a dramatic increase in delays of the junction as a whole. Similarly in the Parker Street/ Debry street intersection, the right and through movements from eastbound Debry street are operating at LOS F along with the right turn movements from westbound Debry street.

2.10 Traffic Accidents

The Centre for Road Safety, within Transport for NSW (TfNSW), has provided historical crash data for the five year period between 2011 and 2015 of crashes within the vicinity of the Hospital, as shown in Figure 10.

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

- Great Western Highway/Parker Street
- Parker Street/Barber Avenue
- Parker Street/Derby Street
- Somerset Street/Derby Street
- Great Western Highway/Bringelly Road
- Bringelly Road/Derby Street
- Parker Street/Copeland Street

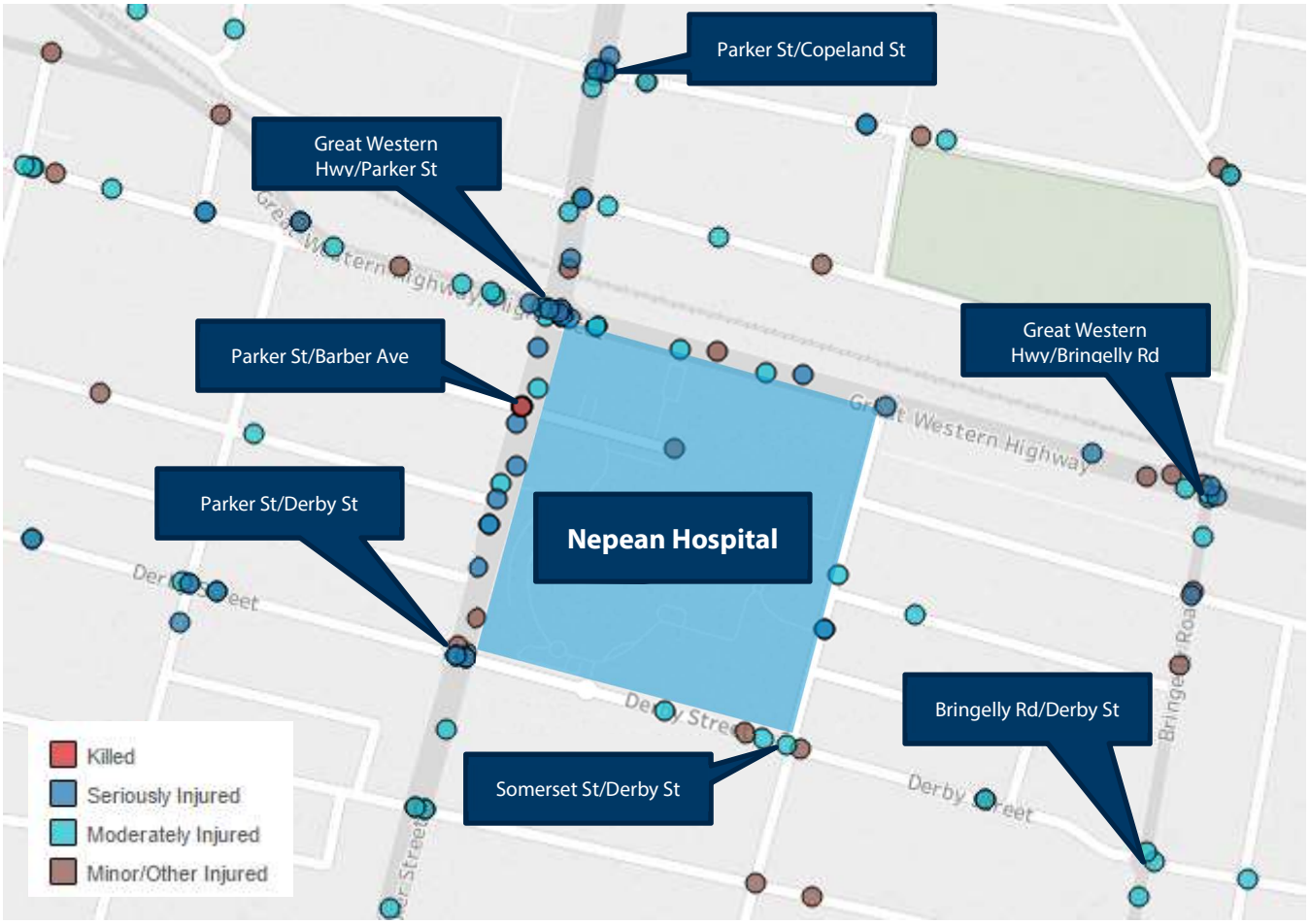


Figure 10 – Crash data within the vicinity of Nepean Hospital from 2011-2015 (Source: Centre for Road Safety - TfNSW, 2016)

Over the five year period reported, one fatal accident occurred at the intersection of Parker Street and Barber Avenue as well as a considerable number of serious injuries occurring at the intersections of Great Western Highway/Parker Street and Great Western Highway/Bringelly Street.

2.11 Public Transport

A number of public transport options are available in the vicinity of the site in the form of buses and rail. The closest station, Kingswood Railway Station, is located approximately 1km (walking distance) from the main Hospital entry whilst bus stops are located along Derby Street, in close proximity to the main Hospital entrance of the South Block. These are further discussed in the sub-sections below.

2.11.1 Bus (Private and Public)

The Hospital Precinct is serviced by the bus routes presented in Table 3. There are two bus stops located on the southern boundary of the Hospital Precinct, as indicated in Figure 11.

Table 3 – Bus routes servicing the Hospital

Route No.	From	To	Frequency (approx)	Services Operate Approx (Weekdays)	Services Operate Approx (Weekends)
774	Mount Druitt	Penrith	Mon-Fri every 30 mins, Sat-Sun every 60 mins	6:25am - 11:36pm	7:33am - 10:20pm
775	Mount Druitt	Penrith	Mon-Fri every 30 mins, Sat-Sun every 60 mins	5:21am - 10:56pm	7:54am - 10:43pm
776	Mount Druitt	Penrith	Mon-Fri every 30 mins, Sat-Sun every 60 mins	5:36am - 10:20pm	8:14am - 11:03pm
789	Luddenham	Penrith	Mon-Fri only two services, No weekend services	7:54am & 4:30pm	No weekend services

The Hospital is relatively well serviced by bus, with a number of routes and regular services (every 30 mins on weekdays) and therefore should provide a reasonably attractive mode share option for some Hospital-related users, subject to the availability of convenient bus stops close to their home location.

This appears to be confirmed by our surveys, which show 4% of outpatients and 4% of visitors utilising bus mode share to travel to the hospital. However, only 1% of staff utilised bus as their mode share option.

Figure 11 - Location of Nearby Bus Stops (Source: NS W Health)

2.11.2 Rail

Kingswood railway station is located approximately 1km from the Hospital, which is within reasonable walking distance for staff and, potentially, visitors to inpatients. Hospital attendees with walking difficulties may find this a less attractive transport mode share, despite taxi links from the station to the Hospital.

The station is on the Western Line, from Emu Plains and Richmond to the City. Services operate every 5 – 15 minutes during peak hours, with services operating from 3.12am to 11.23pm.

The distance from the Hospital and relative frequency of services could make heavy rail a reasonably attractive mode share option for some Hospital-related users, subject to the availability of a convenient railway station close to their home location.

This appears to be confirmed by our surveys, which show 2% of outpatients and 4% of visitors utilising heavy rail mode share to travel to the hospital. However, only 1% of staff utilised heavy rail (or a combination of heavy rail and bus) as their mode share option.

2.12 Cycling

It is noted the cycling infrastructure in the Penrith region is relatively underdeveloped, with no dedicated bicycle paths in the vicinity of the Hospital. However, the surrounding road network makes cycling and motorcycle viable methods of travel.

Despite the relatively level topography surrounding the site, cycling is only likely to be an attractive mode share for daytime staff, and even then only for those that live within a relatively close distance.

Our surveys show that only 1.5% of staff cycle/motorcycle to work, although when asked if they would cycle if end of trip facilities were provided, 17% of staff surveyed said that they would be interested.

2.13 Walking

The topography of the area is relatively flat; however, as with cycling, walking is only likely to be an attractive option for people who live relatively close to the Hospital.

The campus is surrounded by a reasonable volume of low-density (mostly single storey) residential development, apart from the area to the north of the Great Western Highway which is predominantly light industrial and bulky goods.

New apartment blocks also appear to be under construction along Parker Street and Derby Street, which would provide convenient access to the Hospital for, for example, staff.

Having said all of the above, staff on early morning or late evening/night shifts would be unlikely to walk, for safety reasons, unless (for example) renting a property in close proximity to the campus.

For these reasons, we expect that walking would only be an attractive mode share for people living locally. This appears to be supported by our surveys which show only 2% of staff walking to work. 4% of outpatients and 3% of visitors walked to the Hospital.

2.14 Current Parking Provisions

As per the Parking Demand report given by PTC on December 2016 for the parking supply and demand within the Nepean Hospital Precinct, The existing parking facilities within the hospital precinct is shown in Figure 12.

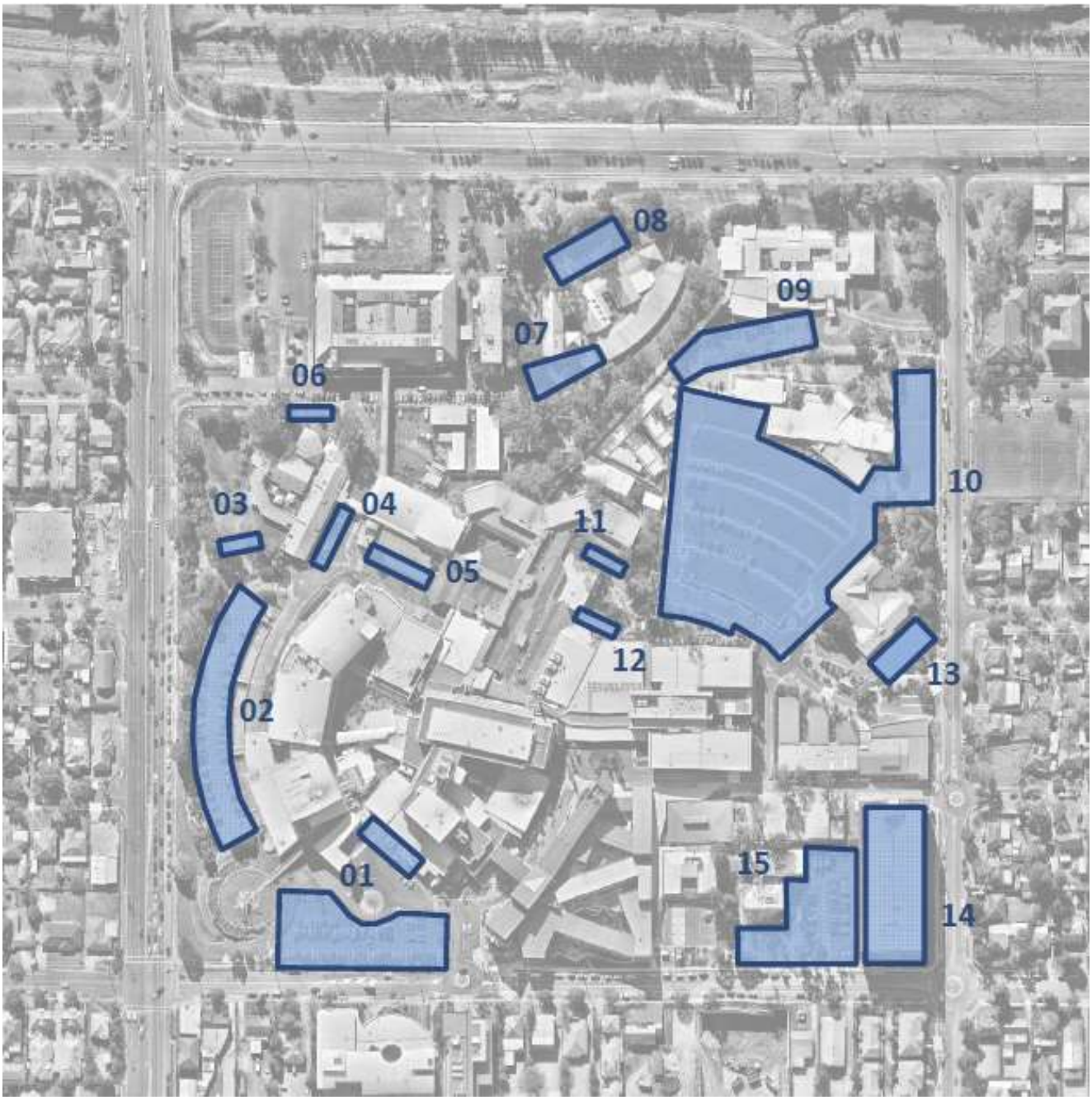


Figure 12: Existing Parking Places

The study identified the existing parking supply and demand associated with the Hospital, which is summarised in Table 4 :

Car Park	Staff / allocated spaces	Public spaces	Shared Public / Staff Spaces	Total spaces
1	7	86		93
2	169	93		262
3	6			6
4		9		9
5	Loading Dock			
6	12			12
7	Tresillian Family Care Centre			
8	Tresillian Family Care Centre			
9	10	37		47
10	44		290	334
11		3		3
12		9		9
13	Child Care Centre			
14	46		612	658
15	76			76
Total	**370**	**237**	**902**	**1509**[1]

Table 4: Parking Supply Breakdown

- Existing on-campus supply = 1,509 spaces (including parking at the MLCP (CP- 14, 15) and excludes drop-off/pick-up and 15 minute spaces)
- Existing off-campus supply = 1,080 spaces within the local road network (within a 500 metre radius).

There are several types of parking facility within the Hospital Campus, which are summarised below:

- Staff/ allocated Parking 370 spaces
- Public Parking 237 spaces
- Shared Public/ Staff Spaces 902 spaces

The parking provision is located within at-grade car parks surrounding the Hospital buildings and 658 spaces accommodated within the multi-storey car park located in the South Eastern part of the Campus.

It is proposed to retain the existing multi-storey car park; however some of the at-grade provision will be displaced by the Hospital Redevelopment. This aspect of the parking provision is described in Section 4 of this Assessment.

[1] *Includes emergency vehicle bays, courier bays etc. When these are excluded, the total bays generally useable by staff and public is 1,495*

3 Proposed Development

Details of the Hospital Redevelopment and the MLCP are presented in the architectural drawings prepared by BVN Architects presented in Figure 13 and Figure 14 for Phase I & II of the Development.

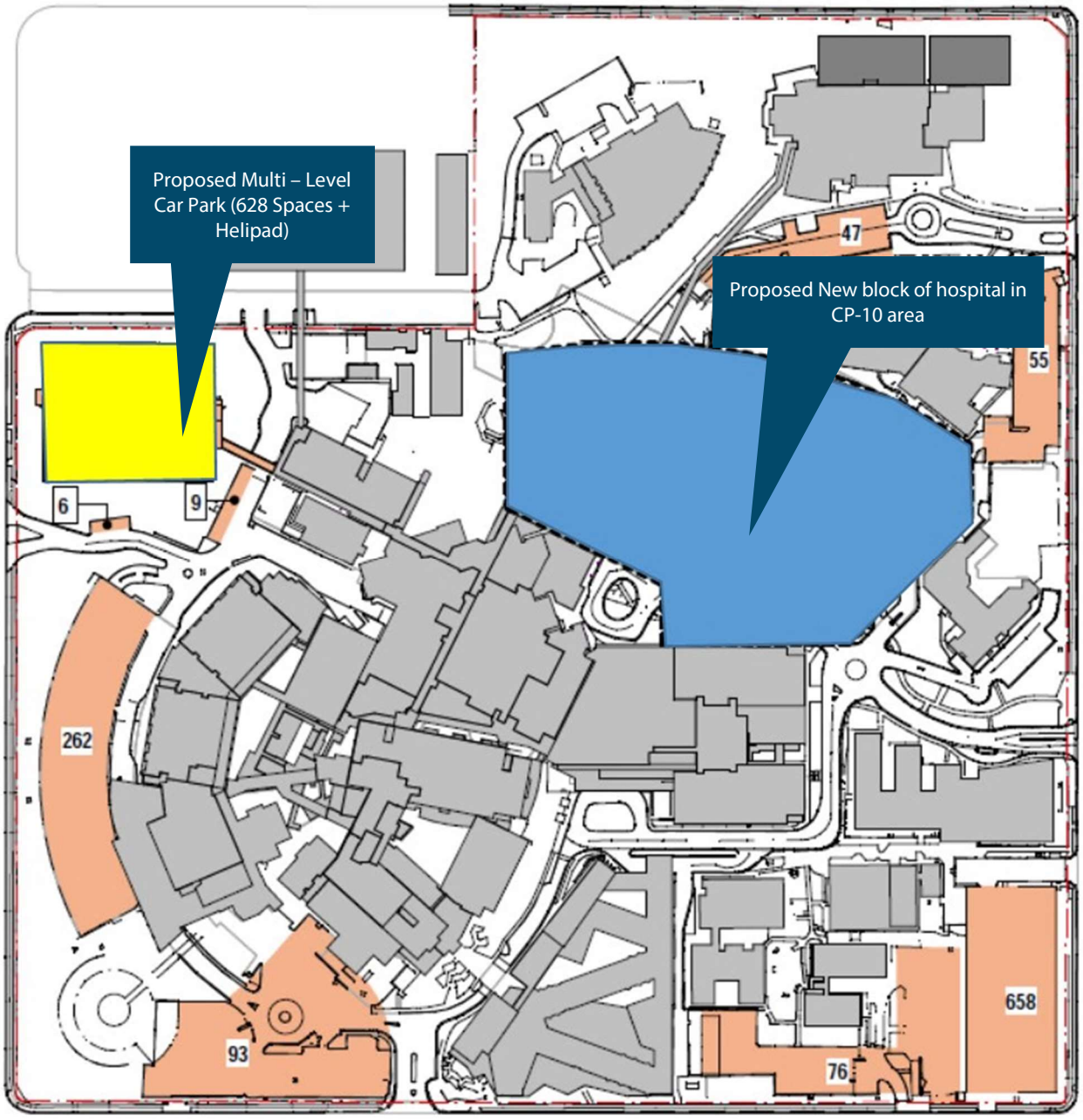


Figure 13 - Hospital Redevelopment - Phase I

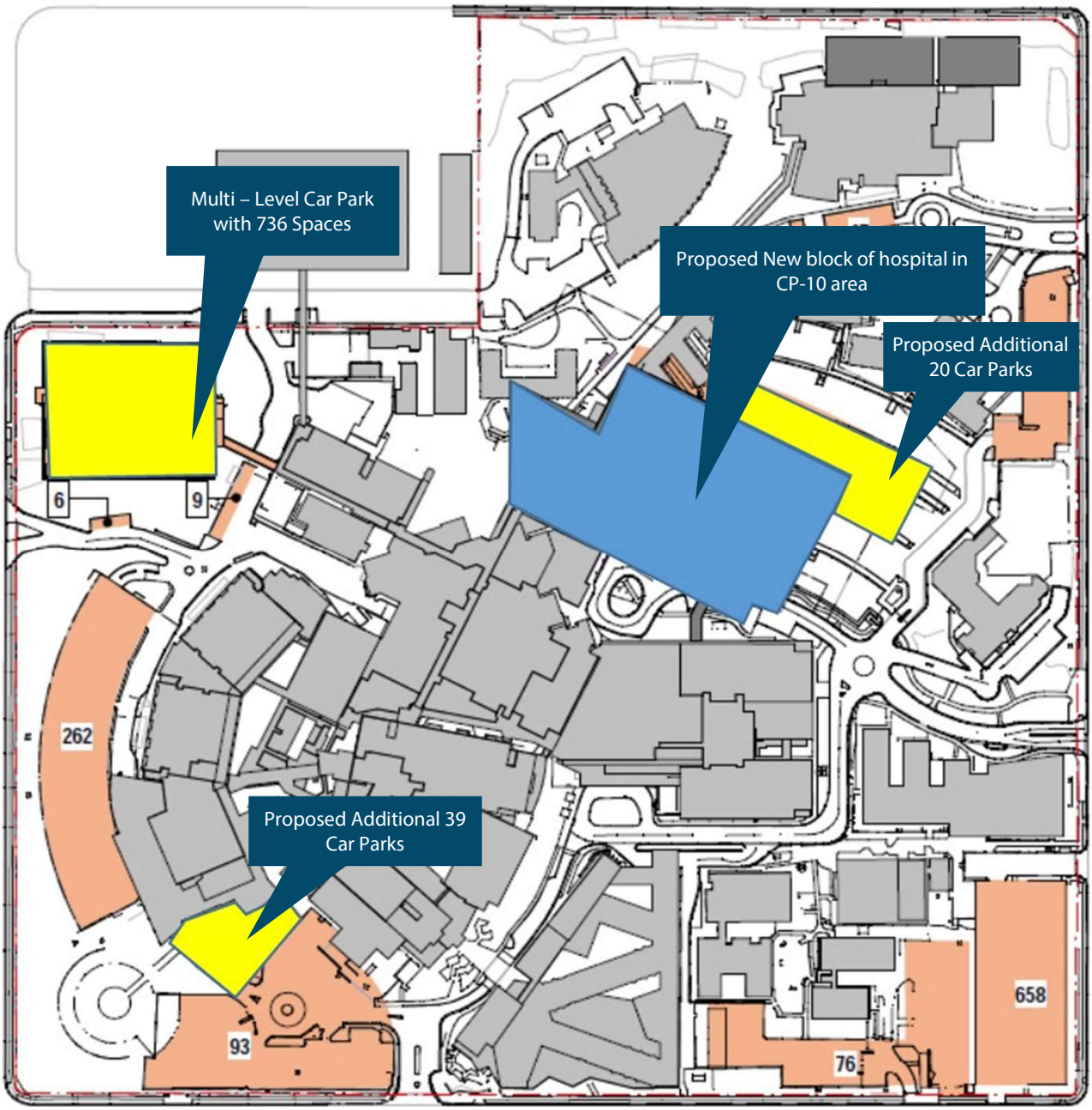


Figure 14 - Proposed Hospital Development - Phase II

3.1 Hospital Redevelopment

The proposed Hospital Redevelopment will accommodate 207 extra overnight beds involving 1346 extra FTE staff, with an increase of 119 daily presentations on an average weekday. The proposed redevelopment is mainly on the eastern side of the hospital campus by constructing a new campus on the Car Park 15 Area. There is a Multi-Level Car Parking is proposed on the western side of the hospital campus and accessible from Barber Avenue. The proposed Multi Level car parking will give a 736 car parking spaces.

On the other hand the proposed new campus will result in a reduction of parking in CP 15 from 334 spaces to 55 spaces. Other related works include the upgrading the road network from Somerset street to the new hospital building by providing an access to the car parking and drop off area inside the development with a Cul De Sac and similar arrangement on the Barber Avenue. Details of the Hospital Redevelopment are presented in the architectural drawings, prepared by BVN Architects.

4 Parking Provision

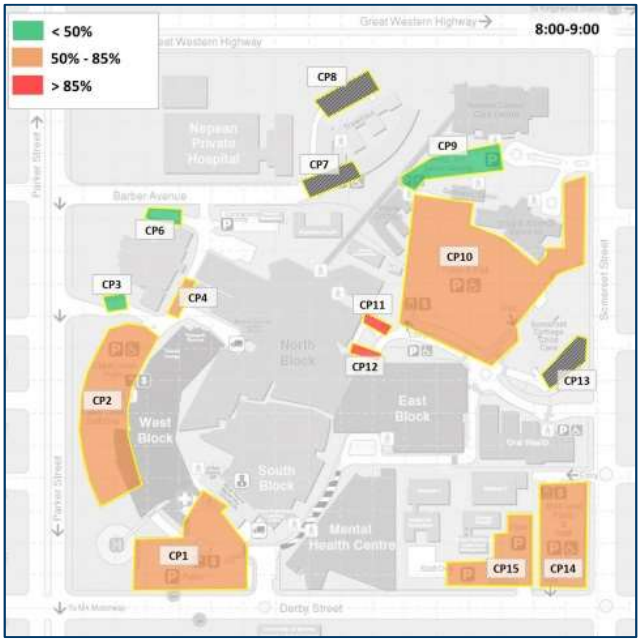
The proposed parking provision has been established following an extensive study of the Hospital undertaken by PTC, including travel mode surveys, traffic surveys and parking occupancy surveys. In summary, the study concluded that the hospital has a current parking demand for 2,146 parking spaces; while the Hospital Campus accommodates 1,495 (excluding emergency vehicle, courier bays etc). During our surveys, the highest recorded peak occupancy was 1,252 spaces (84%) spaces and a further 550 spaces are located within the Hospital surroundings (i.e. within 400 metres of the Hospital Campus). The remaining demand for 101 spaces is accommodated in areas outside of the Hospital Precinct.

4.1 Current Parking Demand

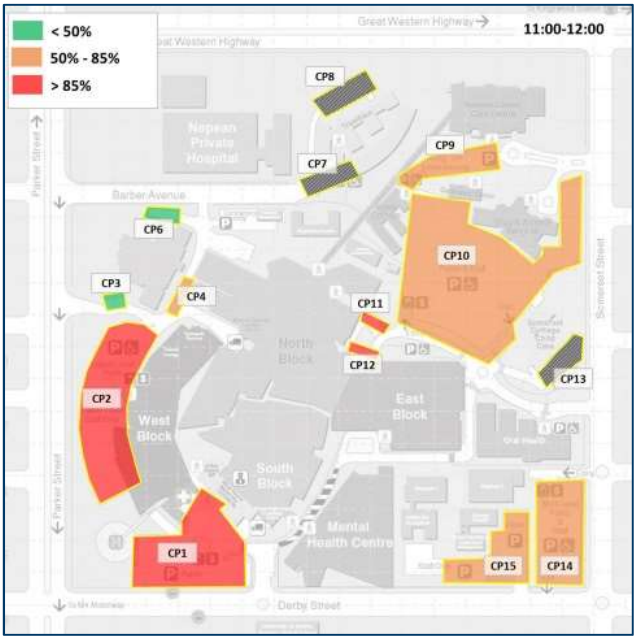
In order to identify the patterns of parking activity in proximity to Nepean Hospital, PTC undertook a detailed hourly occupancy survey of all Hospital parking supply on site for a day.

4.1.1 On – Campus Parking

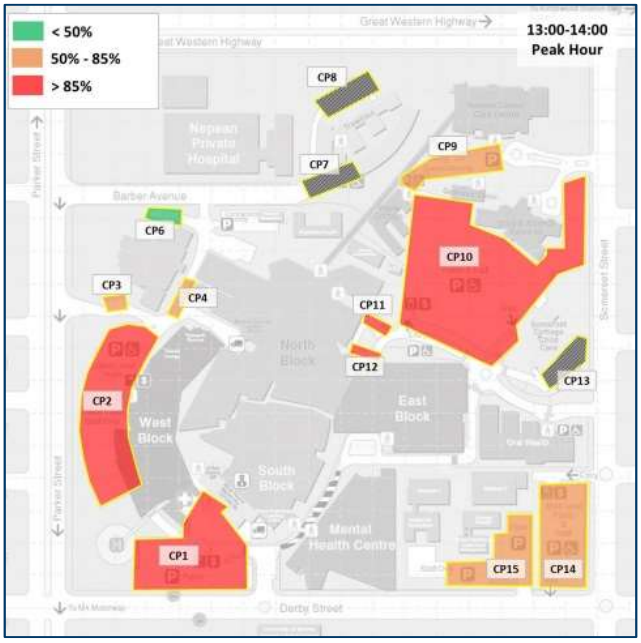
Parking is located throughout the Hospital Precinct along with the Multi-Level Car Park in the South Eastern side of the hospital compound. Peak occupancy occurred at approximately 1pm - 2pm on each day when parking is effectively at 83.9% occupancy. Figure 15 presents the heat maps of the occupancy of the parking lots within the hospital compound.



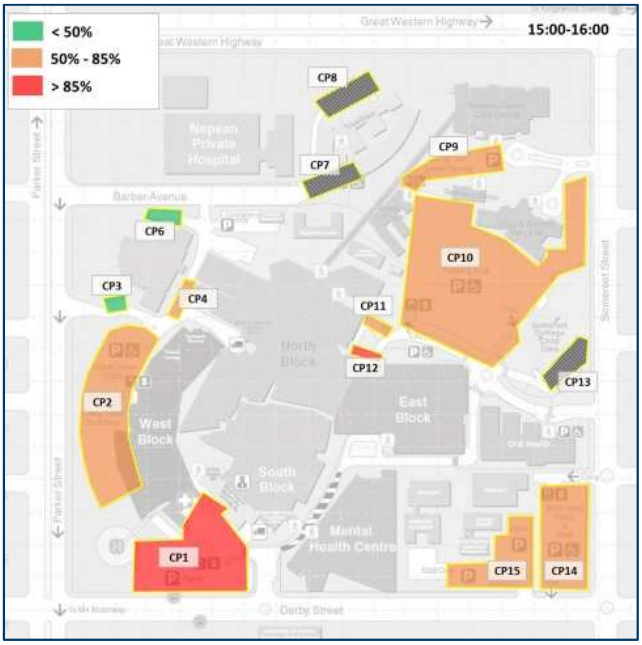
Morning 8:00 – 9:00



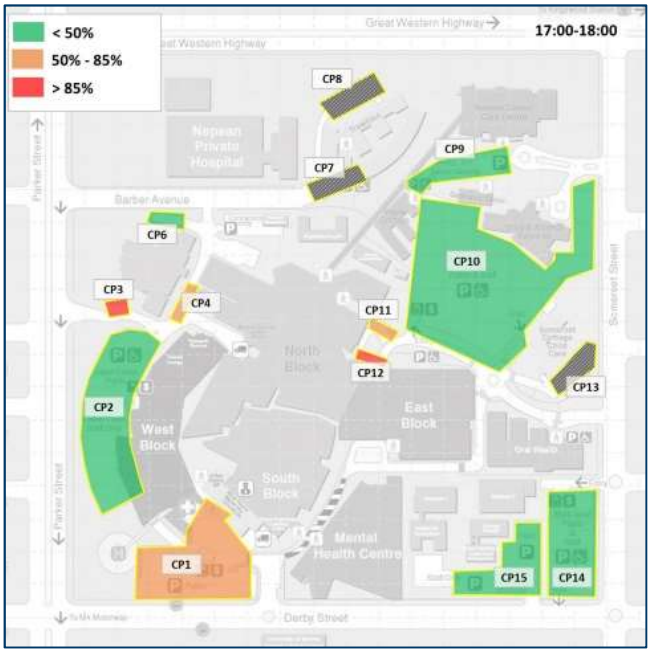
Morning 11:00 – 12:00



Afternoon 13:00 – 14:00



Afternoon 15:00 – 16:00



Evening 16:00 – 17:00

Figure 15 - On Campus Heat maps for Peak Occupancy

4.2 Proposed Parking Provision

Typically, parking demand is estimated based on published data, e.g. the applicable Planning Policies, the RMS Guide to Traffic Generating Developments or by collecting data from a similar facility. The RMS Guide does not present any parking demand data associated with public hospitals (only Private Hospitals and Medical Centres are included). Considering the Nepean Hospital is a Private hospital and the demand for parking is established based on the RMS guidelines.

The Peak parking accumulation (PPA) at a private hospital is estimated by:

PPA = -19.56 + 0.85B +0.27 ASDS

Where ASDS = Average Staff per Weekday per Shift

B = No of beds.

As per the RMS guidelines, the parking requirement for Nepean Hospital is summarised in Table 5

Table 5: Parking Demand as per RMS Guidelines

	Current	Future (2021/22)	Future (2026/27)
Staff on Weekdays	1982	2318	2553
No of Beds	486	721	764
Parking Demand	**929**	**1219**	**1319**

In the case of Nepean Hospital, the most effective method for projecting the future parking demand is to collect data from the existing facility and then apply those findings to the proposed redevelopment on a pro-rata basis, according to expected increases in the number of beds, Full Time Equivalent (FTE) staff and other relevant demand drivers.

In this regard, the data collected from the existing Hospital for the demand and supply; along with the basis for the future parking demand associated with the Hospital Redevelopment is summarised in Table 6.

Table 6 – Parking Demand on Pro – Rata basis

	Current	Future (2021/22)	Future (2026/27)
Staff on Weekdays	1982	2318	2553
Visitors on Weekdays	762	1085	1181
Students & Volunteers on Weekdays	69	83	97
Total	2813	3486	3831
Parking Demand	**1495**	**1853**	**2036**

The parking provided in the hospital Precinct for the various horizon years are summarised in Table 7

Table 7: Parking Demand & Supply

	Current	Future (2021/22)	Future (2026/27)
Demand as per RMS	929	1219	1319
Pro Rata Demand	1495	1853	2036
Parking Supply	**1495**	**1842**	**2009**

As per the RMS guidelines for parking provisions of a Private Hospital, The parking provided in the Nepean Hospital is well above the standards, but as per the pro rata calculation we are providing the parking and it is mostly in line with the proposed development and existing facilities.

5 Impact of Proposed Development

In relation to the traffic assessment, the Project is slightly unusual in that the Hospital Redevelopment represents the key driver of traffic activity (number of staff, beds, visitors etc.) however the projected traffic activity (and the activity associated with displaced parking) will occur at the proposed multi-storey car park location.

As described in Section 4, the number of parking spaces to be provided in the new multi-storey car park was determined through assessment of the parking demand generated by the existing Hospital and the projected growth, which in turn forms the basis for the traffic generation of the development.

It should be noted that the displacement of parking from within the Campus will have the effect of reducing traffic activity in those areas and this has been factored into the traffic assessment and network modelling.

5.1 Traffic Generation

In a similar regard to the projected parking provision, the traffic activity associated with a future use can be determined through reference to published data, or data collected at a similar facility. In relation to the proposed Hospital Redevelopment the existing Hospital provides a suitable basis for the projection of future traffic volumes.

By way of reference, we have also applied the method and formulae presented in the RMS Guide to Traffic Generating Developments, although it is noted that this applies to Private Hospitals and Medical Centres.

The travel characteristics associated with the Hospital and various user groups was collected during the Parking Study. This was used to establish the peak parking demand, which in turn provides the basis of the traffic activity. The existing multi-storey car park includes access control equipment, which records arrival and departure data. This data has been used to determine the arrival rate during the morning peak period and the departure rate during the evening peak period. This has then been applied to the proposed Hospital Redevelopment, based on the number of beds, the number of staff and the number of outpatients and visitors. The displacement of existing car parking is also included within the projected volumes, as this will occur to/from the proposed multi-storey car park.

The method for calculating the traffic generation of the Hospital Redevelopment in accordance with the RMS Guide to Traffic Generating Developments is expressed as the following formulae:

- PVT = -14.69 + 0.69 B + 0.31 ASDS
- MVT = -10.21 + 0.47 B + 0.06 ASDS
- EVT = -2.84 + 0.25 B + 0.40 ASDS

Where PVT = Peak Vehicle Trips (typically 15:00-16:00), MVT = Morning Vehicle Trips and EVT = Evening Vehicle Trips.

Where ASDS = Average Staff Day Shift

Where B = Overnight Beds

Application of these formulae to the Existing and Proposed Hospital redevelopment projects will indicates the projected traffic activity.

Existing Conditions:

- PVT = -14.69 + (0.69 x 486) + (0.31 x 1817) = **884 Vehicle Trips**
- MVT = -10.21 + (0.47 x 486) + (0.06 x 1817) = **327 Vehicle Trips**
- EVT = -2.84 + (0.25 x 486) + (0.40 x 1817) = **845 Vehicle Trips**

Proposed Redevelopment Conditions:

- PVT = -14.69 + (0.69 x 693) + (0.31 x 2544) = **1252 Vehicle Trips**
- MVT = -10.21 + (0.47 x 693) + (0.06 x 2544) = **468 Vehicle Trips**
- EVT = -2.84 + (0.25 x 693) + (0.40 x 2544) = **1188 Vehicle Trips**

But based on the existing conditions and parking demand data available with us, the amount of traffic generation to and from the hospital is governed by no of parking provided within the Hospital campus. As per the existing Traffic generation rates given by RMS the hospital is supposed to attract a 884 and 845 vehicle trips in the morning and evening peak hours. But since there is a limitation of parking provision at present the hospital is attracting 646 vehicles trips (437 entries & 209 exits) (excluding the parking provided on CP 14 & 15 car parks) (Based on the Intersection count surveys) only.

So, considering the above to estimate the trip generation is directly in relation to the parking supply. The no. of trips generating for the provided parking facilities within the hospital compound is shown below.

Table 8 – Supply based Traffic generation

	No of Car Parks	Entry of Vehicles	Exit of Vehicles	Total Vehicles (Entry + Exit)
Existing Condition (Excluding the Roadside parking, MLCP (14 & 15)	775	437	209	646
Proposed Development – Phase 1	775+628-277-12 = 1108	625	299	923
Proposed development – Phase II	775+736-277-12+20+40 = 1280	722	345	1067

Based on the supply, the hospital development attracts 1067 vehicular trips in the peak hour scenario. The supply based demand approach for the development will give us the realistic Traffic generation of the site rather than the actual trip generation.

For the purposes of providing a robust assessment, the method based on the existing hospital data was adopted within the modelling, as it indicates a lower traffic generation during the morning and evening peaks.

5.1.1 Background Traffic

To assess the impact of background traffic growth on the surrounding road network, an annual growth rate of 1.5% for 2021 and 2026 has been applied to the modelling.

A scenario adopting a 1.5% growth rate has also been undertaken as this represents the growth in the 7 year (2009-2016) historical Average Annual Daily Traffic (AADT) volumes referenced from two RMS permanent count stations located at Parker Street (50m south of Cox Avenue) and Great Western Highway (located at 30m East of Bridge Street , Werrington).

5.2 Trip Distribution

As per the proposed development plan and changes in the car park areas, the distribution of traffic is modified. The proposed Trip distribution for the Phase I and Phase II of the development is shown in the attached Figure. The Trip distribution is calculated for the morning and evening peak hours differently.

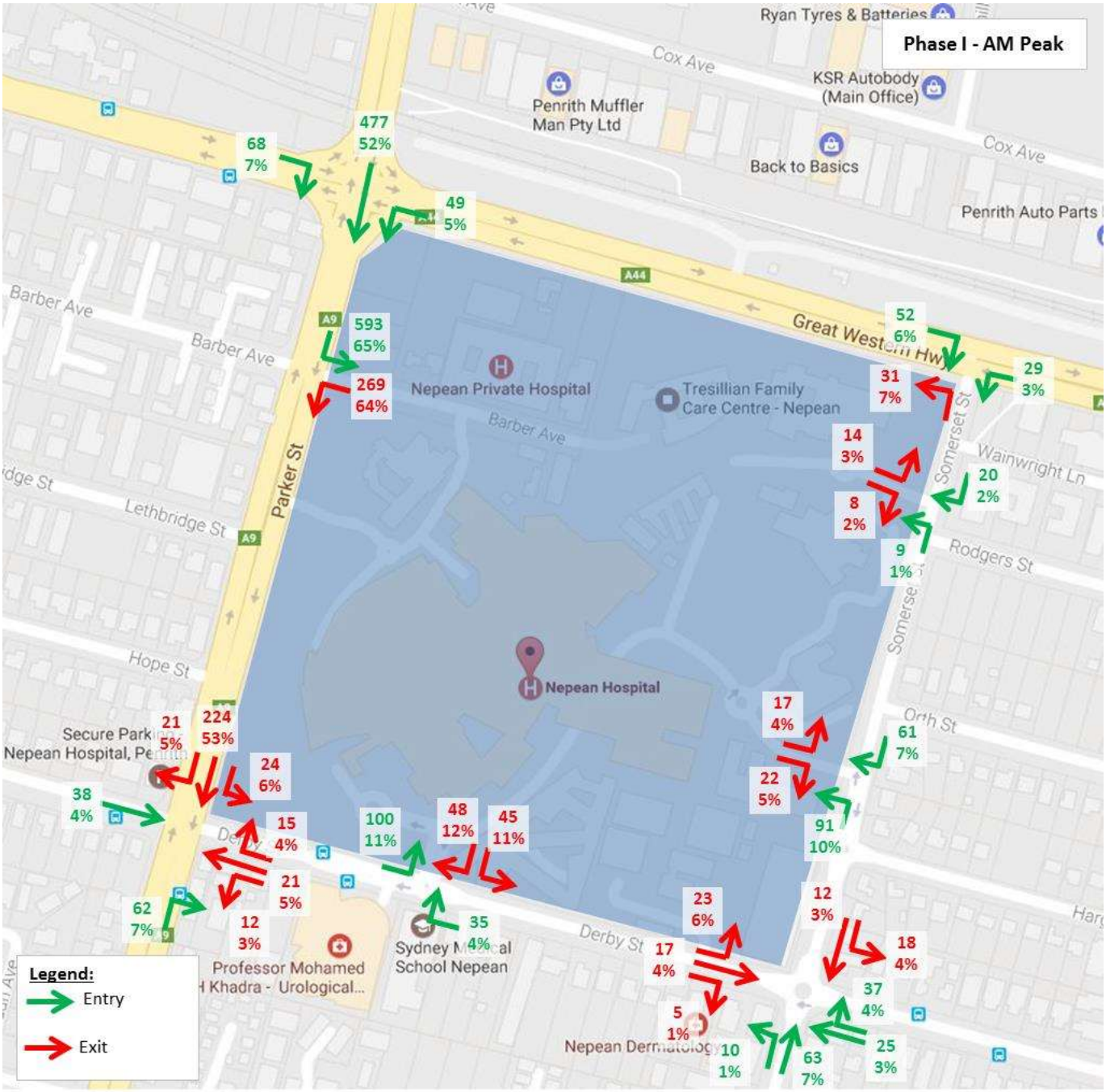


Figure 16: Traffic Distribution for Phase I development – AM

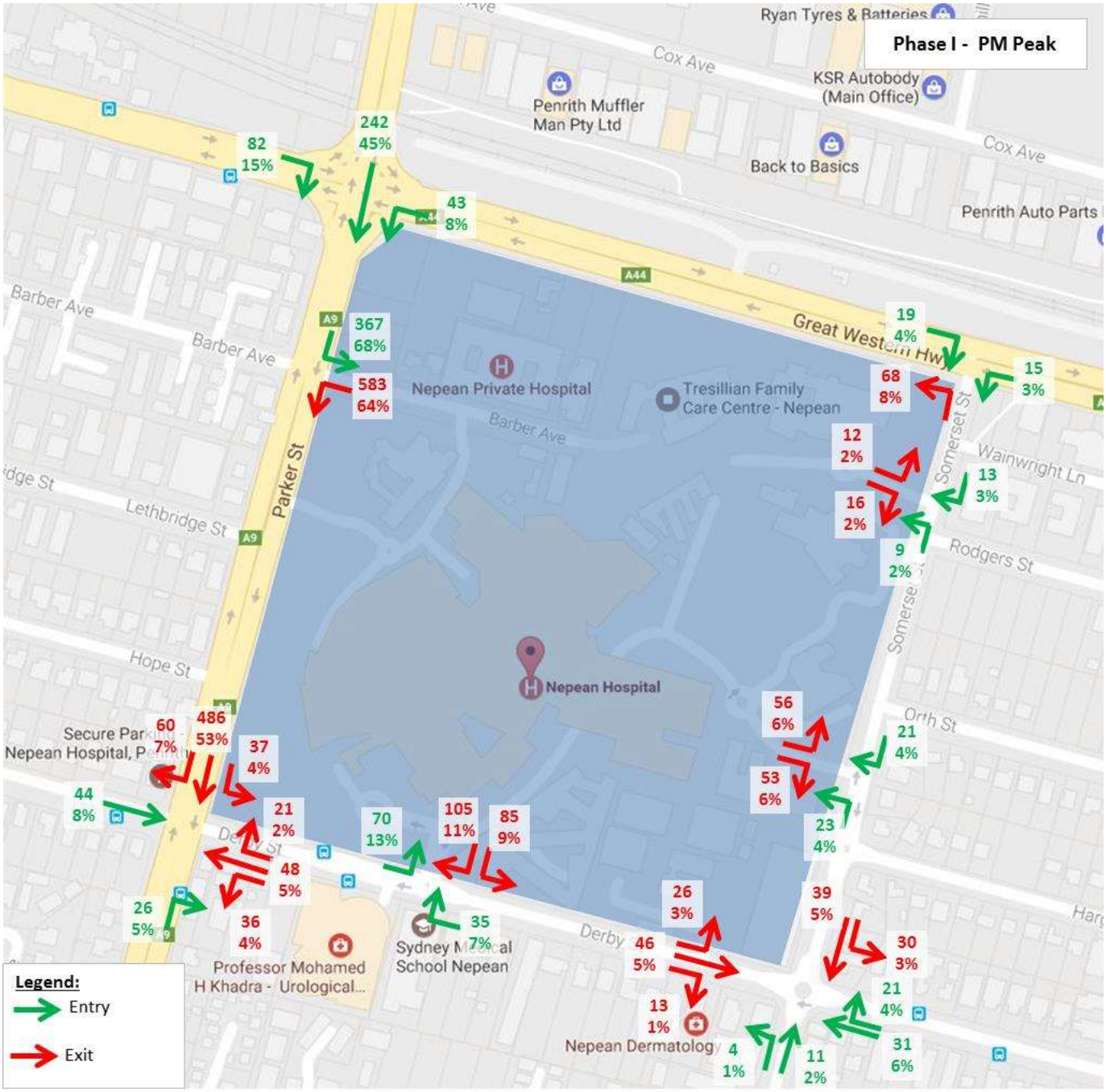


Figure 17: Traffic Distribution for Phase I development - PM

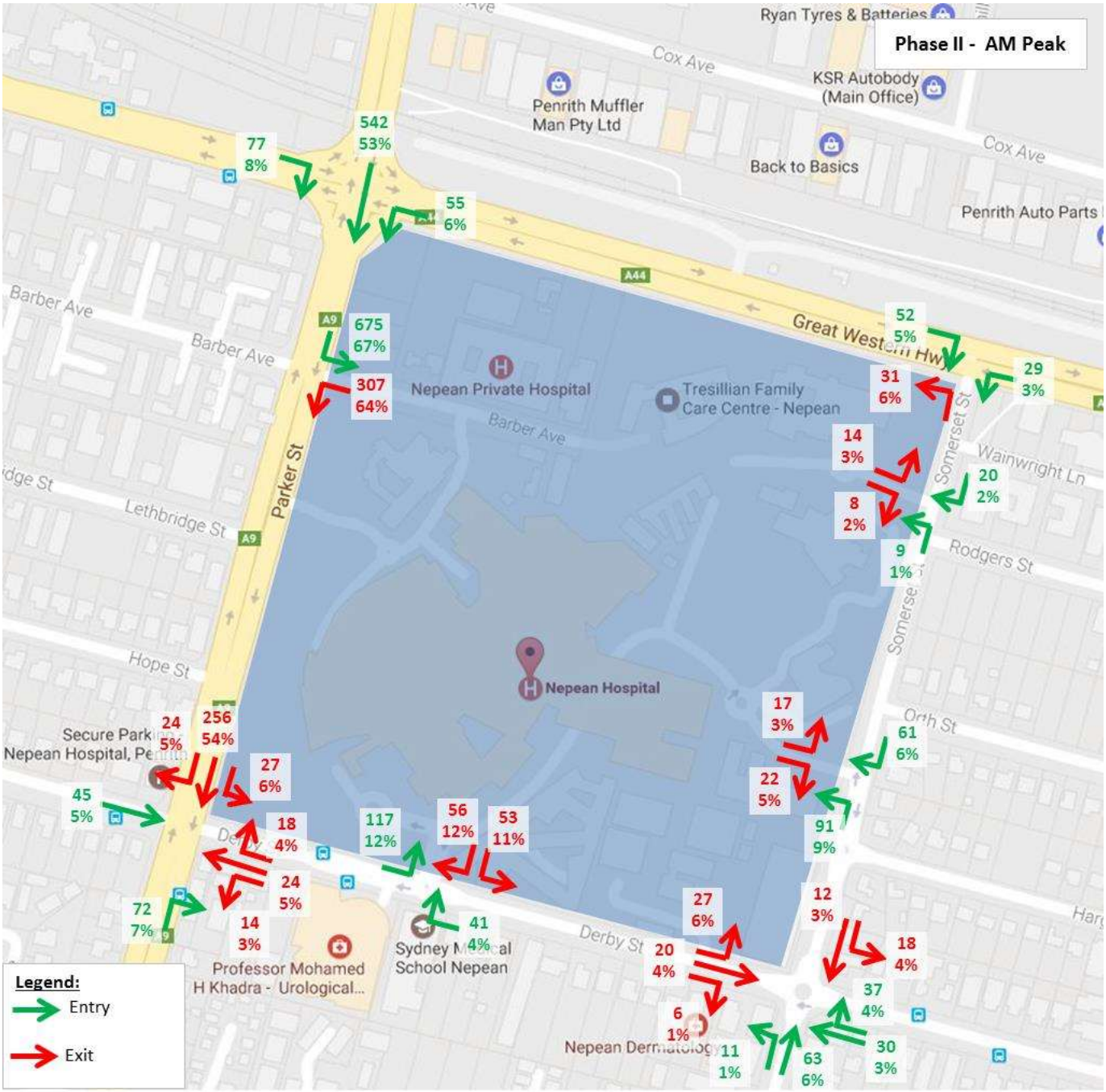


Figure 18: Traffic Distribution for Phase II Development – AM

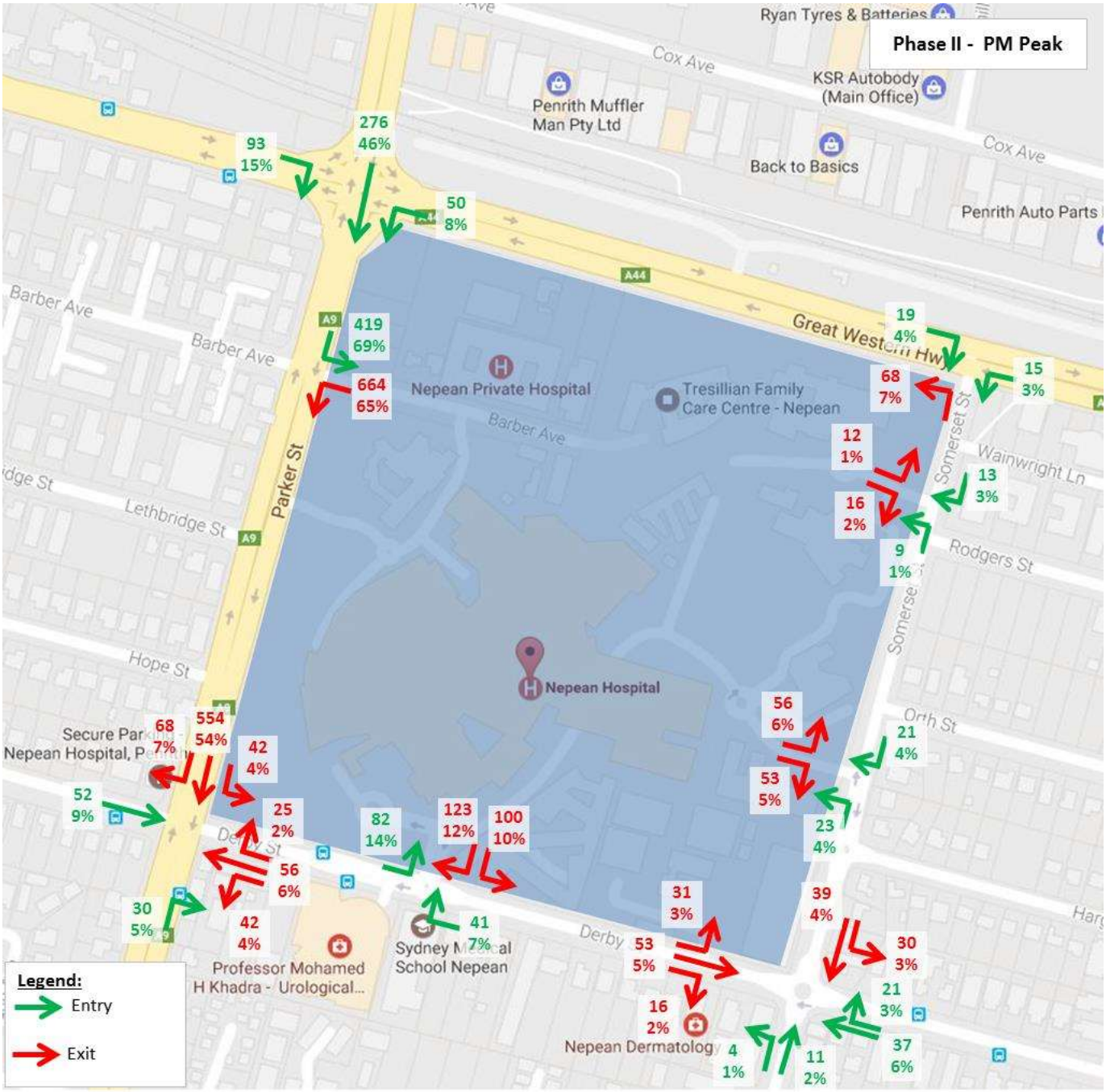


Figure 19: Traffic Distribution for Phase II Development - AM

5.3 Modal Split

Multiple transport modes are available to Hospital attendees (staff, outpatients and visitors), including road, bus, rail and active transport.

Kingswood Railway Station is located approximately 500 metres from the Hospital Campus. However, the convenience of rail as a mode share will also depend on the connections at the other end of the person's journey e.g. the proximity of stations to the person's residence, provision of parking at those stations (i.e. commuter style, long stay parking), and/or bus routes linking their residence to the railway stations.

The survey performed by PTC as part of the Parking Demand Study captured 1,581 respondents consisting of:

- 65% (658 respondents) Hospital Staff
- 35% (346 respondents) Public, in the following groups:
  - 40% (137 respondents) were outpatients
  - 60% (209 respondents) were visitors

The split in the number of users accessing the Hospital by different transport modes is summarised in Table 9. The data indicates that the car is by far the most popular form of access to the Hospital by all users.

Table 9 - Mode of transport access to the Hospital (%) by user group

Mode of Transport	Staff	Outpatients	Visitors
Car	94.7%	85.4%	83.7%
Public Transport – bus, train	1.8%	6.6%	7.6%
Taxi	0%	2.2%	4.8%
Walk	2.0%	1.4%	0.5%
Bicycle	1.5%	4.4%	3.4%

5.4 Traffic Modelling Scenarios

In order to assess the potential traffic impact associated with the Project and the impacts of background traffic growth, a number of modelling scenarios have been developed and modelled. The assessment scenarios are summarised in the following table:

Table 10 - Traffic Modelling Scenarios

Scenario	Year	Network description
S1	2017	As existing – do nothing
S2	2021	As existing – do nothing – 1.5% Growth
S3	2021	As existing + Hospital Development (Phase A)– 1.5% Growth
S4	2026	As existing – do nothing – 1.5% Growth
S5	2026	As existing + Hospital Development (Phase B)– 1.5% Growth

The above scenarios were developed in consultation between BVN Architects & PTC to ensure that modelling identifies all likely impacts resulting from the increase and redistribution of traffic activity around the Hospital Precinct as a consequence of the Project.

5.5 Traffic Modelling Results

The results of the traffic modelling are presented and are summarised in the following Tables11 (AM peak) and 12 (PM peak):

Table 11: AM Peak Intersection Level of Service Summary

ID	Intersection	Proposed Scenarios				
		S1	S2	S3	S4	S5
1	Great Western Highway /Parker Street	B	B	B	B	B
2	Parker Street / Barber Road	A	A	A	A	A
3	Parker Street / Hospital Entrance	A	A	A	A	A
4	Parker Street/ Derby Street	B	B	B	B	C
5	Derby Street / Hospital Entrance (south)	A	A	A	A	A
6	Derby Street /Somerset Street	A	A	A	A	A
7	Somerset Street / Hospital Entrance 1 (east)	A	A	A	A	A
8	Somerset Street / Hospital Entrance 2 (east)	A	A	A	A	A
9	Somerset Street / Great Western Highway	B	B	B	C	B

Table 12 - Afternoon Peak Intersection Level of Service Summary

ID	Intersection	Proposed Scenarios				
		S1	S2	S3	S4	S5
1	Great Western Highway /Parker Street	B	C	C	C	D
2	Parker Street / Barber Road	A	A	A	A	A
3	Parker Street / Hospital Entrance	A	A	A	A	A
4	Parker Street/ Derby Street	D	E	F	F	F
5	Derby Street / Hospital Entrance (south)	A	A	A	A	A
6	Derby Street /Somerset Street	A	A	A	A	A
7	Somerset Street / Hospital Entrance 1 (east)	A	A	A	A	A
8	Somerset Street / Hospital Entrance 2 (east)	A	A	A	A	A
9	Somerset Street / Great Western Highway	D	F	E	F	F

5.6 Improvements to Site Access and Circulation, and Other Traffic Management Measures – Option 1

Typically, the traffic impact associated with a development is measured against existing road conditions and, if a negative impact is likely, road or intersection works may be required to counter this impact, i.e. to retain the current road conditions following the completion of the development.

The Project is somewhat unusual in that the construction period and the incremental operational ramp of use of the Hospital Redevelopment means that the total traffic activity will not occur until 2027. In order to assess the sole impact associated with the project, Scenario 2 comprises the without any project traffic activity (and redistribution), superimposed on to the existing (2017) network with background annual traffic growth of 1.5% is sufficient to cause failures at key intersections (Parkers Road/ Debry Road, Great Western Highway/ Somerset Street) during 2021, prior to the planned construction completion of the Multi-Level Car Park of the project.

The construction of the Project will take place from 2018 to construct the Multi-Level Car Park after completion of the same the new block of the hospital will start at parking CP 10 and which is proposed to complete in 2021. So, the new traffic generation from the proposed hospital will be anticipated only from 2021 with 50% of operations from the new block and the full development is anticipated to complete by 2026.

The period of 9 years between 2017 and 2026 will allow the background traffic volumes to grow to the extent that key intersections serving the hospital will not be able to accommodate the traffic demands under the current arrangements. This means that while the Project will contribute to a minor increase in traffic activity, the majority of new trips on the network between 2017 and 2026 will be generated by background growth.

In this regard it is important to ascertain the proportion of the impact generated by the Project and how this relates to the mitigating measures required to maintain the current road operation. The following section describes the impacts at each intersection and the potential improvements that would be required to maintain the current operation of the road network.

5.6.1 Parker Street /Debry Street

The intersection of Parker Street and Debry Street is subject to delays during the peak periods, which will be exacerbated by the background traffic growth. Under the 1.5% growth scenario (S2) the intersection fails to accommodate the traffic demand in 2021 with the LOS E.

The intersection is currently operating with a Level of Service D, which is reasonable for a town centre intersection during the peak periods, although the Degree of Saturation is over 140%. Typically this indicates that the intersection is able to manage the demand in unfavourable conditions, however any slight increase in traffic activity or interruption to traffic flow results in extended delays and a poor performance. This is evident in the modelling results which indicate a Level of Service F in all future scenarios.

The road network model indicates that upgrading the intersection to include additional lanes for the left turning movements from Parker Street from North to the Debry street and restricting the right turn movement from Debry street (east) to the parker street will improve the intersection LOS to LOS C with a degree of saturation of 95% and the delay of 40 sec. The modified layout is shown in Attachment 3.

Given the current Degree of Saturation, it is evident that the intersection upgrades will be required in coming years regardless of the Hospital Redevelopment, and that the additional traffic activity associated with the Project will have very limited impact on the intersection.

5.6.2 Great Western Highway / Somerset Road

The road network modelling results indicate that this intersection will operate at Level of Service F in 2021 under the 1.5% growth scenario and without the development traffic. This is coz of the right turning movement from westbound Great Western highway to the Somerset Street. The arrangement of priority junction will not going to operate at the required LOS in future years.

Based on the modelling suggestions, the intersection has to be signalised by the year 2021 to sustain the LOS well below the LOS D. The model output for this intersection after the signalisation for the ultimate scenario (S5) is turned out as LOS A with a delay of 8sec and the cycle time of 30sec.

5.7 Improvements to Site Access and Circulation, and Other Traffic Management Measures – Option 2

As per the discussion with the Health Infrastructure team, the option of having one entry point from the Parker Street and the Intersection (Approximately the Barber Junction) has been modified to Signalised Intersection for allowing all the movements from Parker Street to hospital and hospital to Parker Street. The proposed new network of roads and intersections are shown in Figure.

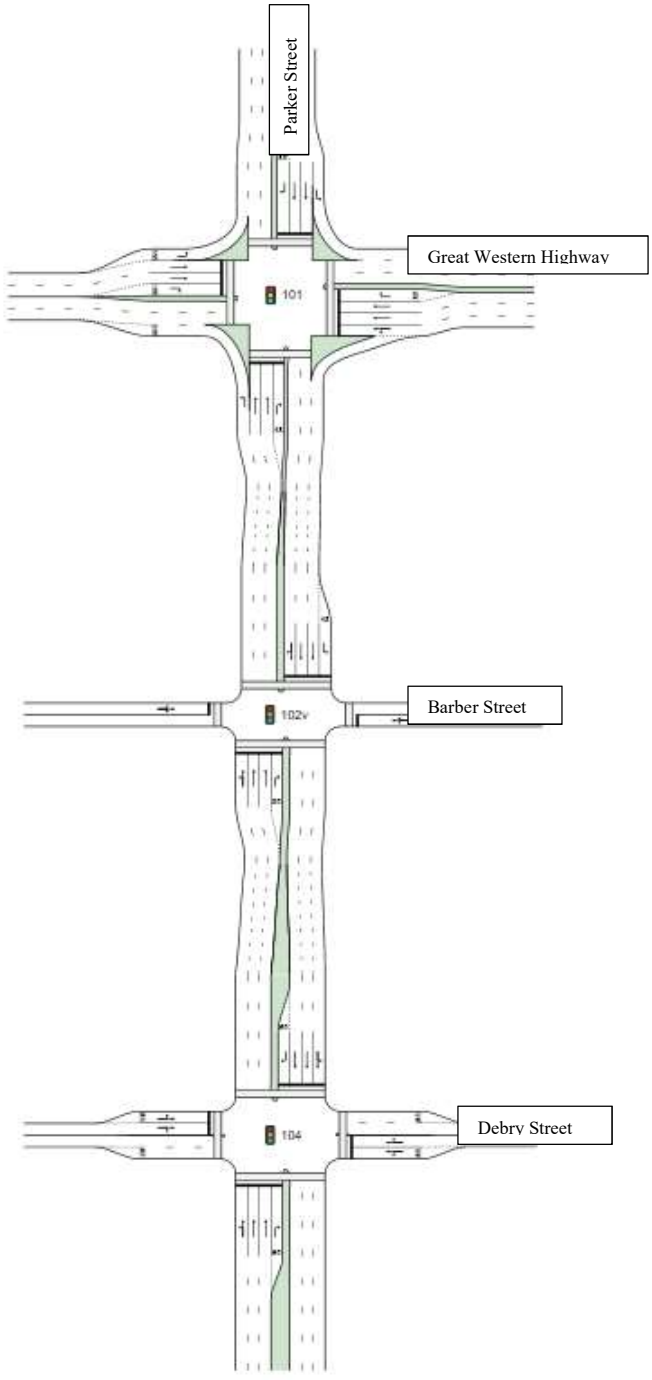


Figure 20: Proposed network on Parker Street from Great Western Highway to Debry Street

By having a new traffic signal for the entry and exit of hospital, the network has been tested for S3 Scenario for the existing network and modified network. Accordingly the network parameters and LOS for the north bound and south bound traffic are modelled. The Modelling results are shown in Table Below. The complete analysis Tables are presented in Attachment 4. In addition to that the proposed has also checked for 2 lanes of entry and exit to the Hospital.

Table 13: Comparison for existing and modified network for S3 Scenario

Route Direction	Network Conditions	LOS	Average Travel Time (Sec)	Average Delay (Sec)
Parker Street (North – South)	Existing	F	268.3	181.8
	Modified (One Lane Entry to Hospital)	F	287.1	196.6
	Modified (Two Lane Entry to Hospital)	E	168.0	77.1
Parker Street (South – North)	Existing	E	187.9	102.3
	Modified (One Lane Entry to Hospital)	D	140.6	50.1
	Modified (Two Lane Entry to Hospital)	D	137.8	46.9

So, by adding the new traffic signal for the hospital entrance, it will slightly impact the Travel time and delays. But in an overall the proposed traffic signal will not improve the traffic conditions on the road. But the proposed new traffic signal will ease the movement of passenger and emergency vehicles to and from the hospital. The Traffic model suggested that if the Traffic Signal is proposed the entry to the hospital should be a 2 lane divided roads for the ease of movements.

6 Access and Car Park Circulation

The following section presents an assessment of the proposed development with reference to the requirements of The Roads Act 1993, The State Environmental Planning Policy (Infrastructure) 2007, AS2890.1: 2004 (Off – street parking), AS 2890.3: 2015 (Bicycle Parking) and AS2890.6:2009 (Off – Street parking for people with disabilities). This section is to be read in conjunction with the Architectural plans in Attachment 1 along with the Swept Path Analysis modelled by PTC.

6.1 Hospital Redevelopment Vehicular Access

The Project involves no amendments to the existing vehicle access arrangement and the provision of new access points. But by introducing the MLCP adjacent to the Parker Street, there will be a lot of redistribution of traffic movements will be happened in the surround area of the network. Similarly for the new hospital block the access will be provided from the same CP 10 access with a little modification to the geometry and alignment of road.

6.2 Multi-Level Car Park Access

The proposed multi-storey car park has been designed to incorporate a primarily one-way system through each level. Vehicles will enter the car park from Parker Street and then to Hospital entrance road and Barber Street. The proposed entry and exit to the MLCP is provided in such a way that it cannot disturb the through traffic on the Parker Street or Barber road in the case any technical issues with the Parking Management systems.

The vehicles can enter from the two way drive way in the ground level. Vehicles then circulate up through the ramp system to the upper levels. The primary car park egress is located on Ground level through 3 exit gates (2 on north, 1 on south). The provision of a predominantly one-way system throughout the car park reduces the number of conflicting movements at each intersecting aisle and also reduces the hesitation time as drivers have a limited choice at each intersection. This provides for a more efficient and safer arrangement. The design incorporates exit routes, which follow the shortest path through the car park, to avoid drivers circulating through each floor.

The Vehicle Swept Path Analysis modelled for the critical intersections are shown in Attachment 5. As per the Swept Path shown in the attachment the vehicle can easily circulate at the intersections.

7 Conclusion

This Traffic and Accessibility Assessment has determined that the proposed additional beds, patients, staff and visitors to the Nepean Hospital as a consequence of the Project (including the new hospital block) will generate additional parking demand and vehicle trips, which have been included within road network modelling.

The Hospital Redevelopment's new Hospital Wing will result in the removal of existing car parking areas resulting in the redistribution of some existing traffic activity, and this has also been included within the road network modelling.

The road network modelling results confirm that the road network surrounding the Hospital is currently operating within capacity and would continue to do so following the completion of the Hospital Redevelopment and the HWP having no regard for background traffic growth. All the roundabouts are operating with LOS A in all the modelling scenarios (ID no: 5 &6). All of the priority controlled intersections within the Hospital Precinct will continue to operate at a Level of Service A with minimal delays except for the Great Western Highway/ Somerset Road and therefore no upgrade works are required for the priority junctions. The intersection of Great western highway with Somerset road is falling under LOS F.

The road network model confirms that the intersection of Parker Street and Debry Street will fail to accommodate the background traffic demand by 2021 (prior to the completion of the proposed Hospital Redevelopment and Multi-Level Car Park) and will require upgrading in order to restore the current Level of Service. The proposed new layout and ban of right turning movements from the Debry Street east to the Parker Street will improve the intersection LOS to LOS C.

The intersection of Great Western Highway and Somerset Street is currently operating at Level of Service F as a priority junction with extensive delays on the right turning movement from Westbound great western highway and left turn from the southbound Somerset street. Given the limited available road reserve, it is recommended that this intersection be upgraded to incorporate traffic signal controls. As these works are required at present to accommodate traffic demands for 2021 (i.e. not related the Hospital Redevelopment).

In terms of the overall road upgrades, the Hospital results in no need for road improvements disregarding the long-term background traffic growth, which requires the more extensive upgrades described above:

8 References

- Roads and Traffic Authority (RTA), 2002, Guide to Traffic Generating Developments (Edition 2),
- Standards Australia, 2004, Australian Standard 2890.1 – Parking facilities: Part 1 – Off Street Parking,
- Standards Australia, 2002, Australian Standard 2890.2 – Parking facilities: Part 2 – Off Street Commercial Facilities,

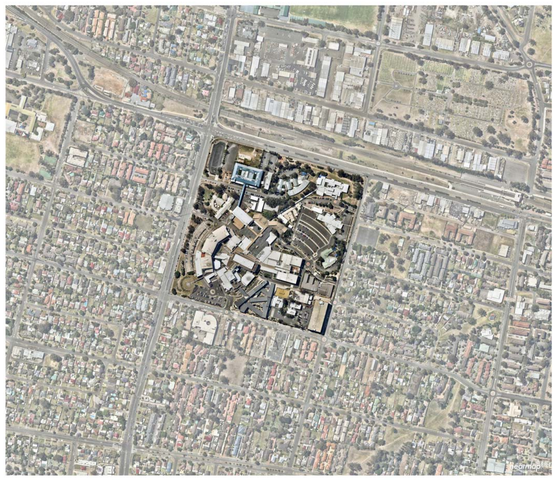
Attachment 1 - Architectural Drawings

NEPEAN HOSPITAL - CAR PARK

DEVELOPMENT APPLICATION

DRAWING LIST

SHEET NUMBER	SHEET NAME
DA00	COVER SHEET
DA01	CONTEXT PLAN
DA02	EXISTING SITE PLAN
DA03	SITE PLAN
DA04	SITE ANALYSIS
DA05	SITE PLAN - DEMOLITION PLAN
DA06	GA PLAN - LEVEL 00
DA07	GA PLAN - LEVEL 02
DA08	GA PLAN - TYPICAL LEVEL
DA09	GA PLAN - LEVEL 06 - WITH HELIPAD
DA10	GA PLAN - LEVEL 06 - WITHOUT HELIPAD
DA11	GA ELEVATIONS - SHEET 01
DA12	GA ELEVATIONS - SHEET 02
DA13	GA SECTIONS
DA14	SHADOW STUDIES
DA15	PERSPECTIVES
DA16	PERSPECTIVES
DA17	EXTERIOR FINISHES
DA18	EXTERIOR FINISHES
DA19	NOTIFICATION PLAN



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE

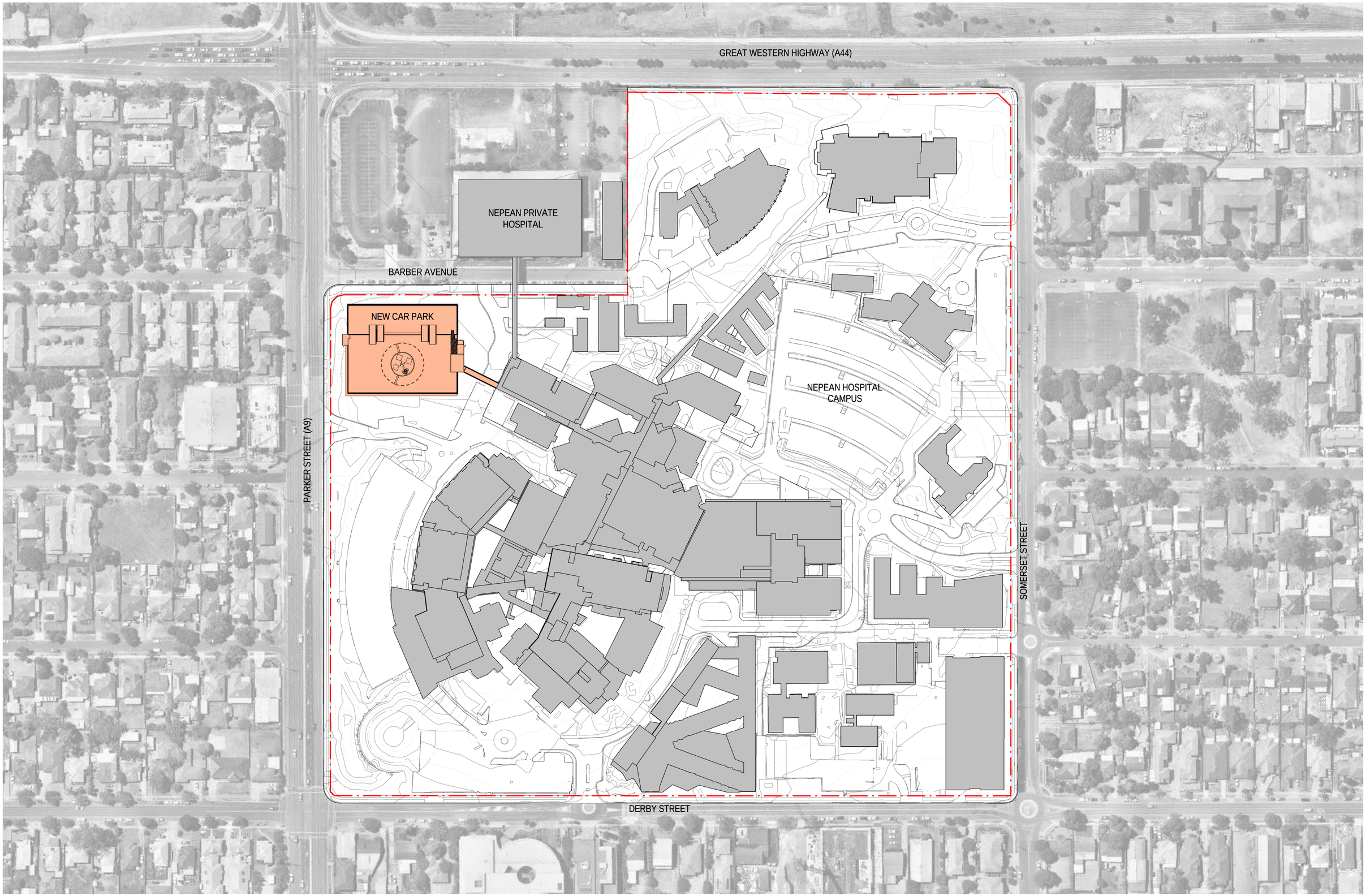
SCALE: @ A1

DRAWING: COVER SHEET

DRAWING NUMBER: AR-DA00

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH

GRAPHIC SCALE: 0 20000 50000

SCALE: 1 : 1000 @ A1

DRAWING: CONTEXT PLAN

DRAWING NUMBER: AR-DA01

DATE: 23.06.17

ISSUE: B

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE 0 10000 20000

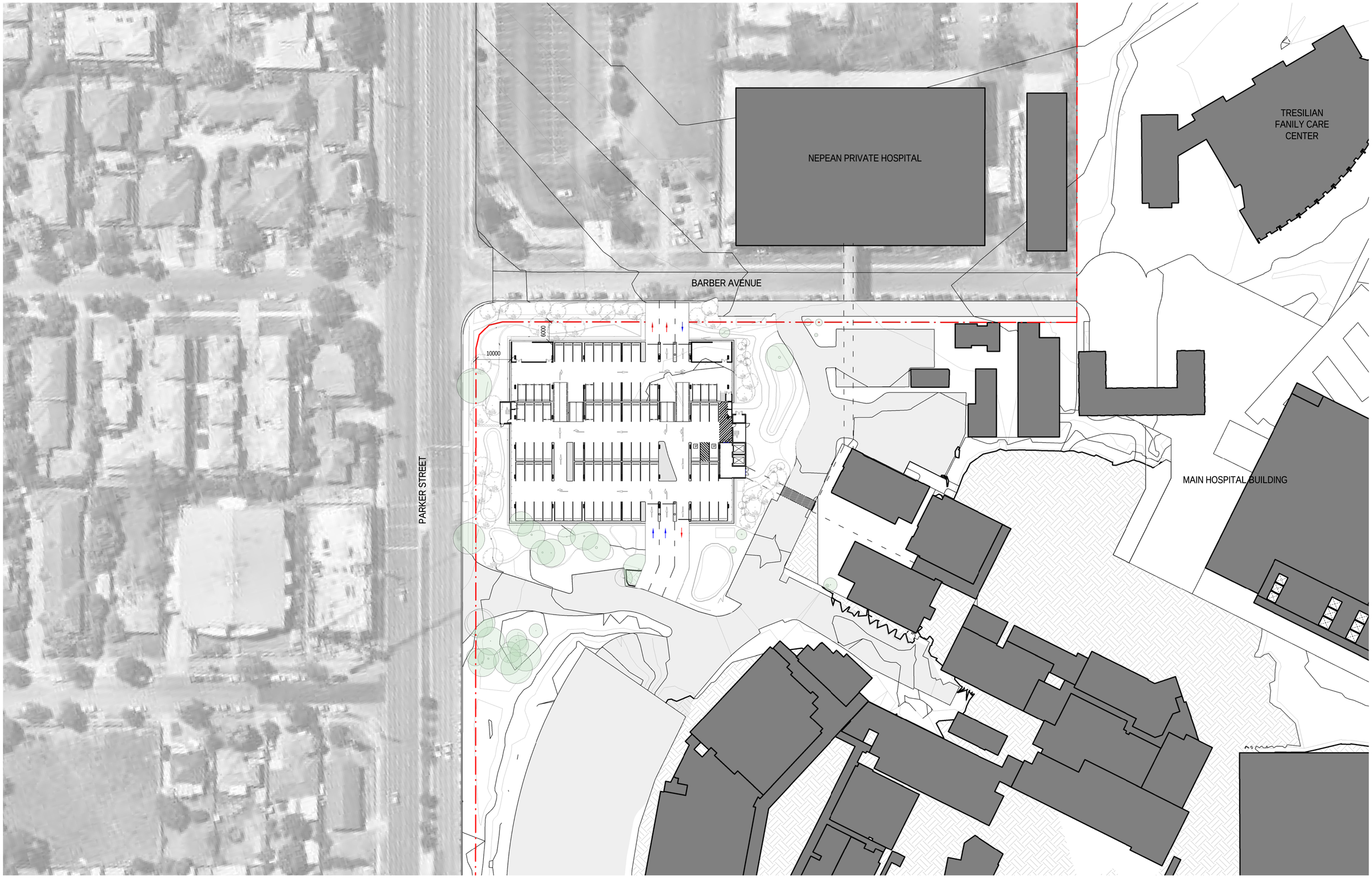
SCALE: 1 : 500 @ A1

DRAWING: EXISTING SITE PLAN

DRAWING NUMBER: AR-DA02

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE 0 10000 20000

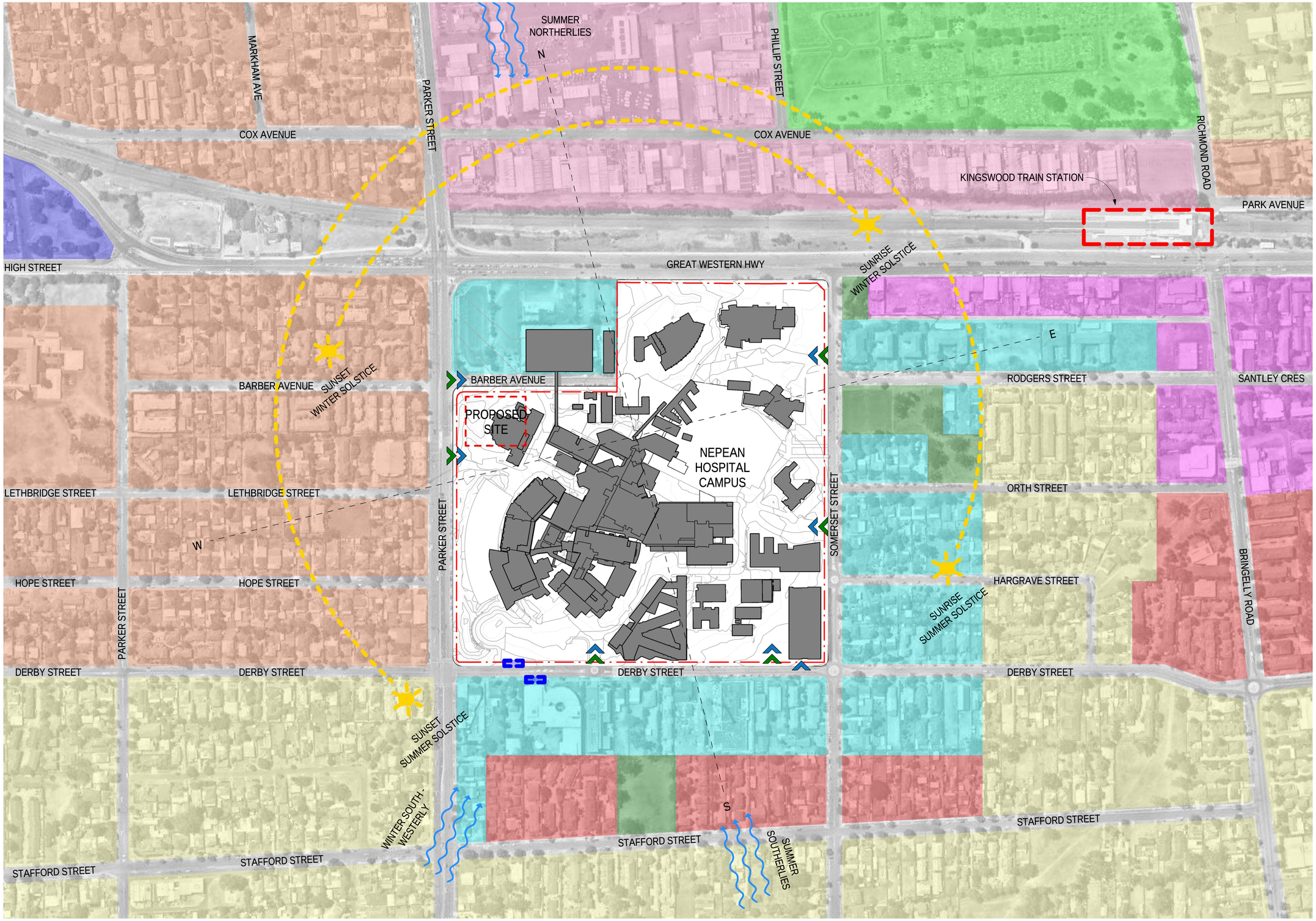
SCALE: 1 : 500 @ A1

DRAWING: SITE PLAN

DRAWING NUMBER: AR-DA03

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 40000 100000

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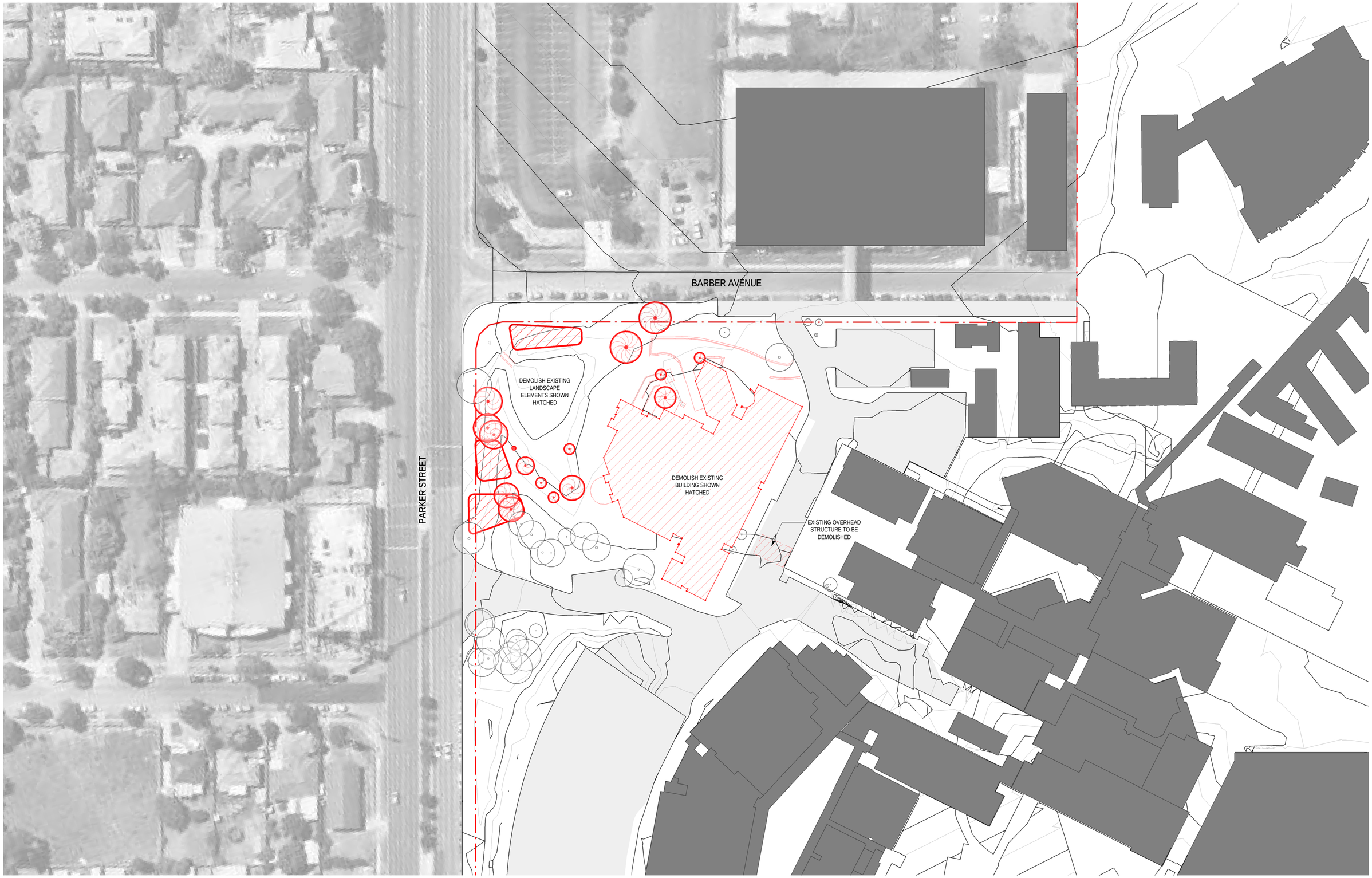
DRAWING: SITE ANALYSIS

DRAWING NUMBER: AR-DA04

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 10000 20000

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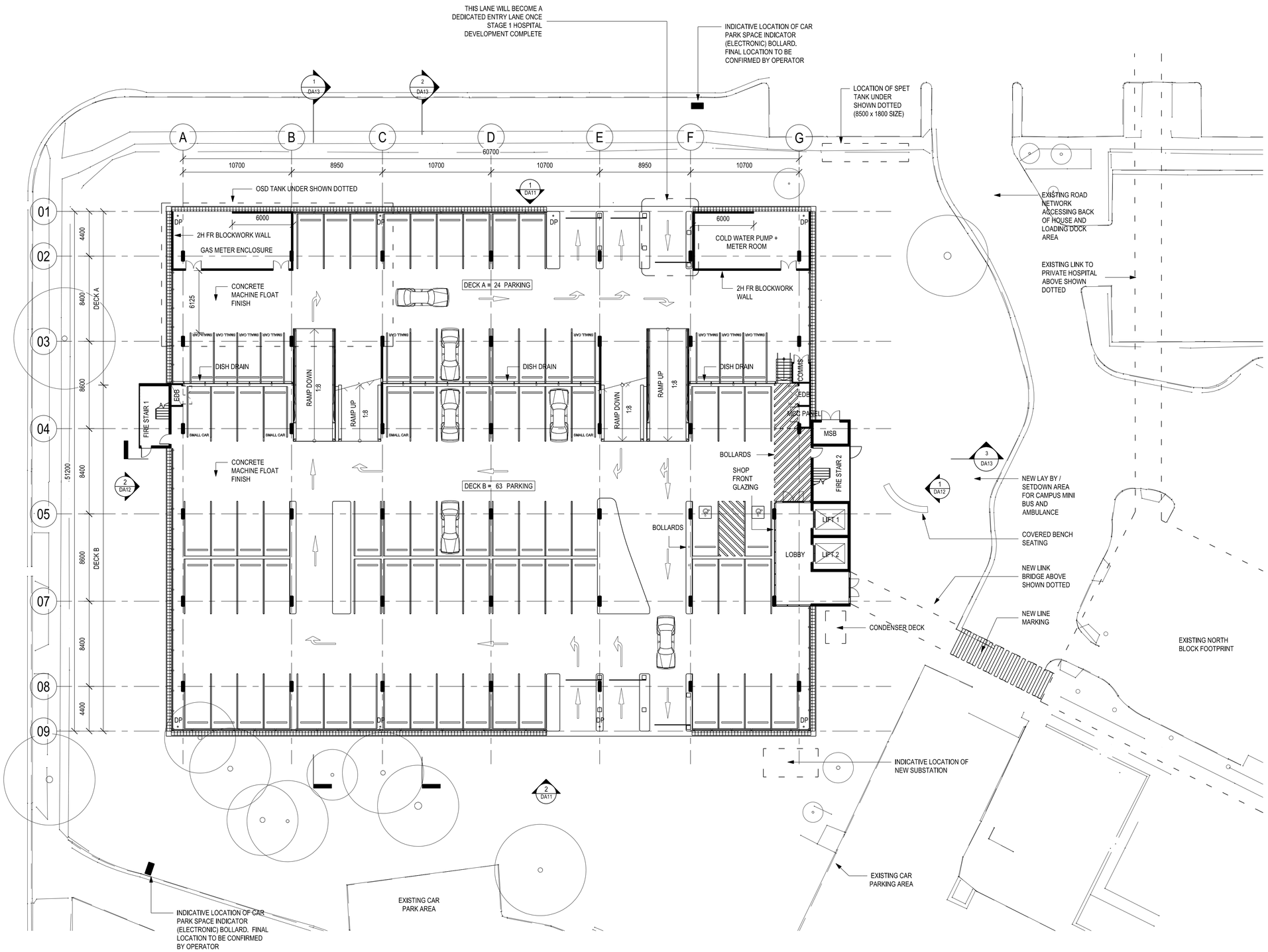
DRAWING: SITE PLAN - DEMOLITION PLAN

DRAWING NUMBER: AR-DA05

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION
C	29.06.17	FOR INFORMATION

CLIENT

PROJECT MANAGER

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

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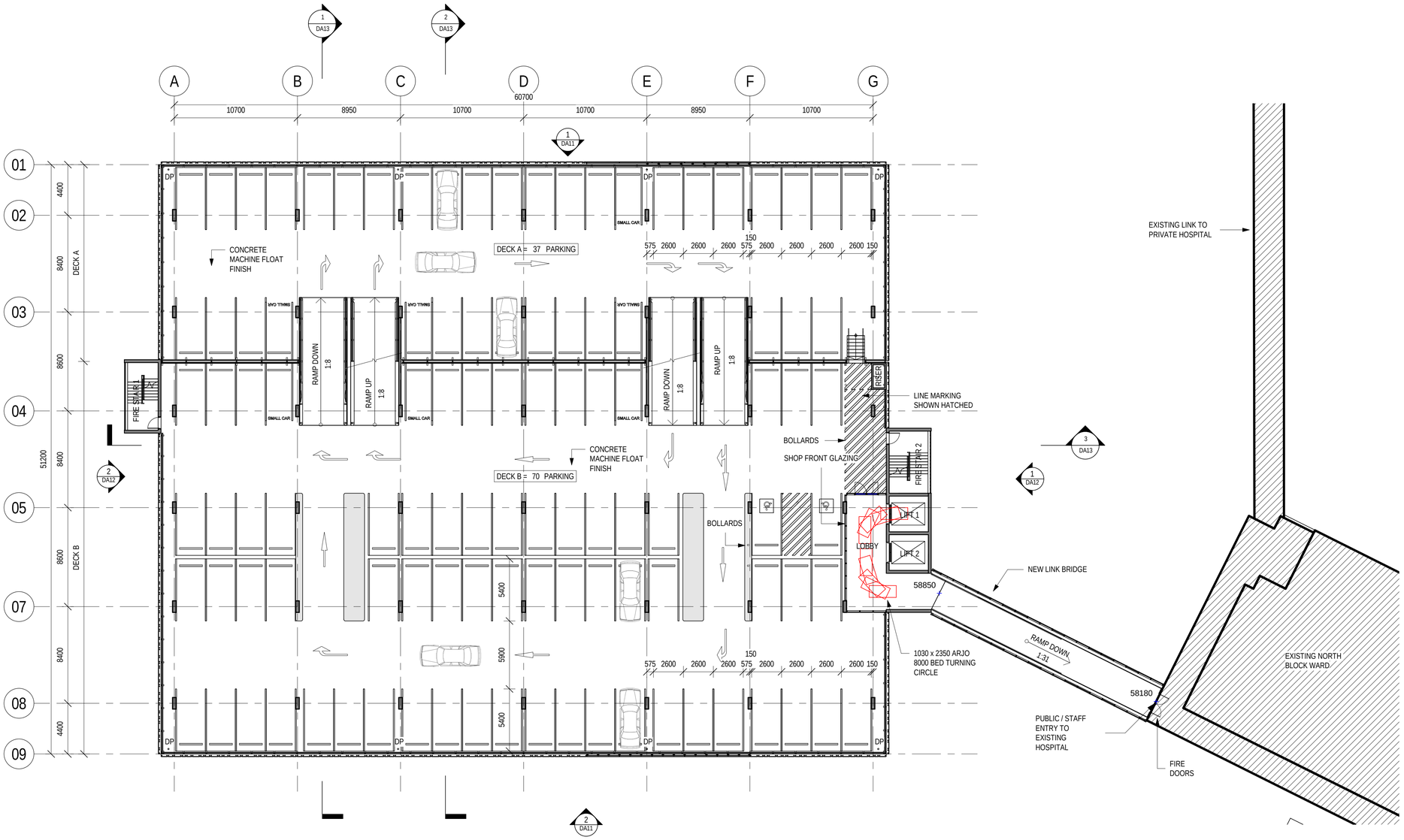
DRAWING: GA PLAN - LEVEL 00

DRAWING NUMBER: AR-DA06

DATE: 29.06.17

ISSUE: C



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

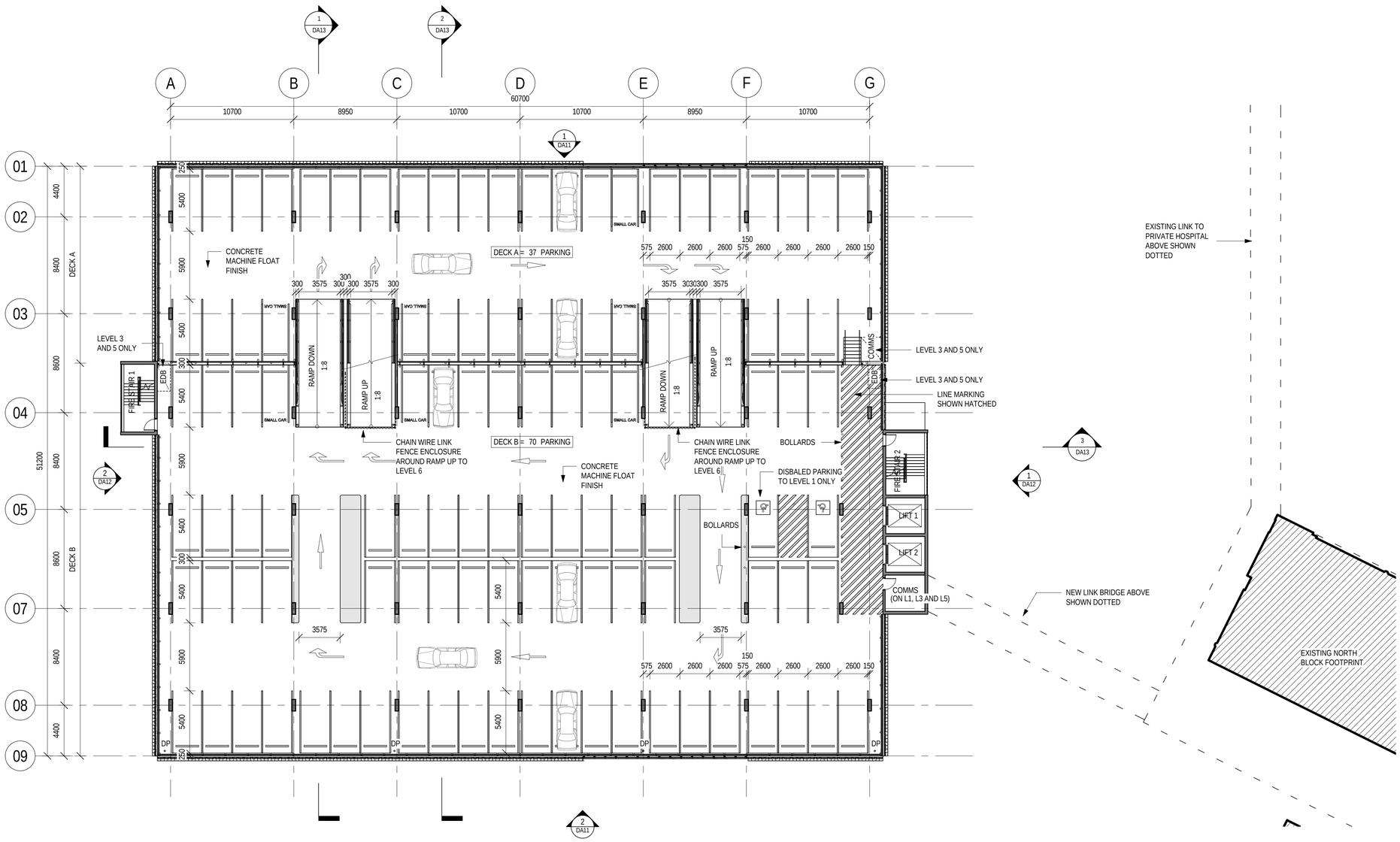
SCALE: 1 : 200 @ A1

DRAWING: GA PLAN - LEVEL 02

DRAWING NUMBER: AR-DA07

DATE: 23.06.17

ISSUE: B



TOTAL PARKING SCHEDULE - WITHOUT HELIPAD

Type	Count
2300 x 5000 - Small Car	57
2600 x 5400 - Accessible Car	6
2600 x 5400 - Standard Car	670
Grand total	733

TOTAL PARKING SCHEDULE - WITH HELIPAD

Type	Count
2300 x 5000 - Small Car	49
2600 x 5400 - Accessible Car	6
2600 x 5400 - Standard Car	570
Grand total	625

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

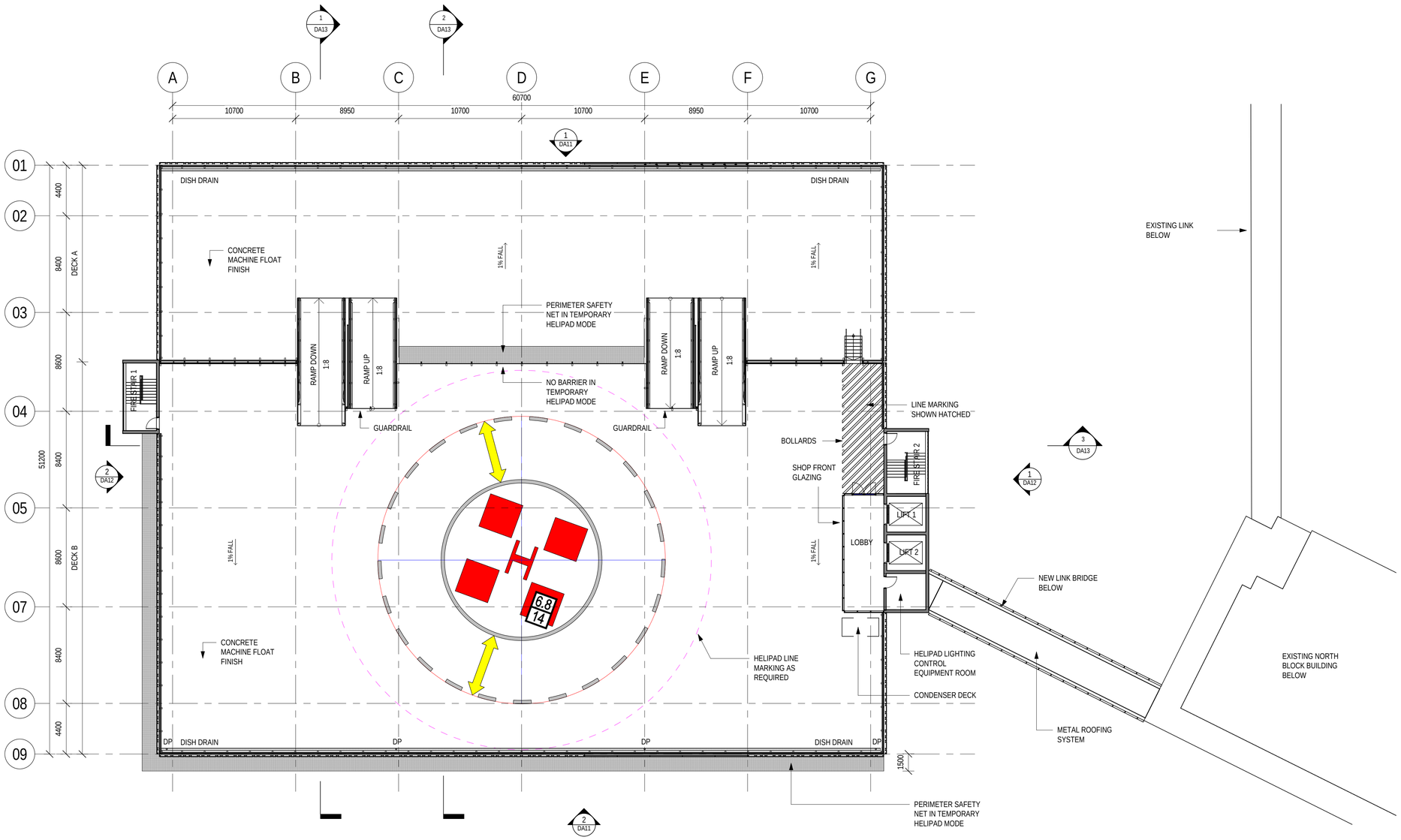
SCALE: 1 : 200 @ A1

DRAWING: GA PLAN - TYPICAL LEVEL

DRAWING NUMBER: AR-DA08

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

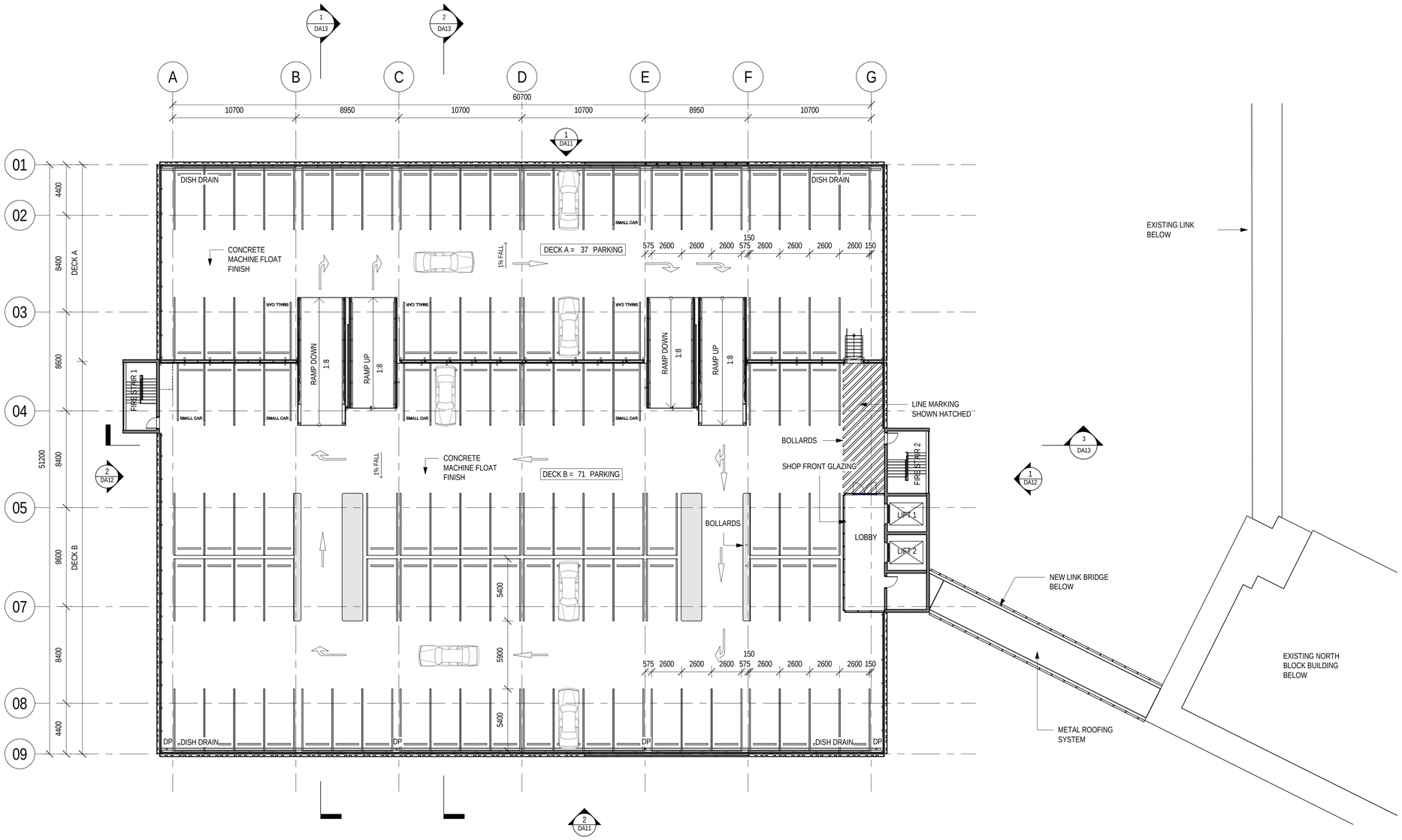
SCALE: 1 : 200 @ A1

DRAWING: GA PLAN - LEVEL 06 - WITH HELIPAD

DRAWING NUMBER: AR-DA09

DATE: 23.06.17

ISSUE: B



ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE 0 4000 10000

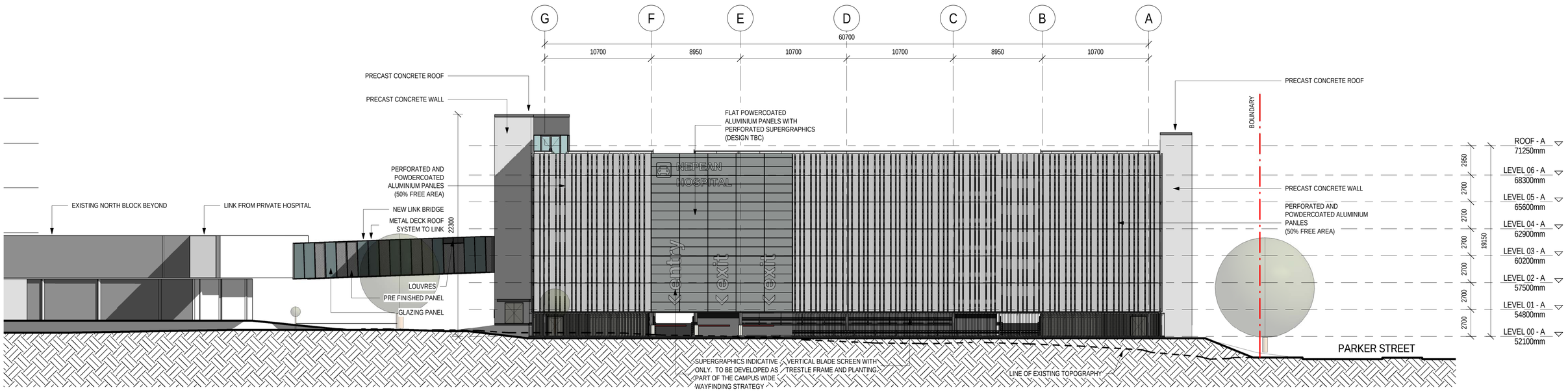
SCALE: 1 : 200 @ A1

DRAWING: GA PLAN - LEVEL 06 - WITHOUT HELIPAD

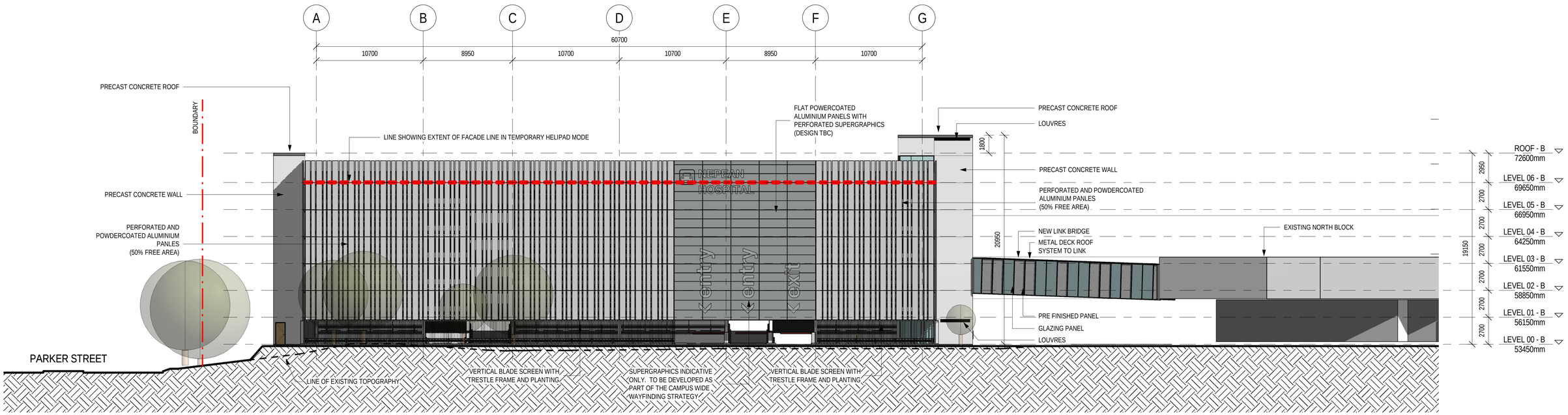
DRAWING NUMBER: AR-DA10

DATE: 23.06.17

ISSUE: B



NORTH ELEVATION



SOUTH ELEVATION

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

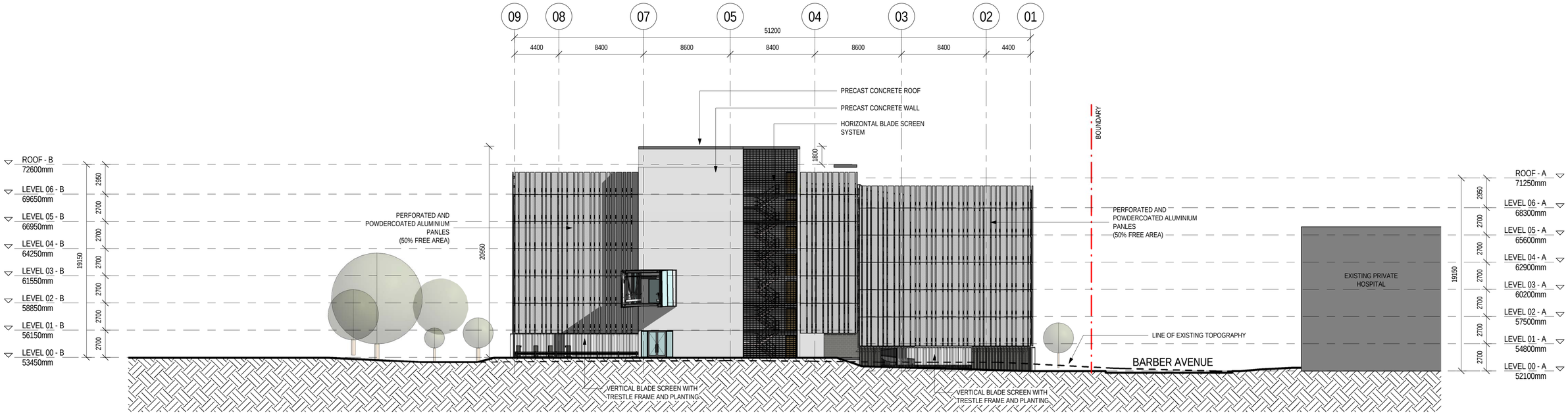
SCALE: 1 : 200 @ A1

DRAWING: GA ELEVATIONS - SHEET 01

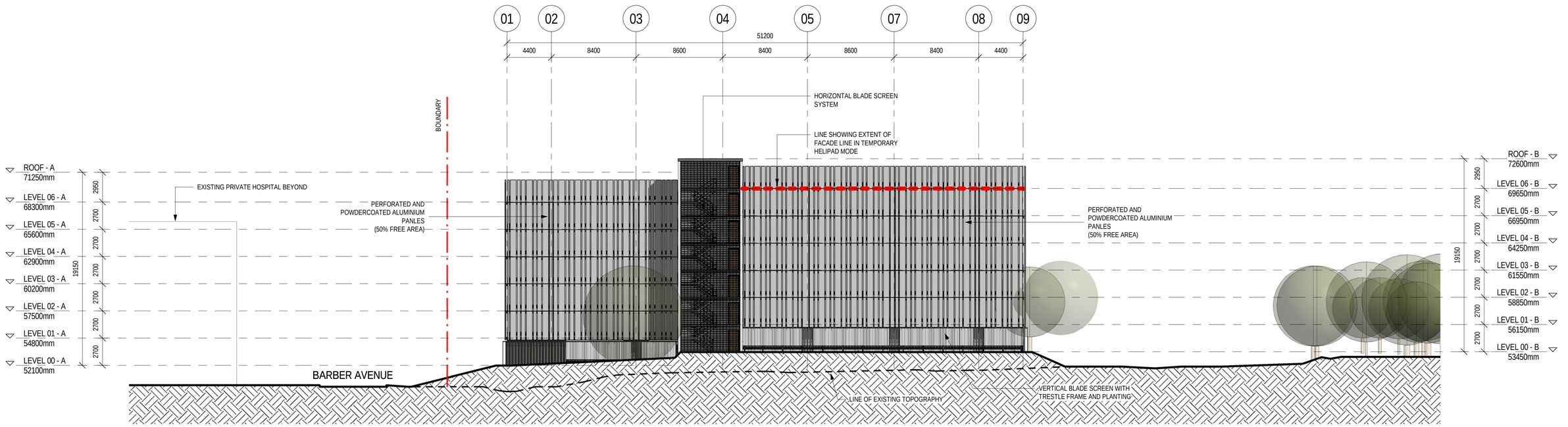
DRAWING NUMBER: AR-DA11

DATE: 23.06.17

ISSUE: B



EAST ELEVATION



WEST ELEVATION

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

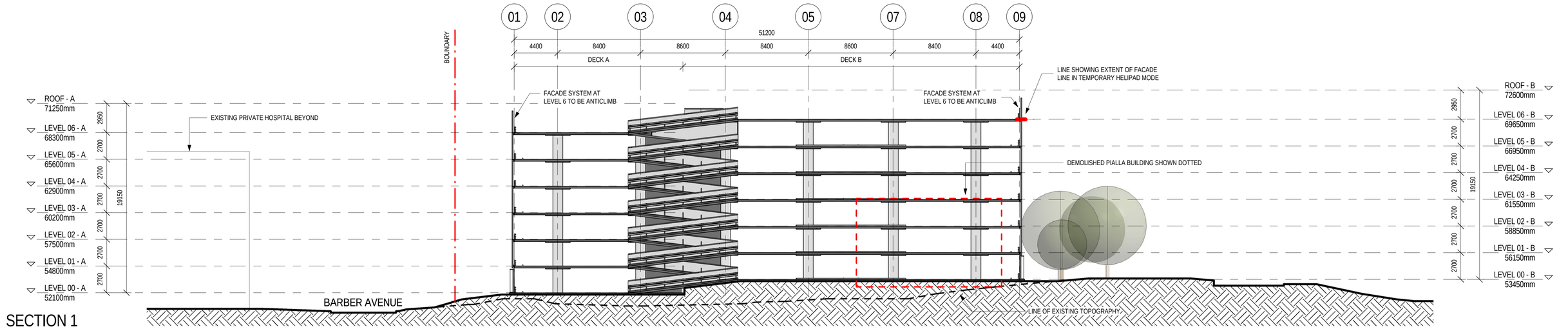
SCALE: 1 : 200 @ A1

DRAWING: GA ELEVATIONS - SHEET 02

DRAWING NUMBER: AR-DA12

DATE: 23.06.17

ISSUE: B



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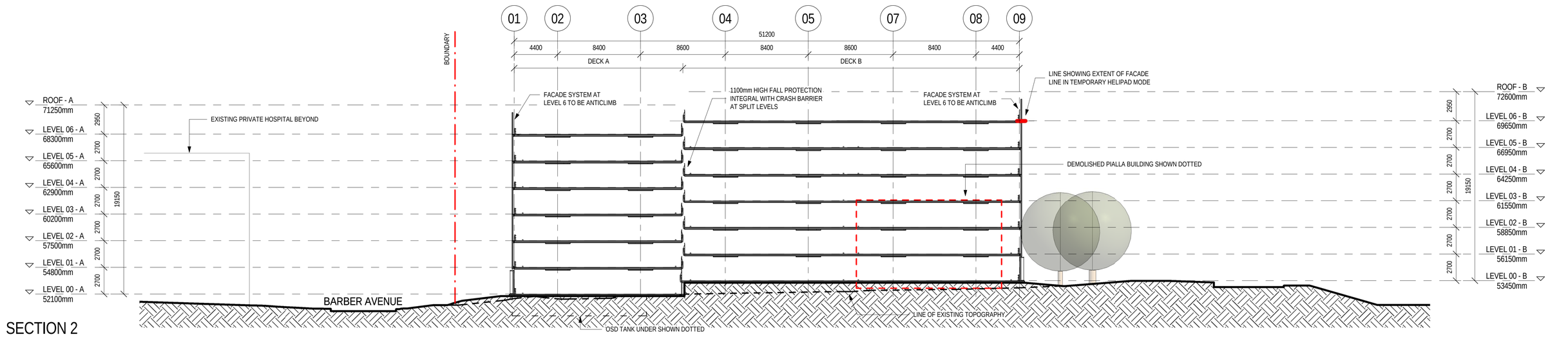

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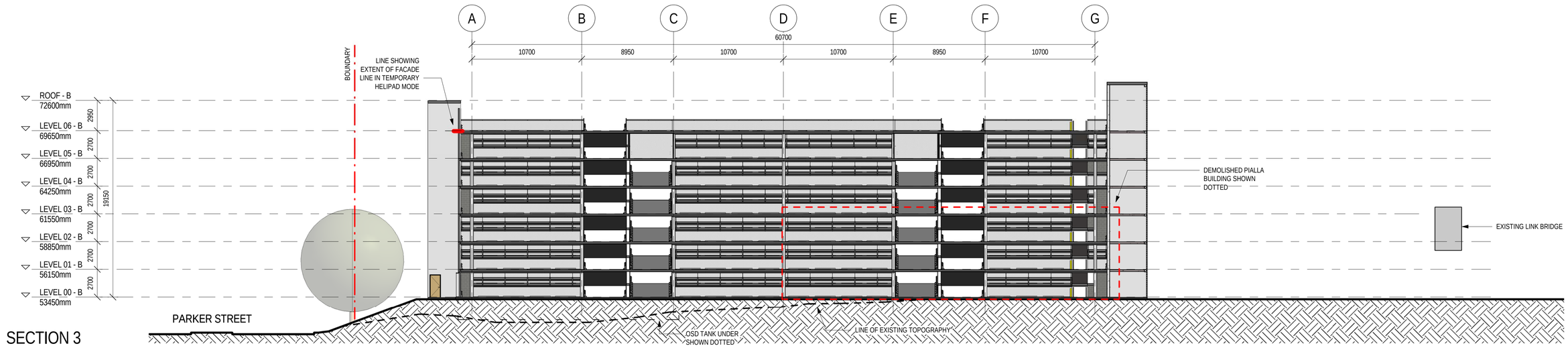


SECTION 3

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW Government Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 4000 10000

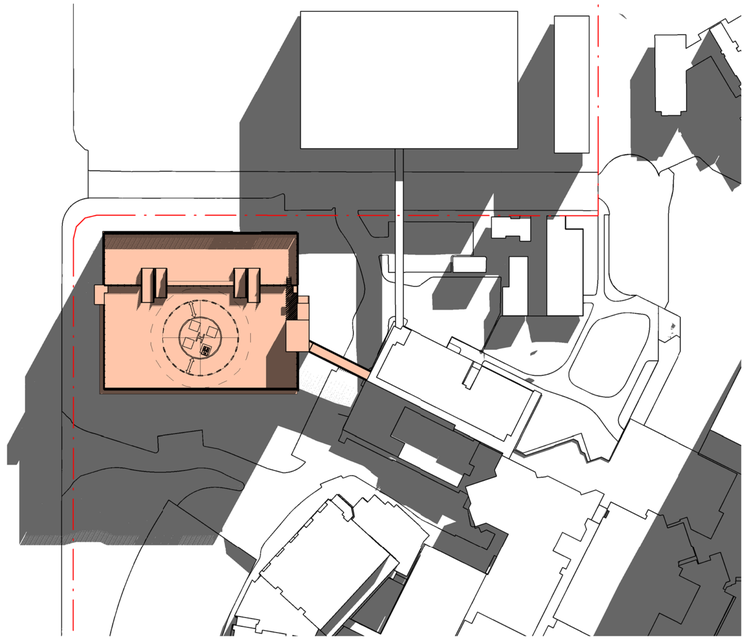
SCALE: 1 : 200 @ A1

DRAWING: GA SECTIONS

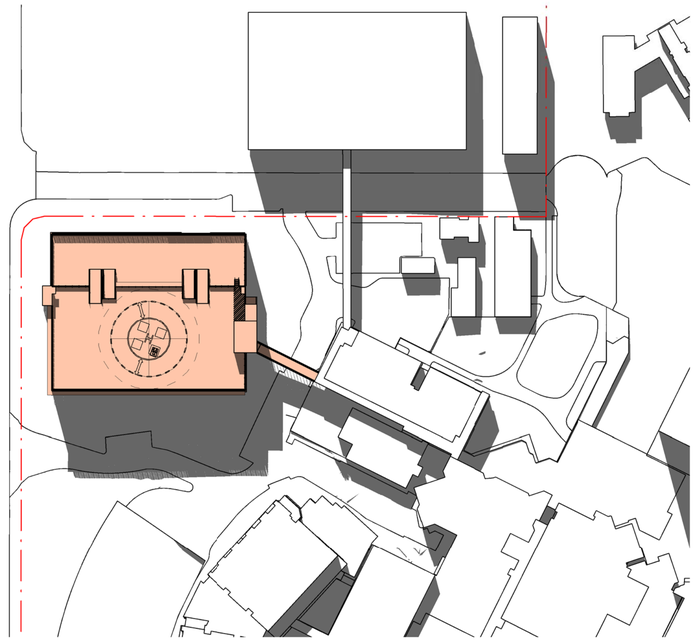
DRAWING NUMBER: AR-DA13

DATE: 23.06.17

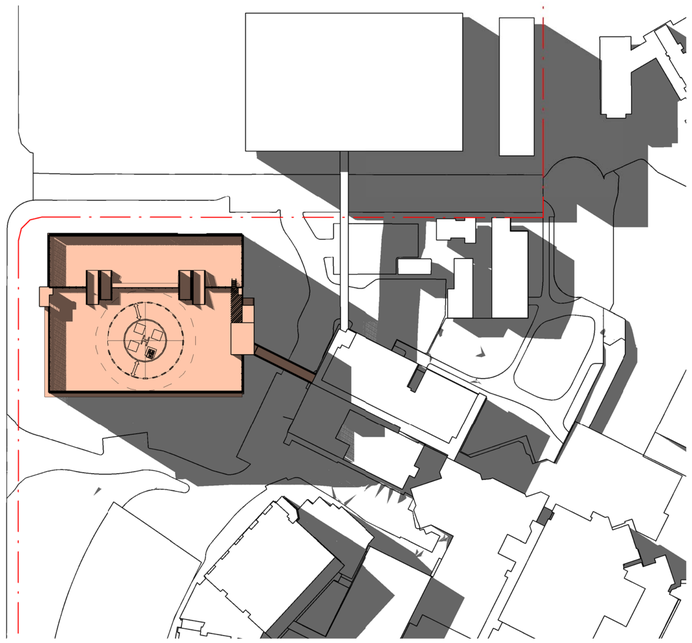
ISSUE: B



21 JUNE - 9AM



21 JUNE - 12PM



21 JUNE - 3PM

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH

GRAPHIC SCALE: 0 20000 50000

SCALE: 1 : 1000 @ A1

DRAWING: SHADOW STUDIES

DRAWING NUMBER: AR-DA14

DATE: 23.06.17

ISSUE: B

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE

SCALE: @ A1

DRAWING: PERSPECTIVES

DRAWING NUMBER: AR-DA15

DATE: 23.06.17

ISSUE: B

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT: NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER: aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 -10000 20000 10000

SCALE: @ A1

DRAWING: PERSPECTIVES

DRAWING NUMBER: AR-DA16

DATE: 23.06.17

ISSUE: B

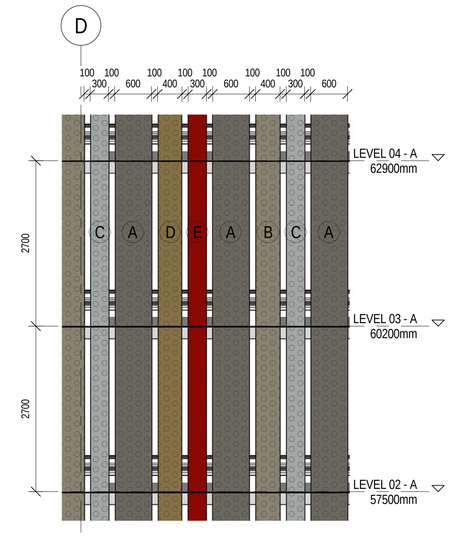
MAIN FACADE SYSTEM

The main façade system comprises of a modular unitised system made up of perforated aluminium panels supported by a subframing system. Panel widths vary in dimension and colour variation providing a more dynamic reading of the façade system and a point of difference to the existing hospital building stock.

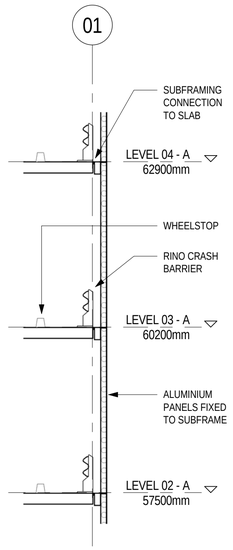
The façade seeks to:

- Effectively address light spill from inside along Parker Street and Barber Ave boundaries
- Provide the required ventilation requirements (50% free area)
- Edge protection and safety for patrons
- Express a vertical language to offset the horizontal form of the carpark structure

The colour palette of the main façade seeks to respond to the character and identity of the site and landscape context of the Nepean Blue Mountain region. Using grey, red and yellow tones, the proposal seeks to represent the colour range of the native Cumberland Plain Shale Woodland and is sympathetic to the proposed landscape solution.



ELEVATION



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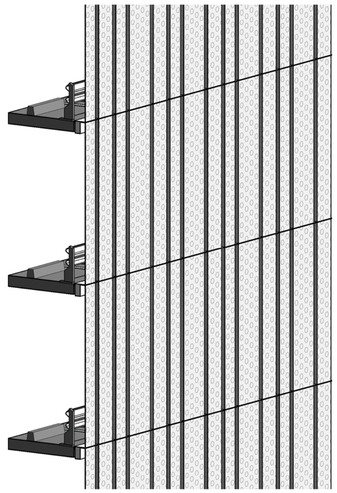

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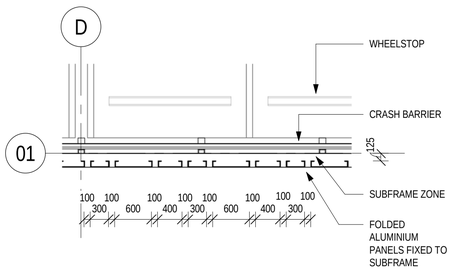
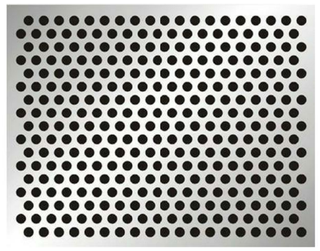


PLAN



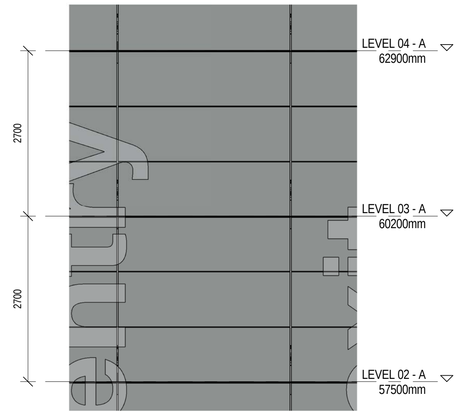
FACADE SAMPLE

- PERFORATED METAL PANEL
- 50% FREE AREA PERFORATIONS

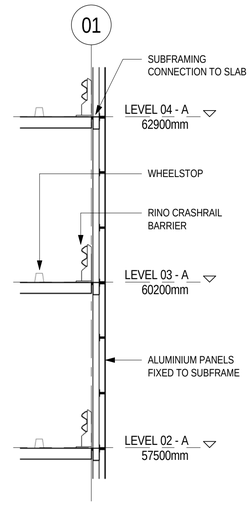
COLOR PALETTE

FACADE ABOVE ENTRY/EXIT POINTS

The façade system above the ground level entry and exit points comprises of a modular unitised system made up of generally solid aluminium panels supported by a subframing system. Panels are arranged in a large format and horizontal in nature to provide a contract to the main vertical façade system and will ultimately assist in the wayfinding strategy for staff and public approaching the carpark by car.



ELEVATION



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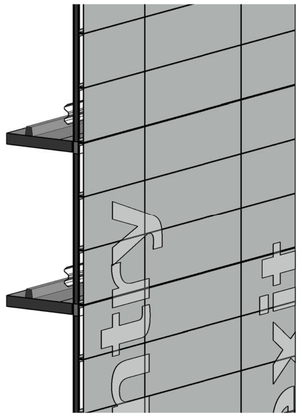

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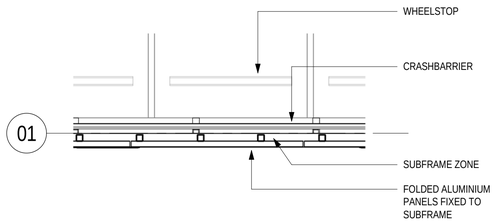


PLAN

FACADE SAMPLE

SOLID METAL PANEL WITH
PERFORATED SUPERGRAPHICS

COLOR PALETTE

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE 0 1000 2000

SCALE: 1 : 50 @ A1

DRAWING: EXTERIOR FINISHES

DRAWING NUMBER: AR-DA17

DATE: 23.06.17

ISSUE: B

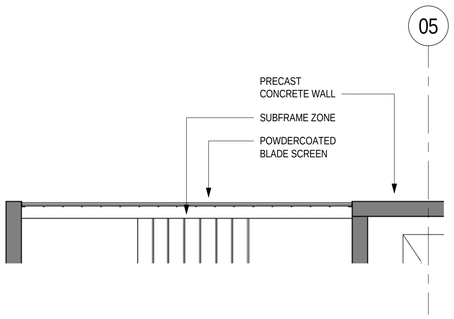
FACADE AROUND CORES

The façade system around the main lift core comprises of a precast concrete panel system. The outward face of the fire stairs are open to address BCA requirements.

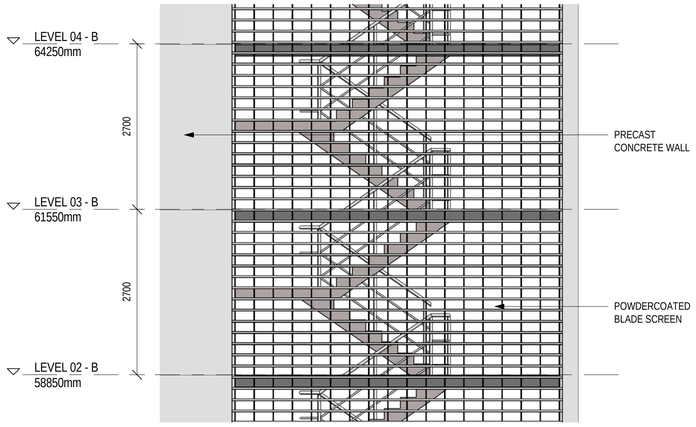
The arrangement and language of the cores seeks:

- Provide a vertical language to offset the horizontal form
- Provide articulation and depth
- Focal point in order to enabling clear wayfinding in the context of the campus and approach from the main hospital
- Link bridge integration to existing North Block from the main lift core
- Integration of an entry forecourt at ground level around the main lift core

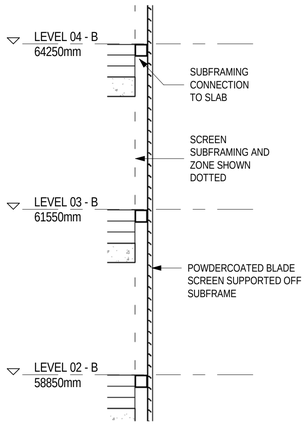
The colour palette is monotone (whites and light greys) to contrast with the colours of the main façade system.



PLAN



ELEVATION



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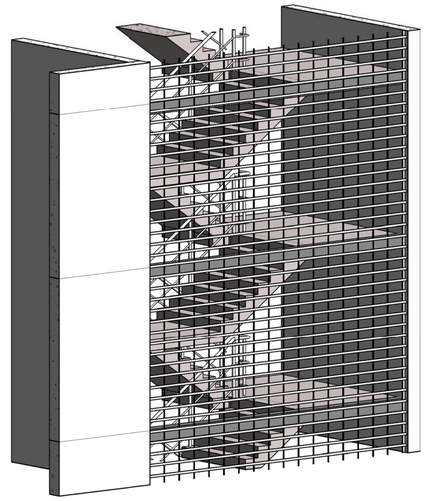
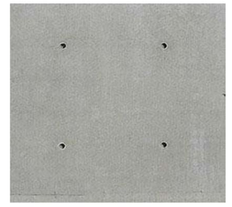


3D



FACADE SAMPLE

PRECAST OFF FORM CONCRETE
FINISH

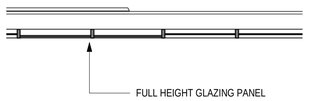
FACADE SAMPLE

HOROZONTAL SCREEN SYSTEM IN
GALVANISED FINISH

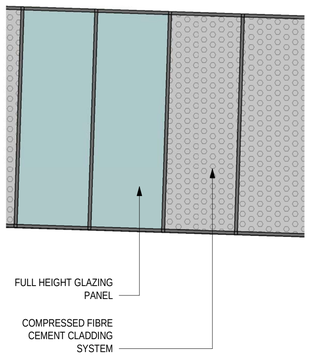
LINK BRIDGE FACADE

The façade system containing the link bridge comprises of a modular unitised panel system and glazing suites.

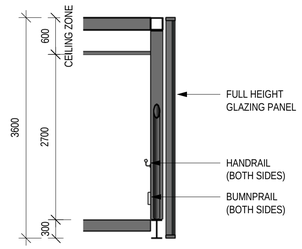
The colour palette is monotone (whites and light greys) to slightly contrast the existing façade colour of North Block.



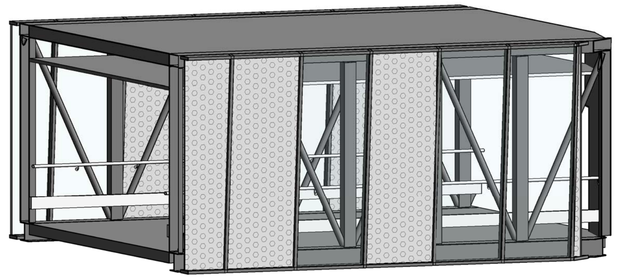
PLAN



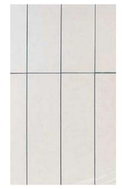
ELEVATION



SECTION

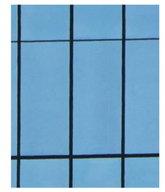


3D



FACADE SAMPLE

COMPRESSED FIBRE CEMENT PANEL
IN GREY FINISH



FACADE SAMPLE

GLAZING UNIT

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE 0 1000 2000

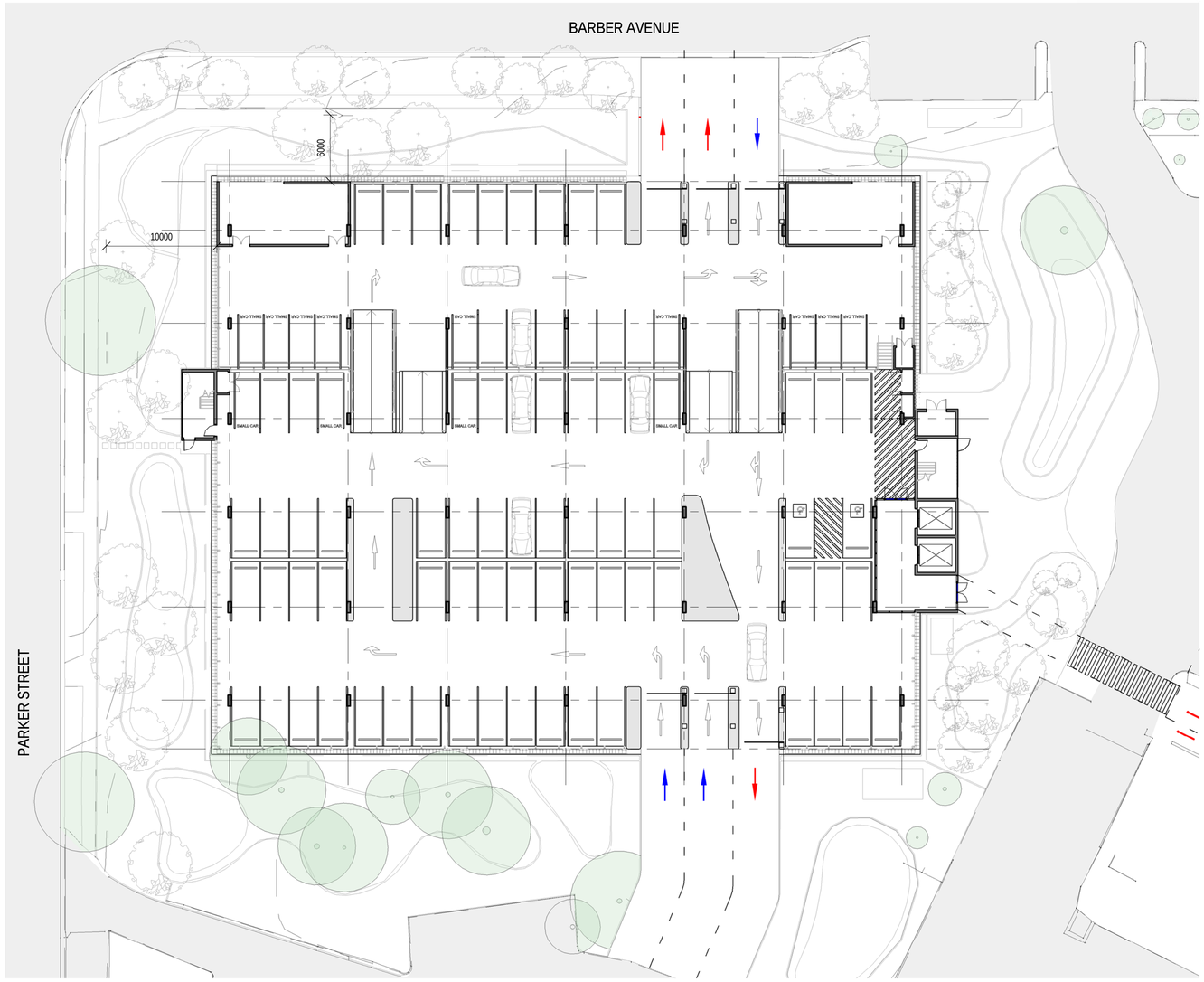
SCALE: 1 : 50 @ A1

DRAWING: EXTERIOR FINISHES

DRAWING NUMBER: AR-DA18

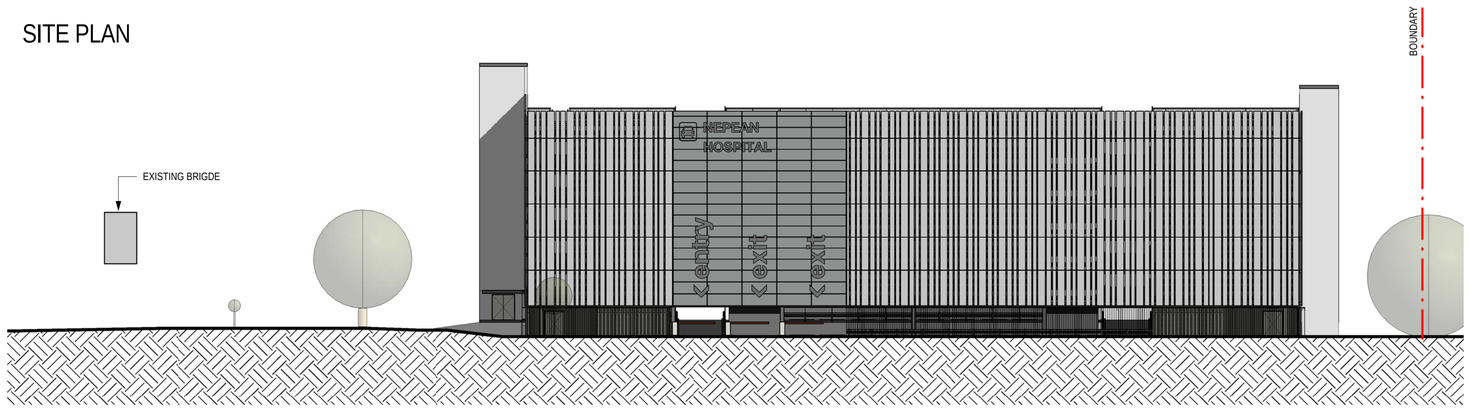
DATE: 23.06.17

ISSUE: B

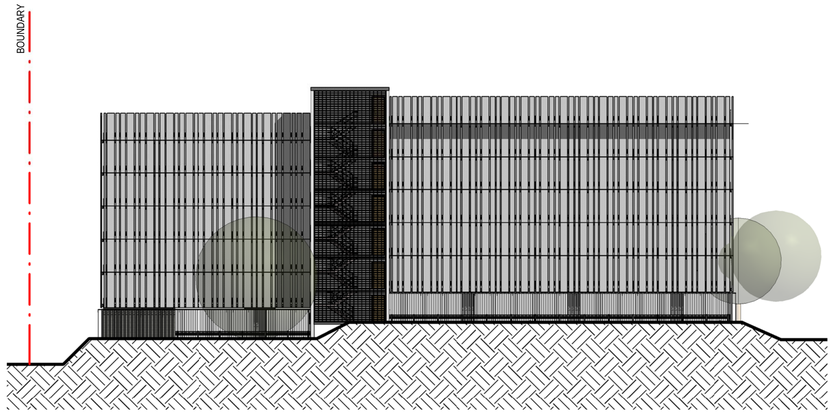


SITE PLAN

EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION

BVN

ISSUE	DATE	FOR
A	09.06.17	FOR INFORMATION
B	23.06.17	FOR INFORMATION

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT MANAGER aurora

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.inh

TRUE NORTH | PROJECT NORTH | GRAPHIC SCALE: 0 5000 10000

SCALE: 1 : 250 @ A1

DRAWING: NOTIFICATION PLAN

DRAWING NUMBER: AR-DA19

DATE: 23.06.17

ISSUE: B

Attachment 2 – Modelling Output – Existing Scenario

MOVEMENT SUMMARY

Site: 101 [1 - 2017 - Existing - Great Western Highway and Parker Street - PM]

1 - 2017 - Existing - Great Western Highway and Parker Street - PM - 15:15 to 16:15
Signals - Actuated Isolated Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	343	1.9	0.187	5.6	LOS A	0.0	0.0	0.00	0.53	52.3
2	T1	865	1.1	0.493	16.2	LOS B	11.2	79.1	0.74	0.64	29.8
3	R2	98	6.8	0.414	40.6	LOS C	3.5	25.7	0.94	0.77	16.5
Approach		1306	1.7	0.493	15.3	LOS B	11.2	79.1	0.56	0.62	35.3
East: Great Western Highway (East)											
4	L2	186	5.2	0.942	44.2	LOS D	14.5	104.9	1.00	0.94	16.7
5	T1	793	2.6	0.942	39.5	LOS C	14.5	104.9	1.00	0.92	29.5
6	R2	396	7.2	0.967	34.9	LOS C	13.5	100.1	1.00	0.94	18.3
Approach		1375	4.3	0.967	38.8	LOS C	14.5	104.9	1.00	0.93	25.6
North: Parker Street (North)											
7	L2	480	5.3	0.268	5.7	LOS A	0.0	0.0	0.00	0.53	43.9
8	T1	1039	6.7	0.613	17.5	LOS B	14.5	107.3	0.79	0.70	28.6
9	R2	275	3.7	0.792	26.5	LOS B	7.4	53.5	0.98	0.82	35.0
Approach		1794	5.9	0.792	15.7	LOS B	14.5	107.3	0.61	0.67	33.0
West: Great Western Highway (West)											
10	L2	533	5.1	0.297	5.7	LOS A	0.0	0.0	0.00	0.53	52.0
11	T1	605	6.4	0.933	39.0	LOS C	12.2	90.0	1.00	0.91	29.9
12	R2	351	3.8	1.119	102.0	LOS F	22.5	162.8	1.00	1.23	16.4
Approach		1488	5.4	1.119	41.9	LOS C	22.5	162.8	0.64	0.85	28.7
All Vehicles		5963	4.5	1.119	27.5	LOS B	22.5	162.8	0.70	0.76	29.6

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

Movement Performance - Pedestrians

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

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [1 - 2017 - Existing - Great Western Highway and Parker Street - AM]

1 - 2017 - Existing - Great Western Highway and Parker Street - AM - 7:15 to 8:15
Signals - Actuated Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	356	1.9	0.194	5.6	LOS A	0.0	0.0	0.00	0.53	52.3
2	T1	908	1.1	0.570	21.6	LOS B	14.5	102.6	0.80	0.70	25.5
3	R2	72	6.8	0.313	38.9	LOS C	2.6	19.6	0.91	0.74	16.9
Approach		1336	1.6	0.570	18.3	LOS B	14.5	102.6	0.60	0.66	32.8
East: Great Western Highway (East)											
4	L2	105	5.2	0.581	41.2	LOS C	7.9	57.1	0.93	0.79	17.6
5	T1	465	2.6	0.581	37.4	LOS C	7.9	57.1	0.94	0.78	30.3
6	R2	348	7.2	0.785	28.7	LOS C	11.1	82.3	0.96	0.84	20.8
Approach		919	4.6	0.785	34.5	LOS C	11.1	82.3	0.95	0.80	26.4
North: Parker Street (North)											
7	L2	638	5.3	0.356	5.7	LOS A	0.0	0.0	0.00	0.53	43.9
8	T1	1029	6.7	0.498	13.1	LOS A	13.1	97.0	0.65	0.58	33.0
9	R2	236	3.7	0.440	23.2	LOS B	6.4	46.2	0.75	0.76	36.8
Approach		1903	5.9	0.498	11.8	LOS A	13.1	97.0	0.44	0.58	36.6
West: Great Western Highway (West)											
10	L2	183	5.1	0.102	5.7	LOS A	0.0	0.0	0.00	0.53	52.1
11	T1	346	6.4	0.562	37.8	LOS C	6.9	50.7	0.94	0.77	30.4
12	R2	146	3.8	0.459	41.8	LOS C	5.6	40.7	0.92	0.78	28.4
Approach		676	5.5	0.562	30.0	LOS C	6.9	50.7	0.68	0.71	33.7
All Vehicles		4834	4.4	0.785	20.5	LOS B	14.5	102.6	0.62	0.66	32.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	36.8	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: 102 [2 - 2017 - Existing - Parker Street and Barber Avenue - hospital entrance - AM]

2 - 2017 - Existing - Parker Street and Barber Avenue - hospital entrance - AM - 7:15 - 8:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Barber Ave (East) (Hospital Entrance)											
4	L2	43	7.9	0.039	6.9	LOS A	0.1	1.1	0.40	0.61	48.2
Approach		43	7.9	0.039	6.9	LOS A	0.1	1.1	0.40	0.61	48.2
North: Parker Steet (North)											
7	L2	81	2.2	0.228	5.6	LOS A	0.0	0.0	0.00	0.11	55.7
8	T1	1197	6.5	0.228	0.0	LOS A	0.0	0.0	0.00	0.03	58.7
Approach		1278	6.3	0.228	0.4	NA	0.0	0.0	0.00	0.04	58.3
All Vehicles		1321	6.3	0.228	0.6	NA	0.1	1.1	0.01	0.06	57.4

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

MOVEMENT SUMMARY

Site: 102 [2 - 2017 - Existing - Parker Street and Barber Avenue - hospital entrance - PM]

2 - 2017 - Existing - Parker Street and Barber Avenue - hospital entrance - PM - 15:15 - 16:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Barber Ave (East) (Hospital Entrance)											
4	L2	86	7.9	0.090	7.7	LOS A	0.3	2.6	0.49	0.69	47.7
Approach		86	7.9	0.090	7.7	LOS A	0.3	2.6	0.49	0.69	47.7
North: Parker Steet (North)											
7	L2	59	2.2	0.284	5.6	LOS A	0.0	0.0	0.00	0.07	56.3
8	T1	1531	6.5	0.284	0.0	LOS A	0.0	0.0	0.00	0.02	59.2
Approach		1589	6.4	0.284	0.2	NA	0.0	0.0	0.00	0.02	58.9
All Vehicles		1676	6.5	0.284	0.6	NA	0.3	2.6	0.02	0.06	57.3

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

MOVEMENT SUMMARY

Site: 103 [3 - 2017 - Existing - Parker Street and Hospital Entrance - AM]

3 - 2017 - Existing - Parker Street and Hospital Entrance - AM - 7:15 - 8:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Hospital Entrance											
4	L2	15	0.0	0.013	6.8	LOS A	0.0	0.3	0.40	0.58	52.4
Approach		15	0.0	0.013	6.8	LOS A	0.0	0.3	0.40	0.58	52.4
North: Parker street (North)											
7	L2	46	0.0	0.218	4.3	LOS A	0.0	0.0	0.00	0.07	56.3
8	T1	1177	6.8	0.218	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		1223	6.5	0.218	0.2	NA	0.0	0.0	0.00	0.02	59.5
All Vehicles		1238	6.4	0.218	0.2	NA	0.0	0.3	0.00	0.03	59.4

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

MOVEMENT SUMMARY

Site: 103 [3 - 2017 - Existing - Parker Street and Hospital Entrance - PM]

3 - 2017 - Existing - Parker Street and Hospital Entrance - PM - 15:15 - 16:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Hospital Entrance											
4	L2	39	0.0	0.041	7.7	LOS A	0.2	1.1	0.49	0.67	52.0
Approach		39	0.0	0.041	7.7	LOS A	0.2	1.1	0.49	0.67	52.0
North: Parker street (North)											
7	L2	20	0.0	0.291	4.3	LOS A	0.0	0.0	0.00	0.02	56.8
8	T1	1608	6.8	0.291	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		1628	6.7	0.291	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		1667	6.5	0.291	0.2	NA	0.2	1.1	0.01	0.02	59.4

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

MOVEMENT SUMMARY

Site: 104 [4 - 2017 - Existing - Parker Street & Derby Street Junction - AM]

4 - 2017 - Existing - Parker Street & Derby Street Junction - AM - 7:15 - 8:15
Signals - Actuated Isolated Cycle Time = 74 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	67	1.1	0.662	27.9	LOS B	13.9	101.4	0.87	0.77	42.6
2	T1	1296	5.4	0.662	22.4	LOS B	14.0	102.2	0.87	0.77	38.3
3	R2	194	2.6	0.377	15.2	LOS B	3.0	21.3	0.74	0.76	42.3
Approach		1557	4.9	0.662	21.7	LOS B	14.0	102.2	0.86	0.77	39.0
East: Derby Street (East)											
4	L2	45	1.6	0.163	29.7	LOS C	2.1	15.1	0.79	0.69	34.7
5	T1	81	3.7	0.395	28.4	LOS B	3.7	26.6	0.86	0.73	33.7
6	R2	60	1.6	0.395	36.3	LOS C	3.7	26.6	0.90	0.75	21.5
Approach		186	2.5	0.395	31.2	LOS C	3.7	26.6	0.85	0.72	30.7
North: Parker Street (North)											
7	L2	107	1.3	0.550	26.8	LOS B	10.8	79.6	0.83	0.74	26.1
8	T1	1003	8.7	0.550	21.2	LOS B	10.8	81.1	0.83	0.72	38.9
9	R2	93	2.6	0.191	15.3	LOS B	1.3	9.5	0.71	0.73	42.3
Approach		1203	7.6	0.550	21.3	LOS B	10.8	81.1	0.82	0.72	38.3
West: Derby Street (West)											
10	L2	41	0.0	0.157	30.5	LOS C	2.0	14.5	0.80	0.69	34.4
11	T1	119	5.3	0.381	28.4	LOS B	4.0	29.5	0.86	0.72	34.2
12	R2	35	5.4	0.381	35.2	LOS C	4.0	29.5	0.88	0.73	39.3
Approach		195	4.2	0.381	30.1	LOS C	4.0	29.5	0.85	0.71	35.4
All Vehicles		3141	5.7	0.662	22.6	LOS B	14.0	102.2	0.84	0.74	38.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	31.3	LOS D	0.1	0.1	0.92	0.92
P2	East Full Crossing	53	22.0	LOS C	0.1	0.1	0.77	0.77
P3	North Full Crossing	53	31.3	LOS D	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	22.0	LOS C	0.1	0.1	0.77	0.77
All Pedestrians		211	26.7	LOS C			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [4 - 2017 - Existing - Parker Street & Derby Street Junction - PM]

4 - 2017 - Existing - Parker Street & Derby Street Junction - PM - 15:15 - 16:15
Signals - Actuated Isolated Cycle Time = 138 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	68	1.1	0.621	45.7	LOS D	23.2	169.0	0.86	0.77	35.2
2	T1	1079	5.4	0.621	39.3	LOS C	23.3	170.5	0.84	0.74	30.2
3	R2	107	2.6	0.324	33.1	LOS C	3.5	25.1	0.87	0.77	32.2
Approach		1255	4.9	0.621	39.1	LOS C	23.3	170.5	0.84	0.74	30.7
East: Derby Street (East)											
4	L2	158	1.6	0.591	40.2	LOS C	14.8	105.5	0.77	0.73	30.3
5	T1	214	3.7	1.431	113.9	LOS F	22.4	160.4	0.84	0.91	15.4
6	R2	95	1.6	1.431	279.6	LOS F	22.4	160.4	1.00	1.29	3.9
Approach		466	2.5	1.431	122.6	LOS F	22.4	160.4	0.85	0.93	13.6
North: Parker Street (North)											
7	L2	104	1.3	0.864	52.4	LOS D	36.7	272.9	0.98	0.89	16.6
8	T1	1389	8.7	0.864	45.0	LOS D	36.7	276.0	0.94	0.85	28.1
9	R2	172	2.6	0.455	29.0	LOS C	5.9	41.9	0.83	0.79	34.1
Approach		1665	7.6	0.864	43.8	LOS D	36.7	276.0	0.93	0.85	28.0
West: Derby Street (West)											
10	L2	84	0.0	0.373	40.7	LOS C	12.6	90.6	0.76	0.69	30.6
11	T1	183	5.3	0.903	37.2	LOS C	12.6	90.6	0.77	0.70	30.4
12	R2	71	5.4	0.903	83.5	LOS F	5.8	42.7	1.00	0.80	25.3
Approach		338	4.0	0.903	47.8	LOS D	12.6	90.6	0.81	0.72	28.8
All Vehicles		3724	5.8	1.431	52.5	LOS D	36.7	276.0	0.88	0.81	25.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	42.4	LOS E	0.2	0.2	0.78	0.78
P2	East Full Crossing	53	34.9	LOS D	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	42.4	LOS E	0.2	0.2	0.78	0.78
P4	West Full Crossing	53	34.9	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		211	38.6	LOS D			0.75	0.75

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 105 [5 - 2017 - Existing - Roundabout at school Entrance - AM]

5 - 2017 - Existing - Roundabout at school Entrance - AM 7:15 - 8:15
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Private Access											
1	L2	1	0.0	0.003	6.0	LOS A	0.0	0.1	0.38	0.54	38.0
2	T1	1	0.0	0.003	5.9	LOS A	0.0	0.1	0.38	0.54	25.7
3	R2	1	0.0	0.003	8.9	LOS A	0.0	0.1	0.38	0.54	42.9
Approach		3	0.0	0.003	6.9	LOS A	0.0	0.1	0.38	0.54	35.4
East: Derby Street (East)											
4	L2	4	0.0	0.149	5.2	LOS A	0.8	6.0	0.21	0.52	43.6
5	T1	147	4.8	0.149	5.2	LOS A	0.8	6.0	0.21	0.52	46.0
6	R2	37	0.0	0.149	8.0	LOS A	0.8	6.0	0.21	0.52	42.2
Approach		188	3.7	0.149	5.7	LOS A	0.8	6.0	0.21	0.52	45.2
North: Medical School Entrance											
7	L2	47	0.0	0.096	6.2	LOS A	0.5	3.4	0.40	0.63	41.5
8	T1	1	0.0	0.096	6.1	LOS A	0.5	3.4	0.40	0.63	34.3
9	R2	51	0.0	0.096	9.0	LOS A	0.5	3.4	0.40	0.63	38.0
Approach		99	0.0	0.096	7.6	LOS A	0.5	3.4	0.40	0.63	39.9
West: Derby Street (West)											
10	L2	105	2.1	0.242	5.1	LOS A	1.4	10.3	0.17	0.50	40.3
11	T1	223	4.7	0.242	5.1	LOS A	1.4	10.3	0.17	0.50	46.4
12	R2	4	0.0	0.242	7.9	LOS A	1.4	10.3	0.17	0.50	38.9
Approach		333	3.8	0.242	5.1	LOS A	1.4	10.3	0.17	0.50	44.8
All Vehicles		623	3.2	0.242	5.7	LOS A	1.4	10.3	0.22	0.52	44.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 105 [5 - 2017 - Existing - Roundabout at school Entrance - PM]

5 - 2017 - Existing - Roundabout at school Entrance - PM 15:15 - 16:15
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Private Access											
1	L2	4	0.0	0.008	7.1	LOS A	0.0	0.3	0.52	0.59	36.9
2	T1	1	0.0	0.008	7.0	LOS A	0.0	0.3	0.52	0.59	25.1
3	R2	2	0.0	0.008	9.9	LOS A	0.0	0.3	0.52	0.59	42.0
Approach		7	0.0	0.008	7.9	LOS A	0.0	0.3	0.52	0.59	36.7
East: Derby Street (East)											
4	L2	7	0.0	0.269	5.6	LOS A	1.7	12.3	0.35	0.53	43.0
5	T1	272	4.8	0.269	5.6	LOS A	1.7	12.3	0.35	0.53	45.4
6	R2	37	0.0	0.269	8.4	LOS A	1.7	12.3	0.35	0.53	41.6
Approach		316	4.1	0.269	5.9	LOS A	1.7	12.3	0.35	0.53	44.9
North: Medical School Entrance											
7	L2	89	0.0	0.207	6.8	LOS A	1.1	7.9	0.49	0.68	40.8
8	T1	1	0.0	0.207	6.7	LOS A	1.1	7.9	0.49	0.68	33.5
9	R2	111	0.0	0.207	9.6	LOS A	1.1	7.9	0.49	0.68	37.2
Approach		201	0.0	0.207	8.3	LOS A	1.1	7.9	0.49	0.68	39.0
West: Derby Street (West)											
10	L2	74	2.1	0.266	5.1	LOS A	1.7	12.1	0.19	0.49	40.3
11	T1	291	4.7	0.266	5.1	LOS A	1.7	12.1	0.19	0.49	46.4
12	R2	1	0.0	0.266	7.9	LOS A	1.7	12.1	0.19	0.49	38.9
Approach		365	4.2	0.266	5.1	LOS A	1.7	12.1	0.19	0.49	45.4
All Vehicles		889	3.2	0.269	6.1	LOS A	1.7	12.3	0.32	0.55	43.8

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

Attachment 3 - Modelling Output – Future Scenarios

MOVEMENT SUMMARY

Site: 101 [1 - 2021 - Opening Without Development - Great Western Highway and Parker Street - AM]

1 - 2021 - Opening Without Development - Great Western Highway and Parker Street - AM - 7:15 to 8:15
Signals - Actuated Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	378	1.9	0.206	5.6	LOS A	0.0	0.0	0.00	0.53	52.3
2	T1	964	1.1	0.605	22.0	LOS B	15.7	111.1	0.82	0.72	25.2
3	R2	76	6.8	0.333	39.0	LOS C	2.8	20.8	0.91	0.74	16.9
Approach		1418	1.6	0.605	18.6	LOS B	15.7	111.1	0.61	0.67	32.5
East: Great Western Highway (East)											
4	L2	112	5.2	0.617	41.5	LOS C	8.4	61.1	0.94	0.80	17.5
5	T1	494	2.6	0.617	37.7	LOS C	8.4	61.1	0.95	0.78	30.2
6	R2	369	7.2	0.844	29.2	LOS C	12.0	89.0	0.98	0.85	20.5
Approach		975	4.6	0.844	34.9	LOS C	12.0	89.0	0.96	0.81	26.2
North: Parker Street (North)											
7	L2	677	5.3	0.378	5.7	LOS A	0.0	0.0	0.00	0.53	43.9
8	T1	1093	6.7	0.529	13.4	LOS A	14.3	105.5	0.66	0.59	32.6
9	R2	251	3.7	0.471	23.4	LOS B	6.9	49.6	0.76	0.77	36.7
Approach		2020	5.9	0.529	12.0	LOS A	14.3	105.5	0.45	0.59	36.4
West: Great Western Highway (West)											
10	L2	183	5.1	0.102	5.7	LOS A	0.0	0.0	0.00	0.53	52.1
11	T1	367	6.4	0.596	38.1	LOS C	7.3	54.1	0.95	0.77	30.3
12	R2	195	3.8	0.610	43.1	LOS D	7.7	55.9	0.95	0.81	28.0
Approach		745	5.4	0.610	31.4	LOS C	7.7	55.9	0.72	0.72	33.0
All Vehicles		5158	4.4	0.844	21.0	LOS B	15.7	111.1	0.63	0.67	32.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	36.8	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 [1 - 2021 - Opening Without Development - Great Western Highway and Parker Street - PM]

1 - 2021 - Opening Without Development - Great Western Highway and Parker Street - PM - 15:15 to 16:15
Signals - Actuated Isolated Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	364	1.9	0.199	5.6	LOS A	0.0	0.0	0.00	0.53	52.3
2	T1	918	1.1	0.512	20.0	LOS B	14.9	105.3	0.74	0.65	26.7
3	R2	104	6.8	0.349	45.7	LOS D	4.4	32.5	0.90	0.77	15.1
Approach		1386	1.7	0.512	18.2	LOS B	14.9	105.3	0.56	0.63	32.8
East: Great Western Highway (East)											
4	L2	198	5.2	0.979	60.1	LOS E	20.2	146.3	1.00	1.00	13.1
5	T1	841	2.6	0.979	55.1	LOS D	20.2	146.3	1.00	0.98	24.7
6	R2	420	7.2	0.927	38.5	LOS C	17.2	127.6	1.00	0.92	17.1
Approach		1459	4.3	0.979	51.0	LOS D	20.2	146.3	1.00	0.96	21.7
North: Parker Street (North)											
7	L2	509	5.3	0.285	5.7	LOS A	0.0	0.0	0.00	0.53	43.9
8	T1	1103	6.7	0.637	21.7	LOS B	19.4	143.8	0.80	0.71	25.4
9	R2	292	3.7	0.761	31.0	LOS C	9.7	69.9	0.97	0.82	32.8
Approach		1904	5.9	0.761	18.8	LOS B	19.4	143.8	0.61	0.68	30.4
West: Great Western Highway (West)											
10	L2	565	5.1	0.315	5.7	LOS A	0.0	0.0	0.00	0.53	52.0
11	T1	642	6.4	0.959	51.5	LOS D	16.8	124.2	1.00	0.95	25.8
12	R2	372	3.8	0.976	59.5	LOS E	20.3	146.9	1.00	0.96	23.4
Approach		1579	5.4	0.976	37.0	LOS C	20.3	146.9	0.64	0.80	30.6
All Vehicles		6328	4.5	0.979	30.6	LOS C	20.3	146.9	0.70	0.76	28.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	41.8	LOS E			0.94	0.94

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

MOVEMENT SUMMARY

Site: 102 [2 - 2021 - Opening Without Development - Parker Street and Barber Avenue - hospital entrance - PM]

2 - 2021 - Opening Without Development - Parker Street and Barber Avenue - hospital entrance - PM - 15:15 - 16:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Barber Ave (East) (Hospital Entrance)											
4	L2	92	7.9	0.099	7.9	LOS A	0.4	2.9	0.50	0.71	47.5
Approach		92	7.9	0.099	7.9	LOS A	0.4	2.9	0.50	0.71	47.5
North: Parker Steet (North)											
7	L2	62	2.2	0.301	5.6	LOS A	0.0	0.0	0.00	0.07	56.3
8	T1	1624	6.5	0.301	0.0	LOS A	0.0	0.0	0.00	0.02	59.2
Approach		1686	6.4	0.301	0.2	NA	0.0	0.0	0.00	0.02	58.9
All Vehicles		1778	6.5	0.301	0.6	NA	0.4	2.9	0.03	0.06	57.3

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

MOVEMENT SUMMARY

Site: 102 [2 - 2021 - Opening Without Development - Parker Street and Barber Avenue - hospital entrance - AM]

2 - 2021 - Opening Without Development - Parker Street and Barber Avenue - hospital entrance - AM - 7:15 - 8:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Barber Ave (East) (Hospital Entrance)											
4	L2	46	7.9	0.042	7.0	LOS A	0.2	1.2	0.41	0.62	48.1
Approach		46	7.9	0.042	7.0	LOS A	0.2	1.2	0.41	0.62	48.1
North: Parker Steet (North)											
7	L2	86	2.2	0.242	5.6	LOS A	0.0	0.0	0.00	0.11	55.7
8	T1	1271	6.5	0.242	0.0	LOS A	0.0	0.0	0.00	0.03	58.7
Approach		1357	6.3	0.242	0.4	NA	0.0	0.0	0.00	0.04	58.2
All Vehicles		1403	6.3	0.242	0.6	NA	0.2	1.2	0.01	0.06	57.4

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

MOVEMENT SUMMARY

Site: 103 [3 - 2021 - Opening Without Development - Parker Street and Hospital Entrance - PM]

3 - 2021 - Opening Without Development - Parker Street and Hospital Entrance - PM - 15:15 - 16:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Hospital Entrance											
4	L2	41	0.0	0.045	7.9	LOS A	0.2	1.2	0.51	0.69	51.8
Approach		41	0.0	0.045	7.9	LOS A	0.2	1.2	0.51	0.69	51.8
North: Parker street (North)											
7	L2	21	0.0	0.308	4.3	LOS A	0.0	0.0	0.00	0.02	56.8
8	T1	1707	6.8	0.308	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		1728	6.7	0.308	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		1769	6.5	0.308	0.2	NA	0.2	1.2	0.01	0.02	59.4

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

MOVEMENT SUMMARY

Site: 103 [3 - 2021 - Opening Without Development - Parker Street and Hospital Entrance - AM]

3 - 2021 - Opening Without Development - Parker Street and Hospital Entrance - AM - 7:15 - 8:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Hospital Entrance											
4	L2	16	0.0	0.014	6.9	LOS A	0.1	0.4	0.41	0.59	52.3
Approach		16	0.0	0.014	6.9	LOS A	0.1	0.4	0.41	0.59	52.3
North: Parker street (North)											
7	L2	49	0.0	0.232	4.3	LOS A	0.0	0.0	0.00	0.07	56.3
8	T1	1249	6.8	0.232	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		1299	6.5	0.232	0.2	NA	0.0	0.0	0.00	0.02	59.5
All Vehicles		1315	6.4	0.232	0.2	NA	0.1	0.4	0.00	0.03	59.4

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

MOVEMENT SUMMARY

Site: 104 [4 - 2021 - Opening Without Development - Parker Street & Derby Street Junction - PM]

4 - 2021 - Opening Without Development - Parker Street & Derby Street Junction - PM - 15:15 - 16:15
Signals - Actuated Isolated Cycle Time = 138 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	73	1.1	0.647	46.3	LOS D	24.5	178.3	0.87	0.78	35.0
2	T1	1145	5.4	0.647	39.9	LOS C	24.6	180.0	0.85	0.75	29.9
3	R2	114	2.6	0.350	34.3	LOS C	3.7	26.7	0.89	0.77	31.6
Approach		1332	4.9	0.647	39.7	LOS C	24.6	180.0	0.86	0.75	30.4
East: Derby Street (East)											
4	L2	167	1.6	0.627	40.5	LOS C	15.7	112.1	0.77	0.74	30.2
5	T1	226	3.7	1.519	130.1	LOS F	25.6	183.1	0.85	0.94	13.9
6	R2	101	1.6	1.519	319.1	LOS F	25.6	183.1	1.00	1.35	3.5
Approach		495	2.5	1.519	138.4	LOS F	25.6	183.1	0.86	0.96	12.3
North: Parker Street (North)											
7	L2	111	1.3	0.920	58.8	LOS E	42.9	319.1	1.00	0.96	15.2
8	T1	1475	8.7	0.920	51.5	LOS D	42.9	322.7	0.96	0.91	26.1
9	R2	182	2.6	0.494	29.8	LOS C	6.3	44.7	0.86	0.80	33.7
Approach		1767	7.6	0.920	49.7	LOS D	42.9	322.7	0.95	0.90	26.2
West: Derby Street (West)											
10	L2	89	0.0	0.399	41.1	LOS C	13.6	98.0	0.77	0.70	30.5
11	T1	195	5.3	0.966	37.5	LOS C	13.6	98.0	0.78	0.71	30.3
12	R2	75	5.4	0.966	88.3	LOS F	6.3	46.3	1.00	0.84	24.5
Approach		359	4.0	0.966	49.0	LOS D	13.6	98.0	0.82	0.73	28.4
All Vehicles		3953	5.8	1.519	57.4	LOS E	42.9	322.7	0.90	0.85	24.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	42.4	LOS E	0.2	0.2	0.78	0.78
P2	East Full Crossing	53	34.9	LOS D	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	42.4	LOS E	0.2	0.2	0.78	0.78
P4	West Full Crossing	53	34.9	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		211	38.6	LOS D			0.75	0.75

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [4 - 2021 - Opening Without Development - Parker Street & Derby Street Junction - AM]

4 - 2021 - Opening Without Development - Parker Street & Derby Street Junction - AM - 7:15 - 8:15
Signals - Actuated Isolated Cycle Time = 87 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	72	1.1	0.676	31.0	LOS C	17.2	125.2	0.87	0.78	41.1
2	T1	1376	5.4	0.676	25.4	LOS B	17.2	126.2	0.87	0.77	36.5
3	R2	205	2.6	0.405	16.8	LOS B	3.6	25.8	0.75	0.77	41.2
Approach		1653	4.9	0.676	24.6	LOS B	17.2	126.2	0.86	0.77	37.3
East: Derby Street (East)											
4	L2	48	1.6	0.170	33.3	LOS C	2.6	18.8	0.78	0.69	33.0
5	T1	86	3.7	0.411	32.6	LOS C	4.6	32.6	0.86	0.73	31.8
6	R2	63	1.6	0.411	41.1	LOS C	4.6	32.6	0.90	0.75	19.7
Approach		198	2.5	0.411	35.5	LOS C	4.6	32.6	0.85	0.73	28.8
North: Parker Street (North)											
7	L2	114	1.3	0.561	29.6	LOS C	13.2	97.8	0.82	0.74	24.5
8	T1	1064	8.7	0.561	24.0	LOS B	13.2	99.6	0.82	0.72	37.2
9	R2	98	2.6	0.209	18.1	LOS B	1.6	11.6	0.75	0.74	40.3
Approach		1276	7.6	0.561	24.0	LOS B	13.2	99.6	0.82	0.73	36.6
West: Derby Street (West)											
10	L2	43	0.0	0.161	34.0	LOS C	2.5	17.8	0.79	0.69	32.8
11	T1	126	5.3	0.390	32.8	LOS C	5.0	36.3	0.86	0.72	32.3
12	R2	37	5.4	0.390	39.9	LOS C	5.0	36.3	0.88	0.73	37.4
Approach		206	4.2	0.390	34.3	LOS C	5.0	36.3	0.85	0.72	33.5
All Vehicles		3333	5.7	0.676	25.6	LOS B	17.2	126.2	0.84	0.75	36.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	37.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	23.6	LOS C	0.1	0.1	0.74	0.74
P3	North Full Crossing	53	37.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	23.6	LOS C	0.1	0.1	0.74	0.74
All Pedestrians		211	30.7	LOS D			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 105 [5 - 2021 - Opening Without Development - Roundabout at school Entrance - PM]

5 - 2021 - Opening Without Development - Roundabout at school Entrance - PM 15:15 - 16:15
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Private Access											
1	L2	4	0.0	0.009	7.2	LOS A	0.0	0.3	0.53	0.59	36.7
2	T1	1	0.0	0.009	7.1	LOS A	0.0	0.3	0.53	0.59	24.9
3	R2	2	0.0	0.009	10.1	LOS A	0.0	0.3	0.53	0.59	41.8
Approach		7	0.0	0.009	8.0	LOS A	0.0	0.3	0.53	0.59	36.5
East: Derby Street (East)											
4	L2	7	0.0	0.287	5.6	LOS A	1.9	13.4	0.36	0.54	42.8
5	T1	288	4.8	0.287	5.6	LOS A	1.9	13.4	0.36	0.54	45.3
6	R2	39	0.0	0.287	8.5	LOS A	1.9	13.4	0.36	0.54	41.5
Approach		335	4.1	0.287	6.0	LOS A	1.9	13.4	0.36	0.54	44.8
North: Medical School Entrance											
7	L2	95	0.0	0.222	6.9	LOS A	1.2	8.6	0.51	0.69	40.6
8	T1	1	0.0	0.222	6.8	LOS A	1.2	8.6	0.51	0.69	33.3
9	R2	117	0.0	0.222	9.8	LOS A	1.2	8.6	0.51	0.69	37.0
Approach		213	0.0	0.222	8.5	LOS A	1.2	8.6	0.51	0.69	38.8
West: Derby Street (West)											
10	L2	78	2.1	0.283	5.2	LOS A	1.8	13.2	0.20	0.49	40.2
11	T1	308	4.7	0.283	5.1	LOS A	1.8	13.2	0.20	0.49	46.3
12	R2	1	0.0	0.283	8.0	LOS A	1.8	13.2	0.20	0.49	38.8
Approach		387	4.2	0.283	5.1	LOS A	1.8	13.2	0.20	0.49	45.3
All Vehicles		942	3.2	0.287	6.2	LOS A	1.9	13.4	0.33	0.55	43.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 105 [5 - 2021 - Opening Without Development - Roundabout at school Entrance - AM]

5 - 2021 - Opening Without Development - Roundabout at school Entrance - AM 7:15 - 8:15
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Private Access											
1	L2	1	0.0	0.003	6.1	LOS A	0.0	0.1	0.39	0.54	37.9
2	T1	1	0.0	0.003	6.0	LOS A	0.0	0.1	0.39	0.54	25.7
3	R2	1	0.0	0.003	8.9	LOS A	0.0	0.1	0.39	0.54	42.8
Approach		3	0.0	0.003	7.0	LOS A	0.0	0.1	0.39	0.54	35.4
East: Derby Street (East)											
4	L2	4	0.0	0.159	5.2	LOS A	0.9	6.5	0.22	0.52	43.5
5	T1	157	4.8	0.159	5.2	LOS A	0.9	6.5	0.22	0.52	46.0
6	R2	39	0.0	0.159	8.0	LOS A	0.9	6.5	0.22	0.52	42.1
Approach		200	3.7	0.159	5.7	LOS A	0.9	6.5	0.22	0.52	45.2
North: Medical School Entrance											
7	L2	51	0.0	0.104	6.3	LOS A	0.5	3.6	0.42	0.64	41.4
8	T1	1	0.0	0.104	6.2	LOS A	0.5	3.6	0.42	0.64	34.2
9	R2	54	0.0	0.104	9.1	LOS A	0.5	3.6	0.42	0.64	38.0
Approach		105	0.0	0.104	7.7	LOS A	0.5	3.6	0.42	0.64	39.8
West: Derby Street (West)											
10	L2	112	2.1	0.258	5.1	LOS A	1.5	11.2	0.18	0.50	40.3
11	T1	237	4.7	0.258	5.1	LOS A	1.5	11.2	0.18	0.50	46.3
12	R2	4	0.0	0.258	7.9	LOS A	1.5	11.2	0.18	0.50	38.8
Approach		353	3.8	0.258	5.1	LOS A	1.5	11.2	0.18	0.50	44.7
All Vehicles		661	3.2	0.258	5.7	LOS A	1.5	11.2	0.23	0.52	44.1

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

Attachment 4 – Mitigation Measures

MOVEMENT SUMMARY

Site: 101 [1 - 2021 - Opening With Development - Great Western Highway and Parker Street - AM]

1 - 2021 - Opening With Development - Great Western Highway and Parker Street - AM - 7:15 to 8:15
Signals - Actuated Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	378	1.9	0.206	5.6	LOS A	0.0	0.0	0.00	0.53	52.3
2	T1	964	1.1	0.605	22.0	LOS B	15.7	111.1	0.82	0.72	25.2
3	R2	76	6.8	0.340	39.0	LOS C	2.8	20.8	0.91	0.74	16.9
Approach		1418	1.6	0.605	18.6	LOS B	15.7	111.1	0.61	0.67	32.5
East: Great Western Highway (East)											
4	L2	172	5.2	0.651	40.2	LOS C	9.9	71.6	0.94	0.81	17.7
5	T1	494	2.6	0.651	37.8	LOS C	9.9	71.6	0.96	0.79	30.1
6	R2	369	7.2	0.844	29.2	LOS C	12.0	89.0	0.98	0.85	20.5
Approach		1035	4.7	0.844	35.1	LOS C	12.0	89.0	0.96	0.81	25.8
North: Parker Street (North)											
7	L2	677	5.3	0.378	5.7	LOS A	0.0	0.0	0.00	0.53	43.9
8	T1	1372	6.7	0.718	15.1	LOS B	22.8	168.6	0.75	0.68	30.9
9	R2	251	3.7	0.471	23.4	LOS B	6.9	49.6	0.76	0.77	36.7
Approach		2299	6.0	0.718	13.2	LOS A	22.8	168.6	0.53	0.64	34.8
West: Great Western Highway (West)											
10	L2	195	5.1	0.109	5.7	LOS A	0.0	0.0	0.00	0.53	52.1
11	T1	367	6.4	0.596	38.1	LOS C	7.3	54.1	0.95	0.77	30.3
12	R2	216	3.8	0.676	43.6	LOS D	8.7	62.9	0.96	0.81	27.8
Approach		778	5.4	0.676	31.5	LOS C	8.7	62.9	0.72	0.72	33.0
All Vehicles		5529	4.5	0.844	21.3	LOS B	22.8	168.6	0.66	0.69	31.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	36.8	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 [1 - 2021 - Opening With Development - Great Western Highway and Parker Street - PM]

1 - 2021 - Opening With Development - Great Western Highway and Parker Street - PM - 15:15 to 16:15
Signals - Actuated Isolated Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	364	1.9	0.199	5.6	LOS A	0.0	0.0	0.00	0.53	52.3
2	T1	918	1.1	0.564	24.6	LOS B	17.0	119.9	0.80	0.70	23.6
3	R2	104	6.8	0.401	43.8	LOS D	4.4	32.9	0.91	0.76	15.6
Approach		1386	1.7	0.564	21.1	LOS B	17.0	119.9	0.60	0.66	30.6
East: Great Western Highway (East)											
4	L2	252	5.2	1.009	70.5	LOS E	24.5	177.5	1.00	1.05	11.4
5	T1	841	2.6	1.009	65.5	LOS E	24.5	177.5	1.00	1.03	22.2
6	R2	420	7.2	0.975	49.0	LOS D	20.4	151.3	1.00	0.97	14.4
Approach		1513	4.3	1.009	61.8	LOS E	24.5	177.5	1.00	1.02	18.9
North: Parker Street (North)											
7	L2	509	5.3	0.285	5.7	LOS A	0.0	0.0	0.00	0.53	43.9
8	T1	1353	6.7	0.747	18.7	LOS B	28.2	208.4	0.77	0.70	27.7
9	R2	292	3.7	0.543	27.4	LOS B	9.7	70.1	0.79	0.78	34.5
Approach		2154	6.0	0.747	16.8	LOS B	28.2	208.4	0.59	0.67	31.8
West: Great Western Highway (West)											
10	L2	565	5.1	0.315	5.7	LOS A	0.0	0.0	0.00	0.53	52.0
11	T1	642	6.4	0.953	53.0	LOS D	17.5	129.0	1.00	0.94	25.3
12	R2	425	3.8	1.176	139.0	LOS F	36.5	264.1	1.00	1.25	13.0
Approach		1633	5.3	1.176	59.0	LOS E	36.5	264.1	0.65	0.88	23.7
All Vehicles		6685	4.5	1.176	38.2	LOS C	36.5	264.1	0.70	0.80	24.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	42.4	LOS E	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	43.8	LOS E			0.94	0.94

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

MOVEMENT SUMMARY

Site: 102 [2 - 2021 - Opening With Development - Parker Street and Barber Avenue - hospital entrance - AM]

2 - 2021 - Opening With Development - Parker Street and Barber Avenue - hospital entrance - AM - 7:15 - 8:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Barber Ave (East) (Hospital Entrance)											
4	L2	288	7.9	0.216	6.4	LOS A	1.0	7.4	0.32	0.58	48.5
Approach		288	7.9	0.216	6.4	LOS A	1.0	7.4	0.32	0.58	48.5
North: Parker Steet (North)											
7	L2	358	2.2	0.292	5.6	LOS A	0.0	0.0	0.00	0.39	52.3
8	T1	1271	6.5	0.292	0.0	LOS A	0.0	0.0	0.00	0.06	57.9
Approach		1628	5.6	0.292	1.2	NA	0.0	0.0	0.00	0.13	55.4
All Vehicles		1917	5.9	0.292	2.0	NA	1.0	7.4	0.05	0.20	53.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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: 102 [2 - 2021 - Opening With Development - Parker Street and Barber Avenue - hospital entrance - PM]

2 - 2021 - Opening With Development - Parker Street and Barber Avenue - hospital entrance - PM - 15:15 to 16:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Barber Ave (East) (Hospital Entrance)											
4	L2	606	7.9	0.540	8.8	LOS A	4.5	33.9	0.58	0.83	46.7
Approach		606	7.9	0.540	8.8	LOS A	4.5	33.9	0.58	0.83	46.7
North: Parker Steet (North)											
7	L2	292	2.2	0.343	5.6	LOS A	0.0	0.0	0.00	0.27	53.7
8	T1	1624	6.5	0.343	0.0	LOS A	0.0	0.0	0.00	0.06	57.8
Approach		1916	5.9	0.343	0.9	NA	0.0	0.0	0.00	0.09	56.4
All Vehicles		2522	6.4	0.540	2.8	NA	4.5	33.9	0.14	0.27	52.1

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

MOVEMENT SUMMARY

Site: 103 [3 - 2021 - Opening With Development - Parker Street and Hospital Entrance - AM]

3 - 2021 - Opening With Development - Parker Street and Hospital Entrance - AM - 7:15 - 8:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Hospital Entrance											
4	L2	72	0.0	0.063	6.9	LOS A	0.2	1.7	0.41	0.63	52.3
Approach		72	0.0	0.063	6.9	LOS A	0.2	1.7	0.41	0.63	52.3
North: Parker street (North)											
7	L2	178	0.0	0.295	4.3	LOS A	0.0	0.0	0.00	0.19	54.9
8	T1	1474	6.8	0.295	0.0	LOS A	0.0	0.0	0.00	0.05	59.3
Approach		1652	6.0	0.295	0.5	NA	0.0	0.0	0.00	0.06	58.8
All Vehicles		1723	5.8	0.295	0.7	NA	0.2	1.7	0.02	0.09	58.3

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

MOVEMENT SUMMARY

Site: 103 [3 - 2021 - Opening With Development - Parker Street and Hospital Entrance - PM]

3 - 2021 - Opening With Development - Parker Street and Hospital Entrance - PM - 15:15 to 16:15
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Hospital Entrance											
4	L2	196	0.0	0.228	8.6	LOS A	0.9	6.4	0.58	0.81	51.3
Approach		196	0.0	0.228	8.6	LOS A	0.9	6.4	0.58	0.81	51.3
North: Parker street (North)											
7	L2	172	0.0	0.416	4.3	LOS A	0.0	0.0	0.00	0.13	55.5
8	T1	2160	6.8	0.416	0.0	LOS A	0.0	0.0	0.00	0.04	59.4
Approach		2332	6.3	0.416	0.3	NA	0.0	0.0	0.00	0.04	59.1
All Vehicles		2527	5.8	0.416	1.0	NA	0.9	6.4	0.04	0.10	57.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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: 104 [4 - 2021 - Opening With Development - Parker Street & Derby Street Junction - AM]

4 - 2021 - Opening With Development - Parker Street & Derby Street Junction - AM - 7:15 - 8:15
Signals - Actuated Isolated Cycle Time = 89 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	72	1.1	0.691	32.3	LOS C	17.8	129.8	0.89	0.79	40.5
2	T1	1376	5.4	0.691	26.7	LOS B	17.9	130.9	0.89	0.78	35.8
3	R2	205	2.6	0.428	19.8	LOS B	4.0	29.0	0.84	0.79	39.1
Approach		1653	4.9	0.691	26.1	LOS B	17.9	130.9	0.88	0.78	36.5
East: Derby Street (East)											
4	L2	48	1.6	0.165	33.5	LOS C	2.7	19.0	0.78	0.69	32.9
5	T1	86	3.7	0.400	32.8	LOS C	4.6	33.1	0.85	0.73	31.7
6	R2	63	1.6	0.400	41.2	LOS C	4.6	33.1	0.89	0.75	19.7
Approach		198	2.5	0.400	35.7	LOS C	4.6	33.1	0.84	0.73	28.8
North: Parker Street (North)											
7	L2	188	1.3	0.683	32.2	LOS C	17.2	126.5	0.88	0.80	22.9
8	T1	1214	8.7	0.683	26.7	LOS B	17.2	129.8	0.88	0.78	35.7
9	R2	173	2.6	0.361	19.4	LOS B	3.3	23.3	0.81	0.78	39.5
Approach		1575	7.2	0.683	26.5	LOS B	17.2	129.8	0.87	0.78	34.9
West: Derby Street (West)											
10	L2	43	0.0	0.157	34.2	LOS C	2.5	18.0	0.79	0.69	32.7
11	T1	126	5.3	0.379	32.9	LOS C	5.0	36.8	0.85	0.72	32.2
12	R2	37	5.4	0.379	40.0	LOS C	5.0	36.8	0.88	0.73	37.4
Approach		206	4.2	0.379	34.4	LOS C	5.0	36.8	0.84	0.71	33.4
All Vehicles		3632	5.7	0.691	27.3	LOS B	17.9	130.9	0.87	0.78	35.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	38.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	24.5	LOS C	0.1	0.1	0.74	0.74
P3	North Full Crossing	53	38.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	24.5	LOS C	0.1	0.1	0.74	0.74
All Pedestrians		211	31.7	LOS D			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [4 - 2021 - Opening With Development - Parker Street & Derby Street Junction - PM]

4 - 2021 - Opening With Development - Parker Street & Derby Street Junction - PM - 15:15 to 16:15
Signals - Actuated Isolated Cycle Time = 138 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street (South)											
1	L2	73	1.1	0.621	45.7	LOS D	23.2	169.0	0.86	0.77	35.2
2	T1	1145	5.4	0.621	39.7	LOS C	23.3	170.6	0.85	0.75	30.0
3	R2	114	2.6	0.354	35.5	LOS C	3.7	26.7	0.90	0.76	31.2
Approach		1332	4.9	0.621	39.7	LOS C	23.3	170.6	0.85	0.75	30.4
East: Derby Street (East)											
4	L2	101	1.6	0.548	40.6	LOS C	14.2	102.0	0.76	0.70	30.6
5	T1	226	3.7	1.328	67.0	LOS E	17.3	123.4	0.80	0.78	22.1
6	R2	101	1.6	1.328	233.7	LOS F	17.3	123.4	1.00	1.19	4.6
Approach		428	2.7	1.328	100.1	LOS F	17.3	123.4	0.84	0.86	15.6
North: Parker Street (North)											
7	L2	266	1.3	1.225	170.8	LOS F	93.8	692.1	1.00	1.40	6.1
8	T1	1785	8.7	1.225	176.7	LOS F	93.9	706.3	1.00	1.43	11.0
9	R2	338	2.6	0.907	47.0	LOS D	16.8	120.3	1.00	0.93	27.2
Approach		2389	7.0	1.225	157.7	LOS F	93.9	706.3	1.00	1.36	11.5
West: Derby Street (West)											
10	L2	89	0.0	0.377	39.9	LOS C	12.6	90.7	0.75	0.69	30.9
11	T1	195	5.3	0.914	39.3	LOS C	12.6	90.7	0.78	0.71	29.6
12	R2	75	5.4	0.914	82.4	LOS F	7.1	52.1	1.00	0.82	25.6
Approach		359	4.0	0.914	48.4	LOS D	12.6	90.7	0.82	0.73	28.6
All Vehicles		4508	5.8	1.328	108.7	LOS F	93.9	706.3	0.93	1.08	15.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	42.4	LOS E	0.2	0.2	0.78	0.78
P2	East Full Crossing	53	34.9	LOS D	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	42.4	LOS E	0.2	0.2	0.78	0.78
P4	West Full Crossing	53	34.9	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		211	38.6	LOS D			0.75	0.75

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 105 [5 - 2021 - Opening With Development - Roundabout at school Entrance - AM]

5 - 2021 - Opening With Development - Roundabout at school Entrance - AM 7:15 - 8:15
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Private Access											
1	L2	1	0.0	0.003	6.2	LOS A	0.0	0.1	0.41	0.54	37.8
2	T1	1	0.0	0.003	6.1	LOS A	0.0	0.1	0.41	0.54	25.6
3	R2	1	0.0	0.003	9.0	LOS A	0.0	0.1	0.41	0.54	42.7
Approach		3	0.0	0.003	7.1	LOS A	0.0	0.1	0.41	0.54	35.3
East: Derby Street (East)											
4	L2	4	0.0	0.168	5.3	LOS A	1.0	6.9	0.24	0.53	43.3
5	T1	157	4.8	0.168	5.3	LOS A	1.0	6.9	0.24	0.53	45.7
6	R2	46	0.0	0.168	8.1	LOS A	1.0	6.9	0.24	0.53	41.9
Approach		207	3.6	0.168	5.9	LOS A	1.0	6.9	0.24	0.53	44.8
North: Medical School Entrance											
7	L2	58	0.0	0.123	6.3	LOS A	0.6	4.4	0.43	0.64	41.4
8	T1	1	0.0	0.123	6.2	LOS A	0.6	4.4	0.43	0.64	34.1
9	R2	65	0.0	0.123	9.1	LOS A	0.6	4.4	0.43	0.64	37.9
Approach		124	0.0	0.123	7.8	LOS A	0.6	4.4	0.43	0.64	39.7
West: Derby Street (West)											
10	L2	138	2.1	0.281	5.2	LOS A	1.7	12.6	0.21	0.50	40.1
11	T1	237	4.7	0.281	5.1	LOS A	1.7	12.6	0.21	0.50	46.2
12	R2	4	0.0	0.281	8.0	LOS A	1.7	12.6	0.21	0.50	38.7
Approach		379	3.7	0.281	5.2	LOS A	1.7	12.6	0.21	0.50	44.3
All Vehicles		714	3.0	0.281	5.9	LOS A	1.7	12.6	0.26	0.53	43.7

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

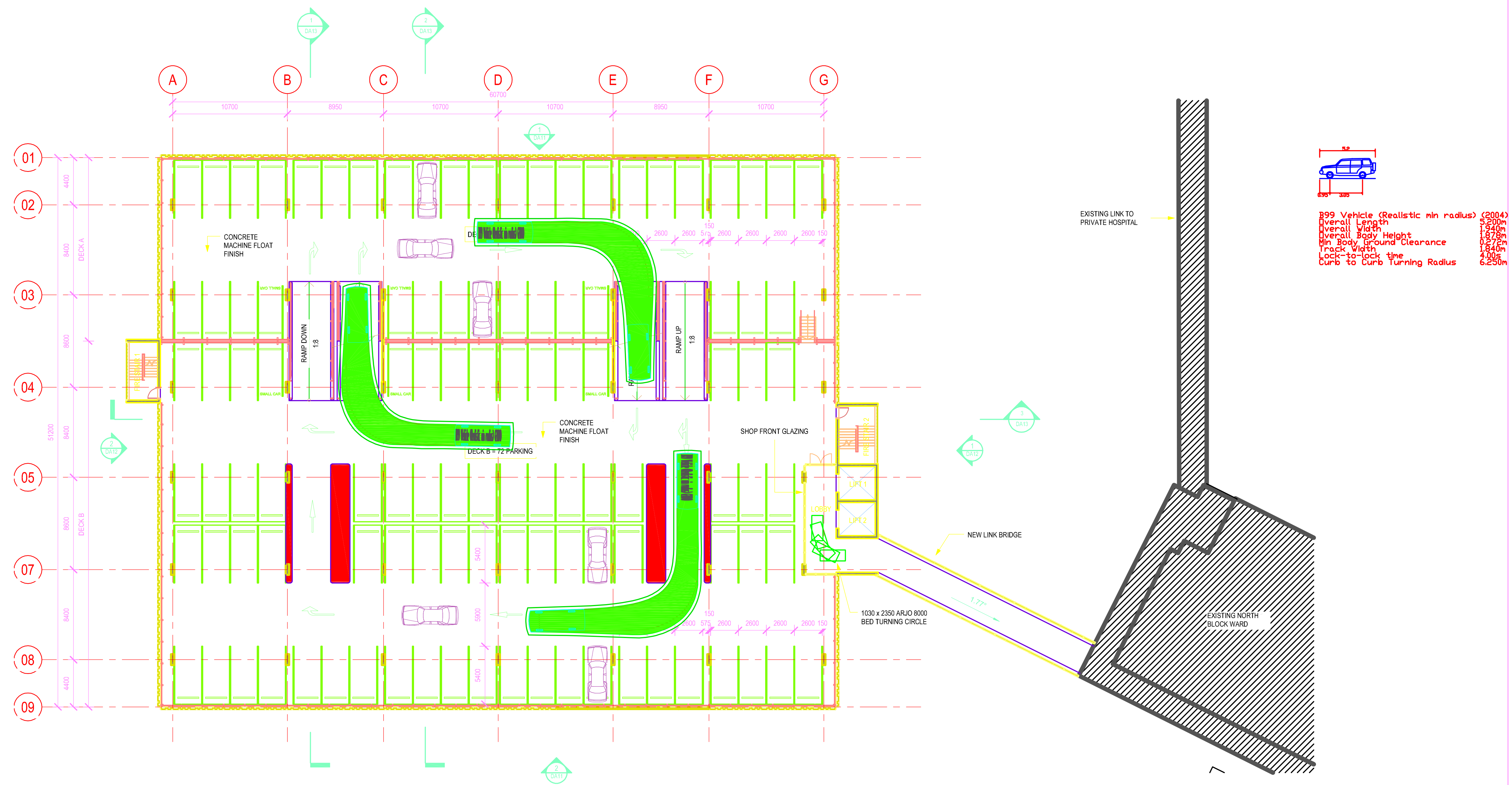
Site: 105 [5 - 2021 - Opening With Development - Roundabout at school Entrance - PM]

5 - 2021 - Opening With Development - Roundabout at school Entrance - PM - 15:15 to 16:15
Roundabout

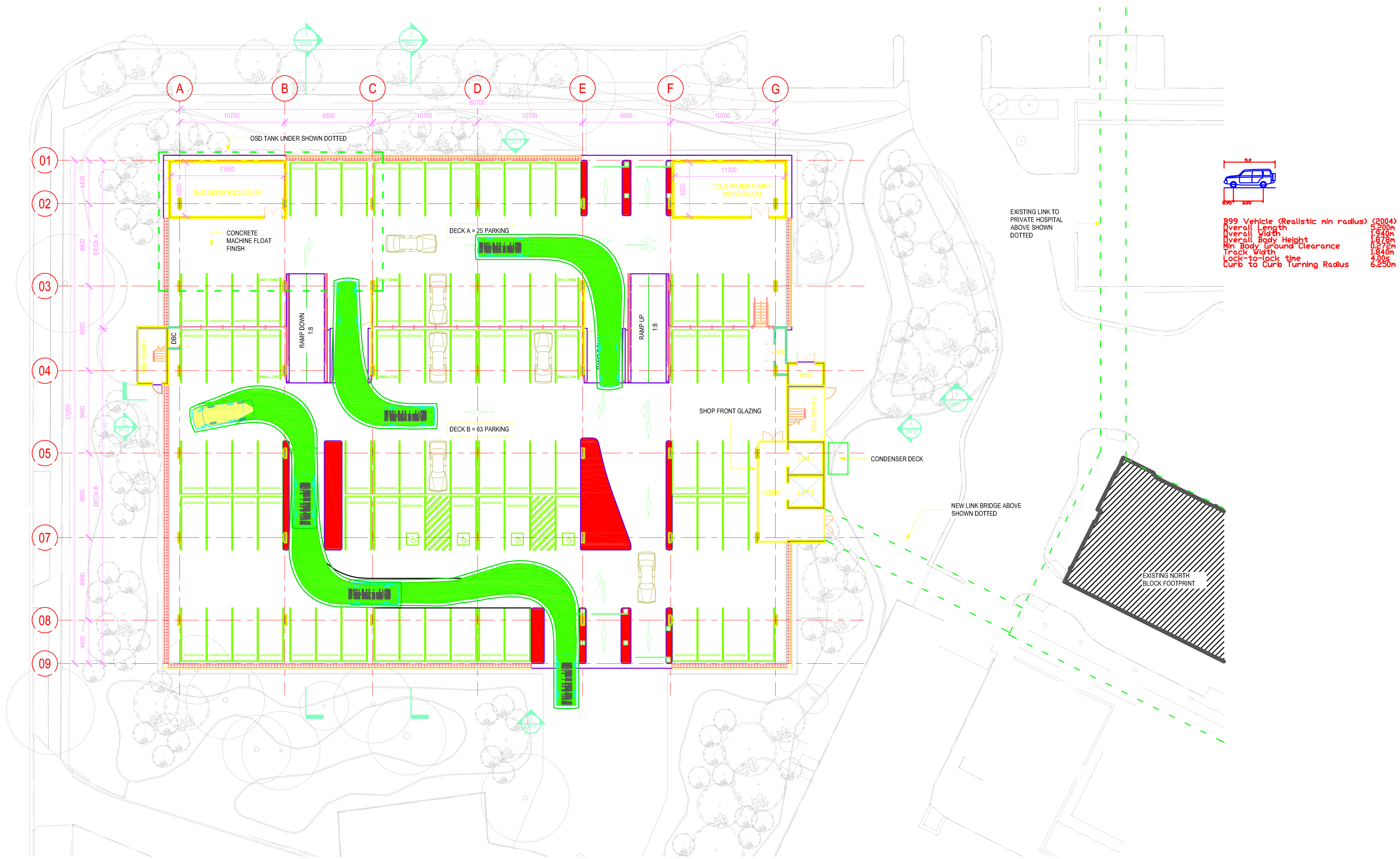
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Private Access											
1	L2	4	0.0	0.009	7.3	LOS A	0.0	0.3	0.54	0.60	36.5
2	T1	1	0.0	0.009	7.3	LOS A	0.0	0.3	0.54	0.60	24.9
3	R2	2	0.0	0.009	10.2	LOS A	0.0	0.3	0.54	0.60	41.6
Approach		7	0.0	0.009	8.1	LOS A	0.0	0.3	0.54	0.60	36.3
East: Derby Street (East)											
4	L2	4	0.0	0.295	5.7	LOS A	1.9	13.9	0.39	0.55	42.7
5	T1	288	4.8	0.295	5.7	LOS A	1.9	13.9	0.39	0.55	45.1
6	R2	46	0.0	0.295	8.6	LOS A	1.9	13.9	0.39	0.55	41.3
Approach		339	4.1	0.295	6.1	LOS A	1.9	13.9	0.39	0.55	44.6
North: Medical School Entrance											
7	L2	102	0.0	0.243	7.0	LOS A	1.4	9.6	0.52	0.70	40.6
8	T1	1	0.0	0.243	6.9	LOS A	1.4	9.6	0.52	0.70	33.2
9	R2	128	0.0	0.243	9.8	LOS A	1.4	9.6	0.52	0.70	36.9
Approach		232	0.0	0.243	8.5	LOS A	1.4	9.6	0.52	0.70	38.7
West: Derby Street (West)											
10	L2	89	2.1	0.296	5.2	LOS A	1.9	14.1	0.22	0.49	40.0
11	T1	308	4.7	0.296	5.1	LOS A	1.9	14.1	0.22	0.49	46.1
12	R2	1	0.0	0.296	8.0	LOS A	1.9	14.1	0.22	0.49	38.6
Approach		399	4.1	0.296	5.2	LOS A	1.9	14.1	0.22	0.49	45.0
All Vehicles		977	3.1	0.296	6.3	LOS A	1.9	14.1	0.35	0.56	43.4

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

Attachment 5 - Swept Path Analysis



ISSUE	DATE	FOR	CLIENT	PROJECT MANAGER	PROJECT	PROJECT NUMBER	TRUE NORTH	PROJECT NORTH	GRAPHIC SCALE	SCALE	DRAWING	DRAWING NUMBER	DATE	ISSUE
					New Nepean Hospital Car Park	s1607004.lnh			0 4000 10000	1 : 200 @ A1	GA PLAN - LEVEL 02	AR-DA07		



ISSUE	DATE	FOR

CLIENT

PROJECT MANAGER

PROJECT: New Nepean Hospital Car Park

PROJECT NUMBER: s1607004.lnh

TRUE NORTH

PROJECT NORTH

GRAPHIC SCALE: 0 4000 10000

SCALE: 1 : 200 @ A1

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