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Campbelltown Hospital For NSW Health Infrastructure

Parking Demand Study & Traffic Assessment

For the attention of: Margo Kouvaris

10 October 2017



Document Control

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Contact

Kelvin Worthington & Abdullah Uddin
02-89200800
kelvin.worthington@parkingconsultants.com
abdullah.uddin@parkingconsultants.com

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PARKING & TRAFFIC CONSULTANTS
Suite 102, 506 Miller Street
Camberay NSW 2062

Ph. +61 2 8920 0800
Fax +61 2 8076 8665

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1 Executive Summary

- Parking & Traffic Consultants (PTC) was engaged by Health Infrastructure (HI) to prepare a demand study and traffic assessment in respect of the car parking at Campbelltown Hospital (the Hospital), to assist in determining the current and projected parking requirement at the campus.
- The Hospital is to undergo significant expansion over the next 15 years in response to the following drivers¹:
 - Expected population growth of 58% across the Macarthur LGAs (Campbelltown, Camden & Wollondilly).
 - Growth of 144% in Macarthur residents aged 70+.
 - Growth of 58% in children aged 0 – 14 years
 - Diabetes rates 32% higher than the State average
 - Emergency Department presentations expected to increase by 90%
 - More than 50% of Macarthur residents requiring surgery currently travel outside the Macarthur region for their healthcare

Parking

- Future parking requirement was estimated for three points in time, as instructed by HI, being:
 - 2021/22
 - 2026/27
 - 2031/32
- The Hospital currently has a total of 1,280 car parking spaces (excluding emergency vehicle bays, loading docks etc which are not generally available to staff and visitors). During our surveys, the highest recorded peak occupancy was 1,212 spaces (95%).
- We normally consider a car park as operating at practical capacity when occupancy is in excess of 90%, particularly in a site which has multiple car parks with complex circulation (as at the Hospital) and in the absence of a parking guidance system to direct patrons to the last few available spaces. Therefore it appears that the Hospital parking is currently operating at practical capacity.

¹ Source: Clinical Services Plan May 2017

- Our survey of the RPZ indicates that current alternative parking supply for use by Hospital staff, outpatients and visitors, within reasonable, practical distance comprises an approximate total of 621 spaces (564 on-street bays and 57 off-street bays), excluding 'unauthorised' locations such as Campbelltown Private Hospital and Centric Park Central, summarised as follows:

Table 1 - Total Off-Campus Parking Supply

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

- All of the parking within the RPZ is free of charge, comprising unrestricted parking mainly in the Residential Areas to the west of Parkside Crescent and Centennial Drive and time restricted (3P or 2P) parking on Parkside Crescent, Centennial Drive and Hyde Parade. This makes it a viable option for staff, outpatients and visitors who, for whatever reason, do not want or are unable to park in the on-campus car parks provided by the Hospital.

- During our surveys, peak occupancy of the off-campus parking within the RPZ was:

Table 2 – Peak Occupancy of Off Campus Parking within RPZ

Category	Peak Occupancy
Off Street	98%
On Street	58%

- A summary of the key input assumptions to the parking demand model is as follows:

Table 3 – Key Input Assumptions

Input assumptions	Current	2021/22	2026/27	2031/32
Clinical Staff FTE				
Campbelltown Hospital	969	1,391	1,731	2,027
Paediatrics				
Mental Health	132	166	207	243
Total	1,101	1,557	1,938	2,270
Administration & Support Services Staff FTE				
Total	470	674	838	981
VMO				
Total	94	135	167	196
Outpatients – Occasions of Service				
Campbelltown Hospital	216,682	253,401	296,343	319,136
Paediatrics		55,440	115,920	176,400
Mental Health		Inc in Campbelltown Hospital data above		
Total	216,682	308,841	412,263	495,536
Inpatients – Beds				

Input assumptions	Current	2021/22	2026/27	2031/32
Campbelltown Hospital	369	512	636	747
Paediatrics	25	80	89	98
Mental Health	66	68	95	116
Total	460	660	821	961

ED Presentations – weekday average

Total	192	237	288	328
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- Based on our analysis, a summary of the estimated current and future parking demand and supply is as follows:

Table 4 – Summary of Estimated Current & Future Parking Demand & Supply

Total Parking Supply/Demand Analysis	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
On Campus Supply				
Total On Campus Supply (assuming no additional parking provision)	1280	1280	1280	1280
Demand (per Table 41 – Summary of Weekday Peak Parking Demand)				
Staff	975	1355	1607	1843
Public	231	324	423	503
LHD Controlled – Fleet Vehicles	4	6	8	9
Other users	88	112	135	158
Total Demand	1298	1797	2173	2513
Breakdown of Total Demand²:				
General Hospital Only		1394	1685	1953
Paediatrics Only		218	236	256
Mental Health Only		185	252	303
Total		1797	2173	2513
Total On Campus Surplus/(Shortfall)	(18)	(517)	(893)	(1233)

² Based on bed proportions

Total Parking Supply/Demand Analysis	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Off Campus Supply:				
Off campus off street supply <500m (per Table 9)	57	57	57	57
Off campus on street supply <500m (per Table 10)	564	564	564	564
Total Off Campus Supply	621	621	621	621
Estimated Total Off Campus Supply for Hospital-related Users³	225	225	225	225
Surplus / (Shortfall)	207	(292)	(668)	(1008)

- Note that we have assumed Hospital related users will continue to utilise 22% of the off campus parking supply, in line with our surveys and current demand estimate. In addition, we have assumed (and agreed with HI) that Hospital-related users will utilise 50% of the unutilised off campus supply. In total, therefore, Hospital-related users will utilise 225 off-campus spaces.
- The **current** estimated on campus shortfall of 18 bays can be met by off campus parking supply of 225 bays for Hospital-related users.
- However, the **estimated 2021/22, 2026/27 and 2031/32** on campus shortfall of 517 bays, 893 bays and 1233 bays cannot be met by off campus parking supply within the RPZ; shortfall 292 bays, 668 bays and 1008 bays respectively.
- The demand estimates in the report to 2031/32 reflect the full CSP scope. However it is assumed that the additional capacity provided under the Campbelltown Hospital Redevelopment Stage 2 will be fully utilised before 2031/32 (the exact year capacity is yet to be confirmed by the project team as planning progresses, and is subject to further review by HI).⁴

These conclusions are subject to the following assumptions:

Demand

- The current % of day shift and administration staff driving and requiring a parking space is 98%, which is high, and is likely to be due (at least in part) to all parking at the Hospital being free of charge.
- We are informed by HI that, going forward, the Hospital will implement demand management strategies to reduce the % of day shift and administration staff driving and requiring a parking space.
- We have therefore adopted reductions in the % of day shift and administration staff driving and requiring a parking space, in line with those agreed with HI at the Nepean Hospital project (i.e. 3% point reduction by 2021/22, 8% point reduction by 2026/27 and 10% point reduction by 2031/32)
- No changes to the parking behaviour of, outpatients and visitors (i.e. %'s driving, parking etc are as per the demand estimates).

³ Assume 21% of off campus supply used by Hospital-related users (per PTC occupancy surveys). Also allow that 50% of unutilised parking supply is utilised by Hospital-related users going forward. Total 225 spaces.

⁴ As advised by HI in email dated 5th October 2017

- No changes to the % of outpatients and visitors who are dropped off and do not park.

Supply

- No changes by Council to on-street parking regimes that result in fewer spaces being available to hospital-related users, for example:
 - Unrestricted parking spaces become restricted (e.g. 2P) and therefore not practically available for use by staff. Note, however, that assuming a time restriction of, say, 2P these spaces could be used by patients and visitors to the hospital.
 - Other parking restrictions (e.g. "No Stopping/Parking") are introduced, thereby making spaces unavailable to hospital staff, patients and visitors.
- No significant increase in demand for parking from external sources (e.g. University, private hospital etc).

Traffic

- A traffic assessment on the road network surrounding the hospital has been undertaken for existing and 2031 scenarios. Although the road network in the locality and hospital access points are currently operating at a satisfactory level of service, with the increase of parking by 2.4 times in 2031, the current access via the Parkside Crescent/ Central Road roundabout will not be able to cater the future traffic demand. There will be significant congestion and queuing at this intersection. Therefore, future expansion of the car parks within the hospital should be carefully considered and access points should be dispersed to various directions to eliminate any potential bottleneck within the hospital. Another access point to Appin Road should be investigated further.
- Public transport availability is currently adequate although the staff usage of the public transport is very minimal. A number of recommendations are outlined in section 9.3 to make public transport more competitive and attractive to the staff members.
- The hospital should promote active transport usage to the staff and visitors. Day time staff members living within reasonable walking and cycling distance should be encouraged to avoid motorised trips. Specific recommendations are outlined in section 9.4.
- The campus has existing traffic and pedestrian safety issues which can be addressed in the short term with minimum cost (section 0). In the longer term, a Road Safety Audit should be undertaken within the hospital campus.
- In summary, as parking supply is directly related to traffic generation, the hospital should focus on sustainable and other modes of transport for its day time staff so that the overall need for parking demand is reduced in the future. Similar to other hospitals, a Green Travel Plan (GTP) should be prepared for the Campbelltown Hospital. As noted above, we understand that the Hospital will be implementing demand management strategies in order to reduce the % of day shift and administration staff that utilise car mode share.
- The contents of this report are governed by the statements set out in [Section 11](#) and should therefore be read in conjunction with them.

2 Introduction

Parking & Traffic Consultants (PTC) was engaged by Health Infrastructure (HI) to prepare a demand study and traffic assessment in respect of the car parking at Campbelltown Hospital, to assist in determining the current and projected parking requirement at the campus.

PTC has extensive experience in all aspects of car park design, planning and performance advice. Our expertise spans all classes of property including hospitals, universities, airports, shopping centres and commercial property and is complemented by a full range of traffic engineering services.

Our recent major health campus projects include:

- Gosford Hospital (2013 – 2017) parking demand studies, traffic engineering services and assistance with procuring a car park operator, on behalf of HI
- Nepean Hospital (2016) parking demand study and traffic assessment, to assist in determining the current and future parking demand, on behalf of HI.
- Port Macquarie Base Hospital (2016), in respect of current and projected parking demand, and design assistance in developing concept locations for additional parking spaces, on behalf of HI.
- Shoalhaven Hospital (2016), in respect of current and projected parking demand, and design assistance in developing concept locations for additional parking spaces, on behalf of HI.
- Westmead Health Campus (2012 & 2016), in respect of current and projected parking demand, on behalf of HI.
- Royal North Shore Hospital (2014) in relation to the sale of the hospital parking concession (comprising approximately 2000 bays) by Infrashore.
- Logan Hospital (2014-2015) parking demand and revenue estimates in relation to the opportunity to partner with a third party provider to deliver car parking facilities at the hospital.
- Gold Coast University Hospital (2008 - 2016), a 2,500 bay multi-level car park project for SurePark, the successful tenderer for the project.
- Sunshine Coast University Hospital (2011 – 2016) parking demand and revenue estimates for a 3,350 bay multi-level car park project for SurePark. Also assistance to Exemplar Group in regard to access control equipment requirements at the site.

3 Campbelltown Hospital

This section provides background to Campbelltown Hospital ("the Hospital").

3.1 Background

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

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

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

Key Statistics ⁵	
Clinical Staff (FTE) ⁶	1,101
Administration & Support Services Staff ²	767
Total Beds (overnight & day)	460
Outpatient Occasions of Service (per annum)	216,682
Emergency Department Presentations (per annum) ⁷	70,408
Students (average per day)	160

The Hospital is to undergo significant expansion over the next 15 years in response to the following drivers⁸:

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

⁵ Per Hospital Data

⁶ Included Hospital Staff and Mental Health Staff

⁷ Calculation: Weekdays Emergency Presentations + Weekends Emergency Presentations = $192 \times 260 + 197 \times 104 = 70408$

⁸ Source: Clinical Services Plan May 2017

As a result of the planned expansion over the next 15 years, additional parking will be required for staff, outpatients and visitors to inpatients.

PTC has been engaged to estimate current and future parking demand, to inform development of a parking strategy (undertaken by others) to address the increased parking requirement.

3.2 Campus plan

The plan below shows the Hospital campus and the various major parking areas.



Figure 1 - Campus Plan

Parking allocations are signed including:

- Public Parking
 - Visitor
 - Disabled
 - 1/2P Disabled
 - DSU⁹ Patient Only
 - Cancer Therapy Centre Patient Only
 - PACS Permit (Patient only)
 - Client Only (Drug Advisory Building)
- Staff & Special Parking
 - Staff
 - Fleet
 - Engineering
 - Disabled
 - VMO
 - Short Term Parking for School Users (UWS?) – 2 spaces
 - CSSD – 1 space
 - Pathology

A chained area (27 bays) was observed within Car Park 5 (Staff Car Park 2). We believe that this area is reserved for afternoon shift staff, to assist the day/afternoon shift changeover.

⁹ Day Surgery Unit



Figure 2 - Chained area in Car park 5

All parking at the Hospital is currently free of charge. Public car parks are not time restricted. For these reasons we believe that utilisation of CP6, CP8 & CP9 (in particular) is likely to be a mix of staff and public (despite signage indicating specific allocation (e.g. public).

3.3 Current Parking Supply

A summary of the current parking supply at the Hospital is as follows. Loading docks, UWS car park, ambulance bays and Pick-up & Drop-off bays have been excluded, as these are not generally available to hospital staff and public.

Table 5 - Breakdown of Parking Supply by Car Park

Map Code	Car Park	Total Bays
CP1	Birunji	82
CP2 Staff	Cancer Therapy Centre	196
CP2A Public	Cancer Therapy Centre	44
CP3	Block C	20
CP4A	Waratah House	15
CP4	Waratah House	22

Map Code	Car Park	Total Bays
CP5A	Engineering Office	6
CP5	Staff Car Park 2	248
CP6	Visitor Car Park 2	121
CP7A	Main Entrance	2
CP7	Staff Car Park 1 (VMO)	38
CP8A	In front of Emergency	10
CP8	Visitor Car Park 1	197
CP9	Staff Car Park 3	257
Drug	Drug Advisory Building	22
Total		1280

In addition to the above supply of parking, the Hospital uses a grassed area (as shown in the photos below) adjacent to Car Park 9 (Staff Car Park 3) located at the southern end of the campus as 'overflow' staff parking. As individual parking bays are not marked it is difficult to determine how many vehicles could be parked in this area, however we estimate the maximum capacity at approximately 80 cars.



Figure 3 - Car Park 9 (Staff Car Park 3) on-grass Parking

4 Demand & Revenue Estimates Methodology Overview

PTC's general approach to estimating parking demand is outlined in the diagram below. This methodology is familiar to HI as it has been used to estimate parking demand at a number of hospital sites. We acknowledge that no two sites are identical; therefore our general methodology is tailored to the requirements of each specific site.

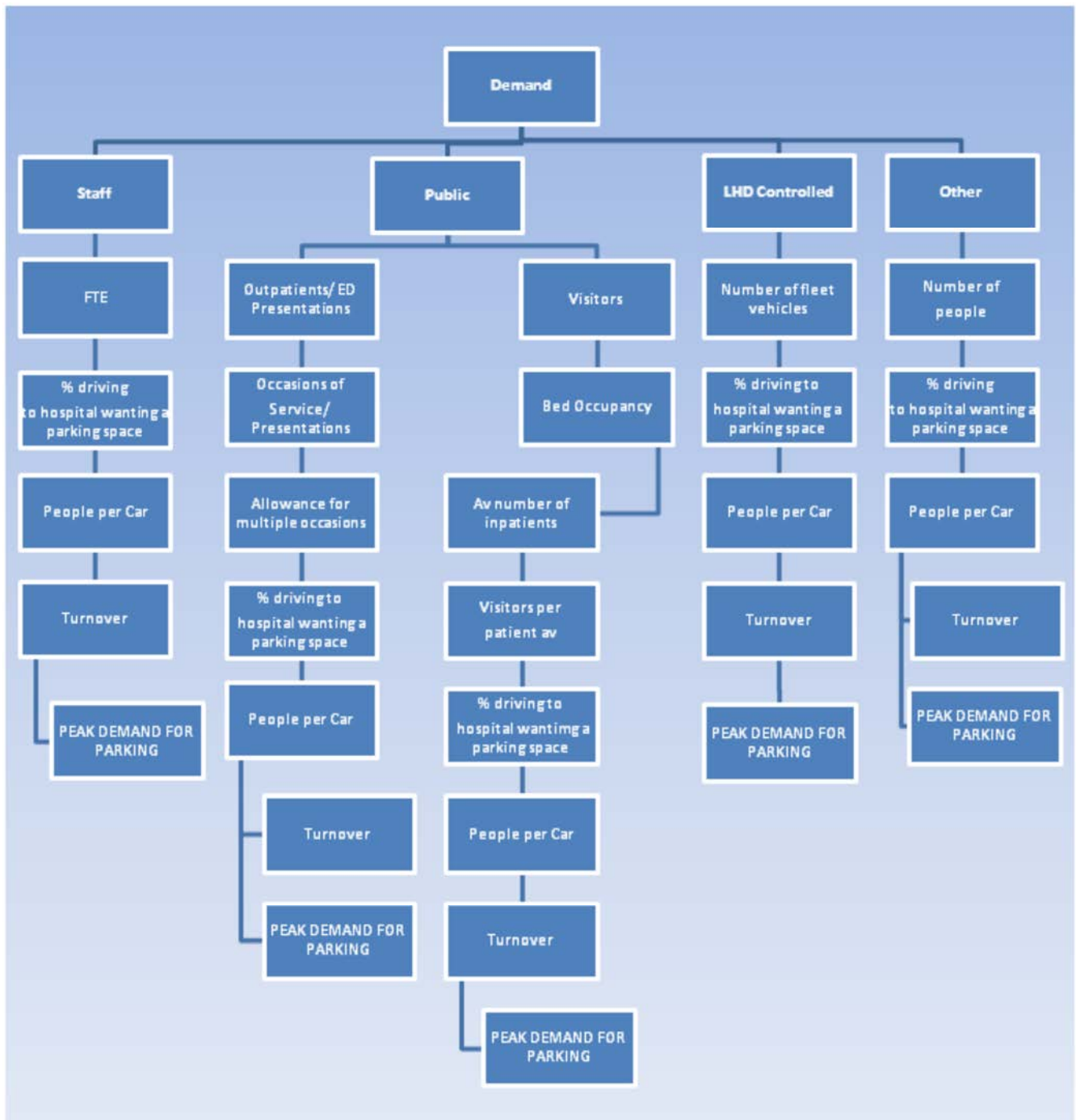


Figure 4 - Parking Demand Estimate Methodology Overview

In order to estimate the current and future demand that would be derived from parking at the Hospital, PTC was provided with certain information by HI and the Hospital/LHD.

In addition we carried out the following surveys:

- Staff – via online methodology
- Outpatients and visitors– via face to face interviews, on 19th and 20th July 2017.
- Car park occupancy and length of stay surveys of the entire hospital car parks, on 19th and 20th July 2017.
- Parking supply and demand surveys within the Relevant Parking Zone (see Section 6 of this report).

We also carried out a site visit on Tuesday 27th June 2017 to meet with Hospital representatives, view 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 (list not exhaustive):

- Staff numbers and shift patterns
- Visiting Medical Officers (VMO's)
- Total bed numbers (overnight & day) and occupancy %
- Outpatient occasions of service
- Emergency Department Presentations
- Education & Training (including students)
- Retail & Volunteer staff
- Available nearby on-street parking
- Other off-street parking in the area
- External parking demand drivers (if any)
- Staff, outpatient and visitor survey responses
- Results of our on-campus car park surveys (occupancy and length of stay)
- Proportion of visitors attending the Hospital during peak hours

Where specific data was not available we applied our knowledge and experience of other comparable hospital sites in estimating key factors such as car park turnover for staff and VMOs.

The raw demand data was converted into detailed demand estimates, subdivided by the appropriate user and time categories, expected turnover per space, etc. The results have been incorporated into individual spreadsheets representing the following scenarios, as requested by HI:

- Current (2016)
- Future (2021/22)
- Future (2026/27)
- Future (2031/32)

5 Transport Environment at Campbelltown Hospital

5.1 Transport mode options servicing the Hospital

The hospital transport access guide (reproduced below) indicates the current transport environment at the Hospital.



Figure 5 - Campbelltown Hospital Transport Access Guide¹⁰

¹⁰ https://www.swslhd.health.nsw.gov.au/CEWD/pdf/venues/Campbelltown_TAG.pdf

5.1.1 Road

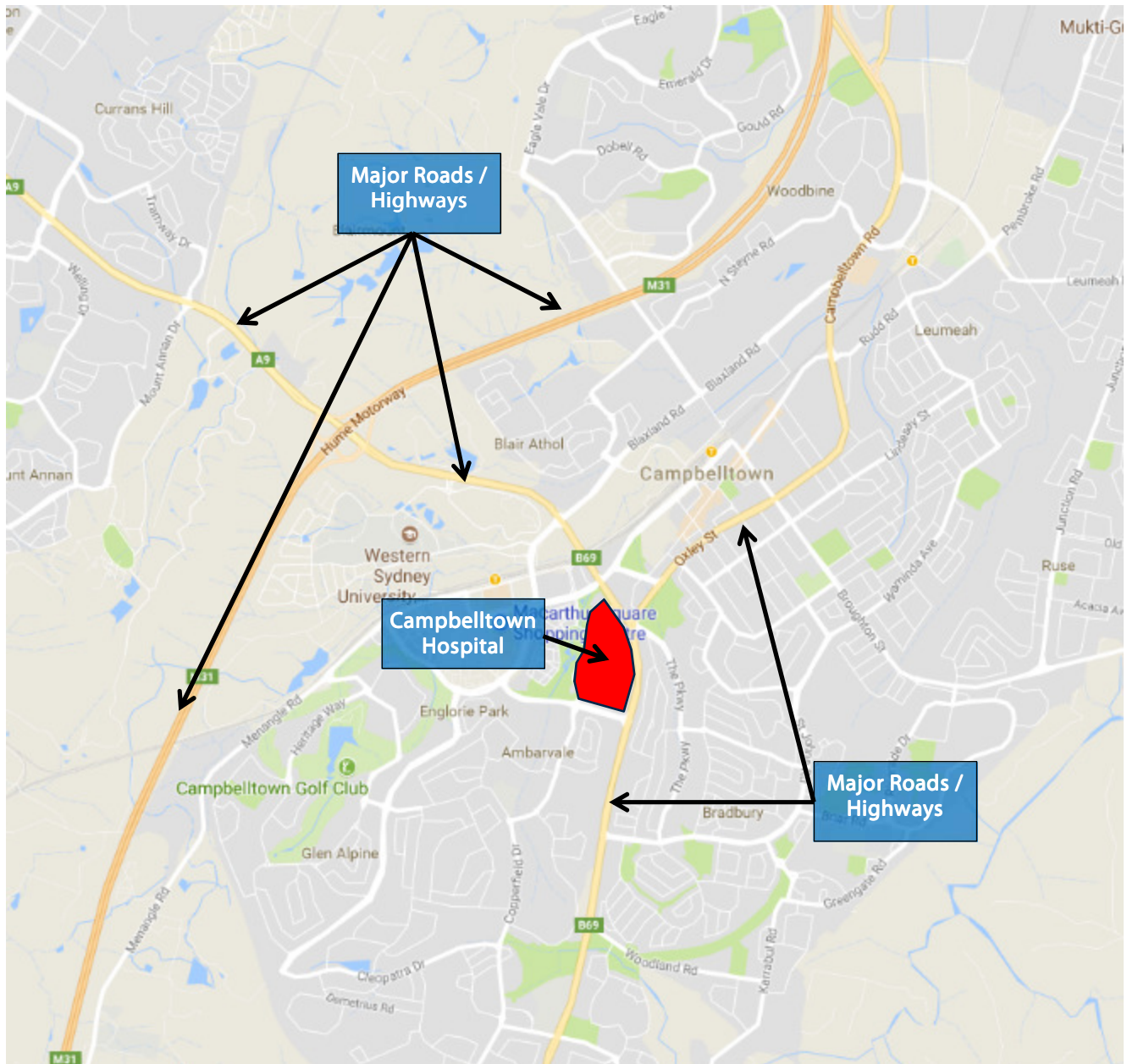


Figure 6 - Road Network Surrounding Campbelltown Hospital

The Hospital has excellent road connections in all directions, making access by car (or motorcycle) relatively easy. It is serviced by the following major local roads:

- North – Narellan Road, M31 Hume Highway and Oxley-Moore-Campbelltown Road
- South – Appin Road and M31 Hume Highway
- East – St John’s Road, The Parkway and Oxley-Moore-Campbelltown Road
- West – Narellan Road and M31 Hume Highway

Additionally, the Hume Highway is located approximately 2km west of the Hospital, providing good road access to the north, south and west of Campbelltown.

5.1.2 Bus

The Hospital is serviced by the following bus routes¹¹:

Table 6 - Bus Routes Servicing Campbelltown Hospital

Bus Route	From	To	Frequency (approx.)	Services operate approx. (Weekdays)	Services operate approx. (Weekends)
870	Campbelltown	Liverpool	Weekday & Sat every 15 mins, Sun every 30 mins	6:02am – 10:00pm	Sat 8:55am – 8:50pm, Sun 8:55am – 7:45pm
870	Liverpool	Campbelltown	Weekday & Sat every 15 mins, Sun every 30 mins	5:56am – 9:41pm	Sat 6:42am – 8:39pm, Sun 7:10am – 8:05pm
871	Campbelltown	Liverpool	Weekday & Sat every 15 mins, Sun every 30 mins	9:18am – 1:15pm	Sat 7:26am – 5:25pm, Sun 7:55am – 3:55pm
871	Liverpool	Campbelltown	Weekday & Sat every 15 mins, Sun every 30 mins	10:07am – 3:07pm	Sat 8:15am – 6:17pm, Sun 9:10am – 7:08pm
872	Campbelltown	Liverpool	Weekday & Sat every 15 mins, Sun every 30 mins	6:01am – 10:30pm	Sat 6:50am – 10:30pm, Sun 7:23am – 9:45pm
872	Liverpool	Campbelltown	Weekday & Sat every 15 mins, Sun every 30 mins	6:08am – 10:16pm	Sat 7:12am – 10:23pm, Sun 7:46am – 9:38pm
887	Wollongong	Campbelltown	Weekday every 30mins (Peak) and 60mins (Off-peak), Weekend 3 services (Sat) and 2 services (Sun)	6:58am – 1:42pm and 4:40pm – 7:36pm	Sat 3 Services and Sun 2 Services
887	Campbelltown	Wollongong	Weekday every 60 mins, Weekend 2 services	7:15am – 6:31pm	2 Services
888	Campbelltown	St Helens Park Loop	Weekday and Sat every 10-20mins, Sun every 30mins	4:29am – 11:56pm	Sat 5:51am – 12:03am, Sun 7:40am – 10:57pm
888	St Helens Park Loop	Campbelltown	Weekday and Sat every 10-20mins, Sun every 30mins	4:12am – 12:21am	Sat 6:14am – 12:28am, Sun 7:08am – 9:22pm

The Hospital is relatively well serviced by bus, with a number of routes and relatively regular services 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.

¹¹ <https://transportnsw.info>

This appears to be confirmed by our surveys, which show 4% of outpatients and 3.7% of visitors utilising bus mode share to travel to the hospital. However only 0.3% of staff utilised bus as their mode share option.

We are advised by BLP¹² that following discussions with Interline Bus Company (Michael Pruss) it is intended to increase bus services to the Hospital from 2018. Current services of 2 per hour (off peak) and 4 per hour (peak) will increase 100% to 4 per hour (off peak) and 8 per hour (peak). We have prepared a sensitivity analysis of how this might affect parking demand, as set out in [Section 0](#).

5.1.3 Heavy Rail

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

Campbelltown Station is on the Cumberland, Southern Highlands, Airport and Inner West & South lines. Macarthur Station is on the Southern Highlands, Airport and Inner West & South lines. Services on these lines provide access to the campus from the north, south, east and west as follows¹³:

Table 7 - Heavy Rail Routes servicing Campbelltown Hospital

Train Line	From	To	Frequency (approx.)	Services operate approx. (Weekdays)	Services operate approx. (Weekends)
Cumberland Line	Schofields	Campbelltown	Every 30 mins	Campbelltown 7:44am – 8:11pm	No Services
Cumberland Line	Campbelltown	Schofields	Every 30 mins	Campbelltown 6:36am – 5:39pm	No Services
Inner West & South Line	Campbelltown	City	Every 30 mins	Campbelltown 3:43am – 12:03am, Macarthur 9:12pm – 11:59pm	Campbelltown 4:03am – 12:09am, Macarthur 11:05pm & 12:05am
Inner West & South Line	City	Campbelltown	Every 30 mins	Campbelltown 5:15am – 2:31am, Macarthur 7:14pm	Campbelltown 4:37am – 2:26am, Macarthur 4:40am & 5:43am-6:13am
Southern Highlands Line	Goulburn	Campbelltown	Weekday every 5-20mins (peak) & 60mins (off-peak), Weekend every 5-15mins (peak) & 2 services every 2 hour (off-peak)	Campbelltown arr. 4:39am–12:02am, Campbelltown dep. 4:50am-12:03am, Macarthur 4:36am–11:59pm	Campbelltown arr. 5:19am–11:23pm, Campbelltown dep. 5:24am – 11:24pm, Macarthur 5:16am – 11:20pm
Southern Highlands Line	Campbelltown	Goulburn	Weekday every 10-30mins (peak) & 60mins (off-peak), Weekend every 5-15mins (peak) & 2 services every 2 hour (off-peak)	Campbelltown arr. 5:11am–12:17am, Campbelltown dep. 5:13am-12:23am, Macarthur 5:16am	Campbelltown arr. 8:24am–12:44am, Campbelltown dep. 6:04am – 12:52am, Macarthur 6:07am

¹² File note from Adam Muggleton dated 7th September 2017

¹³ <http://www.sydneytrains.info/timetables>

Train Line	From	To	Frequency (approx.)	Services operate approx. (Weekdays)	Services operate approx. (Weekends)
				– 12:26am	– 12:55am
Airport Line	Macarthur	City	Weekday every 3-10mins (morning peak) & every 15-30mins (off-peak), Weekend every 30mins	Campbelltown 4:05am – 12:03am, Macarthur 4:31am – 11:59pm	Campbelltown 4:12am – 12:09am, Macarthur 4:31am – 12:05am
Airport Line	City	Macarthur	Weekday every 5-15mins (evening peak) & every 15-30mins (off-peak), Weekend every 30mins	Campbelltown 5:13am – 2:18am, Macarthur 4:31am – 11pm	Campbelltown 4:37am – 2:15am, Macarthur 4:40am – 12:48am

Services via the South Highlands Line and Airport Line are reasonably frequent and offer services throughout the day (from early morning to late evening). The Cumberland Line and Inner West & South Line offer less convenient services (every 30 mins) on weekdays, and there are no services on the Cumberland Line on weekends.

Despite regular services, our surveys showed just 3% of outpatients and 2.9% of visitors utilising heavy rail mode share to travel to the Hospital. Only 0.6% of staff utilised heavy rail (or a combination of heavy rail and bus) as their mode share option. This is mainly because people generally need transit connections between train and bus; the need to change travel modes is indicated in our surveys as a major reason why hospital-related users do not use public transport.

5.1.4 Walking

Walking is only likely to be an attractive option for people who live relatively close to the campus (see Relevant Parking Zone map in next section of this report for details of nearby residential areas).

Walkers might include staff, outpatients and visitors; however, staff on early morning or late evening/night shifts would be unlikely to walk for safety reasons.

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 0.2% of staff walking to work. 1.2% of visitors and no outpatients walked to the Hospital.

5.1.5 Cycling

Similar to walking, cycling is only likely to be an attractive mode share for staff members who live within relatively close distance to the campus.

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

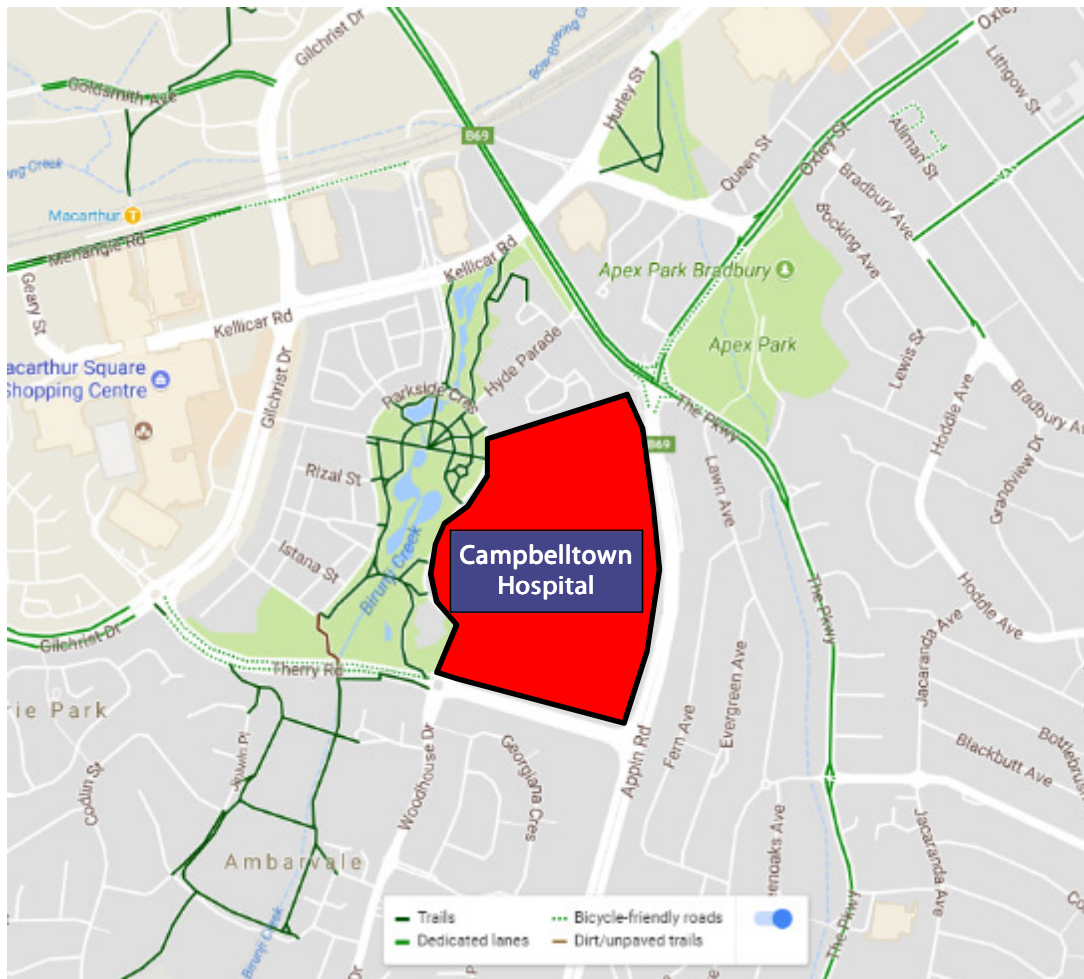


Figure 7 – Bike paths near Campbelltown Hospital

Our surveys of staff indicate that only 0.5% travel to work by motorcycle but none of them cycle, although when asked if they would cycle if end of trip facilities were provided, 12.6% of staff surveyed said that they would be interested.

5.2 Comments

Following our review of the current transport environment at the Hospital, we make the following general comments:

- Transport modes available to Hospital attendees (staff, outpatients and visitors) are primarily road, bus and heavy rail.
- Heavy rail is considered unlikely to be a first-choice mode share for staff, outpatients and visitors as it will ultimately depend on factors such as 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.
- Our surveys at other hospitals (and confirmed by our surveys at the Hospital) have indicated that when patrons have to change transport mode as part of their journey (e.g. rail to bus, bus to bus etc) it becomes a less attractive proposition than if a single mode share can be adopted to their destination.
- In our experience, outpatients and visitors to inpatients attending hospital are already under a certain level of stress; therefore motor vehicle provides them with the easiest option in term of travelling to/from the hospital (i.e. they don't need to plan their journey to any great degree, as they would if using public transport). Also, if an outpatient is in a certain degree of discomfort, public transport does not provide an attractive option in terms of accessibility and comfort.
- Despite multiple mode share options for people attending the Hospital, public transport may not offer a viable option for various reasons, including lack of convenience, lack of flexibility (e.g. staff member who needs to drop off and pick up children), and a lack of services at the required times (e.g. evening and night shift staff may find that services are limited when they need to use them).
- The latter point (lack of services available to staff outside peak hours) means that public transport is only likely to be a practical option for administrative staff and, possibly, day shift staff.
- A further reason why people might not use public transport is that the journey time may take longer than by car, as public transport tends to not directly link point A to point B. Staff surveyed cited this as a major reason for not using public transport.
- Where a reasonable supply of free parking is provided at hospitals (either on or off campus) and the hospital has good road links, driving is likely to be the primary mode share of choice for staff, outpatients and visitors.

Based on all of the above, we are of the view that driver mode share is generally likely to be most attractive for staff, outpatients and visitors at Campbelltown Hospital.

This opinion is supported by our surveys at the Hospital which indicate the following car mode share adopted by staff, visitors and outpatients. Table 8 provides comparison with survey results from other suburban and regional hospitals in NSW. The accessibility to public transport varies by site but all indicate the car is by far the most attractive transport mode for all user groups.

Table 8 – Summary of car mode share at Campbelltown Hospital

Hospital	Car Mode Share		
	Staff	Visitors	Outpatients
Campbelltown Hospital	98%	91%	91%
Gosford Hospital	95%	83%	80%
Nepean Hospital	95%	84%	85%

The above table shows that Campbelltown Hospital has the highest car mode share in comparison with other benchmarked hospitals.

6 Relevant Parking Zone

This section sets out details of the Relevant Parking Zone (RPZ) for the Hospital.

A site visit was carried out on 27th June 2017 to assess the potential supply and demand for parking in the vicinity of the Hospital, and the likelihood of:

- Alternative parking supply for hospital staff, outpatients and visitors.
- Potential for usage of Hospital parking by external parties.

6.1 Relevant Parking Zone

We reviewed a scale plan of the Hospital in order to identify the RPZ, as shown in the plan below. Relevant 'places of interest' are also indicated.

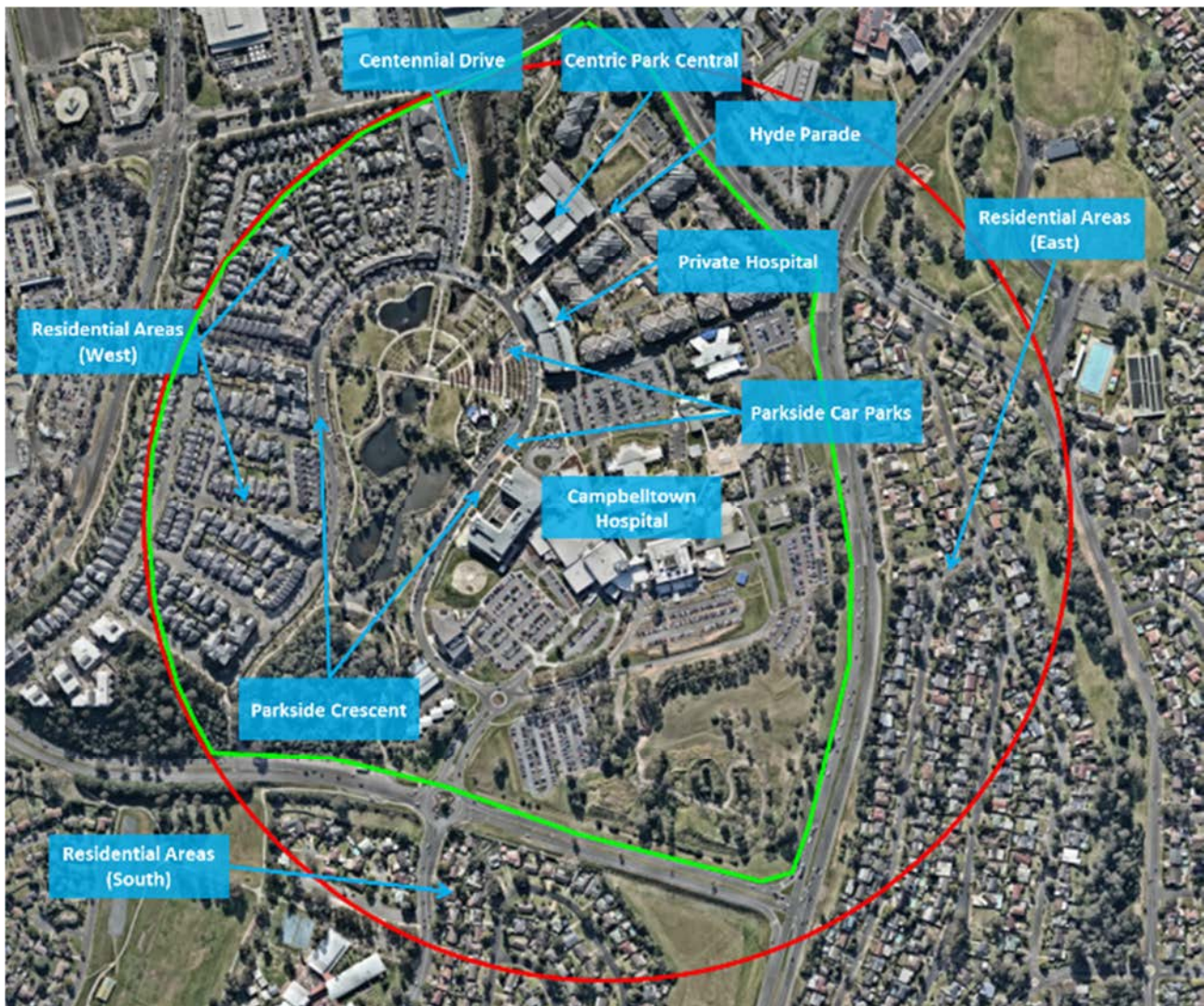


Figure 8 - Relevant Parking Zone (RPZ)

The RPZ was measured using a radius of 500 metres from the approximate centre of the Hospital (see red circle on plan above), considered to be the maximum distance long stay parkers (e.g. dayshift and administration staff) would be prepared to walk to their ultimate destination. However, this distance is unlikely to be an attractive option for afternoon and night shift staff, who would likely to seek to park significantly closer to the Hospital for safety and security reasons.

It is also likely that short stay parkers would want to park significantly closer than 500m, especially with hospital sites where a certain proportion of people with special requirements may need to park closer to their destination e.g. patients with walking difficulties. Special categories of patients would, ideally, require reserved parking immediately adjacent to their destination e.g. oncology, radiology, dialysis etc.

Following our site visit, the areas to the east of the Hospital (across Appin Road) and to the south of the Hospital (across Therry Road) were discounted from the RPZ for the reasons stated in Section 6.3 of this report. **Therefore the RPZ for purposes of this report encompasses the specific streets and residential areas in the area edged in green on the plan.**

6.2 Off-Street Parking within the Relevant Parking Zone

The potential off-street parking options within the RPZ are:

- Campbelltown Private Hospital
- Centric Park Central
- Parkside Car Park 2
- Parkside Car Park 3
- Parkside Car Park 4

However, we have discounted Campbelltown Private Hospital and Centric Park Central mainly because their car parks are clearly signed as being for private use (e.g. Visitors or Tenants), which means parking is 'unauthorised' for Hospital-related users (e.g. staff, visitors, patients etc.) and therefore not a viable long term parking option.

A summary of our observed supply and demand of the three Parkside car parks during the period of our parking surveys is shown in the table below:

Table 9 - Observed supply and demand off-street parking in the RPZ

Weekday Average			Occupied Bays				Occupancy %			
			Average				Average			
Off-Campus Car Park	Bay Type	Capacity	8:00	10:00	12:00	14:00	8:00	10:00	12:00	14:00
Parkside Car Park 2	3P	20	17	20	20	14	85.0%	97.5%	100.0%	70.0%
Parkside Car Park 3	3P	24	20	24	23	22	83.3%	97.9%	95.8%	91.7%
Parkside Car Park 4	1/2P	13	11	13	13	10	84.6%	100.0%	100.0%	76.9%
		57	48	56	56	46	84.2%	98.2%	98.2%	80.7%

The average peak occupancy (98.2%) across our two days of surveys for these car parks occurred between 10.00am - 12.00pm.

6.3 On-Street Parking within the Relevant Parking Zone

There are a number of potential on-street parking locations within the RPZ, as follows:

- Parkside Crescent (east & west).
- Residential area to the west of the Hospital (beyond Parkside Crescent and Centennial Drive).
- Residential area to the south of the Hospital (across Therry Road).
- Residential area to the east of the Hospital (across Appin Road).
- Hyde Parade.
- Centennial Drive.

The locations of these areas relative to the Hospital RPZ are shown in the map in Section 6.1 of this report.

All of the residential areas generally have free, unrestricted on-street parking.

Following our site visit, we largely discounted the residential areas to the south and east of the Hospital for the following reasons:

- The residential area to the south has to be accessed by crossing Therry Road, a dual-carriageway with no signalised crossing point for pedestrians. Utilisation of on-street parking was minimal except for the road adjacent to Thomas Reddall High School (Jaggars Place).
- The residential area to the east is not easily accessible due to limited pedestrian access across Appin Road, a major arterial dual-carriageway, and limited access to the hospital itself from that side of the campus.

A summary of our observed viable supply and demand of the key areas of focus during the period of our parking surveys is shown in the table below:

Table 10 - Summary of On-Street Parking Supply & Demand within the RPZ

Weekday Average Street	Bay Type	Capacity	Occupied Bays				Occupancy %			
			8:00	10:00	12:00	14:00	8:00	10:00	12:00	14:00
Parkside Cres East	3P & 7 Dropped-off bays	96	49	80	82	81	51.0%	83.3%	84.9%	84.4%
Parkside Cres West	3P & Unrestricted	156	66	77	89	83	42.3%	49.4%	57.1%	52.9%
Residential Area to the west of Parkside Cres	Unrestricted	140	50	48	42	43	35.7%	33.9%	30.0%	30.7%
Residential Area to the west of Centennial Drive	Unrestricted	93	40	43	44	44	42.5%	45.7%	46.8%	46.8%
Hyde Parade	2P	29	24	29	29	28	82.8%	98.3%	98.3%	94.8%
Centennial Dr	3P & Unrestricted	50	34	43	41	37	67.0%	85.0%	82.0%	73.0%
Total		564	262	318	326	314	46.5%	56.4%	57.7%	55.7%

Comments are as follows:

- There are approximately a total of 564 on-street parking bays within the RPZ¹⁴.
- Average peak occupancy across our two days of surveys¹⁵ was 326 bays (57.7% of capacity). This occurred at 12.00pm however we observed a similar occupancy at 10.00am and 2.00pm.

¹⁴ Approximate, as individual bays are not all line marked

6.3.1 Parkside Crescent (east)

This street provides the closest 3 hour free on-street parking to the Hospital, the Private Hospital and Centric Park Central.



Figure 9 - Parkside Crescent (East)

Staff (all-day parkers) would be unlikely to park here and risk a parking infringement.

6.3.2 Parkside Crescent (west)

This street is located approximately 350m - 400m from the Hospital main entrance, although the actual walking distance is slightly longer as there is no direct path across the parklands to the Hospital.



Figure 10 - Parkside Crescent (West)

6.3.3 Residential Areas to the west of Parkside Crescent and Centennial Drive

This area is located approximately 400m – 500m from the Hospital main entrance, thus is at the edge of the RPZ. It comprises streets such as Regents Street, Santana Road, Istana Street, Bairin Street, Rizal Street, Paley Street, Linn Street, Hampstead Road and La Rambla Crescent. Some of these locations are shown in the photographs below.



Figure 11 - Residential Areas to the west of Parkside Crescent and Centennial Drive

6.3.4 Hyde Parade

This street is located between Parkside Parade and Narellan Road. Parking is generally restricted to 2 hours maximum stay, although is free of charge.



Figure 12 - Hyde Parade

Staff (all-day parkers) would be unlikely to park here and risk a parking infringement.

6.3.5 Centennial Drive

This street is located at the northern end of Parkside Crescent and is approximately 400m from the Hospital, although only 100m – 150m from the Private Hospital and Centric Park Central.



Figure 13 - Centennial Drive

6.4 Summary and Conclusions

Our survey of the RPZ indicates that current alternative parking supply for use by Hospital staff, outpatients and visitors, within reasonable, practical distance comprises an approximate total of 621 spaces (564 on-street bays and 57 off-street bays), excluding 'unauthorised' locations such as Campbelltown Private Hospital and Centric Park Central, summarised as follows:

Table 11 - Total Off-Campus Parking Supply

Location	Bay Type	Restricted Bays	Unrestricted Bays	Total Bays
Off-Street Car Parks				
Parkside Car Park 2	3P	20	N/A	20
Parkside Car Park 3	3P	24	N/A	24
Parkside Car Park 4	1/2P	13	N/A	13
Subtotal Off-Street Bays		57	N/A	57
On-Street Bays				
Parkside Cres East	3P 6.30am-3.30pm Mon-Fri	96	N/A	96
Parkside Cres West	3P and Unrestricted	27	129	156

Location	Bay Type	Restricted Bays	Unrestricted Bays	Total Bays
Residential Area to the west of Parkside Cres	Unrestricted	N/A	140	140
Residential Area to the west of Centennial Dr	Unrestricted	N/A	93	93
Hyde Parade	2P 8am-6pm Mon-Fri, 8am-1pm Sat	N/A	29	29
Centennial Dr	3P and Unrestricted	36	14	50
Subtotal On-Street Bays		159	405	564
Total (all bays)		216	405	621

All of the parking within the RPZ is free of charge, comprising unrestricted parking mainly in the Residential Areas to the west of Parkside Crescent and Centennial Drive and time restricted (3P or 2P) parking on Parkside Crescent, Centennial Drive and Hyde Parade.

This makes it a viable option for staff, outpatients and visitors who, for whatever reason, do not want or are unable to park in the on-campus car parks provided by the Hospital, for example:

- When the visitor car parks in front of the hospital are at capacity (which, from our survey, does appear to be the case during most of the daytime) visitors may seek a parking space in the RPZ and walk to the Hospital.
- Staff may park in residential areas in preference to the on-campus staff car parks as at peak times our surveys indicate that on-campus staff parking is fully utilised, and Parkside Crescent provides relatively easy access to the north and south via Centennial Drive / Narellan Road and Parc Guell Drive / Gilchrist Drive.

It is not possible to state exactly how many off-campus spaces are used by Hospital-related parkers as vehicles may result from parking demand generated by other major 'entities' in the area, such as:

- Private Hospital
- Centric Park Central
- visitors to the parklands area
- visitors to residents
- residents parking on-street

As noted in Section 5, however, afternoon and night shift staff would be unlikely to use off-campus parking due to safety and security reasons.

7 Surveys undertaken at Campbelltown Hospital

In addition to the site visit of 27th June 2017 we undertook survey works at the Hospital to assist in building the demand model for parking at the campus.

The parking and intercept surveys were conducted over a period of two weekdays on Wednesday 19th and Thursday 20th July 2017, between 8am-6pm each day. The staff survey was run over a period of 13 days from 18th July 2017 to 30th July 2017.

The date for the surveys was chosen in consultation with the Hospital as the (normally) busiest days of the week, although noting that University Students may not be present due to university holidays.

The timing was chosen so that we captured the morning and afternoon peak periods which, in our experience, are respectively at around 11am (when outpatient activity is at its peak and wards are open for visitors) and 2pm when the afternoon shift changeover occurs.

A range of surveys were carried out, as follows, to gain insight into parking behaviours and demand, including:

- Car park occupancy surveys, across the entire campus parking supply, at hourly intervals.
- Vehicle length of stay surveys of Visitor car parks CP6 and CP8.
- Staff surveys. These were undertaken via an online survey (using SurveyGizmo). A total of 600 responses were obtained.
- Intercept (face to face) surveys of people entering the hospital. A total of 404 responses were obtained.

7.1 Occupancy Surveys

Occupancy surveys were conducted of all Hospital car parking (staff and visitor), at hourly intervals. The main objectives of the surveys were to:

- Observe peak parking demand on weekdays.
- Understand which parking areas are more highly utilised than others.
- Utilise this data to cross-verify the estimated peak parking demand from our demand modelling, to ensure accuracy of the demand model.

The occupancy survey results are shown in **Appendix A**.

7.1.1 Overview

As noted earlier in this report (and repeated here for ease of reference) the Hospital has the following supply of on-campus parking for staff, outpatients and visitors. A map showing the locations of these car parks are provided as below:



Figure 14 - Locations of Campbelltown Hospital Car Parks

The following table summarises the capacity of these car parks:

Table 12 - Capacity of Campbelltown Hospital On-Campus Car Parks

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

Despite the above 'formal' allocations please note our earlier comment that because all parking at the Hospital is free of charge and visitor car parks are not time restricted, we believe that utilisation of CP6, CP8 & CP9 (in particular) is likely to be a mix of staff and public.

The occupancy profile for the Hospital campus (outlined in yellow) over a "typical" weekday is illustrated in the heat maps below; Green, being occupancy of less than 50%, Amber occupancy between 50%-85% and Red occupancy greater than 85%.

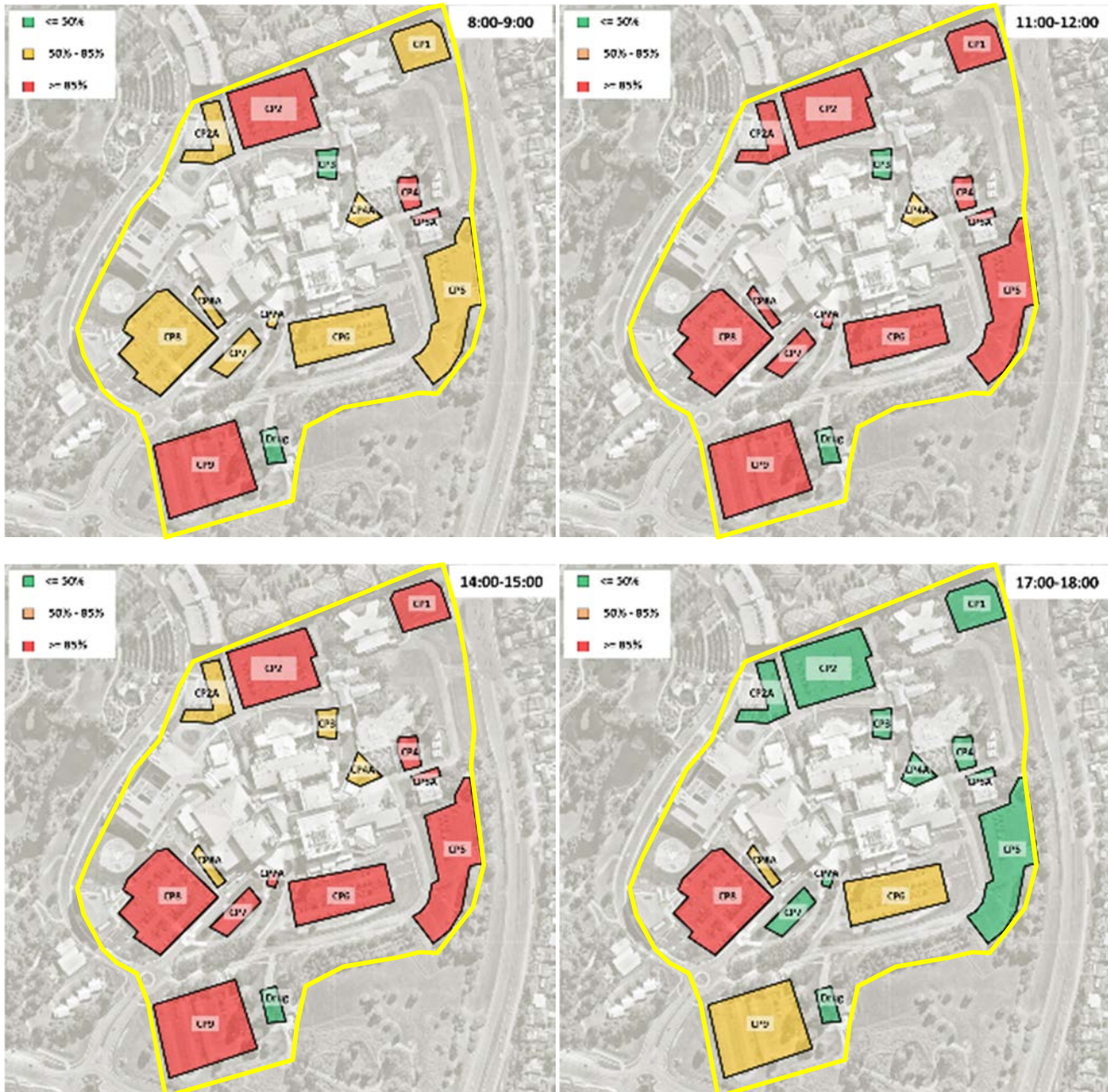


Figure 15 - Parking profile "typical" weekday

Graphically, the car park occupancy profile is as shown below.

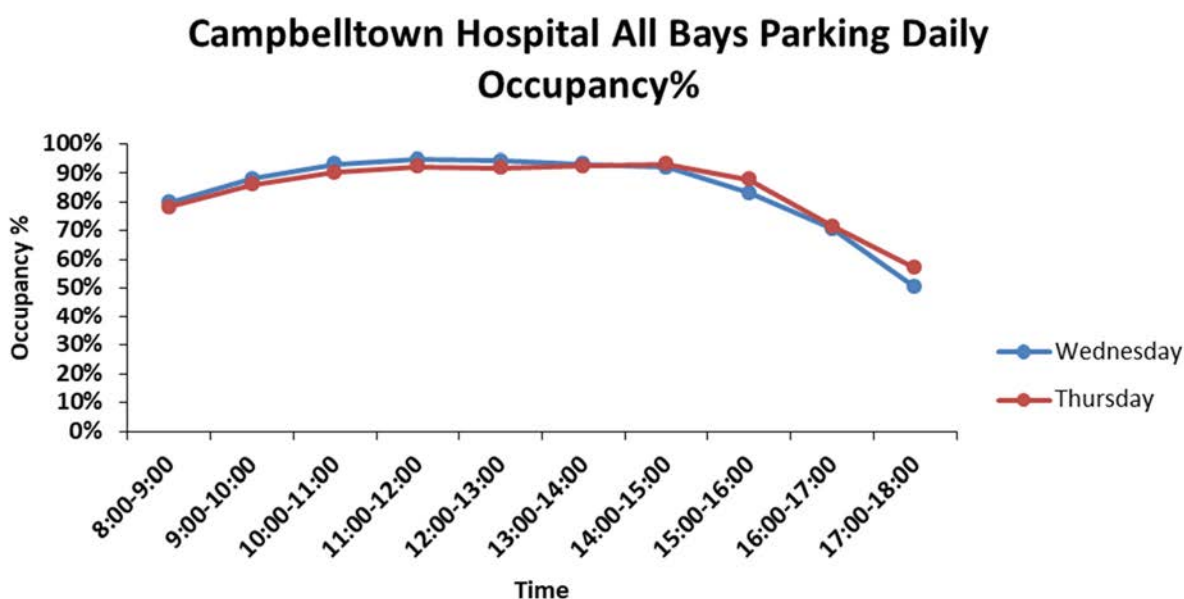


Figure 16 - Car Park Occupancy Profile Chart

Absolute peak occupancy of 1,212 bays (94.7% of total capacity) occurred at approximately 11.00am-12.00pm on 19th July 2017 (Wednesday), as summarised in the following table.

Table 13 - Car Park Occupancy Survey Results

Occupied Bays Summary	Capacity	8:00- 9:00	9:00- 10:00	10:00- 11:00	11:00- 12:00	12:00- 13:00	13:00- 14:00	14:00- 15:00	15:00- 16:00	16:00- 17:00	17:00- 18:00
Wednesday	1280	1022	1125	1191	1212	1207	1193	1178	1063	905	645
Thursday	1280	1002	1102	1154	1181	1174	1182	1191	1124	915	732
Average	1280	1012	1114	1173	1197	1191	1188	1185	1094	910	689

Average peak occupancy across the two weekdays of surveys was 1,197 bays (93.5% of capacity) at 11.00am – 12.00pm.

A breakdown of the 85 available bays at peak on Wednesday 19th July 2017 is as follows:

Table 14 – Breakdown of available bays at peak

Bay Type	Available
Disabled (Public)	2
PACS Permit (Patients)	7
Client Only (Drug Advisory)	5
Staff	45 ¹⁶
Fleet	5
Disabled (Staff)	3
Pathology	1
Total	68

Comments:

- The majority of available bays were in the designed Staff and/or Special parking areas for staff (66% of total available bays).
- This appeared to be a common theme during our surveys and may suggest that these areas are underutilised.
- Of the remaining available bays, none were available to 'general' users, without special permits (e.g. disabled permit).

When peak occupancy in a car park is in excess of 90%-95%, the industry view is that it is operating at practical capacity as, in the absence of a parking guidance system to direct parkers to the last few available bays, there will always be some 'hard to find' bays which remain unoccupied. Our surveys of the parking bays at the Hospital indicate that the car parks are operating within, or in excess of, this range. We therefore conclude that parking at the Hospital is at practical capacity.

¹⁶ 27 relate to Shift Changeover spaces chained off

7.1.2 Staff Parking

For the purposes of our surveys we assumed that all parking at Car Park 4 & 4A (Waratah House) and Car Park 9 (Staff Car Park 3) are staff-related.

A summary of the occupancy survey results are shown in **Appendix A**. Graphically, occupancy of staff bays is as shown below.

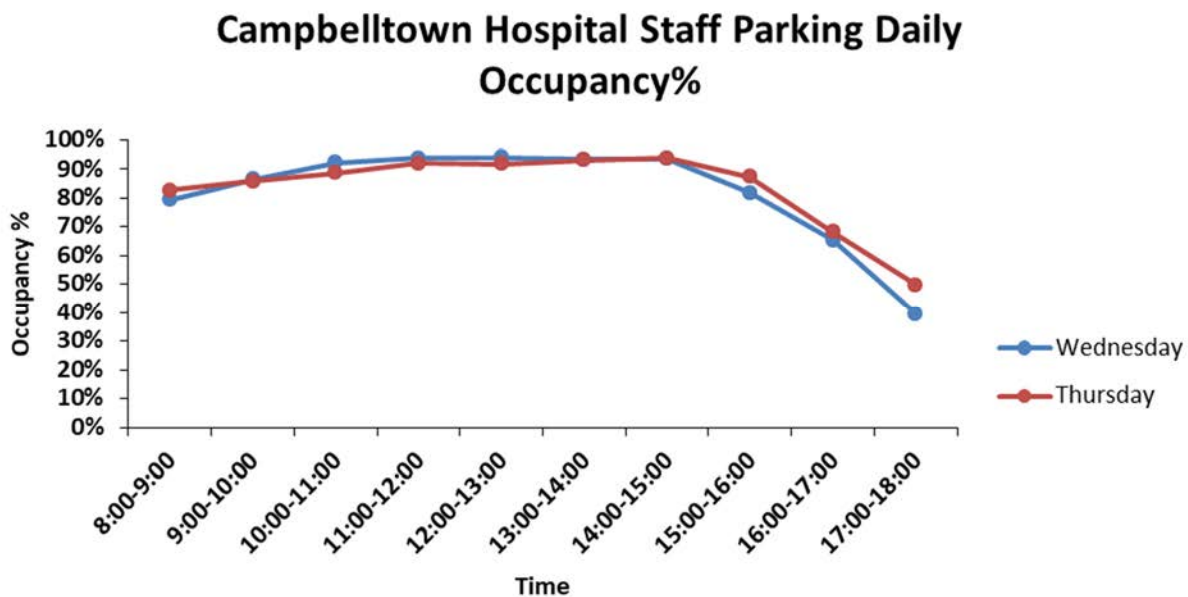


Figure 17 – All Staff Bays Daily Occupancy

The parking profile is as we would expect for hospital staff parking, with relatively high occupancy (approximately 80%) from the start of the day, peaking during approximately 1pm – 3pm on each day. Based on our experience from other major hospitals, it is normal to see peak staff parking demand at this time of day, as afternoon clinical shift arrive before all day clinical shift have left.

The peak occupancy of staff bays at the Hospital Campus is summarised in the following table.

Table 15 - Staff Parking Peak Occupancy

Staff Bays Peak Occupancy				
11:00-12:00	Capacity	Wed 19th Jul	Thu 20th Jul	Average
Occupied Bays	879	825	809	817
Occupancy %	879	93.9%	92.0%	92.9%

Graphically, peak occupancy is as shown below:

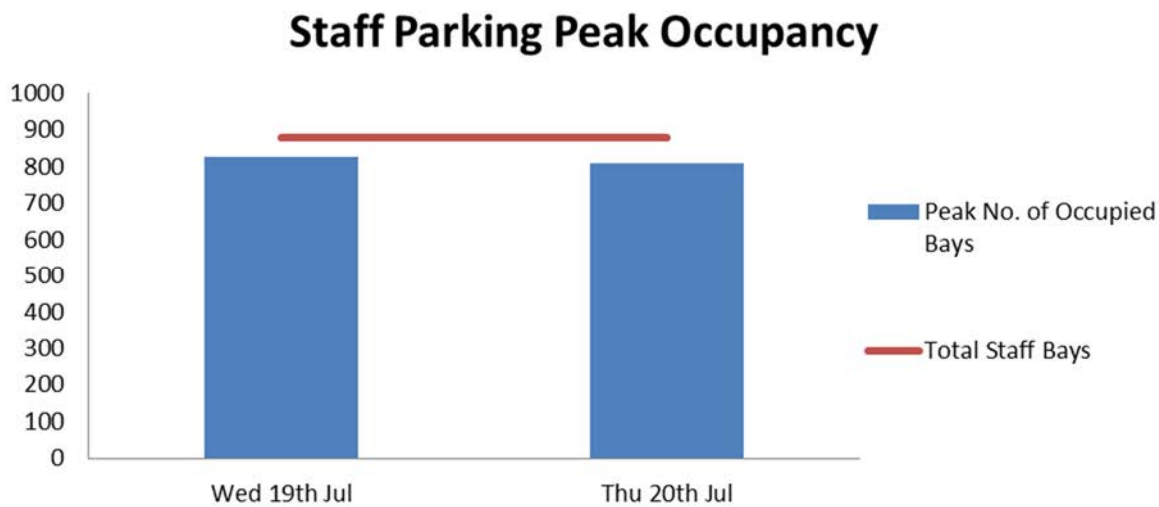


Figure 18 - Staff Parking Peak Occupancy vs. Total Staff Capacity

During our surveys we also observed Car Park 9 (staff car park 3) which had usage in excess of the line marked capacity, with vehicles parked on grass verges (as noted in Section 3.3). Average volumes seen were approximately 45 cars during peak hours. These volumes are in addition to those quoted in Table 15 above.

Weekend occupancy was not surveyed (not in scope), although is likely to be significantly lower than weekday, as fewer clinical and administration staff are on campus and there is no material outpatient activity at the Hospital.

7.1.3 Public Parking

Public parking comprises car parks primarily for outpatients and visitors to inpatients, although these car parks will also be used by other visitors to the Hospital (e.g. those attending meetings etc).

The results of our public parking occupancy surveys are shown in **Appendix A**. Graphically, occupancy of public bays is as shown below.

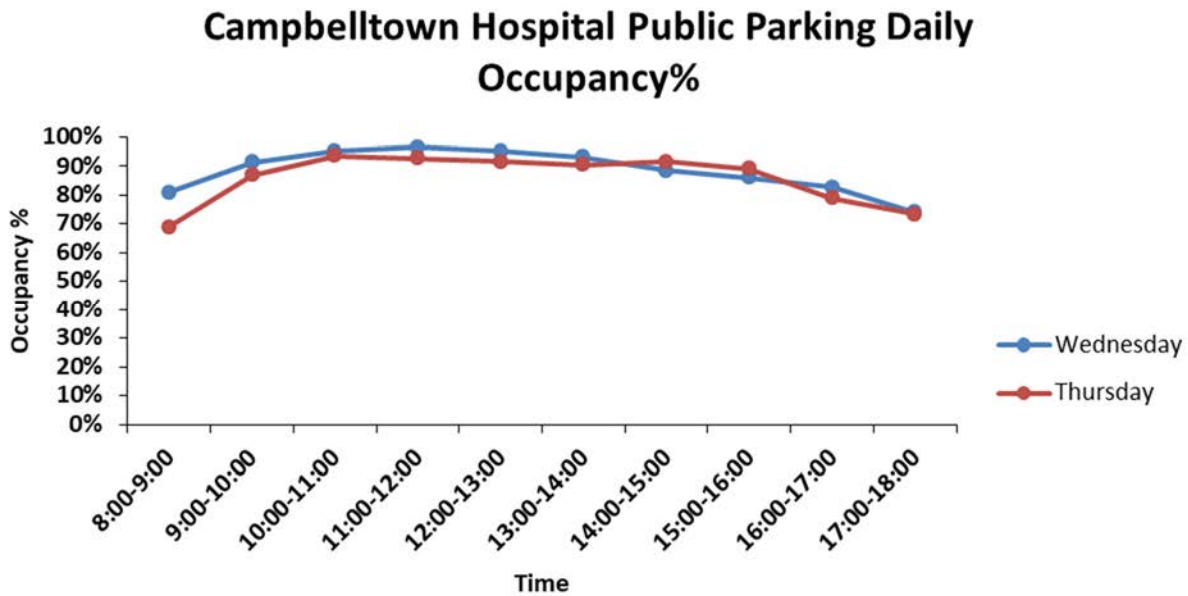


Figure 19 - All Public Bays Daily Occupancy

The parking profile appears to follow a relatively similar pattern across the two survey days. Demand builds relatively strongly from early morning, peaking at approximately 10.00am – 12.00pm on each day. Based on our experience from other major hospitals, we would expect to see peak parking demand at this late morning period, as outpatient activity is usually at its height and morning visiting hours are in operation.

The peak occupancy of public bays at the Hospital Campus is summarised in the following table.

Table 16 - Public Parking Peak Occupancy

Public Bays Peak Occupancy				
10:00-12:00	Capacity	Wed 19th Jul	Thu 20th Jul	Average
Occupied Bays	401	387	372	380
Occupancy %	401	96.5%	92.8%	94.6%

Graphically, peak occupancy is as shown below:

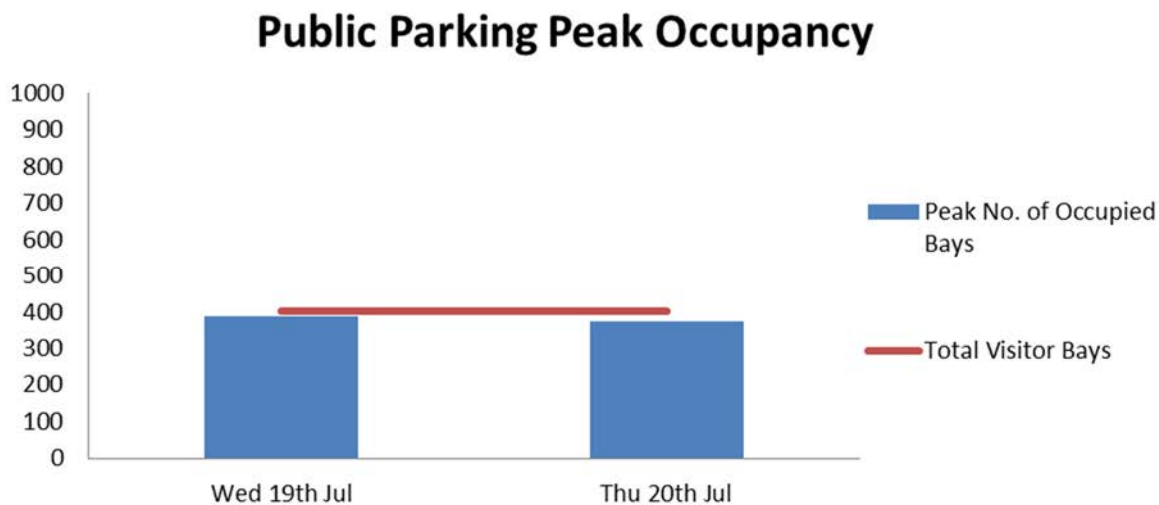


Figure 20 - Public Parking Peak Occupancy vs. Total Public Capacity

During our surveys, we also observed vehicles 'cruising' the main visitor car park (CP8) seeking a parking space, which indicates a shortage of public parking. However, we believe that the following may be exacerbating this situation:

- Staff parking in visitor car parks – our length of stay surveys support this comment
- Inadequate wayfinding signage at the Hospital entry, advising visitors that additional public parking is available in CP6. Appropriate signage is considered vital at this point as CP6 is not visible from the Hospital entry, whereas CP8 is, making this car park the likely first choice for drivers.

In a situation, as at the Hospital, where all parking is free and uncontrolled it is likely that there will be incidence of staff parking in whichever car park is most convenient, which sometimes may be a visitor car park and therefore create an issue of a lack of visitor parking. In these circumstances, a strong communications strategy should be undertaken to staff requesting them to not use the visitor car parks. We did note some signage in the visitor car parks informing staff not to park (i.e. no staff parking between 6.00am and 2.00pm) but our surveys would indicate that this is not being adhered to by some staff. Therefore, appropriate monitoring and enforcement should be undertaken so that offenders are identified and spoken to.

7.1.4 Conclusions

Key conclusions from our occupancy surveys are as follows:

- Based on recorded absolute peak occupancy of 1,212 bays (94.7% of capacity) on Wednesday 19th July 2017, and average peak occupancy across the two days of surveys of 1,197 bays (93.5% of capacity), staff and public parking appears to be operating at practical capacity.
- Of the 68 bays available at Wednesday peak (capacity 1,280 bays – occupancy 1,212 bays), none were available for 'general' parking for visitors and outpatients.
- At peak, the car parks appear to be 68% occupied by staff and 32% by patients / visitors. Based on our experience of other hospitals, a 65% / 35% split is reasonable.

- The Hospital may wish to explore ways of improving management of parking; keeping more spaces available for outpatients and visitors by, for example, chaining off sections of visitor car parks until (say) 8.30am (or such time that outpatients attending clinics are not inconvenienced) so that these are not parked out by staff.
- This will, of course, reduce the preferred parking availability for staff who may then be incentivised to make better use of the staff car parking or have to park in the residential areas to the west of Parkside Crescent and Centennial Drive. Alternatively, staff may carpool or arrange to be dropped off and not park.
- The Hospital should consider improving wayfinding signage to direct public to alternative parking (i.e. CP6).

7.2 Visitor Car Park Length of Stay Surveys

We undertook vehicle length of stay surveys of all parking bays in Car Park 6 (Visitor Car Park 1) and Car Park 8 (Visitor Car Park 2) over a period of two weekdays (Wednesday 19th July and Thursday 20th July 2017) to understand the average length of stay of outpatient and visitor vehicles and the average number of times the bays turnover each day, for use in our parking demand modelling.

The results of our surveys are contained in **Appendix B**.

We assumed that vehicles parking less than 5 hours belong to patients and/or visitors. A summary of the average length of stay and parking bay turnover results for patient and/or visitor vehicles is as follows:

Table 17 – Patient & Visitor Length of Stay and Bay Turnover

Patient & Visitor Parking	
Average Length of Stay	2.22 Hrs/Car
Parking Space Turnover	3.91 Cars/Bay

The modal average length of stay is 0 – 2 hours, as demonstrated by the chart below:

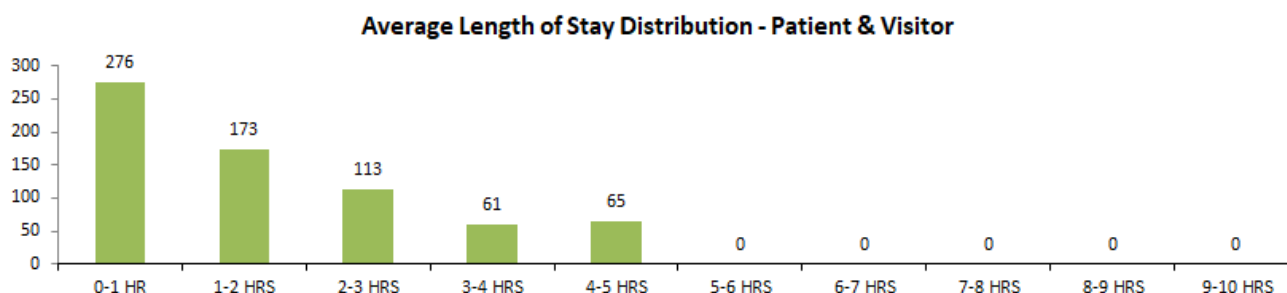


Figure 21 - Patient / Visitor Length of Stay Distribution

Based on our experience of other hospitals, we would expect that most patients / visitors would stay for up to 2 hours, however the data shows that some are also staying considerably longer (up to 5 hours). As parking is currently free of charge and unrestricted there is, of course, no incentive for patients / visitors to exit the car park as quickly as they can, or to be dropped off (and not park) if they expect to be at the Hospital for some time.

Outpatient length of stay will also be impacted by how quickly the Hospital is able to service those patients.

The surveyed parking bay turnover (3.91 times) is higher than that observed at a number of other NSW public hospitals, as shown in the following table:

Table 18 - NSW Hospital Patient/Visitor Parking Bay Turnover Data

Hospital	Bay Turnover
NSW Benchmark Hospitals	2.52 - 3.34
Campbelltown Hospital	3.91

Higher turnover rates mean that fewer parking spaces are required to service the total number of cars attending site in a day. The relatively high turnover rate at the Hospital is likely influenced by the modal length of stay of 0 – 2 hours.

7.3 Online Staff Surveys

We undertook surveys of staff at the Hospital, to understand:

- How they travel to work
- If they drive:
 - Where do they park
 - How many people are in the vehicle
 - Why they do not use public transport
 - Would they be interested in car sharing
 - Would they be interested in cycling to work, if appropriate end of trip facilities were provided (i.e. lockers and showers)

This data was used to construct our estimates of parking demand.

The surveys were undertaken online via "Survey Gizmo".

We obtained a total of 600 responses, which equates to approximately 32%¹⁷ of the estimated staff FTE.

Statistically, a response rate of this magnitude provides a robust basis for analysis.

¹⁷ *Surveyed Staff / (Clinical FTE (Hospital+Mental Health) + Administration Staff (Hospital+Mental)) = 600/(1101+767)=32%*

A breakdown of staff respondents by shift is as follows:

Table 19 - Breakdown of Staff Survey Respondents

Staff Type / Shift	Number surveyed	% of total surveyed
Day Shift	255	42%
Afternoon Shift	57	10%
Night Shift	18	3%
Administration / Office Hours	148	25%
VMO	12	2%
Volunteer	8	1%
Other ¹⁸	102	17%

A summary report of staff responses to all questions can be found in **Appendix C¹⁹**.

In this section of the report we will analyse the responses to questions relating to actual mode share. Later in the report we will analyse the responses to questions relating to ways of reducing car mode share (e.g. appetite for car sharing and cycling).

A summary of the key mode share responses from all staff at the Hospital (irrespective of shift) is as follows:

1. How do you normally travel to work?

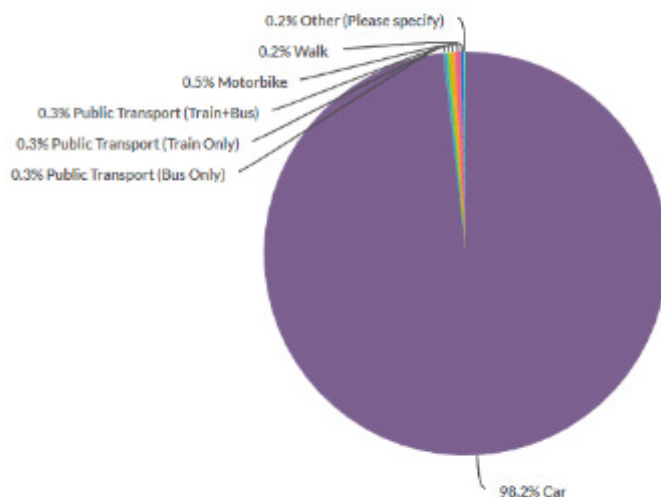


Figure 22 - Staff Mode Share Results

- Car mode share is the primary choice of staff at the Hospital (98.2%).

¹⁸ On call, rotating roster, various different shifts per week etc.

¹⁹ Note that not all questions were answered by all respondents; therefore the answers to some questions may not add up to the total number of responses.

- Only 0.9% of staff travel by public transport (0.3% by Bus Only, 0.3% by Train Only and 0.3% by Train & Bus).
- 0.5% of staff travel by motorcycle; none cycle.
- 0.2% of staff walk

2. In the car you travel to work in, how many people are in the car (including the driver)?

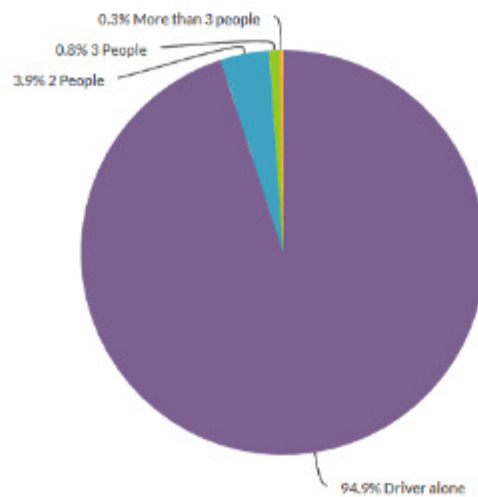


Figure 23 - Staff People per Car Results

- 94.9% of staff who drive to work, do so alone.
- 5.1% of vehicles have more than one person. These may be car sharing or family members travelling together.

3. Do all the people in the car work at Campbelltown Hospital?

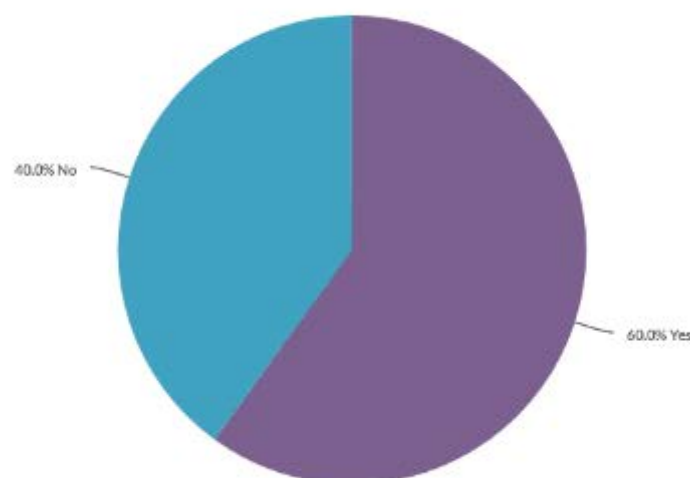


Figure 24 - Staff People per Car Work Location Results

- Where there is more than one person in a vehicle 60% work at the Hospital, suggesting a degree of car sharing.

4. When coming to the Hospital, where do you normally park?

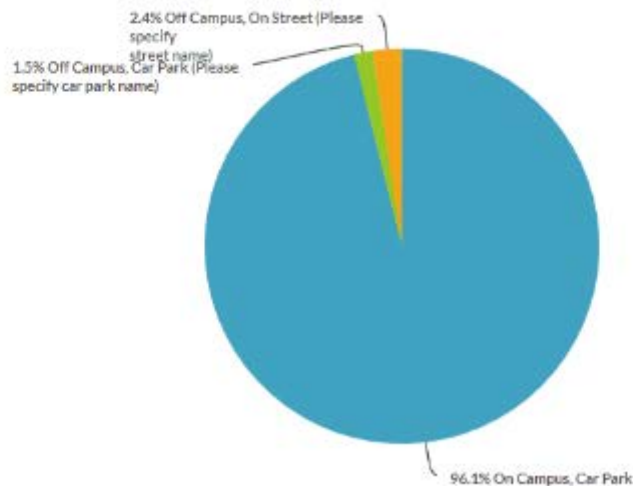


Figure 25 - Staff Parking Location Results

- Of staff that drive 96.1% park in the Hospital car parks.
- Only 3.9% park in off campus parking (2.4% on street; 1.5% off street primarily in the Coopers Cottage)
- No staff are dropped off.

Our surveys showed only 5 staff respondees adopted public transport mode share. Three of them did not own or have access to a car, and two did not drive as driving is more expensive than public transport.

6. You have indicated you travel to work by car, for which reasons do you not use public transport? (Please tick all that apply)

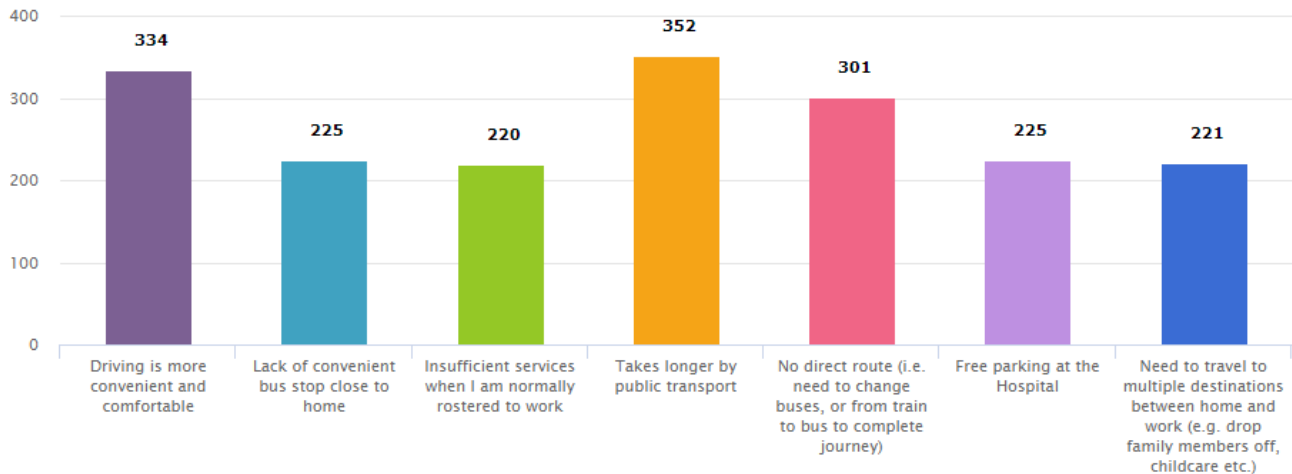


Figure 26 - Staff reasons for driving rather than using Public Transport

- The primary reason given for not using public transport is that public transport takes a longer time than driving.
- The next highest responses are driving is more convenient and comfortable and no direct route.
- Other main reasons are free parking at the Hospital, lack of convenient bus stop close to home, need to travel to multiple destinations between home and work and insufficient services.
- These responses are broadly similar to surveys we have conducted at other regional public hospitals, where public transport does not provide a viable option for the majority of staff, for the reasons shown above.

7.3.1 Conclusions

Key findings from our surveys are as follows:

- 98.2% of staff drive to work
- 94.9% drive alone
- 96.1% park in the hospital car parks
- No staff are dropped off, which means 98.2%²⁰ (100% staff that drive to work) require a parking space somewhere (on or off campus).

²⁰ Calculation: 98.2% drive, 100% of those require a park = 98.2% driving and require a parking space somewhere (on or off campus)

7.4 Intercept Surveys

Intercept (face to face) surveys of outpatients, visitors to inpatients and others (e.g. contractors) were undertaken at the Hospital over two weekdays (19th and 20th July 2017).

The primary objectives of the surveys were to understand:

- How outpatients and visitors travel to the Hospital.
- If they drive:
 - Where do they park.
 - The number of people in each vehicle.
 - Their expected length of stay.

This data was used to construct our parking demand estimates.

During the intercept surveys PTC obtained a total of 344 responses from outpatients and visitors. This equates to approximately 26%²¹ of our estimated number of outpatients and visitors attending the Hospital each day.

We aim to have a sample size of at least 10% of outpatients and visitors, so the achieved 26% provides a reasonable sample.

The results of the intercept surveys are shown in **Appendix D**.

The breakdown of people surveyed is as follows:

Table 20 - Breakdown of Intercept Survey Respondents

Category	Number surveyed	% of total surveyed
Outpatients	101	25%
Inpatients	29	7%
Visitors	243	60%
Contractor	8	2%
Student	15	4%
Other	8	2%
Total	404	100%

²¹ *Surveyed Outpatients and Visitors / (Outpatients per day + Visitors per day) = 344 / (828+513) = 26%*

7.4.1 Outpatients

Outpatient transport mode share results are summarised as follows:

Table 21 - Outpatients Transport Mode Share Results

Mode of Transport	%
Car	91.1%
Public Transport (Bus Only)	4.0%
Public Transport (Train + Bus)	3.0%
Taxi	2.0%

- The mode share results indicate that the primary mode of transport for outpatients is driving.
- The car mode share result of 91.1% is higher than PTC's comparative studies at Gosford Hospital (80%) and Nepean Hospital (85%).
- 7% of outpatients travel by public transport to the Hospital (4% by Bus and 3% by Train+Bus).
- Taxi usage (2%) is in line with Gosford Hospital (2%), but lower than Nepean Hospital (5%).
- Main reasons given for adopting car mode share rather than public transport are outlined in the graph below.

6. For what reasons did you drive and not use public transport? (Please tick all that apply)

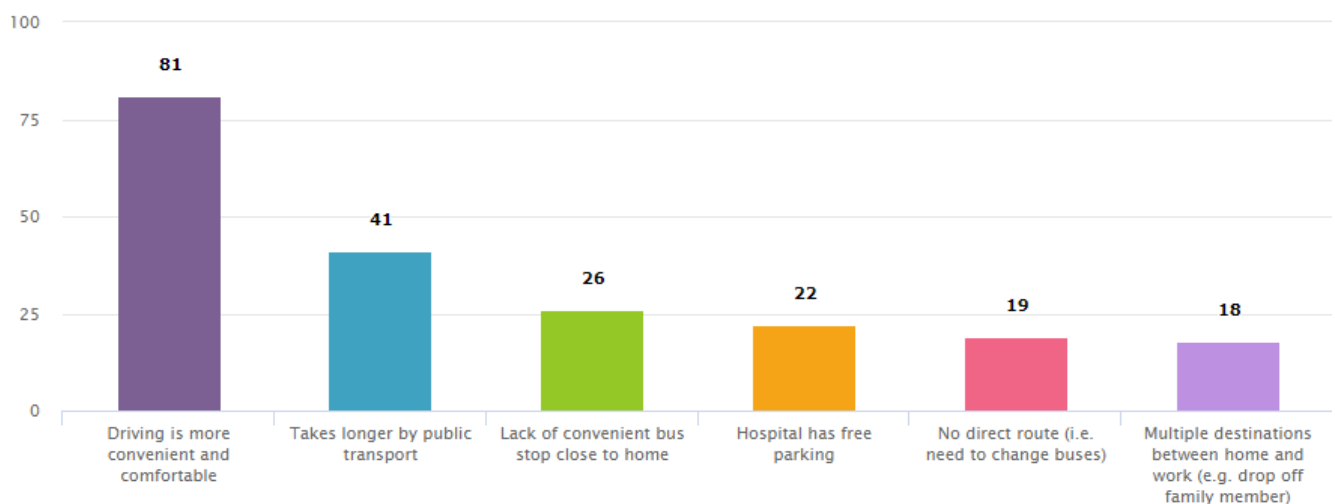


Figure 27 – Outpatient reasons for not using public transport

- The primary reason given for not using public transport is that driving is more convenient and comfortable.
- The next highest response is taking longer by public transport than by car.

- Other main reasons are lack of convenient bus stop close to home, free parking at the Hospital, no direct route and multiple destinations between home and work.

The parking location of outpatients travelling by car is as follows:

Table 22 - Outpatient Parking Locations

Parking Location	%
Hospital Car Parks	75.3%
Off campus - On-Street	5.4%
Off campus – Car parks	4.3%
Dropped off and did not park	15.1%

- Of outpatients that drive 75.3% park in the Hospital car park.
- The % of outpatients dropped off (15.1%) is lower than Gosford Hospital (23%) and Nepean Hospital (28%), however is still relatively significant.
- This may be due to a perceived lack of parking at the Hospital.
- Of the outpatients that parked off campus 5.4% parked on street and 4.3% parked in car parks.

Number of people per car results are summarised as follows:

Table 23 – Outpatient Number of People per Car

No. of People per Car	%
Driver alone	36.6%
2	41.9%
3	16.1%
>3	5.4%

- Where the number of people per car is greater than one, in our experience generally only one person is likely to be the outpatient.

Expected length of stay results are summarised as follows:

Table 24 – Outpatient Expected Length of Stay

Outpatients	Hours
Average expected length of stay	1.68

- Data from our car park length of stay surveys showed an average length of stay of 2.22 hours.
- It appears that outpatients marginally under-estimated their expected length of stay, compared with our surveys of the car park.
- Note, however, that the car park includes outpatients and visitors to inpatients therefore an exact comparison is not possible; however the data does provide a reasonable indication.

7.4.2 Visitors to Inpatients

Visitor mode share results are summarised as follows:

Table 25 – Visitor to Inpatient Transport Mode Share Results

Mode of Transport	%
Car	90.5%
Public Transport (Bus Only)	3.7%
Public Transport (Train+Bus Only)	2.9%
Taxi	0.8%
Bicycle / Motorcycle	0.4%
Walk	1.2%
Other	0.4%

- The mode share results indicate that the primary mode of transport for visitors is driving.
- The car mode share result of 90.5% is higher than Gosford Hospital (83%) and Nepean Hospital (84%).
- 6.6% of visitors travel by public transport to the Hospital (3.7% by Bus and 2.9% by Train & Bus).
- Taxi usage (0.8%) is lower than Gosford Hospital and Nepean Hospital (both 5%).
- Main reasons given for adopting car mode share rather than public transport are outlined in the graph below.

6. For what reasons did you drive and not use public transport? (Please tick all that apply)

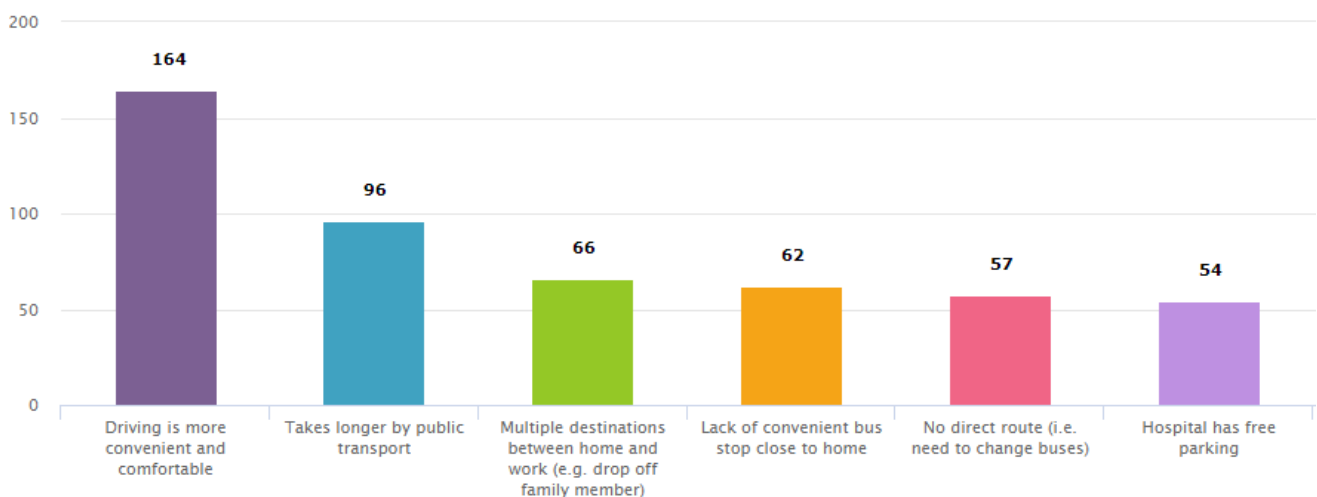


Figure 28 – Visitor reasons for not using public transport

- The primary reason given for not using public transport is that driving is more convenient and comfortable.
- The next highest response is taking longer by public transport than by car.

- Other main reasons are multiple destinations between home and work, lack of convenient bus stop close to home, no direct route and free parking at the Hospital.

The parking location of visitors travelling by car is as follows:

Table 26 – Visitor to Inpatient Parking Locations

Parking Location	%
Hospital Car Parks	86.4%
Off campus - On-Street	5.9%
Off campus – Car parks	4.6%
Dropped off	3.2%

- Of visitors that drive 86.4% park in the Hospital car park.
- The % of visitors dropped off (3.2%) is lower than Gosford Hospital (9%) and Nepean Hospital (15%).
- Of the outpatients that parked off campus 5.9% parked on street and 4.6% parked in car parks.

Number of people per car results are summarised as follows:

Table 27 – Visitor to Inpatient Number of People per Car

No. of People per Car	%
1	56.4%
2	28.6%
3	10.0%
>3	5.0%

- The average (1.64 people per car) appears to correlate with our surveys at other hospitals which suggest that 1 – 2 people per car is generally the norm.

Expected length of stay results are summarised as follows:

Table 28 – Visitor to Inpatient Expected Length of Stay

Visitors to Inpatients	Hours
Average expected length of stay	2.15

- As noted earlier, our surveys of the public car park showed an average length of stay of 2.22 hours.
- It appears that visitors slightly underestimated their expected length of stay; however the car park includes outpatients and visitors; therefore an exact comparison is not possible.

7.4.3 Conclusions

The key conclusions to be drawn from our intercept surveys of outpatients and visitors are as follows:

- The mode share results indicate that the primary mode of transport for outpatients and visitors is car (91.1% and 90.5% respectively).
- Usage of public transport appears relatively low (7% for Outpatients and 6.6% for Visitors).
- % of outpatients parking in the Hospital car parks (75.3%) is lower than that of visitors (86.4%).
- % of outpatients and visitors parking off campus is very similar (9.7% for Outpatients, 10.5% for Visitors).
- % of outpatients being dropped off and not parking (15.1%) is significantly higher than that of visitors (3.2%).

8 Parking Demand

This section sets out the parking demand estimates at the Hospital based on:

- The data provided to us by the Hospital/HI/SWSLHD,
- Our review of the transport environment and the RPZ, and
- Our surveys at the Hospital (see preceding sections of this Report).

8.1 Summary of Demand Estimates

We have prepared four parking demand estimates, as follows:

Table 29 - Summary of Parking Demand Estimates

Demand Estimate	Overview of Content / Purpose	Appendix
Current	Current situation, based on data from the Hospital/SWSLHD (via HI).	Appendix F
Future (2021/22)	Future estimate, based on data from the Hospital/SWSLHD (via HI), including ²² : <ul style="list-style-type: none"> • General Hospital growth (143 additional beds) • Additional Paediatric services (55 beds and 11 clinics) • Additional Mental Health services (2 beds) 	Appendix G
Future (2026/27)	Future estimate, based on data from the Hospital/SWSLHD (via HI) including ²³ . <ul style="list-style-type: none"> • General Hospital growth (267 additional beds) • Additional Paediatric services (64 acute beds and 23 clinics) • Additional Mental Health services (29 beds) 	Appendix H

²² All increases are cumulative, from current

²³ All increases are cumulative, from current

Demand Estimate	Overview of Content / Purpose	Appendix
Future (2031/32)	<p>Future estimate, based on data from the Hospital/SWSLHD (via HI) including²⁴.</p> <ul style="list-style-type: none"> • General Hospital growth (378 additional beds) • Additional Paediatric services (73 acute beds and 35 clinics) • Additional Mental Health services (50 beds) 	Appendix I

8.2 General Assumptions

General assumptions used in the preparation of the **current** demand estimate (**Appendix F**) and **future** demand estimates (**Appendices G – I**) are as follows:

- Hospital data (staff Headcounts²⁵, number of beds, outpatient activity etc) is as supplied by the Hospital/SWSLHD (via HI) per the Hospital information template.
- Where hard data has not been provided to us, or is not available, we have adopted assumptions based on our experience of other comparable hospitals and from observations during our site visit.
- The current percentages adopted for driver mode share, parking on campus etc. are based on our staff and outpatient/visitor surveys at the Hospital.
- We are informed by HI that, going forward, the Hospital will implement demand management strategies to reduce the % of day shift and administration staff driving and requiring a parking space.
- We have therefore adopted reductions in the % of day shift and administration staff driving and requiring a parking space, in line with those agreed with HI at the Nepean Hospital project (i.e. 3% point reduction by 2021/22, 8% point reduction by 2026/27 and 10% point reduction by 2031/32).
- Parking space turnover data is based on our length of stay surveys at the Hospital.

Note that the demand estimates are based on **total demand** (i.e. all persons requiring parking somewhere, either on campus or off campus), which is our normal practice when reporting to HI.

The **future** demand estimates (**Appendix G-I**) are based on information obtained from the sources outlined above, the Clinical Services Plan for Macarthur 2016 - 2031 dated 28th September 2017 (CSP).

²⁴ All increases are cumulative, from current

²⁵ Hospital provided staff headcounts, so PTC applied a ratio of 1.2 to convert headcounts into full time equivalent (FTE), based on our experience.

Appendix E summarises the current and future demand drivers and assumptions, which we arrived at using a combination of the above. A summary of the key assumptions is as follows:

Table 30 – Key Input Assumptions

Input assumptions	Current	2021/22	2026/27	2031/32
Clinical Staff FTE				
Campbelltown Hospital	969	1,391	1,731	2,027
Paediatrics				
Mental Health	132	166	207	243
Total	1,101	1,557	1,938	2,270
Administration & Support Services Staff FTE				
Total	470	674	838	981
VMO				
Total	94	135	167	196
Outpatients – Occasions of Service				
Campbelltown Hospital	216,682	253,401	296,343	319,136
Paediatrics		55,440	115,920	176,400
Mental Health		Inc in Campbelltown Hospital data above		
Total	216,682	308,841	412,263	495,536
Inpatients – Beds				
Campbelltown Hospital	369	512	636	747
Paediatrics	25	80	89	98
Mental Health	66	68	95	116
Total	460	660	821	961
ED Presentations – weekday average				

Input assumptions	Current	2021/22	2026/27	2031/32
Total	192	237	288	328

Below is a summary of our analysis, assumptions and conclusions regarding current and future demand for parking at the Hospital. The data has been used to build our demand estimates (**Appendices F - I**).

8.3 How to interpret the Parking Demand estimates

We set out below the rationale for interpreting our demand estimates, adopting “Outpatients” (**Appendix F**) as a worked example.

Reading from left to right across the spreadsheet:

- People x % requiring a car space²⁶ / people per car = total cars per day.
- Total cars per day (as above) / parking space turnover = peak parking spaces required.
- Therefore, for Outpatients the calculation is as follows:

782 people per day x 77% requiring parking / 1 person per car = 605 cars per day requiring parking / space turnover of 3.91 = 155 parking spaces required at peak.

8.4 Weekday Staff Parking Demand

We calculated the breakdown of weekday and weekend staff based on FTE staff numbers for the Hospital and the Mental Health, being:

Table 31 - Weekday and Weekend Staff FTE Split

	Hospital Current and Future	Mental Health Current
Weekdays	64.7%	67.3%
Weekends	35.3%	32.7%

The Hospital provided a proportionate weekday breakdown of staff on each shift, being:

Table 32 – Weekday Breakdown of Staff per Shift

	Hospital Current and Future	Mental Health Current
Day Shift FTE	63.9%	64.1%
Afternoon Shift FTE	22.3%	22.7%
Night Shift FTE	13.8%	13.2%

To the day shift and administration staff numbers²⁷ we applied a percentage currently driving to work and requiring a car space²⁸ (98% * 100% = 98%), based on our staff surveys at the Hospital.

²⁶ i.e. excludes those who arrive by car but are dropped off and do not park

²⁷ Day shift and administration only

²⁸ i.e. excluding those who are dropped off and do not require parking

As noted earlier, for the future estimates we have adopted reductions in the % of day shift and administration staff driving and requiring a parking space, in line with those agreed with HI at the Nepean Hospital project (i.e. 3% point reduction by 2021/22, 8% point reduction by 2026/27 and 10% point reduction by 2031/32).

For afternoon shift we applied a driving to work percentage of 100%, and parking on campus 95%, based on our staff surveys at the Hospital.

For night shift staff we assumed a driving to work percentage of 100%, and parking on campus 100%, based on our experience at other hospitals.

The numbers of staff per car adopted for day shift and afternoon shift are 1.08 and 1.02 respectively based on our surveys at the Hospital. We assumed 1 staff per car for night shift based on our experience at other hospitals.

The Hospital also provided the current headcount number of weekday Administration staff (536) therefore PTC converted it into FTE, at 447²⁹. As the working hours of administration staff are generally 9am-5pm, we assumed they have same parking behaviours as day shift clinical staff³⁰.

When estimating peak staff parking demand at a hospital campus, it is important to factor in the shift changeover which generally occurs in early afternoon when the day and afternoon shifts cross over, as some afternoon shift staff will require parking whilst day shift staff are still on campus.

The Hospital were unable to provide an estimate of the current afternoon shift staff that arrive prior to day shift staff leaving, so we assumed 45.5%³¹ based on the data from 2013 Campbelltown Hospital Parking Study, which has been confirmed by HI.

Future staff numbers have been escalated at the same rate of growth as bed numbers, as agreed with HI (in the absence of data from the Hospital/LHD).

Using the demand drivers and assumptions outlined above (and summarised in **Appendices F - I** we estimate peak demand for staff parking to be as follows:

Table 33 – Staff Peak Parking Demand

Weekday staff peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Day Shift	414	569	671	768
Afternoon shift changeover allowance	71	101	126	147
Administration Staff	459	640	754	863
Total spaces	944	1310	1551	1778

8.5 Weekday VMO Parking Demand

The Hospital provided the current total number of Visiting Medical Officers (VMOs), at 113. We split this number into Weekdays (83%) and Weekends (17%) based on our 2013 Campbelltown Hospital Parking Study (in the absence of current guidance from the Hospital/LHD).

Future VMO numbers have been escalated at the same rate of growth of bed numbers.

²⁹ Administration Staff FTE = Headcount number / 1.2

³⁰ Administration Staff – 98% drive, 100% park on campus, 1.08 staff per car

³¹ 2013 data (100 afternoon shift staff arrive before day shift staff leave / 220 total afternoon shift staff that drive) = 45.5%

In our experience car mode share is the only reasonable option for VMOs as they often need to work at different locations during the day and/or may need to attend the Hospital at short notice. We therefore assumed that 100% drive to work and that they travel alone (i.e. 1 person per car).

VMO's have allocated spaces at the Hospital so we assumed 100% park on campus.

As VMOs are likely to come and go during the day we assumed a parking space turnover of 3 times, based on our experience and other NSW hospital sites.

Using the demand drivers and assumptions outlined above (and summarised in **Appendices F - I**) we estimate peak demand for VMO parking to be as follows:

Table 34 – VMO Peak Parking Demand

Weekday VMO peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Spaces	31	45	56	65

8.6 Weekday Public Parking Demand

8.6.1 Weekday Outpatients Parking Demand

The Hospital/HI supplied current annual outpatient activity (defined as “occasions of services”) of 216,682, and forecast activity of 296,343 in 2026/27 and 319,136 in 2031/32³².

For the year of 2021/22, due to the absence of occasions of services data, PTC applied an **Equivalent Annual Increase Rate** (3.1804%³³) to estimate the activity number in 2021/22. Therefore our estimated 2021/2022 outpatient activity number is 253,401³⁴.

To these numbers we added an allowance for the proposed additional paediatric clinics, as advised by the Hospital/LHD (via HI). In the absence of data we assumed an average of 20 patients per clinic, per day, or 5,040 per clinic, per annum³⁵, based on our experience of other health sites.

To allow for multiple occasions of service to one patient (e.g. consultation and radiography) we divided the total occasions of service by a factor of 1.1 which, in the absence of hard data from the hospital, is our normal practice (based on our experience of other hospitals).

We divided the outcome by 252 weekdays³⁶ to arrive at a volume per weekday. This assumes minimal outpatient activity at weekends.

We applied a percentage of outpatients driving to the Hospital and requiring a car space (91.1% * 84.9% = 77%), based on our surveys.

We then applied a space turnover of 3.91 times to the resulting number of vehicles per day (based on our Length of Stay surveys), to arrive at the peak parking demand.

Applying the demand drivers set out above (and summarised in **Appendices F - I**) we estimate that the peak demand for parking from outpatients would be as follows:

³² Data Source: per emails from Hospital on 11/08/2017 and 15/08/2017

³³ Equivalent Annual Increase Rate = $((1 + (2026/27 \text{ activity number} / 2016/17 \text{ activity number} - 1))^{(1/10)}) - 1 = ((1 + (296343 / 216682 - 1))^{(1/10)}) - 1 = 3.1804\%$

³⁴ 2021/22 outpatient activity = 2016/17 activity number * $(1 + \text{Equivalent Annual Increase Rate})^{(5)} = 216682 * (1 + 3.1804\%)^{(5)} = 253,401$

³⁵ Based on 260 weekdays, minus 8 public holidays

³⁶ 260 weekdays minus 8 public holidays

Table 35 – Outpatient Peak Parking Demand

Outpatients peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Spaces	155	220	294	354

8.6.2 Weekday Visitor Parking Demand

The Hospital provided the current and future number of beds (460, 660, 820 & 961 respectively) and a bed occupancy rate of 83%.

To the resulting numbers we applied an average of 2 visitors per inpatient³⁷ to derive the total number of visitors.

We applied an estimated percentage of weekday visitors driving to the Hospital and requiring a car space ($90.5\% \times 96.8\% = 88\%$) and average people per car (1.64) based on our surveys at the Hospital.

We then applied a space turnover of 3.91 times per day (as for Outpatients), based on our surveys at the Hospital.

Peak daytime demand from visitors was estimated on the assumption that 50%³⁸ of visitors will require parking during the daytime peak hours (8am – 6pm).

Applying the demand drivers set out above (and summarised in **Appendices F - I**) we estimate that the peak demand for parking from visitors is as follows:

Table 36 – Visitor to Inpatient Peak Parking Demand

Visitor peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Spaces	52	75	93	109

³⁷ Per Hospital's reply to PTC's query on 08/08/2017, Current Query 2.

³⁸ Based on 2013 data, confirmed by Hospital as a reasonable assumption

8.6.3 Weekday Emergency Department Parking Demand

We were provided with average weekday ED presentations data by the Hospital (192 per weekday).

Forecast ED presentations are 86,746 p.a. (2021/22), 105,427 p.a. (2026/27) and 119,810 p.a. (2031/32) respectively³⁹. We applied the increases of forecast annual ED presentations, as uplift ratios⁴⁰, to estimate the forecast ED presentations per weekday as shown below:

Table 37 - Average ED Presentations per Weekday

ED Presentations Uplift Ratios	Current (2016/17)	Future (2021/22)	Future (2026/27)	Future (2031/32)
Annual ED presentations	70,408 ⁴¹	86,746	105,427	119,810
Uplift ratios	N/A	1.232	1.215	1.136
Average ED presentations per Weekday	192	237 ⁴²	288 ⁴³	328 ⁴⁴

To the average weekday ED presentations figure we applied a 77% car mode share requiring a car space, based on our surveys of outpatients. Those attending by ambulance would be expected to be followed relatively quickly thereafter by someone driving and requiring parking in the hospital car park.

We estimated the proportion of ED presentations that occur during peak parking hours⁴⁵ from Hospital data of weekday presentations by time (63%).

We applied a space turnover of 3.91 times (as for visitors) in order to estimate the peak weekday parking demand (and summarised in **Appendices F - I**), as follows:

Table 38 – Emergency Department Peak Parking Demand

ED Presentations peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Spaces	24	29	36	40

8.7 LHD Controlled Fleet Vehicles

The current number of fleet vehicles (13) was supplied by the Hospital.

We assumed 100% drive and require a park on site.

As with VMO vehicles, we applied a space turnover of 3 as fleet vehicles likely to come and go during the day.

We applied the growth rate of bed numbers (as a general proxy for growth) to the number of future fleet vehicles.

³⁹ SWSLHD Revision of the Clinical Services Plan for Macarthur to 2031, page 68, table 27

⁴⁰ Uplift ratios: $2021/22 = 86746/70408 = 1.232$, $2026/27 = 105427/86746 = 1.215$, $2031/32 = 119810/105427 = 1.136$

⁴¹ $2016/17 \text{ ED presentations} = \text{weekday ED presentations} * 260 + \text{weekend ED presentations} * 104 = 192 * 260 + 197 * 104 = 70408$

⁴² $2021/22 \text{ Average ED presentations per Weekday} = 192 * 1.232 = 237$

⁴³ $2026/27 \text{ Average ED presentations per Weekday} = 237 * 1.215 = 288$

⁴⁴ $2031/32 \text{ Average ED presentations per Weekday} = 288 * 1.136 = 328$

⁴⁵ 8am-6pm

On this basis (and as summarised in **Appendices F – I**) we estimate that the peak demand for parking from fleet vehicles is as follows:

Table 39 – LHD Controlled Fleet Vehicle Peak Parking Demand

LHD Controlled peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Spaces	4	6	8	9

8.8 Other Parking Demand

For the purposes of the model (and as previously agreed with HI) we included Education & Training, Students, Volunteers, Retail Staff and Community Health Vehicles as 'other'.

Some of these categories have slightly different demand drivers and assumptions – see **Appendix E** for details.

Current data was provided by the Hospital.

Future volumes have been escalated at the same rate of growth of bed numbers⁴⁶.

We estimate that the peak demand for parking from these user groups is as follows:

Table 40 – Other Peak Parking Demand

Weekday staff peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Education & Training	20	27	32	37
Students	50	63	78	92
Volunteers	9	13	15	17
Retail Staff	6	9	10	12
Community Health Vehicles	3	0	0	0
Total spaces	88	112	135	158

⁴⁶ Except Community Health Vehicles – HI advised that Community Health is unlikely be incorporated within the site in the future. Per Meeting minutes on 02/08/2017, Point 9.4

8.9 Summary of Weekday Peak Parking Demand

A summary of estimated weekday peak parking demand is shown in the table below:

Table 41 – Summary of Weekday Peak Parking Demand

Summary of weekday peak demand for parking	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
Staff (inc VMO)	975	1355	1607	1843
Public				
Outpatients	155	220	294	354
Visitors	52	75	93	109
ED Presentations	24	29	36	40
	231	324	423	503
LHD Controlled – Fleet Vehicles	4	6	8	9
Other	88	112	135	158
Total Spaces	1298	1797	2173	2513

8.10 Analysis of Parking Demand & Supply

Based on the above, a summary of the estimated current and future parking demand and supply is as follows:

Table 42 – Summary of Estimated Current & Future Parking Demand & Supply

Total Parking Supply/Demand Analysis	Current	Future (2021/22)	Future (2026/27)	Future (2031/32)
On Campus Supply				
Total On Campus Supply (assuming no additional parking provision)	1280	1280	1280	1280
Demand (per Table 41 – Summary of Weekday Peak Parking Demand)				
Staff	975	1355	1607	1843
Public	231	324	423	503
LHD Controlled – Fleet Vehicles	4	6	8	9
Other users	88	112	135	158
Total Demand	1298	1797	2173	2513
Breakdown of Total Demand⁴⁷:				
General Hospital Only		1394	1685	1953
Paediatrics Only		218	236	256
Mental Health Only		185	252	303
Total		1797	2173	2513
Total On Campus Surplus/(Shortfall)	(18)	(517)	(893)	(1233)
Off Campus Supply:				
Off campus off street supply <500m (per Table 9)	57	57	57	57
Off campus on street supply <500m (per Table 10)	564	564	564	564
Total Off Campus Supply	621	621	621	621
Estimated Total Off Campus Supply for Hospital-related Users⁴⁸	225	225	225	225
Surplus / (Shortfall)	207	(292)	(668)	(1008)

⁴⁷ Based on bed proportions

⁴⁸ Assume 21% of off campus supply used by Hospital-related users (per PTC occupancy surveys). Also allow that 50% of unutilised parking supply is utilised by Hospital-related users going forward. Total 225 spaces.

- Note that we have assumed Hospital related users will continue to utilise 22% of the off campus parking supply, in line with our surveys and current demand estimate. In addition, we have assumed (and agreed with HI) that Hospital-related users will utilise 50% of the unutilised off campus supply. In total, therefore, Hospital-related users will utilise 225 off-campus spaces.
- The **current** estimated on campus shortfall of 18 bays can be met by off campus parking supply of 225 bays for Hospital-related users.
- However, the **estimated 2021/22, 2026/27 and 2031/32** on campus shortfall of 517 bays, 893 bays and 1233 bays cannot be met by off campus parking supply within the RPZ; shortfall 292 bays, 668 bays and 1008 bays respectively.
- The demand estimates in the report to 2031/32 reflect the full CSP scope. However it is assumed that the additional capacity provided under the Campbelltown Hospital Redevelopment Stage 2 will be fully utilised before 2031/32 (the exact year capacity is yet to be confirmed by the project team as planning progresses, and is subject to further review by HI).⁴⁹

These conclusions are subject to the following assumptions:

Demand

- The current % of day shift and administration staff driving and requiring a parking space is 98%, which is high, and is likely to be due (at least in part) to all parking at the Hospital being free of charge.
- We are informed by HI that, going forward, the Hospital will implement demand management strategies to reduce the % of day shift and administration staff driving and requiring a parking space.
- We have therefore adopted reductions in the % of day shift and administration staff driving and requiring a parking space, in line with those agreed with HI at the Nepean Hospital project (i.e. 3% point reduction by 2021/22, 8% point reduction by 2026/27 and 10% point reduction by 2031/32)
- No changes to the parking behaviour of, outpatients and visitors (i.e. %'s driving, parking etc are as per the demand estimates).
- No changes to the % of outpatients and visitors who are dropped off and do not park.

Supply

- No changes by Council to on-street parking regimes that result in fewer spaces being available to hospital-related users, for example:
 - Unrestricted parking spaces become restricted (e.g. 2P) and therefore not practically available for use by staff. Note, however, that assuming a time restriction of, say, 2P these spaces could be used by patients and visitors to the hospital.
 - Other parking restrictions (e.g. "No Stopping/Parking") are introduced, thereby making spaces unavailable to hospital staff, patients and visitors.
- No significant increase in demand for parking from external sources (e.g. University, private hospital etc).

8.11 Weekend Peak Parking Demand

Note that we have not quantified weekend parking demand as it will always be lower than the weekday peak, due to:

⁴⁹ As advised by HI in email dated 5th October 2017

- Lower volumes of staff, particularly administration and support services staff.
- Limited or no outpatient activity.

8.12 Staff & Public Parking Allocations

An analysis of individual parking shortfall by staff and public users is problematic due to some car parks being shared by all user groups.

8.13 Verification checks

We tested the veracity of the current parking demand model in a number of ways:

- Comparing the estimated peak parking demand with the observed peak demand from our site visits.
- Reality check comparing the estimated number cars parking off campus at peak with the observed number of cars parking off campus at peak.

8.13.1 Estimated Peak Demand vs Observed Peak Demand

Appendix J adopts the current base estimate (**Appendix F**) but applies to the number of cars each day the % that park on campus, per our surveys of staff, patients and visitors.

The outcome is the estimated peak on campus parking demand.

A summary of the analysis is as follows:

Table 43 – Verification Check

Verification check against observed peak occupancy	Bays
Estimated peak <u>on-campus</u> parking demand (per Appendix J)	1,217
Observed peak occupancy – on campus (Wednesday 11am-12pm)	1,213
Difference	4

Therefore, this verification check appears to suggest that the current base estimate provides a reasonably robust basis for projecting forward.

8.13.2 Reality Check

As a high level reality check we undertook the following assessment.

Table 44 – Reality Check

High Level Reality Check	Bays
Estimated Total Peak Parking Demand ⁵⁰ (A)	1,298
Observed peak on campus occupancy ⁵¹ (B)	1,213
Balance assumed to be parking off campus (A – B = C)	85
Off campus occupied bays within RPZ (D)	382
% of off campus occupied bays relating to hospital-related users (C / D)	22%

Comments:

- The above reality check shows that the current number of cars parking off campus is less than the off campus supply. If the opposite were the case then the demand model would be incorrect.
- A utilisation figure in the region of 22% may be reasonable based on our surveys, which shows that some staff, outpatients and visitors parked off campus (3.9%, 9.7% and 10.5% respectively).

It is not possible to identify whether cars parking off campus belong to hospital-related users. Some may belong to other user groups such as:

- Residents
- Visitors to residents
- Visitors to the parklands area
- Campbelltown Private Hospital Users (e.g. staff, visitors, patients etc.)
- Centric Park Central staff and visitors

⁵⁰ Per Table 42

⁵¹ Per our surveys

8.14 Sensitivity Analysis

8.14.1 Increase in Bus Services

As noted earlier in this report, we are advised that bus services to the Hospital will double in 2018. We therefore undertook a sensitivity analysis to estimate the potential impact on parking demand.

For the purposes of this analysis we assumed that the percentages of outpatient and visitors using bus as their mode share (as per our surveys) would double (e.g. outpatients increases from 4% to 8%), in line with the proposed increase in bus services.

Staff usage of public bus services is negligible. Also, we have already allowed for a reduction in day shift and administration staff % driving and requiring a parking space as part of our base case analysis. It is to be assumed that increased use of public bus will form a part of the demand strategies proposed to bring about this reduction in car mode share.

The outcomes of our sensitivity analysis are as follows:

Table 45 - Sensitivity Analysis re Additional Bus Services

	2021/22			2026/27			2031/32		
	Base Case (spaces)	Sensitivity Analysis (spaces)	Difference	Base Case (spaces)	Sensitivity Analysis (spaces)	Difference	Base Case (spaces)	Sensitivity Analysis (spaces)	Difference
Outpatients	220	211	9	294	281	13	354	338	16
Visitors	75	72	3	93	89	4	109	104	5
Total difference			12			17			21

As can be seen, the effect of a 100% increase in bus mode share has a relatively minimal impact on parking demand – only 21 fewer public spaces are required by 2031/32.

9 Traffic Assessment

9.1 Traffic Surveys

In order to determine the existing traffic activity associated with the Hospital, two forms of traffic survey were undertaken at key locations and the car park entry/ exit driveways during the same period as the parking demand surveys. The traffic surveys are discussed in the following sections.

9.1.1 Tube Counts

Tube counts were undertaken at 12 locations in Parkside Crescent and other car park access roads between the periods 16 July to 22 July 2017. Survey data (5-Day Average Annual Daily, 85%ile Speed and Vehicular Classification) are presented in the following figures:

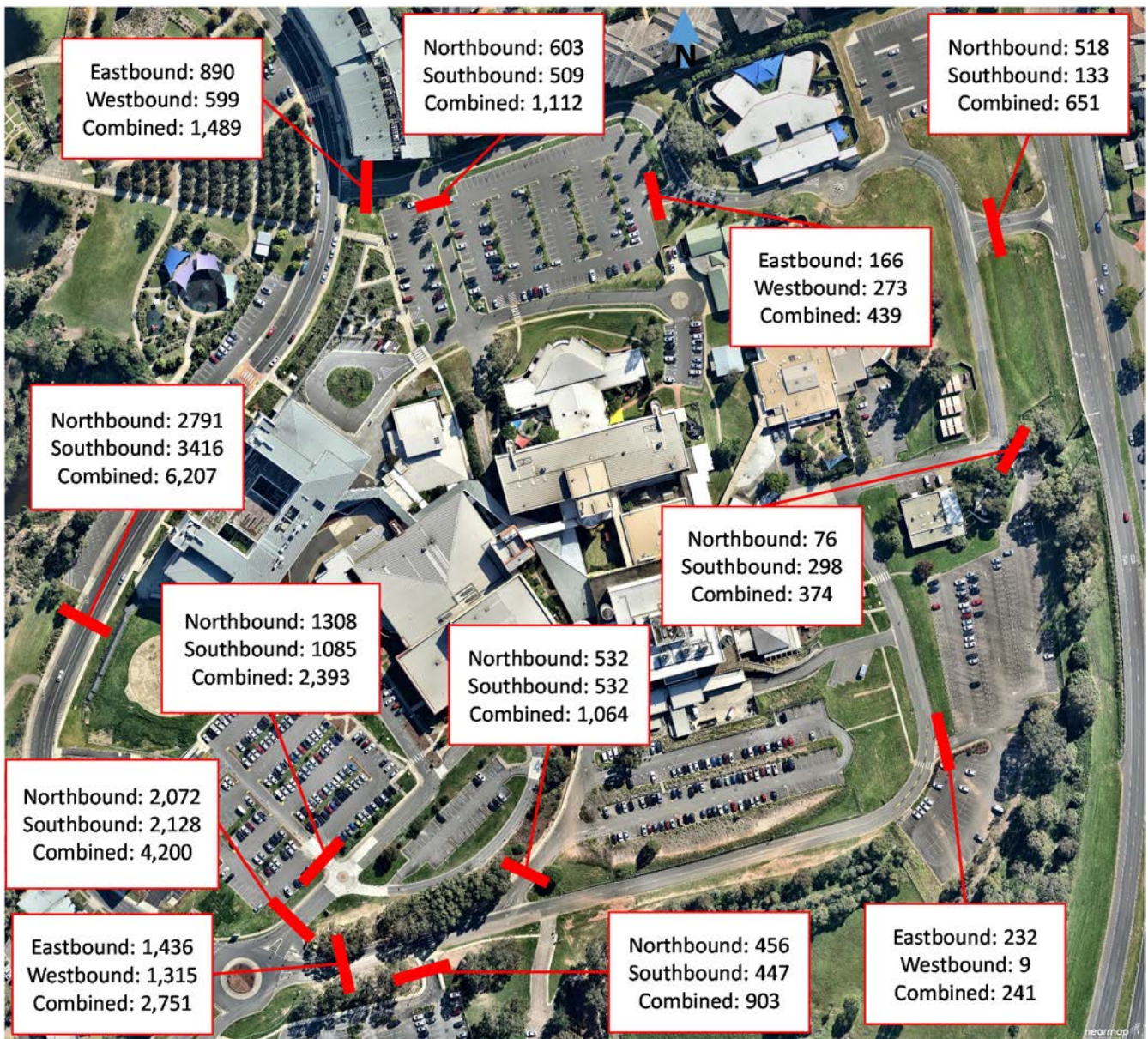


Figure 29: 5-day Average Annual Daily Traffic (AADT)

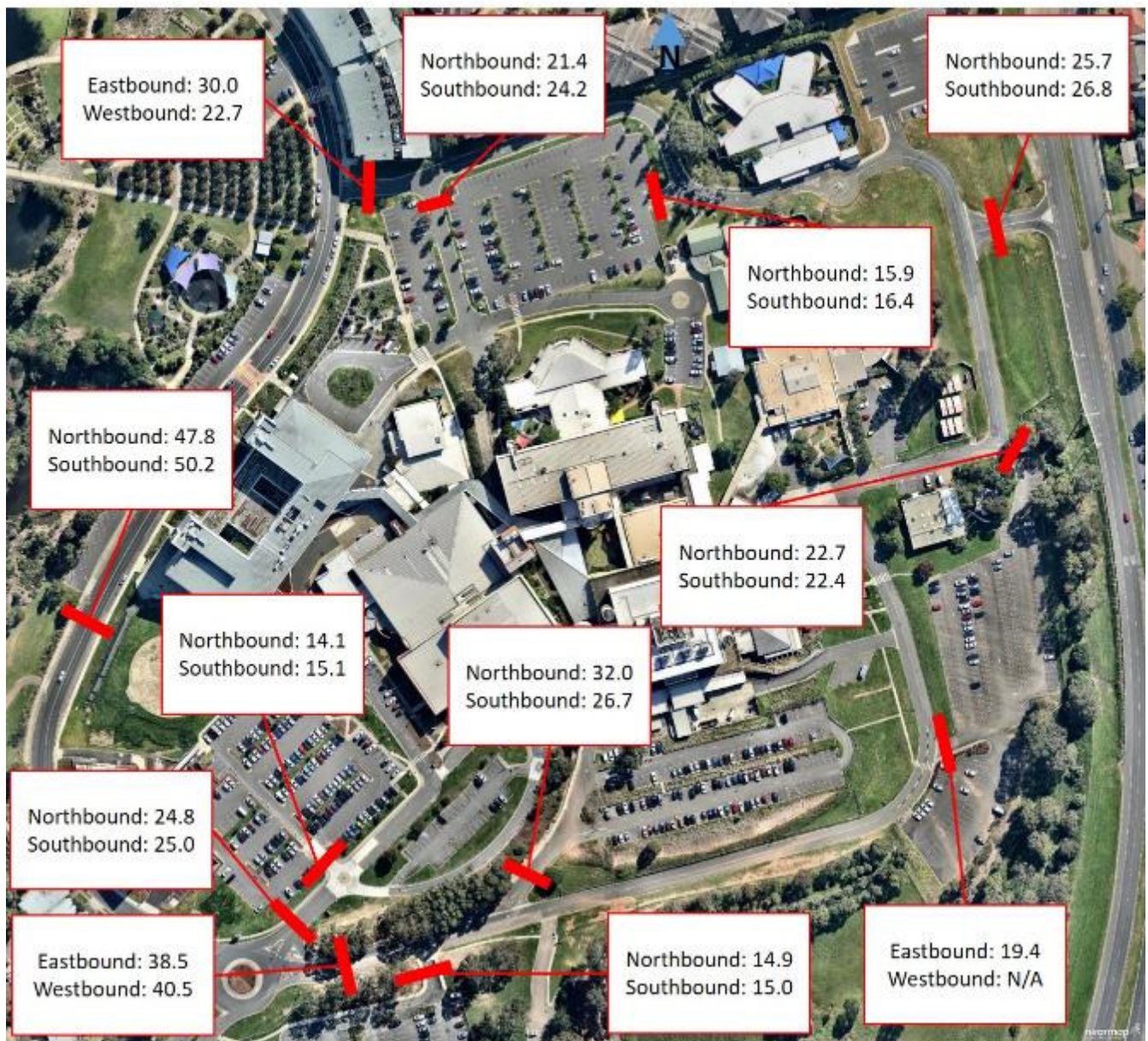


Figure 30: 85th Percentile Speed (km/h)

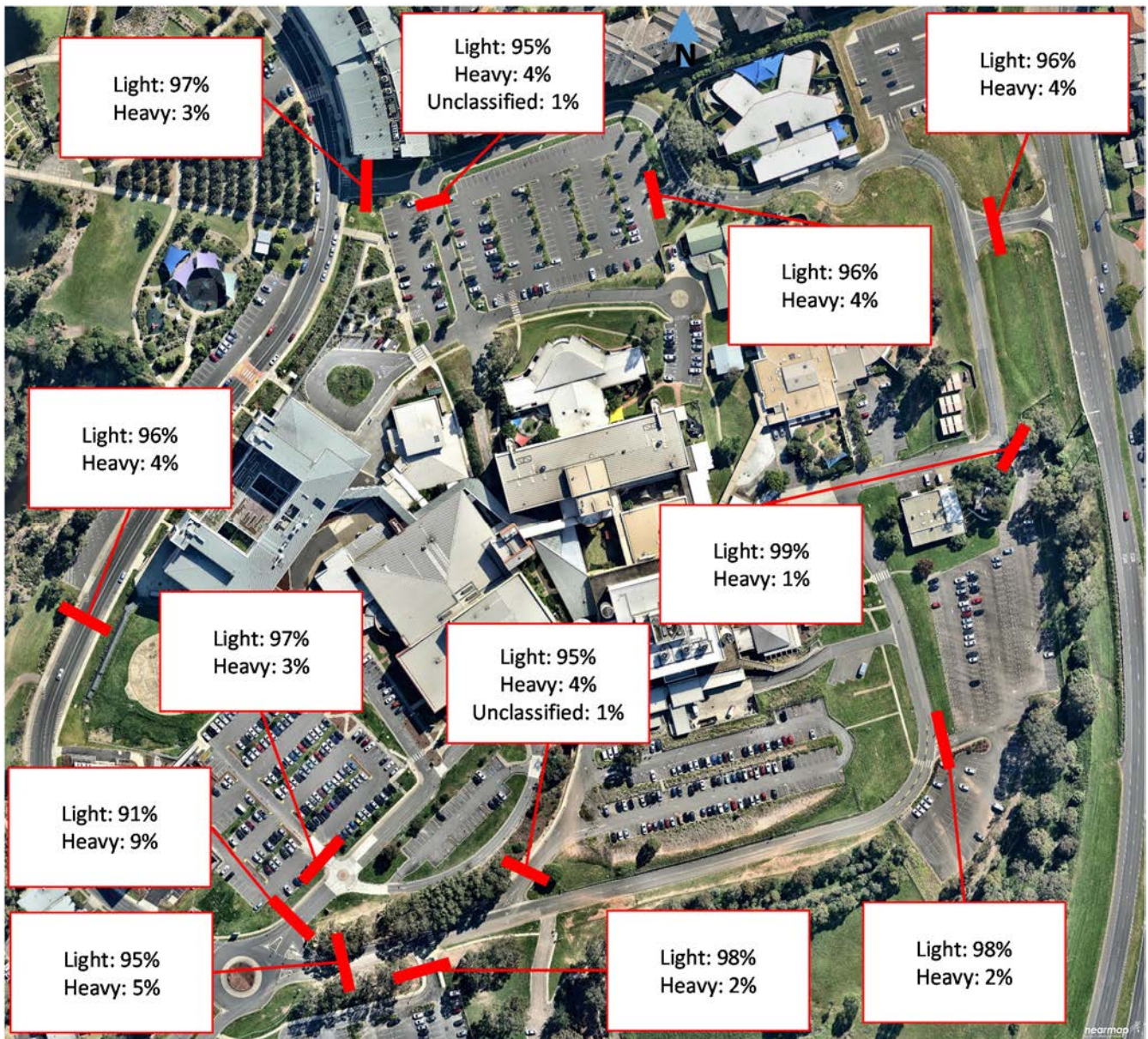


Figure 31: Light and Heavy Vehicle Classification

The car parks within the hospital are generally connected within the campus. From the external road network, the hospital can be accessed from three primary access points, being

- *Access via the roundabout at Parkside Crescent/ Central Road* – the roundabout provide access to the car parks primarily located on the southern end of the hospital such as CP7, CP7A, CP9, CP5 etc. Generally, traffic travelling to/ from the south, east or west via Therry Road and Woodhouse Drive use these hospital entrances. Traffic survey data show that combined two southern accesses carried 6,951 vehicles per day (77% of hospital traffic).
- *Northern access via Parkside Crescent* – this left-in/ left-out access primarily serves car park 2 (staff and public), 4, 5 etc. Generally, traffic coming from the north and travelling to the south use this access. This access carried 1,489 vehicles per day (16% of hospital traffic).

- *Eastern access via Appin Road* – this-left in/ left-out access primarily serves the car parks located eastern and northern ends (e.g. car parks 1, 2, 3, 4, 5 etc.). This access carried 651 daily traffic (7% of hospital traffic).

The traffic data shown in Figure 29 also show that at the major internal access points traffic counters recorded around 1,000 to 2,000 vehicles per day which equates to 100 to 200 vehicles during the peak hours. The peak traffic at the count locations is also generally aligned with the peak occupancies of the carparks. During the site inspections, no major queuing or delays were observed in or around the carparks.

The above traffic distribution on the three access points are reasonable and currently working efficiently. The performance of intersections at various access points are discussed in subsequent sections of this report.

The 85th percentile speed⁵² within the internal link roads was generally 15-30km/hour which is considered to be acceptable (Figure 30). The existing 10km/h regulatory signposting within the internal roads is unrealistic to achieve.

The 85th percentile speed in Parkside Crescent was recorded at or below 50km/h which is acceptable. Overall no major speeding issues were identified within the hospital precinct.

The heavy vehicle proportion was generally below 5% at most of the count locations (Figure 31). Given the bus route and service vehicle access to the hospital, 5% heavy vehicle to the hospital is considered acceptable.

9.1.2 Intersection Counts

Intersection counts were undertaken on Thursday, 20 July 2017 (non-school holiday period) at the following two intersections between the periods 6.30-9.30am & 3.30-6.30pm:

- Central Road/ Parkside Crescent/ hospital access roundabout
- Parkside Crescent/ hospital access T – intersection

The peak hour traffic data is shown in Figure 32. The traffic data indicates that the Central Road/ Parkside Crescent roundabout carried 699 vehicles in the AM peak and 992 vehicles in the PM peak respectively. During the PM peak (3.30-4.30pm), traffic volume was approximately 30% more than the AM peak (7.45-8.45am). A detailed analysis of the traffic data shows that the dominant movement in the PM peak was the traffic between Central Road and Parkside Crescent (both directions) which is not necessarily the hospital related traffic.

At Parkside Crescent/ hospital access intersection, there were 533 vehicles in the AM peak and 788 vehicles in the PM peak. The traffic at this intersection was also approximately 32% greater in the PM peak, compared to the AM peak. Similar to the other intersection, the dominant movement was the north-south traffic which is not hospital related traffic.

During the site inspections, both the intersections were observed to be free flowing.

⁵² "The speed at or below which 85% of all vehicles are observed to travel under free flowing conditions past a nominated point"

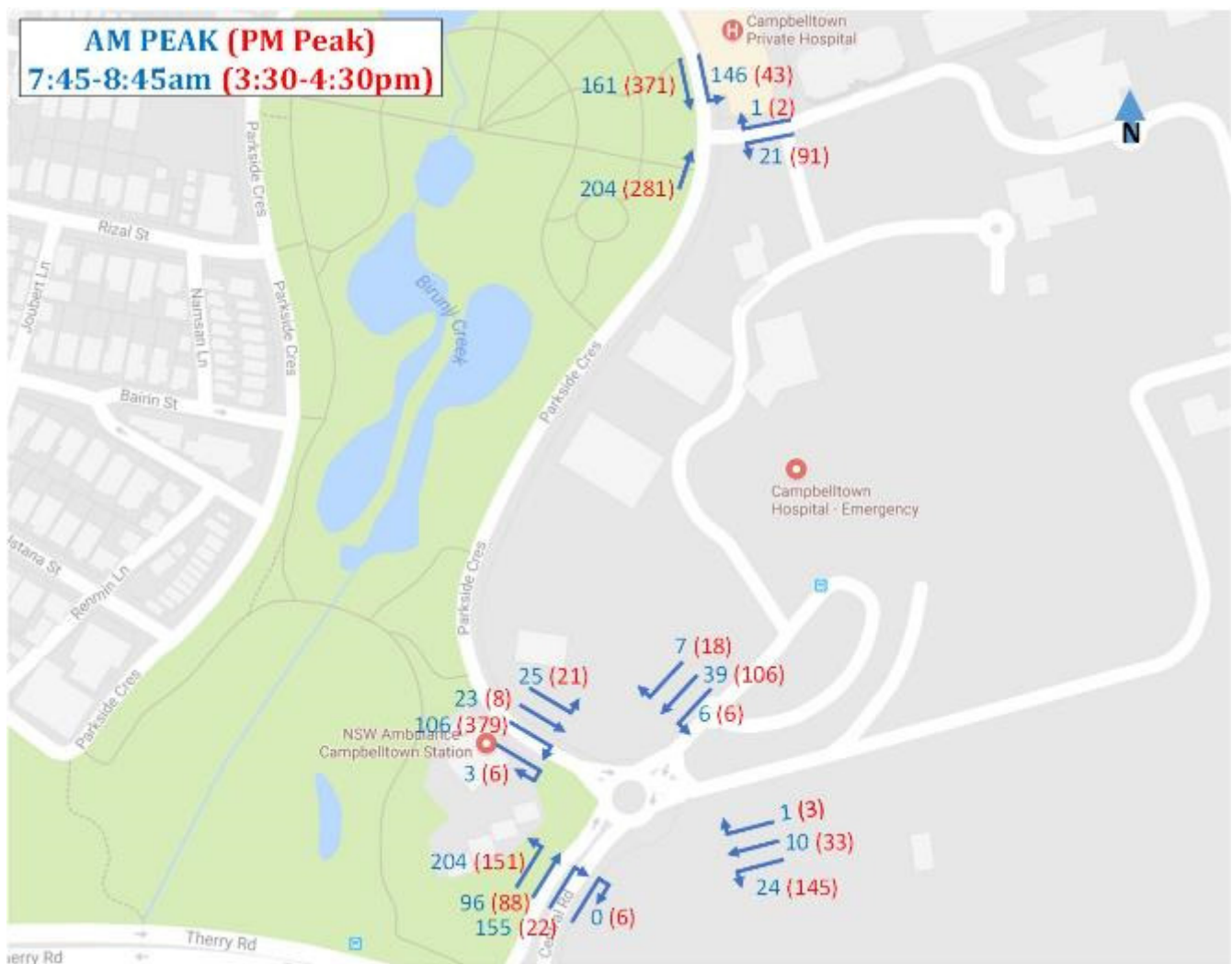


Figure 32: Existing Intersection Count Data

9.2 Intersection Performance

9.2.1 Existing

Using the collected survey data, the subject two intersections have been modelled with the SIDRA intersection modelling software. The SIDRA software package is designed to assess the amount of delay to vehicles using an intersection, and provides a level of service, as well as other performance indicators, that describe an intersection's performance based on its arrangement. These performance indicators are as follows:

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

- **Level of Service (LoS)** – This is a categorisation of average delay, intended for simple reference using six different bands as presented in Table 46. In NSW, a LoS D or better is considered acceptable in the urban areas.

Table 46 – Level of Service Definitions

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

An analysis of the existing intersection operation has been performed in SIDRA, using the existing road geometry and traffic volumes. The results are summarised in Table 47.

Table 47 – SIDRA Outputs associated with Existing Situation

Period	Intersection	Deg Sat (V/C)	Ave Delay (S)	LoS	Max Queue (m)	Approach
AM Peak	Central Rd/ Parkside Cres	0.309	5	A	14.0	Central Rd
	Parkside Cres/ Hpt. Access	0.201	1.9	A	6.6	Parkside Cres (N)
PM Peak	Central Rd/ Parkside Cres	0.339	6.2	A	15.3	Parkside Cres
	Parkside Cres/ Hpt. Access	0.235	1.2	A	2.6	Parkside Cres (N)

Sidra modelling results in Table 47 show that currently the Central Road/ Parkside Crescent intersection is operating at LOS A with significant spare capacity. The average vehicular delay is only 5-6 seconds in both the AM and PM peak traffic hours. The maximum queue in Central Road and Parkside Crescent are also reasonable. Existing queuing in Central Road has no effect on the traffic operation at the Therry Road/ Central Road roundabout.

The Parkside Crescent/ Car Park Access intersection is also operating at LOS A on all approaches in both the AM and PM peak hours. This intersection also has significant spare capacity to accommodate additional traffic. There is a minor delay for southbound traffic in Parkside Crescent, probably due to through movement being held up by the left turning movement into the car park access as there is an existing pedestrian zebra crossing at this T – intersection (east approach). However, the queue is relatively minor and quickly dispersed over time.

As stated previously, the PM traffic volume in both intersections are approximately 30% higher than the AM peak traffic which has been demonstrated by the Sidra results. However, even in the PM peak hours the existing local road network is relatively free flowing and generally acceptable.

9.2.2 Future

The hospital currently has 1,293 car parking spaces. The demand estimate for the 2031-32 model shows that the hospital would require 3,103 car parking spaces, which equates to approximately 2.4 times increase from the current supply. Therefore, a sensitivity testing has been undertaken in the Sidra model by multiplying the current traffic volume by 2.4 in all movements as there will also be growth of background traffic along with the hospital related traffic. The future Sidra results (2031-32) are summarised in Table 48.

Table 48 – SIDRA Outputs associated with Future (2031-32) Situation

Period	Intersection	Deg Sat (V/C)	Ave Delay (S)	LoS	Max Queue (m)	Approach
AM Peak	Central Rd/ Parkside Cres	0.766	6.9	A	79.8	Central Rd (S)
	Parkside Cres/ Hpt. Access	0.500	2.2	A	23.9	Parkside Cres (N)
PM Peak	Central Rd/ Parkside Cres	1.662	134.3	F	127.6	Hospital Access (E approach, hospital car park 9 entrance)
	Parkside Cres/ Hpt. Access	0.587	2.7	A & B	19.6	Hospital Access (E)

The results in the above table show that the Central Road/ Parkside Crescent/ Hospital Access intersection will continue to operate at LOS A during the AM peak hour. The maximum queue will be in Central Road (80m) which will not affect the Central Road/ Therry Road/ Woodhouse Drive roundabout. However, during the PM peak, the intersection will operate in LOS F with a maximum queue of 128m at the hospital access car parks (east approach). This will seriously affect the operation of car park 9. The entry vehicle into car park 9 may potentially hold up the eastbound traffic behind them due to longer westbound queue on approach to Central Road/ Parkside Crescent/ Hospital Access roundabout. Similarly, vehicles would not be able to exit the car park 9 due to long westbound queue on the access road. Therefore, further investigation and analysis would be required for car park 9 access.

A detailed analysis of Sidra (Appendix K) also shows that at the main hospital entrance queuing will be 116m which will affect the operation of car parks 7 & 8. The AVD at this intersection will be 134 seconds and the intersection will operate well above the capacity.

Based on the future Sidra results, the access to the car parks through this roundabout should be reconsidered. In summary, the access to the car parks within the hospital should be dispersed to avoid any potential bottlenecks in the area. Another signalised access road to Appin Road may have merit and should be discussed with the relevant government authorities. Further, the subject one-lane roundabout is recommended for upgrading in the future.

The Parkside Crescent/ Hospital Access T-intersection will continue to operate at a satisfactory level with reasonable spare capacity. The queuing at the east approach (hospital access) will be approximately 20m which should not affect the operation of car park 2 (staff & public). The queuing at the north approach will be 24m which will not affect the Parkside Crescent/ Hyde Parade intersection. Despite this intersection operating at a satisfactory level in the future, we recommend that a road network model should be developed by investigating various intersection upgrades and car park access scenarios.

9.3 Assessment of Public Transport

9.3.1 Bus Services

As stated in section 5.1.2, the hospital is currently served by bus route services 870, 871 & 872 (Campbelltown - Liverpool), 887 (Campbelltown - Wollongong) and 888 (Campbelltown – St Helens Park). Our assessment of the existing bus network and usage are summarised below:

- Although the 870, 871, and 872 routes have frequencies of 30-60min, staggering of the busses results in effective wait times between buses around 10-20min (Mon-Sat) and 30min (Sun);
- Route 887 has very fewer services, however, this is considered appropriate given the longer route length. The majority of commuters utilising this service would plan ahead and make note of the timetable. It should be noted that there is another hospital located in Wollongong. Therefore, there might be some inter hospital trips by the buses;
- The route services between Liverpool and Campbelltown are quite complementary. Overlap in their coverage results in shorter wait times along the major corridors, whilst small variances from each other allow greater network coverage without too much waste of the route capacity;
- For 870, 871 and 872 routes, the time table varies between 5-10min. This is quite suitable given the low ridership and population density within the area;
- The aforementioned bus routes, with the exception of the 887, the bus stop right outside the main entrance of the Hospital provides a high level of accessibility especially for low mobility commuters such as elderly, frail and parents with prams;
- A single bus shelter is provided outside the hospital entrance. There are two benches with tinted plastic barriers on three (3) sides. The roof is a half-cylinder made from corrugated metal. The shelter provides adequate protection from the external environment (e.g. wind & rain) and allocated two benches are sufficient for the existing awaiting patronage; and
- Bus capacity is not an issue as noted by our surveyors who undertook the intercept surveys outside the hospital main entrance.

Regrettably, despite the reasonable frequency and network coverage, only 0.3% staff use the bus services. In fact, currently about 4% outpatients and visitors use the bus services which is significantly higher than the staff mode to bus services.

To increase the mode share to bus transport, we recommend the following measures should be considered:

- Currently the majority of direct bus services run along the north-south corridor (Figure 33). However, using multiple bus routes or a combination of trains and buses, the network coverage is quite extensive. Nonetheless, given the low frequency of services, waiting time for connecting services are likely to be a major discouraging factor for low public transport usage;

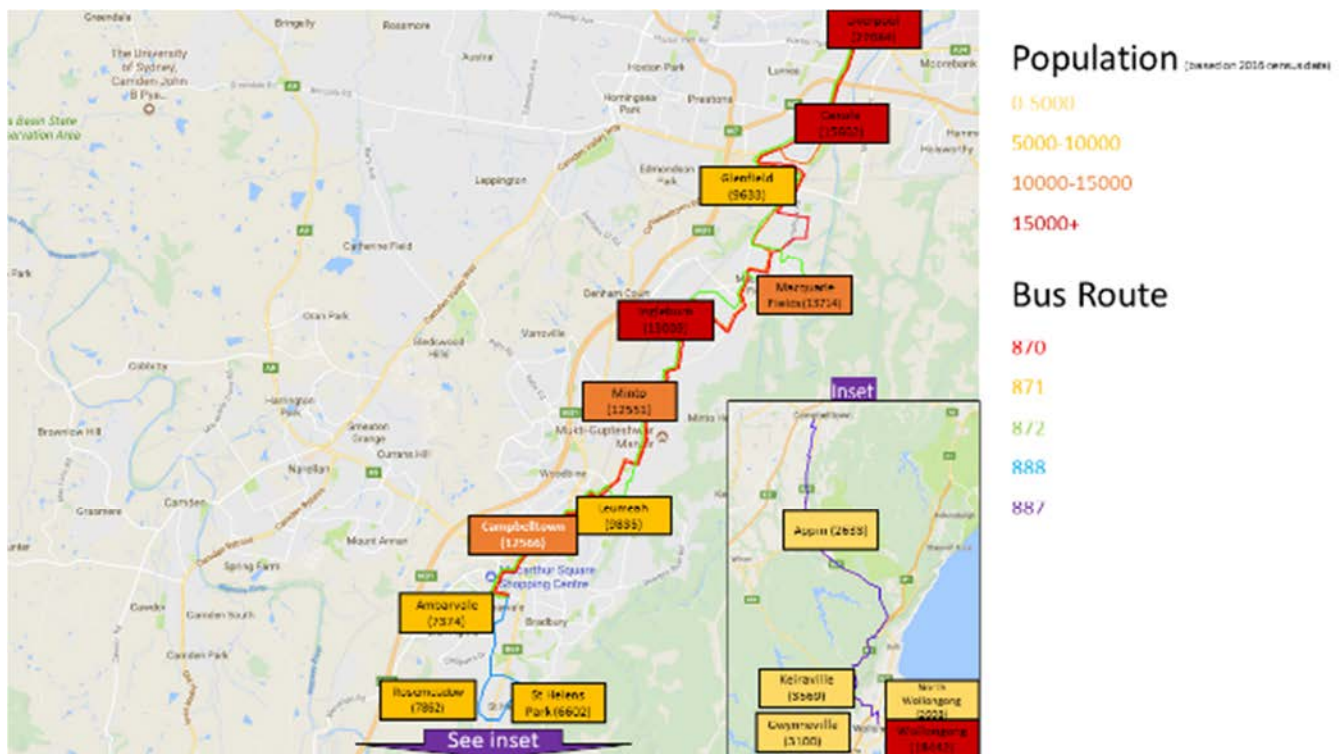


Figure 33: Existing Bus Network Coverage

- NSW State Government is currently considering Rapid bus routes in various parts of Sydney. Rapid bus routes will directly connect major centres for jobs, shopping centres and other growth areas and improve Sydney's cross-metropolitan public transport network. In this area, the Government is currently investigating a new Rapid bus route covering the Growth Centres: Liverpool – Campbelltown via Leppington and Oran Park areas. The Rapid route will provide:
 - Over 150 new services every weekday on this Growth Centre route;
 - More early morning, evening, night and weekend services; and
 - Integrate with the delivery of the South West Rail Link.

An opportunity to link the Rapid bus route to Campbelltown Hospital along with Macarthur Shopping Centre should be discussed with the State Government. A simpler and more frequent bus service along the corridor will make bus travel more attractive to the staff and visitors.

To assist in achieving a greater utilisation of public bus mode share, we understand from BLP that the local bus contractor (Interline Bus Company) is proposing to double services to the Hospital in 2018 (as noted earlier in this report).

9.3.2 Train Services

As stated in section 5.1.3, currently 0.6% staff and 3% outpatients and visitors utilise rail transport. The current service frequencies are considered reasonable although improvements to rail services along the corridor should focus on increasing frequencies and alleviating the bottlenecks on the network that cause delays. The improved reliability will promote heavy rail usage in the area.

The hospital has limited control to amend the existing rail services. However, it should be noted that currently bus route services 870, 871 and 872 travels somewhere alongside the Liverpool to Campbelltown train line. Buses currently stop at Glenfield, Ingleburn, Leumeah stations and very close to other stations. This

provides an easy mode change from train to bus and vice versa. This should be promoted to the hospital staff and visitors highlighting the benefits of transferring from one mode to another.

The integration of the bus and train timetable between the hospital and adjoining train stations should be investigated and necessary representation should be made to the State Government.

9.4 Assessment of Pedestrian Routes

As stated in Section 5.1.4, currently 0.2% of staff and 1.2% of visitors walk to the hospital. No outpatients walk to the Hospital.

Walking is a viable transport option for distances under one (1) kilometre (approximately 20-25min) and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improved health for the individual, reduced congestion on the road network and reduced noise and emission pollution. Our site observations show that the existing footpath networks and crossing points between the adjoining residential precincts and the hospital are generally adequate.

The pedestrian connections from the car parks to the hospital entrances are usually acceptable. Within the hospital precinct, paths are mostly quite generous. Away from the hospital, at many locations footpaths are not provided or are provided only one side of the street. In many instances, the road network has been designed to prioritise vehicle movements, including intersections with roundabouts where pedestrians need to negotiate many directions of traffic whilst crossing the road. These often provide positive efficiency outcomes for vehicle movements; however, pedestrians have no priority and are at greater risk crossing when compared with other intersection layouts (Photograph 1).



Photograph 1: Parkview Cres/ Hyde Pde Intersection - pedestrians need to negotiate three directions of traffic

In the staff survey, we could not determine the staff living within the walking catchment of the hospital due to large geometry of postcode 2560 (Campbelltown). As such, we recommend that further staff survey should be undertaken to target staff living within 800m-1km catchment (approximately 10-20min walk) as shown in Figure 34. Walk trip should be promoted to these staff members.

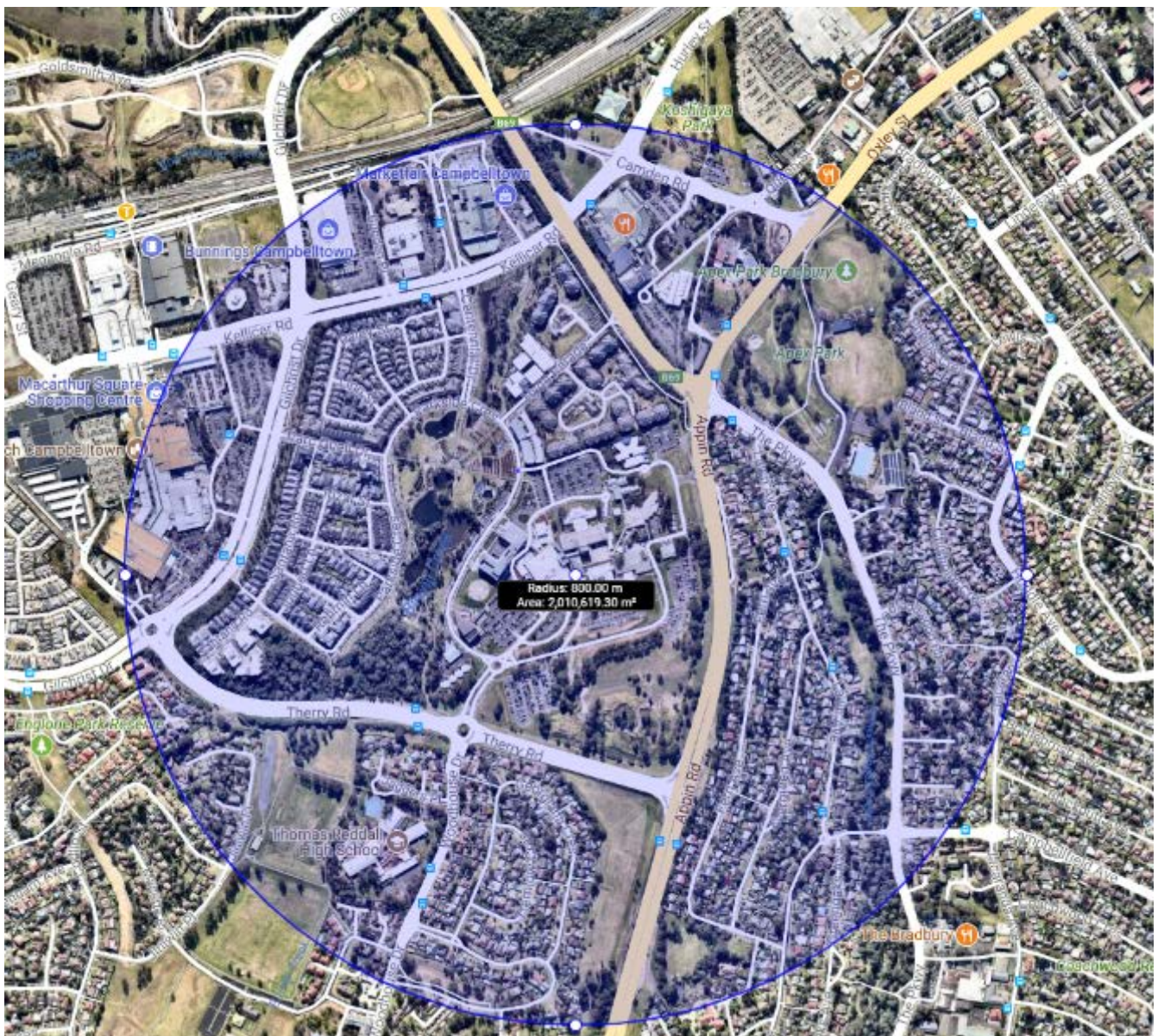


Figure 34: 800m radius of the hospital

Further, it is important to note that the train connection between Liverpool to Campbelltown is much faster than buses (e.g. 23min compared to approx. 70-80min by buses). From the hospital, Macarthur Station is approximately 20min walk (Campbelltown Station is a 30min walk). State Government has a land use and infrastructure plan for streetscape works, such as shared pathways, footpath improvements, pedestrian crossings and refuges to improve connections to Campbelltown Station and within Campbelltown CBD (Figure 35).

The pedestrian route to Campbelltown & Macarthur stations should be assessed. If required, necessary discussion should be held with the Council and State Government. Staff, especially day time staff, should be encouraged to use the pedestrian routes to the stations highlighting the health benefits and reduction of net travel time by traveling via train and walk, rather than bus.

'Walk to Work Day' should be celebrated to the hospital on annual basis (<http://www.walk.com.au/wwt/homepage.asp>).



Figure 35: NSW Government Land Use & Infrastructure Plan

9.5 Assessment of the Cycleway Routes

Our site observations indicate that minimal cycling is currently occurring to the hospital and no bicycle was seen parked at the racks located outside the main entrance of the hospital. No end of trip facility (e.g. bike lockers, male and female shower facilities etc.) is provided to the hospital. Consequently, no staff member use bike to the hospital, however, 12.6% staff responded that they would be interested to cycling if the end of trip facilities are provided.

The existing bicycle network in the locality is highly fragmented (Figure 7). Generous road width and shoulder in the area provide an opportunity to those who are willing to ride on road, however, less confident riders may not find the road network conducive for regular riding. Shoulder lanes between the moving traffic and the door opening zone presents safety implications to cyclists and on many occasions shoulder lanes generally end just before the intersections and reappear on the opposite side.

Due to its location, land use, geometry and road network, it is reasonable to consider that the cycling mode to the hospital by the day time staff will be below the Sydney's average (typically 1-2%). However, similar to walk trips, staff living within 2.5m radius (considered as a short trip) should be encouraged to ride (Figure 36). Discussions should also be held with the Council for safe and direct cycling path to the hospital from the nearby residential precincts.

Existing bike racks should be upgraded and cycling should be promoted to the staff members. Bicycle lockers and end of trip facilities should also be provided within the hospital.



Figure 36: 2.5Km catchment of the Hospital

9.6 Implementation of Green Travel Plan

A Green Travel Plan (GTP) sets out policies and practices to develop objectives and measures to encourage more walking, cycling, public transport and car share to an organisation. In principle, a well-connected, direct and prioritised infrastructure for walking and cycling should essentially reduce the demand for onsite parking.

A GTP should be prepared for Campbelltown hospital similar to:

- Royal North Shore Hospital

(http://www.nslhd.health.nsw.gov.au/HealthInformation/HealthPromotion/Documents/Projects/Healthy_Weight/GoActive2Work/RNSH_WTP.pdf)

- Lismore Hospital

(<http://nnswhd.health.nsw.gov.au/wp-content/uploads/LBHTravelPlan.pdf>)

A Transport Advisory Committee should be formed who will observe, set out and monitor the transport goals of the hospital on short, medium and long-term basis.

9.7 Dedicated Carpooling Space

The hospital should allocate some dedicated carpooling spaces to promote carpooling by the staff members living in the same areas. There are many ways to manage carpooling spaces which can be explored in due course. As a start, two (2) to three (3) parking spaces are recommended for carpooling with an effective marketing strategy to promote these spaces to the staff members.

9.8 Disability Parking Spaces

Based on the Building Code of Australia⁵³ the Hospital is required to supply “People with Disabilities” (PWD) parking spaces in the following ratios:

Public Parking

- 1 space per 50 for the first 1000 spaces,
- 1 space per 100 spaces (or part thereof) thereafter.

Staff Parking

- 1 space per 100 spaces (or part thereof).

⁵³ Class 9A facility (Health Care)

Based on the above, and our current parking demand estimate per [Appendix F](#), the provision of PWD spaces at the Hospital should be as follows:

User Group	BCA requirements re PWD space provision	Current Parking Demand (spaces)	Required PWD space provision
Public	1 space per 50 for the first 1000 spaces 1 space per 100 spaces thereafter	225	5
Staff	1 space per 100 spaces	1,067	11
Totals		1,292	16 (1.2%)

However, in our experience some Hospitals have a significantly higher public PWD provision, as high as 6% of parking spaces in some instances.

The BCA requirements are the minimum provision, although car park owners obviously have discretion to provide a higher volume of PWD spaces to meet the particular needs of the users of their car parks. Some States provide formal guidelines on such matters, for example the ACT Planning & Land Authority Parking and Vehicular Access General Code states:

*“Notwithstanding any provision in the Building Code of Australia or in AS2890, parking spaces for people with disabilities are to comprise a minimum of 3% (rounded up to the nearest whole number) of the total number of parking spaces required in accordance with this code **with a higher provision rate required for car parks serving health facilities and other facilities which provide services for aged persons and people with disabilities.**”*

Currently 46 disability parking spaces are provided in the campus which equates to 3.5% of total spaces. Our site observations indicate that the spaces are located in reasonable proximity to the building entrances.

We recommend that with future increase of the car park supply, the minimum provision of public PWD parking should be as the current level (3.5%). However, if a higher provision is considered appropriate, based on the specific demographics of the Hospital, a figure of 6% of supply could be appropriate. Staff PWD parking could be at a lower level, say 1%, in line with the BCA guidelines, or as high as the current provision (3.5%). These ranges would result in the following PWD provisions as at 2031/32:

User Group	PWD provision	Future Parking Demand (spaces) – 2031/32 ⁵⁴	Recommended PWD space provision
Public	3.5% - 6%	407	15 – 25
Staff (and others)	1% - 3.5%	2,386	24 – 84
Totals		2,793	39 – 109 1.4% - 3.9%

⁵⁴ Per Appendix I

9.9 Subsidised Public Transport

To improve the relative attractiveness of public transport, other transport modes such as driving should be benchmarked against and generally exceed the cost of public transport. We recommend that Opal Card credits should be introduced as an equity measure and incentivise to public transport use.

9.10 Car Share

Car share services will remove a common requirement to drive to the hospital for personal or business purposes. Subsidising car share membership will attract more car share users. Inter hospital trips can be made by car share vehicles, thus reducing the overall hospital fleet numbers. Discussion should be held with the car share operators (e.g. GoGet, Flexicar, PopCar etc.) to ascertain the demand for car share vehicles within the hospital campus.

9.11 Shuttle Bus Service

Based on the staff survey, if there is reasonable number of staff are found to be living within the 5-10km radius of the hospital, a shuttle bus can be considered in the future based on the demand. Discussion should be held with Transport for NSW/ Council for effective operation of the shuttle bus service.

9.12 Recommended Traffic & Pedestrian Safety Improvements

During the site inspection, a number of existing road network deficiencies within the hospital have been identified. The flowing road network improvements are recommended to improve the safety of pedestrians and vehicular traffic within the hospital campus. For convenience, the whole campus is divided into four (4) sections (Figure 37).

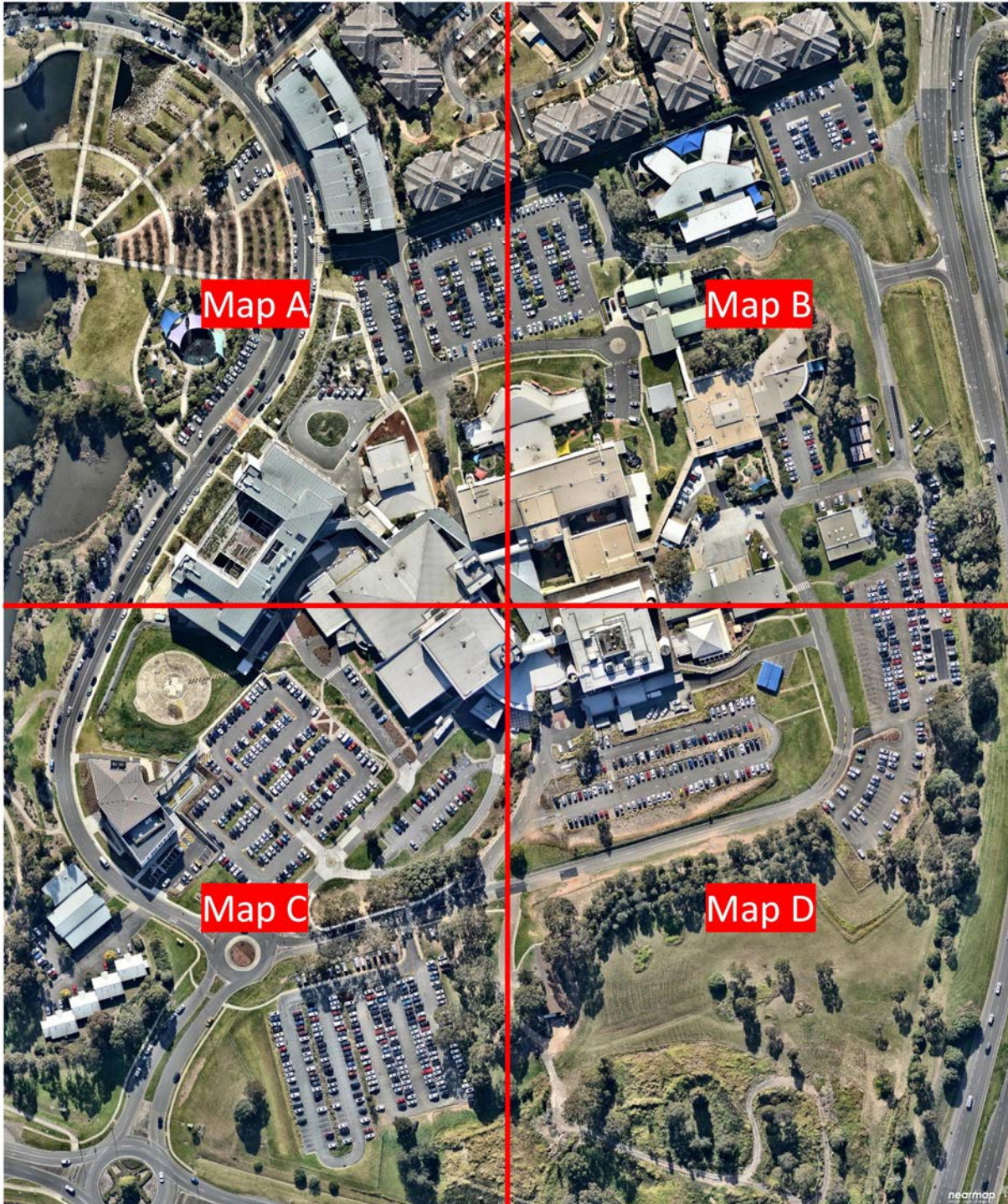


Figure 37: Hospital Campus

Map A

- A. Existing lack of pedestrian crossing facility. Recommend installation of a refuge island by Campbelltown Council as Parkside Crescent is a Council controlled local road (Photograph 1);
- B. Pedestrian crossing line marking is faded. Repainting is recommended by Campbelltown Council;
- C. Vehicles are observed to drive in the opposing lane to make right turns into and out of the car parks 2 & 3 (Figure 1). Discourage this illegal manoeuvre by extending the central median island approximately by 5m in each direction;
- D. Disability Parking paint on ground is faded. Repainting is recommended;
- E. Install missing 'Giveway' sign;
- F. Install missing pedestrian crossing sign;
- G. Install missing bollard at the disability parking to prevent illegal parking at the shared area;
- H. Install missing disability parking sign;
- I. Replace existing faded and non-standard 'No Parking' sign;
- J. Install missing pedestrian crossing sign (double sided both approaches); and
- K. Pedestrian crossing line marking is faded. Repainting is recommended by Campbelltown Council.

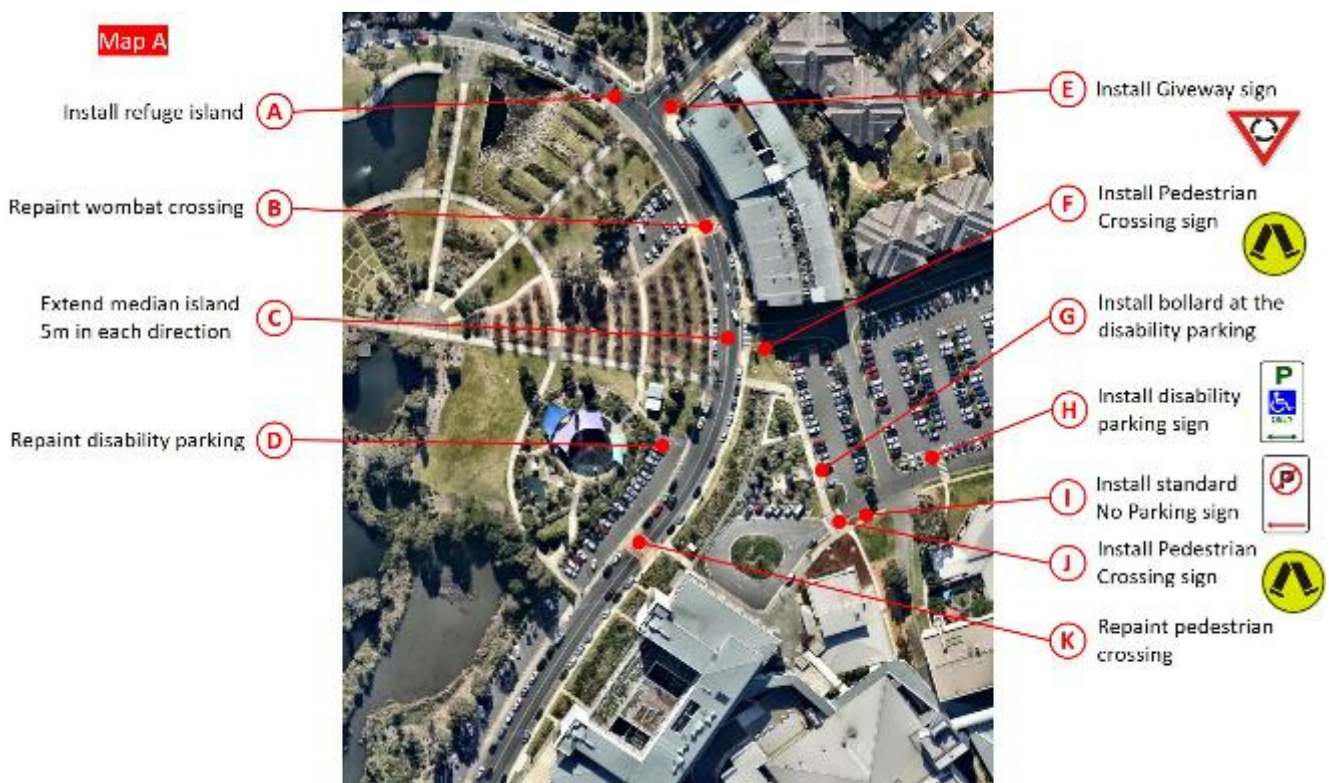


Figure 38: Recommended Measures (Map A)

Map B

- A. Install missing pedestrian crossing (double sided both approaches);
- B. The existing median strip at the middle is longer than required which is causing turning difficulty. Recommend reducing the length or replace with painted median;
- C. 'No Access to Appin Road' signs located at wrong locations. Recommend removing these signs;
- D. Replace non-standard disability parking sign with standard sign;
- E. Install missing Giveway sign;
- F. Replace faded No Parking sign;
- G. Install missing pedestrian crossing signs. All faded signs need to be replaced;

- H. The existing median strip at the middle is longer than required which is causing turning difficulty. Recommend reducing the length or replace with painted median;
- I. Roundabout paint is faded. Vehicles were observed to go over the roundabout. This could be discouraged by replacing the painted roundabout with a raised central island. Also require roundabout signs (both approaches).
- J. The existing No Stopping sign pole is bent. Repair is required.

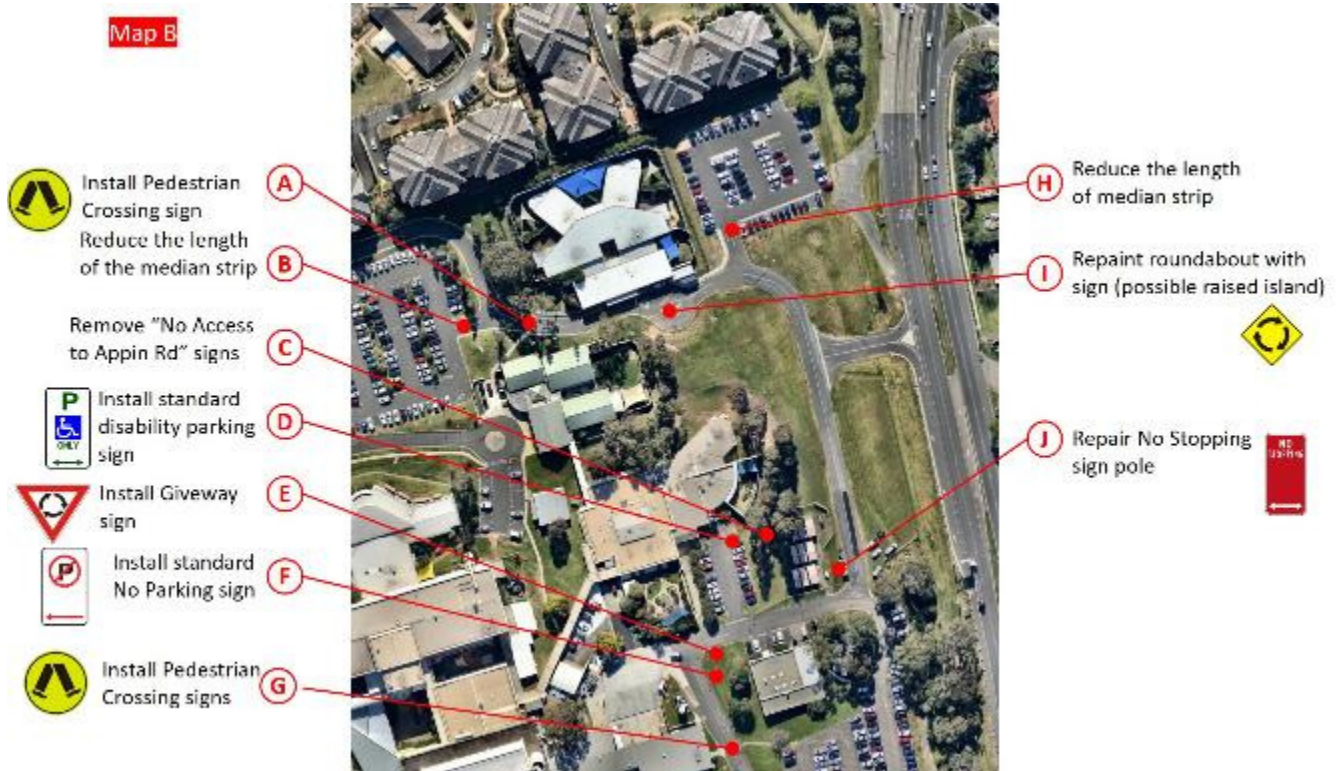


Figure 39: Recommended Measures (Map B)

Map C

- A. Pedestrian Crossing signs are faded. Replacement is required;
- B. Existing No Stopping sign is faded and bent at an angle. Repair is required;
- C. Existing Pedestrian Crossing sign on both sides are faded. Replacement is required;
- D. Pedestrian Crossing signs are missing. Installation is required.
- E. Vehicles drive over kerb to park on the grass by damaging the kerb and footpath. Install No Parking signs and ensure enforcement;
- F. Replace non-standard No Parking sign;
- G. Replace non-standard disability parking signs;
- H. Disability parking signs are faded. Replacement is required. No need to install sign in every parking bay, two signs at the end bays with appropriate arrows should be sufficient;
- I. Giveway control intersection requires a Giveway sign and line marking should be a dashed line (TB line), not a solid line;
- J. 10 KPH painted words on ground are ineffective for speed control. Recommend the use of rubber speed humps as a traffic calming device;



- K. Existing Stop sign is faded. Replacement is required; and
- L. Vehicles were observed to drive over the pedestrian ramps to park at the grass verge. Serious pedestrian safety issue. Recommend No Parking signage at the verge and effective enforcement.



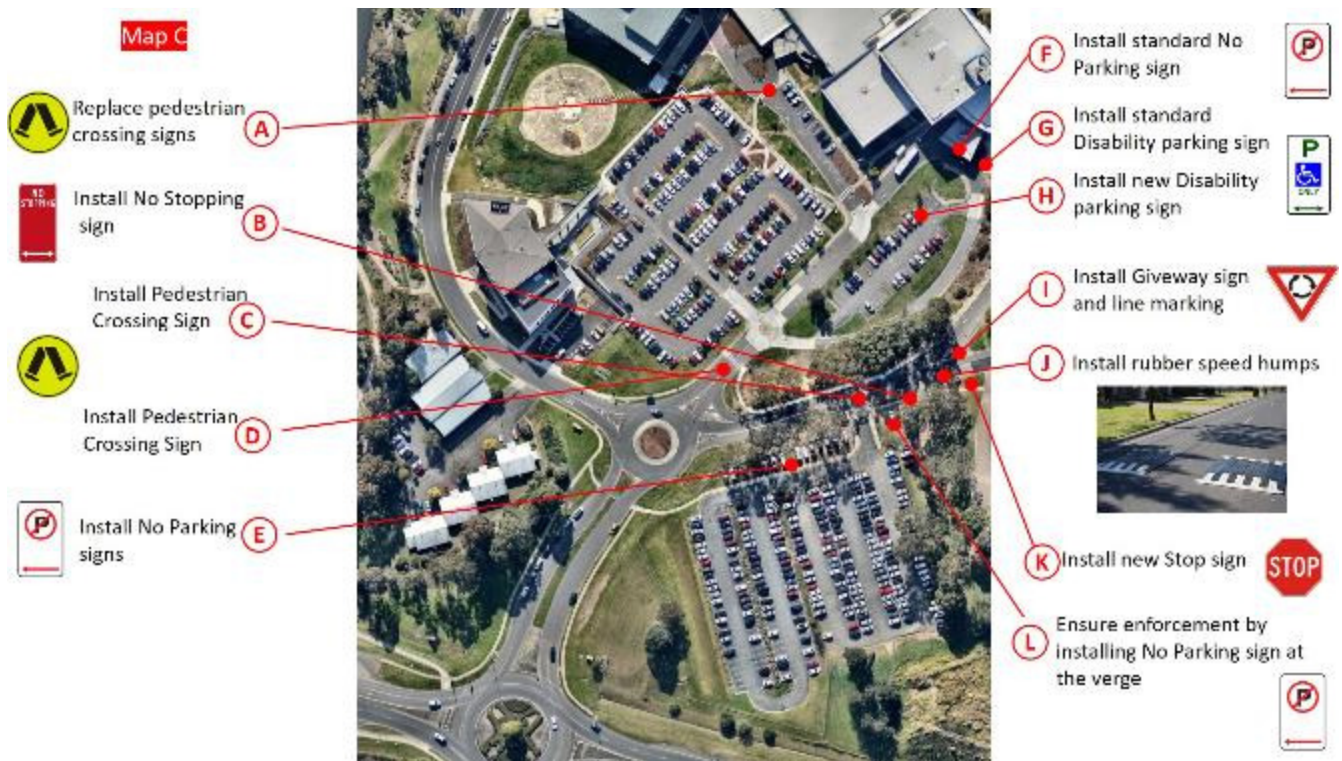


Figure 40: Recommended Measures (Map C)

Map D

- No Standing signs are obsolete and are superseded by No Stopping signs. Replace with standard No Stopping sign;
- 'No Parking On Roadway; Park in Bays Only' signs are located behind the fence and out of the general line-of-sight. Install standard No Parking sign at a suitable location;
- This car park entry and exit are confusing, one-way controls are in place, yet there are two accesses separated by central median islands. Vehicles were observed to drive against existing one-way control, confused by the central median islands. Recommend kerb extensions and removal of central median islands at the entry and exit points;



Existing Entry



Existing Exit

- D. Replace faded signs;
- E. Currently plastic bollards and chains are used to reserve the designated spaces which is proven to be ineffective. Folding or electrical bollards are recommended;
- F. Replace non-standard No Parking sign;
- G. Remove obsolete boom gate; and
- H. Existing median strip encroaches onto the pedestrian crossing which creates pedestrian trip hazard. Cut back the median strip by aligning the pedestrian crossing. Also replace the faded signs at the crossing.

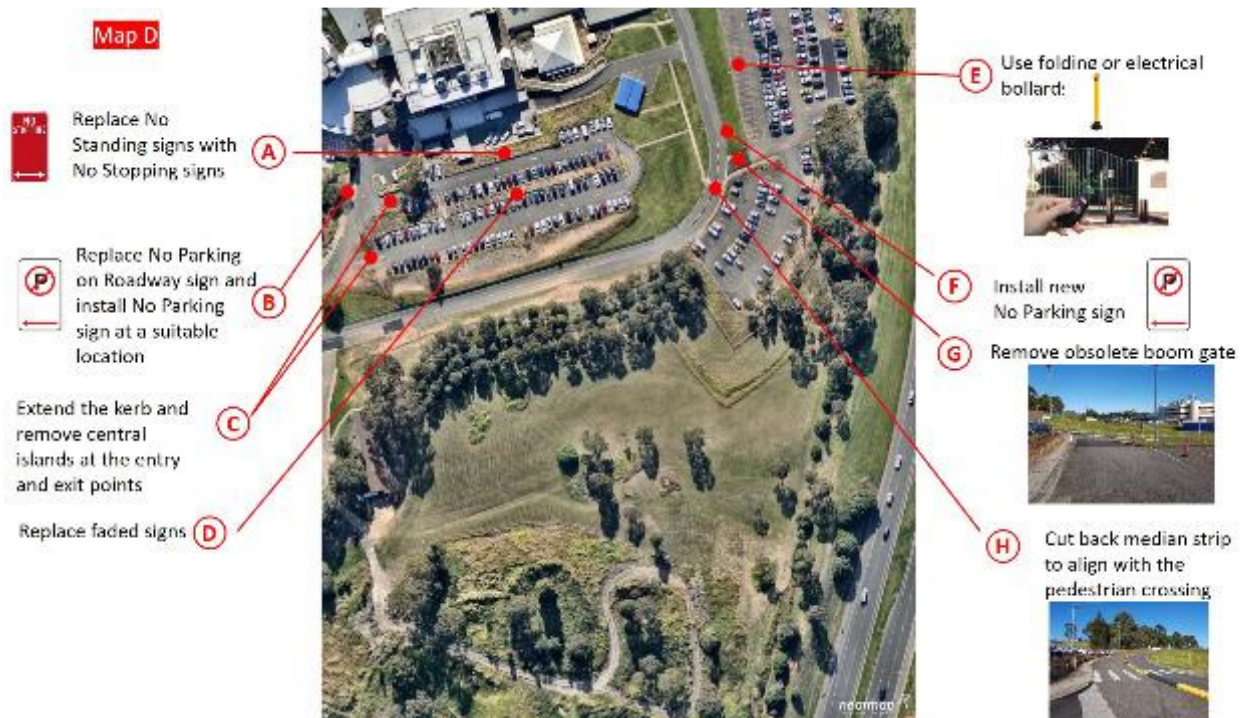


Figure 41: Recommended Measures (Map D)

The above recommended traffic and pedestrian management measures should be implemented in short term basis. In the longer term, a Road Safety Audit should be undertaken in the hospital campus by a qualified Road Safety Auditor.

10 Car Park Options Assessment

In total four (4) multi-level car parks have been considered within the hospital precinct (Figure 42). The pros and cons of each option are provided below.



Figure 42: Future Car Park Options

10.1 Option A (Multi level above the north car park)

Context

- Seven (7) level split deck car park with 1,070 spaces, net gain 780 spaces;
- Located on the northern end, the car park is in close proximity to Parkside Crescent;
- Secondary access could be provided via Appin Road;
- Located at the pedestrian desire lines e.g. hospital to the south and café to the north;
- Close proximity to the private hospital; and
- Alternate parking supply will be required during the construction phase;

Pros

- Ideally located between the public & private hospital and therefore good interface;
- No gradient issues for pedestrian connectivity to the hospital; and
- Good accessibility for staff, visitors and other user groups (e.g. outpatients).

Cons

- Due to the existing central median island on Parkview Cres, vehicular access to/ from the Parkview Cres will be restricted to left-in/ left-out only;
- Due to the above reason, northbound traffic to/ from the car park will have difficult access;
- Parkview Cres carries significant volume of through traffic, especially during the PM peak hour. Additional traffic generated from this car park (approx. 270% additional capacity) will likely cause traffic congestion and queuing in the area;
- Service vehicles turning to/ from Parkview Cres may have access issues due to the existing central median island; and
- Decant existing parking.

10.2 Option B (Multi level car park south of Central Road)

Context

- Seven (7) level split deck car park 647 spaces (net gain 647 spaces) east-west (Option B) or north-south (Option B1) oriented or $647 \times 2 = 1,294$ space car park east-west oriented;
- Topography and gradient issue;
- Primary access is via Parkview Cres and secondary access via Appin Road;
- Greenfield site, therefore no additional parking will be required during construction;
- The site geometry is quite large. Therefore, more flexibly in designing the car park according to the need; and
- This option will work best if a direct connection is established to Appin Road (to the east).

Pros

- No additional parking is required during construction as it is a greenfield site; and
- Possible separated ambulance and service vehicle access.

Cons

- Due to the high topography, DDA compliant pedestrian connectivity would be a challenge;
- Parkview Cres would be the primary access point. As such, there are potential queuing and congestion at the Central Road/ Parkview Crescent roundabout;
- Pedestrians will have to access the car park by crossing the access road (Central Road). Assuming a wombat crossing or zebra crossing, pedestrian movements on the road may cause delays and conflicts; and
- Adequate night time lighting will be required, otherwise there might be safety issues.

10.3 Option C (Multi Level car park adjacent to Block B)

Context

- Seven (7) level split deck car park (886 spaces, net gain 700 spaces);
- Reasonable gradient; and
- Suitable location as it is close to the main hospital entrance.

Pros

- Suitable pedestrian connectivity could be established; and
- Likely traffic split between Parkview Cres and Appin Road. Therefore, minimum traffic impact due to the additional capacity of the car park.

Cons

- Access to the car park needs to be carefully considered due to the location of the moderate bend. Otherwise, there might be some safety and sight distance issues; and
- Additional parking would need to be provided during the construction, staged construction might be a possibility to minimise the parking impact during construction.

10.4 Option D (Multi level car park adjacent to Appin Road)

Context

- Seven (7) level split deck car park (886 spaces, net gain either 700 or 886 spaces based on the orientation);
- Potential topography issues;
- Primary access can be established via Appin Road; and
- Additional parking would be required during the construction; staged construction might be a possibility to minimise the parking impact during construction.

Pros

- Best option for vehicular connectivity to Appin Road. A signalised intersection would cater vehicular connection on both directions on Appin Road; and
- Appin Road access will ease the traffic pressure on Parkview Cres.

Cons

- Away from the hospital entrance, DDA compliant pedestrian connectivity might be an issue;
- Visitor and service vehicle parking are far away from the main hospital entrance and may not be feasible;
- Adequate night time lighting will be required, otherwise there might be safety issues; and
- Far away from the amenities, may not be suitable for outpatients.

11 Limits of this report

All surveys, forecasts and recommendations have been made in good faith and on the basis of the information available to PTC at the time of writing this report.

Where general data has been applied based on other hospitals, there is the need to recognise the fact that each hospital is to some extent unique, particularly regarding driving habits, sensitivity to parking prices, alternative means of transport, available free parking on street, demographics of the area etc.

The demand estimates should be considered as indicative only because they do not take into account variations due to:

- The potential effect of economic up or downturns,
- Inflation trends,
- The introduction or increase of any taxes on property in general or specific to parking,
- Any other factors that may adversely or positively affect parking demand.

Any reference to future market conditions should be regarded as estimates only. The process of making forward projections of such elements involves assumptions about a considerable number of variables and contingencies which are acutely sensitive to changing conditions.

Kelvin Worthington / Abdullah Uddin
Parking & Traffic Consultants