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Liverpool Hospital - Car Parking Demand Study

For Health Infrastructure NSW
20 December 2018

**parking;
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Document Control

Liverpool Hospital - Car Parking Demand Study, Report

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1 Executive Summary

1.1 Background

- Parking & Traffic Consultants (**ptc.**) was engaged by Health Infrastructure (HI) to prepare a parking demand study in respect of the car parking at Liverpool 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 14 years in response to the following drivers¹:
 - The Liverpool LGA population is expected to grow 41% from 2016 to 2031, a growth rate more than double the expected growth for the rest of NSW
 - The population people aged 70+ years is projected to increase by 109% by 2031
 - The current (2016/17) occupancy of the Hospital is 102%
 - In 2016/17 Liverpool Hospital was the busiest Emergency Department in NSW with 83,135 presentations
 - Acute adult overnight separations at Liverpool Hospital is expected to increase 36% between 2016 and 2031
 - The Liverpool LGA population has a higher rate of obesity (23%) and smokers (17%) compared to the NSW state average (19% and 14% respectively)

1.2 Parking

- The parking requirement was estimated for four scenarios, as agreed with HI², being:

Table 1 - Liverpool Hospital Parking Demand Study Scenarios Summary

Demand Estimate	Overview of Content / Purpose
Current (2017/18) – Base Case	<p>Current situation, based on data from HI³ and Westmead Hospital Parking Demand Study and Surveys.</p> <p>% of day shift and administration staff drivers requiring a car space based on an assessment of staff permits currently on issue plus current waiting list (per Section 8.2)</p>

¹ Source: Clinical Services Plan v1.9 30 August 2018

² See email to Laine Simpson, HI, 11 December 2018

³ Primary Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

Demand Estimate	Overview of Content / Purpose
Future (2025/26) – Base Case	<p>Future estimate, based on data from HI⁴ including.</p> <ul style="list-style-type: none"> General Hospital growth (187 additional inpatient beds⁵) Growth in FTE Staff numbers by 14.6%⁶
Future (2025/26) – Sensitivity Analysis 1	Assumed 10% reduction in day shift and administration staff drivers requiring a car space
Future (2025/26) – Sensitivity Analysis 2	Assumed 10% increase in day shift and administration staff drivers requiring a car space

- The Hospital currently has a total of 2,295 car parking bays (excluding other bays for emergency vehicles, loading docks etc. which are not generally available to staff and visitors). During our surveys, the recorded peak occupancy for all bays was 2,117 (92%).
- 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 all car parks are operating close to or above 90% occupancy (with the exception of the Western Campus fleet car park). We therefore conclude that parking at the Hospital is operating above practical capacity. Any vacancies observed during our site visit were primarily in LHD controlled or staff car parks, which may indicate that some staff on the waiting list could be allocated passes, in order to maximise occupancy of staff car parks.
- 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 1,902 spaces, which are summarised as follows:

Table 2 - Total Off-Campus On-Street Parking Supply

	Restricted Bays	Unrestricted Bays	Total Bays
Total On Street (all bays)	246	669	915

Table 3 - Total Off-Campus Off-Street Parking Supply

	Total Bays
Total Off Street Bays (all paid parking)	987

⁴ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁵ Per clarification note from HI December 2018 – current inpatient beds 807, 2025/26 inpatient beds 994

⁶ Per Liverpool Health Campus Assumptions for Car Park demand Study, Update 7 December 2018 (v4) – 2017/18 FTE 4,354 2025/26 FTE 4,989

- The majority of the on-street parking within the extended RPZ is free of charge, located mainly in the areas to the north (residential / commercial) and east (light industrial) of the Hospital. The on street parking spaces closer to the city centre, to the west and south of the Hospital, are typically time restricted between 1 and 2 hours, and require payment on weekdays (weekends free). Fee structures for on street parking are less expensive than non-concessional pricing at the Hospital car parks.
- This makes most of the parking in the RPZ a viable option for staff (particularly unrestricted on-street spaces), 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.
- Occupancy (and the related number of cars) during our survey of the off-campus parking within the RPZ is highlighted in the tables below:

Table 4 - Total Off-Campus On-Street Parking Supply

On Street Parking Bays	Capacity	Occupancy (cars)	Occupancy (%)
Unrestricted Occupancy %	669	637	95.22%
Restricted Occupancy %	246	230	93.50%
Totals	915	867	95%

Table 5 Off campus Off-Street parking supply in RPZ

Off Street Parking Bays	Capacity	Occupancy (cars)	Occupancy %
Off street parking bays (all paid parking)	987	879	89%

- Additionally, located just beyond the RPZ is Westfield Liverpool Shopping Centre which offers 3 hours free parking. From observations during our on-site survey, we believe that this car park is being utilised by outpatients and visitors to inpatients. In the absence of outpatient and visitor surveys it is not possible to estimate the extent of utilisation by these user groups.
- A summary of the key input assumptions to the parking demand model is as follows⁷:

Table 6 – Key Input Assumptions

Input assumptions	Current (2017/18)	2025/26
Total Staff FTE	4,354	4,989
VMO	238	273
Outpatients – Service Events	418,129	549,194
Inpatients – Beds	807	994
ED Presentations – weekday average	242	327

⁷ Source: Liverpool Health Campus Assumptions for Car Park demand Study, Update 7 December 2018 (v4)

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

Table 7 – Summary of Estimated Current & Future Parking Demand & Supply

Total Parking Supply/Demand Analysis	Current – Base Case	Future (2025/26)	Sensitivity Analysis 1 (10% reduction in staff car mode share)	Sensitivity Analysis 2 (10% increase in staff car mode share)
Total On Campus Supply (assuming no additional parking provision)	2295	2295	2295	2295
Demand (per Table 30 – Summary of Weekday Peak Parking Demand)				
Staff (inc VMO)	2160	2476	2284	2668
Public	479	602	602	602
LHD Controlled – Fleet Vehicles	25	28	28	28
Other users	149	176	167	185
Total Demand	2813	3282	3081	3483
Total On Campus Shortfall	518	987	786	1188
Additional spaces required (compared to current)		469	268	670
Less: Current unutilised Off Campus supply within RPZ – see Section 6.5⁸		156	156	156
Net Requirement		313	112	514

- The current estimated on campus shortfall of 518 bays is currently met by off campus parking supply.
- Our surveys indicate Hospital related users are utilising approximately 40% of the occupied off campus supply (696 of 1,746 off-campus spaces), noting there are competing demand drivers from the Sydney Southwest Private Hospital, other various medical service providers in the area, visitors / parents to Liverpool Girls High School, TAFE NSW Liverpool students and staff members, residences and businesses within the medical precinct which, overall, means that the RPZ is currently operating at practical capacity (92% - see **Section 6.5**) with, at most, only 156 spaces available (assuming people can find them, are prepared to pay for them etc).
- Assuming a status quo in terms of the RPZ utilisation (i.e. no additional utilisation of the RPZ), an additional 469 spaces⁹ would be required (in total) by 2026/27 (sensitivity analyses range is 268 – 670 additional spaces).

⁸ Assuming 100% utilization of RPZ

⁹ Current demand 2813, 2026/27 demand 3282 = increase of 469

- In the absence of additional parking this will likely result in hospital-related users having to park beyond the RPZ or adopt a different mode share option (e.g. public transport).
- If the estimated **public** parking demand at 2025/26 is to be met in full (602 spaces) an additional 164 **public allocation** would be required¹⁰.
- We strongly recommend comprehensive staff and public surveys at the hospital to further validate the demand modelling and estimates (i.e. to confirm % driving and requiring a parking space, people per car, parking location etc). We also recommend that the Hospital be requested to confirm key data where assumptions are currently being utilised (e.g. proportion of staff rostered on weekdays, staff shift splits etc.).

These conclusions are subject to the following assumptions:

Demand

- We have not assumed any significant change in parking behaviour (i.e. %'s driving etc) of the public or staff in future, apart from the sensitivity analyses provided which assumes a 10% reduction and a 10% increase in day shift and administration staff % driving and requiring a parking space.
- No changes to the % of outpatients and visitors who are dropped off and do not park.

Supply

- No changes to Hospital parking supply (so that the estimated future shortfall can be determined)
- No changes by Council to on-street parking regimes that result in fewer spaces being available to hospital-related users¹¹, such as:
 - 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. Private Hospital and Private Medical Practices and other entities).

¹⁰ Current public allocation 438

¹¹ We have researched the Draft Western City District Plan (March 2018) and Liverpool City Council's Development Control Plan but can find no definitive information to suggest any changes to current on-street parking controls. At a high level, the existing time restricted parking adjacent to the Hospital precinct is assisting to service the nearby retail and commercial areas, as well as the hospital, so is considered unlikely to be removed, or re-allocated to Unrestricted or No Parking by Council. The Unrestricted parking in the wider RPZ could be re-allocated to time restricted, however this would only likely be in response to resident complaints and we have not been able to locate any evidence of this.

1.3 Other matters

- Some operational matters, for consideration by the Hospital/LHD, are dealt with in **Section 10**.

1.4 Limits of this Report

- 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

ptc. was engaged by Health Infrastructure (HI) to prepare a parking demand study in respect of the car parking at Liverpool Hospital (the Hospital), to assist in determining the current and projected parking requirement.

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:

- Campbelltown Hospital (2017 - 2018) current and projected parking demand studies, traffic studies and wayfinding strategy development, on behalf of HI
- Lismore Base Hospital (2015) current and projected parking demand studies and car park management strategy development, on behalf of HI
- Gosford Hospital (2013 – 2018) parking demand studies, traffic engineering services and assistance with procuring a car park operator, on behalf of HI
- Nepean Hospital (2016 - 2018) parking demand studies and traffic assessments, to assist in determining the current and future parking demand, 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 (2016 - 2018) parking demand and revenue estimates in relation to the feasibility of providing additional car parking facilities at the hospital, on behalf of Metro South Health.
- 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 – 2017) 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.
- Wagga Wagga Hospital (2018) in respect of current and projected parking demand, on behalf of HI.
- Dubbo Base Hospital (2018) in respect of current and projected parking demand, on behalf of HI.

3 Liverpool Hospital

3.1 Background

Located within the central business district of Liverpool, Liverpool Hospital is the major health service provider for south-western Sydney. Currently, the hospital is a tertiary referral academic and research centre providing health services such as emergency and trauma care, maternity, cancer care, mental health, surgical services, etc.

The hospital is adjacent to the Georges River, between Warwick Farm and Liverpool Railway Stations and is bisected into east and west campuses by the Southern Rail Line. The campus is bounded by Goulburn Street to the west, Campbell Street to the north and Elizabeth Street to the south. Its location adjacent to the Georges River means that a significant part of the hospital is affected by the Probable Maximum Flood (PMF) level. The current entrance to the Liverpool Cancer Therapy Centre (cnr. of Goulburn and Campbell Streets) is one of the highest and most accessible locations on the site, above the PMF (Probable Maximum Flood) level (see Figure 1 below):



Figure 1 - Hospital Location

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

Table 8 - Liverpool Hospital Key Statistics

Key Statistics ¹²	2017/18
Total Staff FTE	4,354
VMO	238
Total Inpatient Beds	807
Outpatient Service Events (per annum)	418,129
Emergency Department Presentations (average per day)	242

The Hospital is to undergo significant expansion over the next 14 years in response to the following drivers¹³:

- The Liverpool LGA population is expected to grow 41% from 2016 to 2031, a growth rate more than double the expected growth for the rest of NSW
- The population of people aged 70+ years is projected to increase by 109% by 2031
- The current (2016/17) bed occupancy of the Hospital is 102%
- In 2016/17 Liverpool Hospital was the busiest Emergency Department in NSW with 83,135 presentations
- Acute adult overnight separations at Liverpool Hospital is expected to increase 36% between 2016 and 2031
- The Liverpool LGA population has a higher rate of obesity (23%) and smokers (17%) compared to the NSW state average (19% and 14% respectively)

In order to meet the expected increased demand generated by these aspects, it is planned to expand the Hospital through the development of the Liverpool Health and Academic Precinct project. The \$740m project, currently in master planning stage, involves clinical and non-clinical infrastructure, including the following services:

- Comprehensive Cancer Centre
- Mental Health
- Emergency Department
- Aged Care
- Maternity
- Acute Rehabilitation
- Paediatrics

¹² Source: Liverpool Health Campus Assumptions for Car Park demand Study, Update 7 December 2018 (v4)

¹³ Source: Clinical Services Plan v1.9 30 August 2018

- Ambulatory Care
- Day Surgery / High Volume Short Stay
- Associated clinical support services
- Interventional Radiology
- Non Clinical Services
- Operating Theatres
- Facilities for teaching and research
- Inpatient beds
- Pathology
- Parking

Health Infrastructure ("HI") requires traffic and parking studies to support the expansion plans and has engaged **ptc.** to undertake the following works:

- Parking Demand Study
- Traffic and Transport Study Review
- Advice on Masterplan
- Concept Design Input and Analysis

This report is only in relation to the parking demand study for the Hospital.

3.2 Campus Plan & Parking Supply

The plan below shows the current parking areas within the Hospital campus and the proposed multi-deck¹⁴ following the demolition of P2 multi-deck.

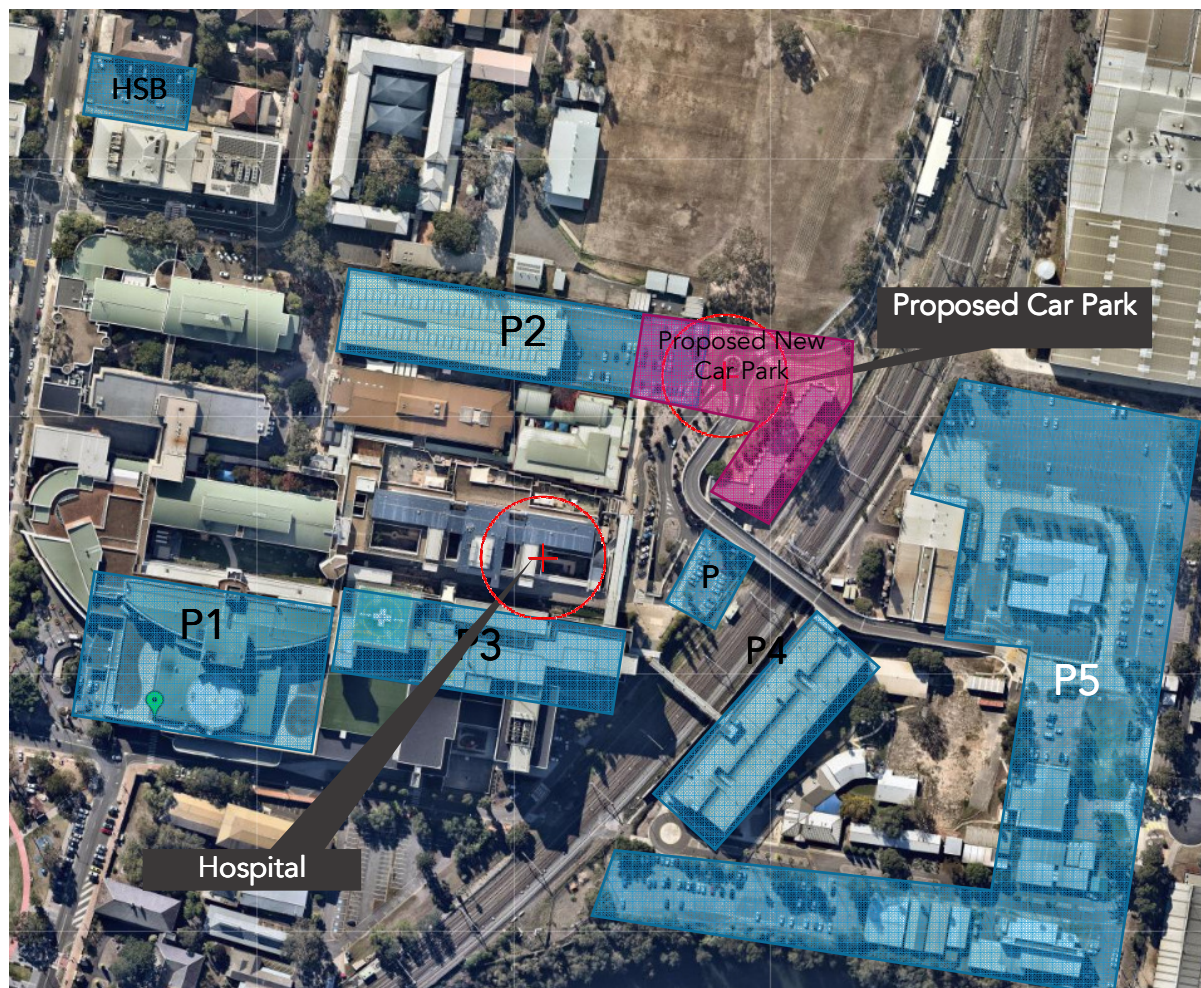


Figure 2 – Current On Campus Parking Supply and Proposed New Multi-level car park location

¹⁴ Approximate size / location only – detail still being developed

A summary of the current parking supply at the Hospital is as follows¹⁵.

Table 9 - Breakdown of Parking Supply by Car Park

Car Park	Comment	Staff & Fleet	Public	Total
1	100% Public		143	143
2	40% Public, 60% Staff	358	239	597
3	40% Public, 60% Staff	85	56	141
4	100% Staff	780		780
5	100% Staff	575		575
6	HSB (Health Services Building)	35		35
7	Western Campus Fleet Vehicles car park	24		24
	Totals	1857	438	2,295
	% of total supply	81%	19%	

Current parking allocation is heavily weighted in favour of staff (81%).

In our experience of other hospitals a more usual allocation is in the range 70%/30% (staff/public) and sometimes 65%/35%, depending on individual hospital site requirements and policies.

It is not clear from the information available if the allocations at the Hospital are supply driven or demand driven. Public parking fees at the Hospital are higher than other parking within (and just outside) the RPZ, which may be driving public to utilise this in preference to Hospital car parks. Conversely, the recently implemented¹⁶ NSW Health Car Park Concessions Policy may increase demand for on-campus parking from outpatients and visitors to inpatients. A more detailed discussion around price elasticity of demand is contained in **Section 9**.

Comprehensive surveys of staff, outpatients and visitors to inpatients would assist in understanding the key motivations at Liverpool Hospital, and the degree to which public and staff parking behaviours are driven by convenience, availability, price, and concessions availability.

¹⁵ Capacity for Car Parks 1 to 6, totalling 2271 spaces, was provided by HI . ptc. established the capacity of Car Park 7 during the site visit.

¹⁶ 1 July 2017

3.3 Parking Fees

All parking at the Hospital currently requires payment, with concessions available under the NSW Health Parking Concessions Policy¹⁷. Current staff and public parking fees are as follows:

Table 10 - Liverpool Hospital Staff Car Parking Fees

Staff parking	Fees
Per day	\$4.50
5 days per week	\$18.90
Weekly	\$22.70 ¹⁸

Table 11 - Liverpool Hospital Public Car Parking Fees (Standard)

Standard Public parking	Fees
0.0 - 0.5 Hours	\$4.00
0.5 – 1.0 Hours	\$8.00
1.0 – 1.5 Hours	\$12.00
1.5 – 2.0 Hours	\$16.00
2.0 – 2.5 Hours	\$20.00
> 2.5 Hours	\$24.00

Table 12 – Liverpool Hospital Public Car Parking Fees (Concessional)

Concession Public parking	Fees
0.0 - 3.0 Hours	Free
Single entry >3 Hours	\$5.50
3 day ticket	\$11.10
7 day ticket	\$22.20

¹⁷ Source: <http://www.parking.health.nsw.gov.au/>

¹⁸ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

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.

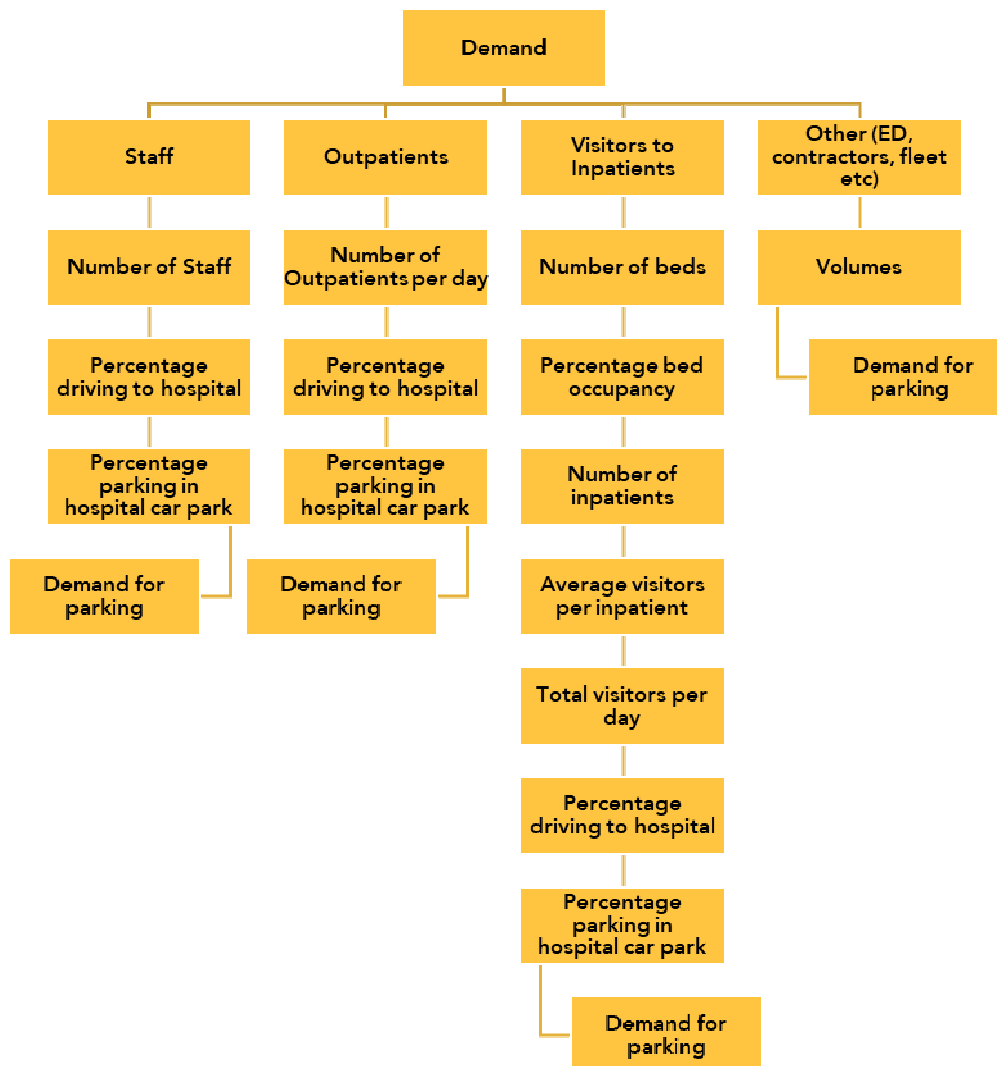


Figure 3 - Parking Demand Estimate Methodology Overview

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 HI¹⁹.

¹⁹ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

In addition we carried out the following surveys:

- Car park occupancy survey of all the hospital car parks and the parking supply within an extended Relevant Parking Zone, on 20th June 2018.
- Parking supply and occupancy counts within the Relevant Parking Zone (see **Section 6** of this report).

Note that an initial attempt at a staff online survey, to obtain car mode share data, proved ineffective (<100 responses). Therefore, after discussion with HI²⁰ we have estimated the current % of staff driving to work and requiring a parking space by analysing current staff permits on issue and the staff parking waiting list and applying assumptions as to their shift allocation e.g. priority given to night shift etc (see **Section 8.2** for details).

Also note that we were not engaged to undertake surveys of patients and visitors (as is our normal practice). Therefore, outpatient and visitor to inpatient % driving, people per car and parking space turnover data is from a comparable hospital (Westmead²¹).

We strongly recommend that staff and outpatient/visitor surveys be undertaken, as this will provide site specific data and also enable further verification of the current demand estimate model.

Information reviewed in order to obtain an understanding of the parking demand generators at the Hospital included (list not exhaustive):

- Staff numbers (FTE)
- Allocated parking for Fleet
- Total bed numbers (inpatient) and occupancy %
- Outpatient service events
- Emergency Department Presentations
- Education & Training (including students)
- Available nearby on-street parking
- Other off-street parking in the area
- External parking demand drivers; local high-school, Private Hospital, TAFE and other medical services in the precinct (noted only – we have not undertaken detailed demand analysis for these entities)
- Results of our on-campus car park surveys (occupancy only)

Where specific data was not available we applied our knowledge and experience of other comparable hospital sites (mainly Westmead Hospital²²) in estimating key factors such as car park turnover for staff, public and VMOs, staff shift patterns, retail and volunteer staff FTE, staff present for shift changeover, visitors to inpatients, and emergency presentations during peak period etc.

²⁰ See email from Laine Simpson dated 5 December 2018

²¹ Considered to be the best fit from our benchmark data i.e. is a major Sydney metropolitan hospital, with multiple service offerings, busy ED, Classification A1 Principal Referral Hospital etc

²² Considered to be the best fit from our benchmark data i.e. is a major Sydney metropolitan hospital, with multiple service offerings, busy ED, Classification A1 Principal Referral Hospital etc

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 agreed with HI²³:

Table 13 - Liverpool Hospital Parking Demand Study Scenarios Summary

Demand Estimate	Overview of Content / Purpose
Current (2017/18) – Base Case	Current situation, based on data from HI ²⁴ , and benchmark data from Westmead Hospital Parking Demand Study and Staff Surveys. % of staff drivers requiring a car space based on an assessment of staff permits currently on issue, plus current waiting list (per Section 8.2)
Future (2025/26) – Base Case	Future estimate, based on data from HI ²⁵ including. <ul style="list-style-type: none"> General Hospital growth (187 additional inpatient beds²⁶) Growth in FTE Staff numbers by 14.6%²⁷
Future (2025/26) – Sensitivity Analysis 1	Assumed 10% reduction in staff drivers requiring a car space
Future (2025/26) – Sensitivity Analysis 2	Assumed 10% increase in staff drivers requiring a car space

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.

²³ See email to Laine Simpson, HI, 11 December 2018

²⁴ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

²⁵ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

²⁶ Per clarification note from HI December 2018 – current inpatient beds 807, 2025/26 inpatient beds 994

²⁷ Per Liverpool Health Campus Assumptions for Car Park demand Study, Update 7 December 2018 (v4) – 2017/18 FTE 4,354 2025/26 FTE 4,989

5 Transport Environment at Liverpool Hospital

5.1 Transport mode options servicing the Hospital

Liverpool is one of the largest suburbs in South Western Sydney is well connected by road and rail to all surrounding suburbs.

5.1.1 Road

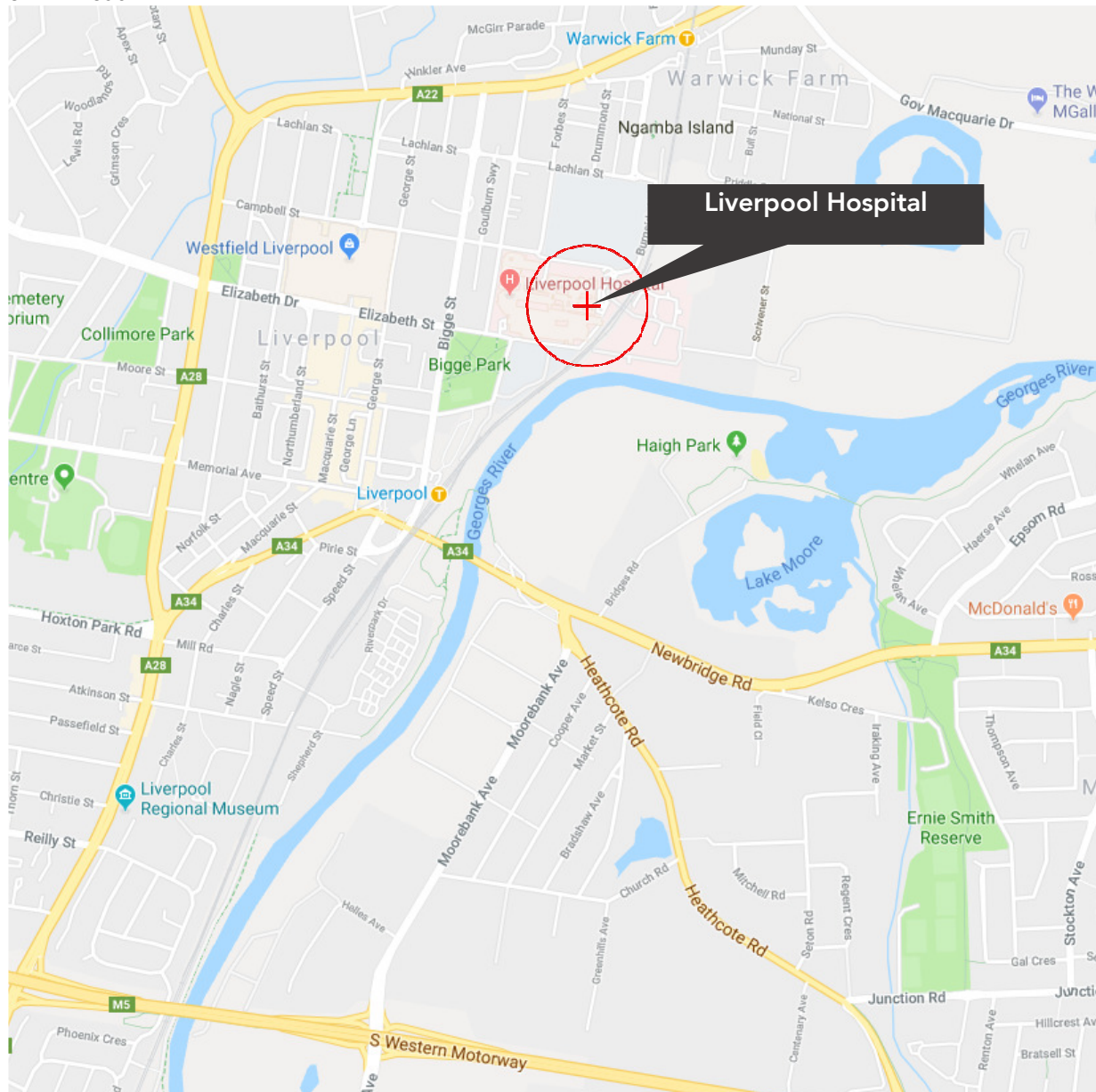


Figure 5 - Road Network Surrounding Liverpool Hospital

Located close to the town centre, the Hospital has excellent road connections in all directions, making access by car (or motorcycle) relatively easy. The Hospital is at the intersection of Elizabeth Street and Goulburn Street. The Hume Highway is within 1 kilometre of the Hospital whilst the South Western Motorway is within 3 kilometres of the Hospital.

The Hospital is serviced by the following major local roads:

- North – Hume Highway / Sydney Road and Cumberland Highway
- South – South Western Motorway (M5), Newbridge Road and Heathcote Road
- West – Hume Highway / Copeland Street

5.1.2 Bus

There are a number of bus stops close to the Hospital, as highlighted in **Figure 6** below:

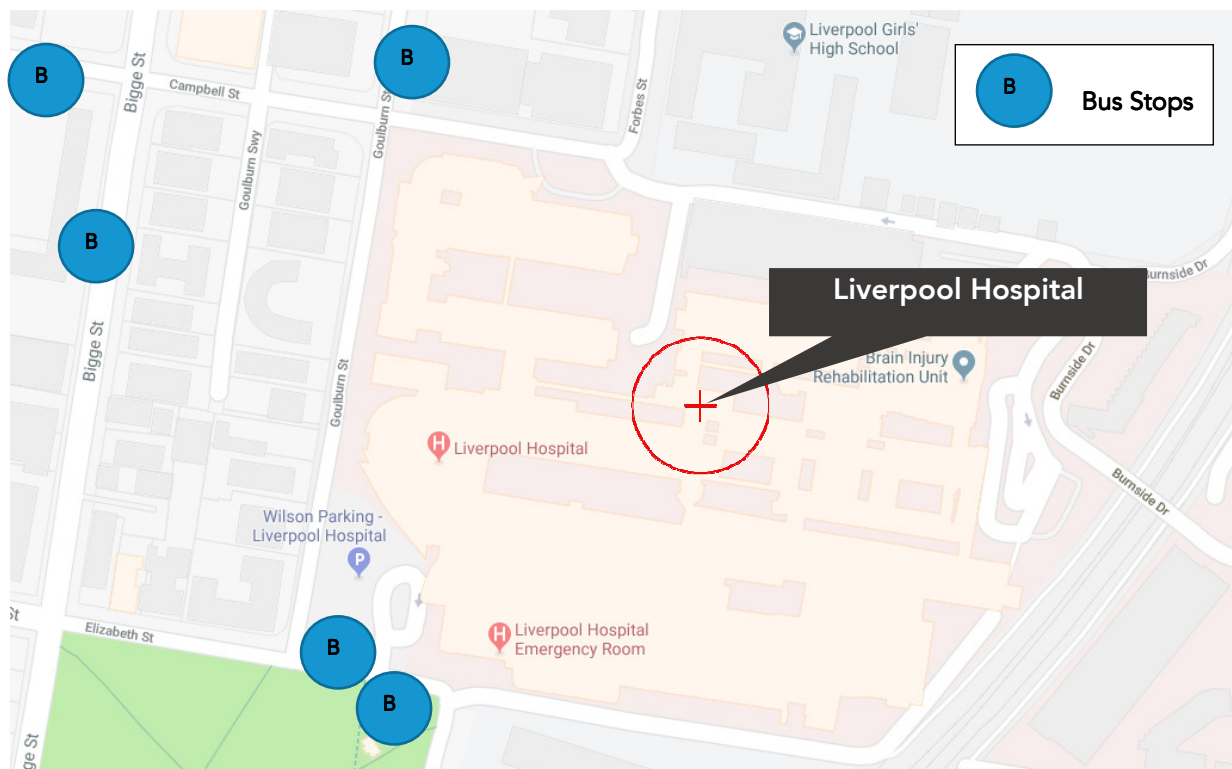


Figure 6 – Closest bus stops near Liverpool Hospital

The bus stops highlighted in **Figure 6** above are serviced by 26 bus routes, which are summarised in **Attachment 7**.

Given the close proximity of the bus stops to the Hospital and the frequency of services, bus travel should be a viable option for both staff and the public.

5.1.3 Heavy Rail

The Hospital is serviced by a heavy rail station, located approximately half a kilometre to the south of the Hospital (7 minute walk). Liverpool Station is serviced by trains running on the Inner West Bankstown and Cumberland lines on both weekdays and weekends.

Another heavy rail station, Warwick Farm, is located approximately 1.4km from the Hospital (16 minute walk),

Given the close proximity of the Liverpool rail station to the Hospital and the frequency of services, heavy rail should be a viable option for both staff and the public.

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 close by.

5.1.5 Cycling

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

Bicycle parking is available in the Hospital P1 and P2 car parks and at other sites around the Hospital Campus.

Despite being located on a flat plain, bicycle access to the Hospital from many suburban areas is difficult, primarily due to the lack of connected facilities in close proximity to the Hospital as illustrated in **Figure 7** below.

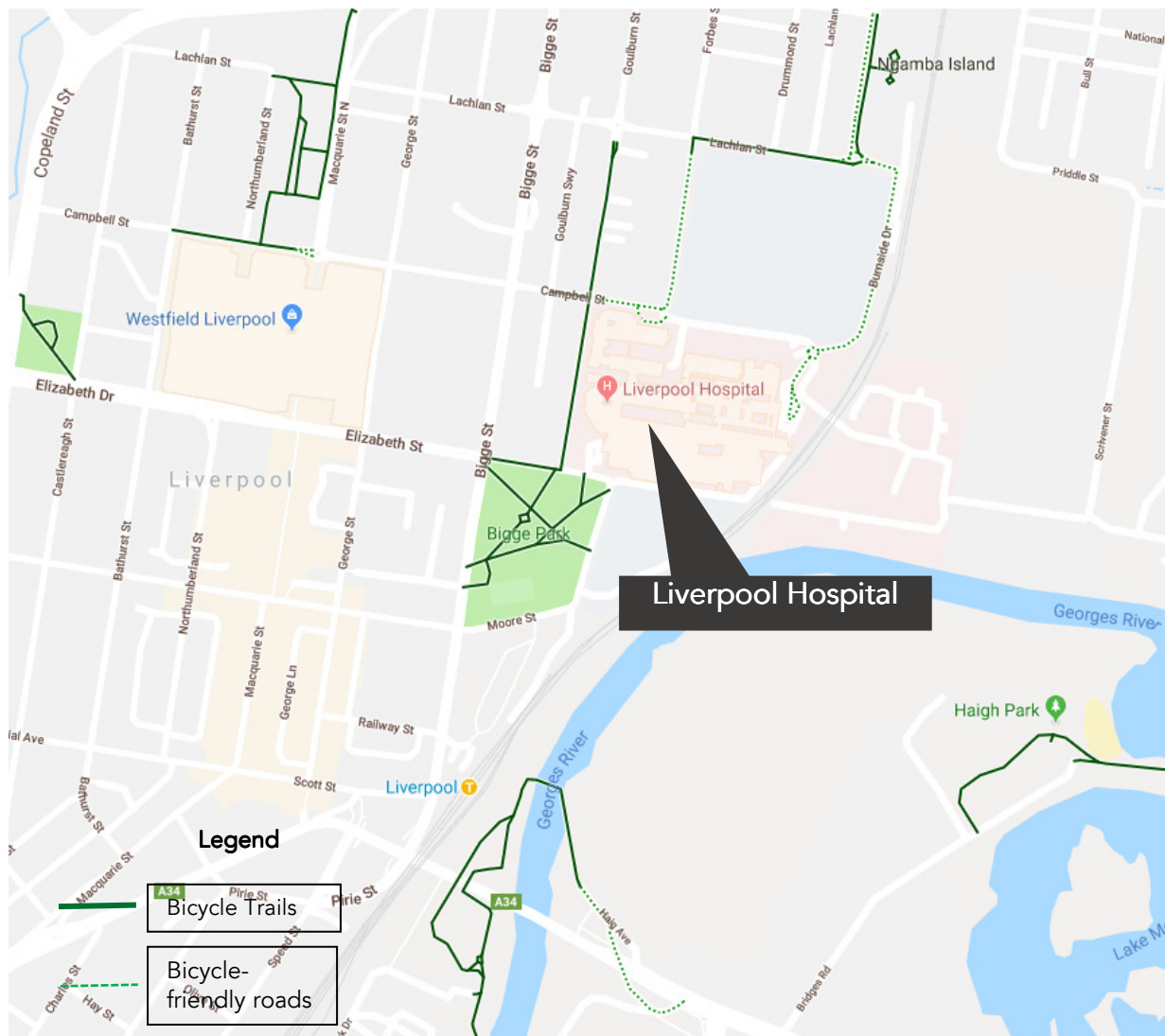


Figure 7 – Bike paths around Liverpool Hospital

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 to inpatients) are primarily road, heavy rail and bus.
- 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 the availability of mode share options for some people attending the Hospital, our surveys at other NSW hospitals²⁸ tend to indicate that 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).
- 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. Our surveys at other NSW hospitals cite this as a major reason for not using public transport.
- Where a reasonable supply of 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 to inpatients.

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 to inpatients at Liverpool Hospital.

²⁸ 17 sites in total

6 Relevant Parking Zone

A site visit was carried out on 20th June 2018 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.
- Other competing demand drivers in the RPZ

6.1 Relevant Parking Zone

The map below indicates the Relevant Parking Zone (RPZ) for the Hospital.

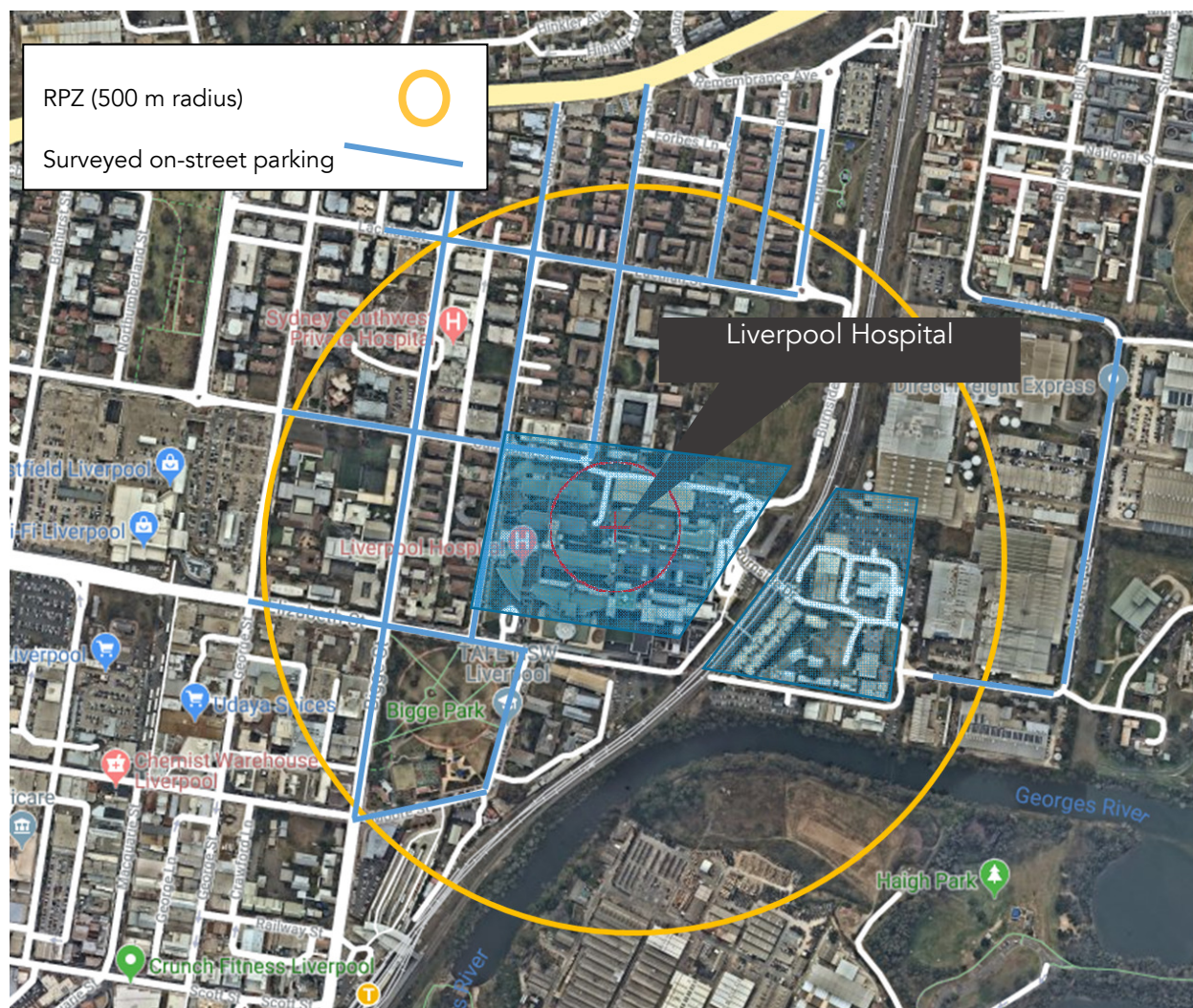


Figure 8 - Relevant Parking Zone Liverpool Hospital (hospital campus highlighted in blue)

The RPZ was measured using a radius of 500 metres from the approximate centre of the Hospital (see yellow circle on figure 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. Night shift staff would likely seek to park significantly closer to the Hospital for safety and security reasons.

For the purposes of this study, we surveyed an extended area beyond the RPZ, primarily in response to the (albeit limited) online staff survey results which indicated parking occurring in this extended area. The blue lines in **Figure 10** above indicate all the streets surveyed as part of our on-street parking occupancy surveys, which form part of the extended survey area.

It is likely that short stay parkers would want to park significantly closer than 500m, given the nature of the site 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 are normally allocated reserved parking immediately adjacent to their destination e.g. oncology, radiology, dialysis etc.

It should be noted that during our occupancy survey, we observed both staff and public walking to the hospital from areas well beyond the RPZ (including Westfield Shopping Centre and Warwick Farm Train Station). In the absence of comprehensive staff and public surveys it is difficult to assess if the reason for this behaviour is due to the lack of parking availability on campus or cost of parking on campus (e.g. Westfield Car Park provides 3 hour free parking).

6.2 Off-Street Parking within the Relevant Parking Zone

Three off street car parks were identified within, or on the fringe of, the RPZ (highlighted in pink below).



Figure 9 - Off Street Parking close to Liverpool Hospital

A summary of these car parks is as follows:

Table 14 – Off Street Car Parks

Car Park	Type	Operator	Capacity (spaces)	Occupancy (cars) ²⁹	Occupancy (%)	Fees	ptc. comments
35 Bigge Street	At Grade	Care Park	80	75	94%	Flat rate \$12 per day	Could be used by staff and/or public, although there is no wayfinding signage in surrounding streets so is relatively difficult to find. Fee \$12 flat rate is

²⁹ 10am – 2pm on day of survey

							<p>considerably higher than comparable staff fee at the hospital (\$22.70 per week); also considerably higher than the public concessional fee (up to 3 hours – free, > 3 hours - \$5.50). At non-concessional rates, a fee of \$12 is equivalent to a 1.5 hour stay at the hospital, so could be attractive if the expected stay is greater than 1.5 hours, however would be more likely to use Westfield (3 hours free).</p> <p>Staff who do not have a parking permit at the Hospital would be more inclined to utilise free on-street parking, even if this means parking further away (as observed during our surveys).</p>
Warren Serviceway	Multi-deck	Liverpool City Council	634 ³⁰	531	84%	0 – 1 hr \$3 1 – 2 hrs \$5 2 – 3 hrs \$7 3 – 4 hrs \$10 4 – 5 hrs \$12 >5 hrs \$15 Weekly \$40 - \$50 (depending on level parked) Monthly Unreserved \$120 Monthly Reserved \$220 Annual	<p>Car park is approximately 500m walking distance from the hospital main entrance, therefore on the fringe of the RPZ.</p> <p>Could be used by staff and/or public, although public who are not regular visitors to the hospital may find it difficult to locate as it is 'behind' another building (and therefore not easily visible from the road) and signage is very localised.</p> <p>Weekly/monthly/annual fees are higher than comparable staff fee at the hospital (\$22.70 per week).</p> <p>Staff who do not have a parking permit at the Hospital would be more inclined to utilise free on-street parking,</p>

³⁰ Council website says 640 spaces. Our survey shows 634 spaces

						\$1,200	<p>even if this means parking further away (as observed during our surveys).</p> <p>Public fees are higher than the hospital concessional fee (up to 3 hours – free, > 3 hours - \$5.50). At non-concessional rates, the hospital car park is more expensive (e.g. 2 hour stay \$16 vs. \$5 in this car park) so could be attractive to public who do not qualify for concessionary parking, however would generally be more likely to use Westfield (3 hours free).</p>
33 Moore Street	Basement	Secure Parking	273	273 ³¹	100%	0 – 30 mins \$2 30 mins – 1 hr \$4 1 – 2 hrs \$6 2 – 3 hrs \$8 3 – 4 hrs \$12 4 – 5 hrs \$15 5 – 6 hrs \$17 Early Bird \$10	<p>Similar to Warren Serviceway Car Park, this car park is approximately 500m walking distance from the hospital main entrance and could be used by staff and/or public, although public who are not regular visitors to the hospital may find it difficult to locate as it is 'behind' another building (and therefore not easily visible from the road) and signage is very localised.</p> <p>Early Bird fee is considerably higher than comparable staff fee at the hospital (\$22.70 per week).</p> <p>Staff who do not have a parking permit at the Hospital would be more inclined to utilise free on-street parking, even if this means parking further away (as observed during our surveys).</p>

³¹ Secure Parking are stack parking cars in the Early Bird section of the car park to increase utilization – Early Bird section (Level 2) has 35 bays but 49 cars were parked there. Remainder of car park appears to be largely reserved parking. Occupancy recorded as 100% as it would be incorrect to include the actual number in the total for all car parks, as this would artificially reduce the number of bays available in other car parks (e.g. Warren Serviceway).

							Public fees are higher than the public concessional fee (up to 3 hours – free, > 3 hours - \$5.50). At non-concessional rates, the hospital car park is more expensive (e.g. 2 hour stay \$16 vs. \$6 in this car park) so could be attractive to public who do not qualify for concessionary parking, however would generally be more likely to use Westfield (3 hours free).
Totals			987	879	89%		

The off street car parks appear to be operating at close to practical capacity³² with only approximately 108 spaces available.

In the absence of staff and public surveys at the hospital it is not possible to say to what extent the above car parks are currently being used by hospital-related users.

6.3 Off Street Parking beyond the RPZ

Beyond the RPZ, there are two major off street parking areas still within reasonable distance to the Hospital (Warwick Farm Train Station and Westfield Shopping Centre - highlighted in yellow in **Figure 9** above).

Based on our visual observations these are utilised by both staff and public, although in the absence of comprehensive staff and public surveys it is not possible to estimate to what extent.

³² Practical capacity defined as occupancy in excess of 90%

6.4 On-Street Parking within the Relevant Parking Zone

There are a number of potential on-street parking locations within the extended RPZ. The locations of these streets are shown in the map below.

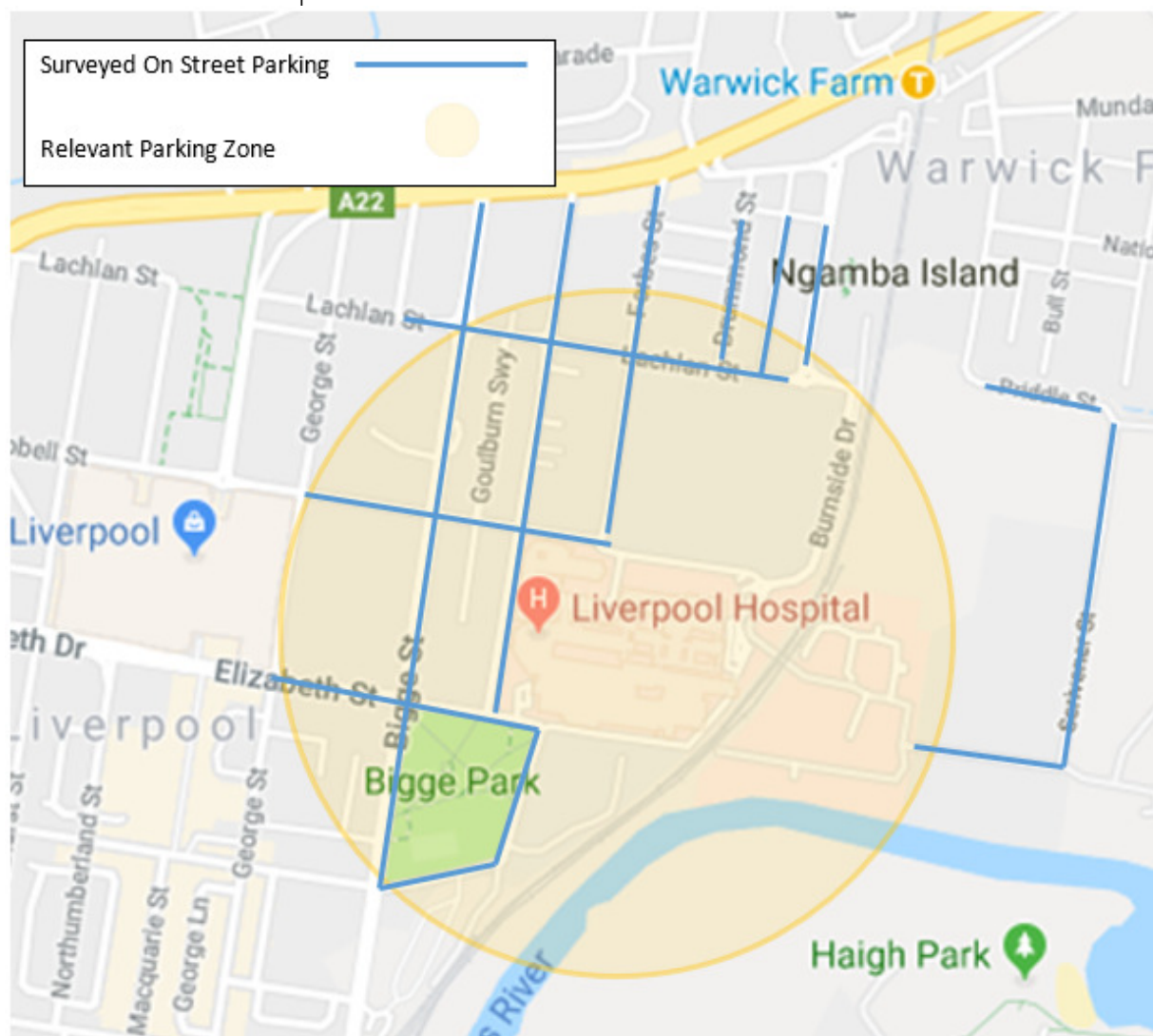


Figure 10 - On Street Parking in RPZ

A summary of these parking locations is as follows:

Table 15 - Off-Campus On-Street Parking Supply

Location	Time Restriction	When Enforced	Unrestricted		Restricted	
			Capacity	Occupied	Capacity	Occupied
Moore St (Bigge St to College St)	2P (paid & free) Fees \$2.50ph, max \$5 (2 hours)	9am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			35	35

College St (Elizabeth St to Moore St)	2P (paid & free) Fees \$2.50ph, max \$5 (2 hours)	9am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			53	53
George St (Campbell St to Elizabeth St)	Limited parking (taxi, disabled only)					
Campbell St (Forbes St to George St)	1P & 2P (paid & free) Fees \$2.50ph	8.30am - 6pm, Mon - Fri 8.30am - 12.30pm, Sat			20	20
	Disabled	24/7			7	7
	Unrestricted	24/7	21	21		
Elizabeth St (George St to Hospital)	1P (paid & free) Fees \$2.50ph	9am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			31	16
Bigge St (Moore St to Hume Highway)	1P (paid & free) Fees \$2.50ph	10am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			39	38
	Unrestricted	24/7	76	76		
Goulburn St (Elizabeth St to Hume Highway)	1P & 2P (paid & free) Fees \$2.50ph	8.30am - 6pm, Mon - Fri 8.30am - 12.30pm, Sat			61	61
	Unrestricted	24/7	87	86		
Forbes St (Hume Highway to Campbell St)	Unrestricted	24/7	56	56		
Lachlan St (George St to Hart Ln)	Unrestricted	24/7	89	89		
Drummond St (Lachlan St to Hart Ln)	Unrestricted	24/7	50	49		
Lachlan Ln (Lachlan St to Hart Ln)	Unrestricted	24/7	19	18		
Hart St (Lachlan St to Hart Ln)	Unrestricted	24/7	54	54		
Scrivener Street	Unrestricted	24/7	144	136		
Priddle Street	Unrestricted	24/7	73	52		
Unrestricted Spaces / Occupancy %			669	95.22%		

Restricted Spaces / Occupancy %	246	93.50%
--	------------	---------------

The majority of the on-street parking within the extended RPZ is free of charge, located mainly in the areas to the north (residential / commercial) and east (light industrial) of the Hospital. However, the on street parking spaces closer to the city centre, to the west and south of the Hospital, are typically time restricted between 1 and 2 hours, and require payment on weekdays (weekend free). The fees payable are generally less expensive than non-concessional pricing in the Hospital car parks, at \$2.50 per hour (compared to \$8.00 per hour in the Hospital car parks), however eligible concessional parkers at the Hospital can obtain 3 hours free parking.

6.5 Summary and Conclusions

Our survey of the extended RPZ indicates that current alternative parking supply for use by Hospital staff, outpatients and visitors, within reasonable, practical distance comprises 1,902 spaces, summarised as follows:

Table 16 – Summary of Off Campus Parking Supply in RPZ

Car Park	Capacity	Occupancy (cars)	Occupancy (%)
Off Street	987	879	89%
On Street	915	867	95%
Totals	1,902	1,746	92%

Overall, the off campus car parking locations (on-street and off-street) appear to be operating at practical capacity³³ (92%).

It is also important to note that the occupancy of most on-street parking spaces within the RPZ, particularly unrestricted spaces, was either at 100% or close to it during the occupancy survey.

All of our research indicates that most of the parking in the RPZ is a viable option for staff (particularly unrestricted spaces), outpatients and visitors to inpatients who, for whatever reason, do not want to, or are unable to, park in the on-campus car parks provided by the Hospital. For example, staff may park in residential / light industrial areas near the Hospital due to the lack of available spaces in the on-campus staff car parks, as evidenced by the current waiting list for on campus staff parking permits (754 staff³⁴).

This appears to be further supported by the high occupancy rates observed in on-street and off-street parking within the RPZ. As noted earlier, we also observed both public and staff members walking to and from the car parks at Westfield Shopping Centre and Warwick Farm Train Station.

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

³³ Practical capacity defined as occupancy in excess of 90%

³⁴ Source: Wilson Parking Liverpool Hospital Car Parking Monthly Operation Report November 2018

- Sydney Southwest Private Hospital and other various medical service providers in the area
- Liverpool Girls High School
- TAFE NSW Liverpool
- Visitors to residents, and
- Residents parking on-street

7 Surveys undertaken at Liverpool Hospital

Note that an initial attempt at a staff online survey, to obtain car mode share data, proved ineffective (<100 responses). Therefore, as requested by HI³⁵ we have estimated the current % of staff driving to work and requiring a parking space using data in regard to current staff permits on issue and staff parking waiting list (see **Section 8.2** for details).

Also note that we were not engaged to undertake surveys of patients and visitors (as is our normal practice). Therefore, outpatient and visitor to inpatient % driving, people per car and parking space turnover data is from a comparable hospital (Westmead³⁶).

We strongly recommend that staff and outpatient/visitor surveys be undertaken, as this will provide site specific data and also enable further verification of the current demand estimate model.

7.1 Occupancy Surveys

Occupancy surveys were conducted of all Hospital car parking (staff and visitor) on 20 June 2018, during the expected peak period between 10am to 1pm. The main objectives of the surveys were to:

- Observe peak parking demand on weekdays.
- Understand which parking areas are more highly utilised than others.

The occupancy survey results are shown in **Attachment 1**.

³⁵ See email from Laine Simpson dated 5 December 2018

³⁶ Considered to be the best fit from our benchmark data i.e. is a major Sydney metropolitan hospital, with multiple service offerings, busy ED, Classification A1 Principal Referral Hospital etc

A map showing the locations of the Hospital car parks is provided below:



Figure 11 - Locations of Liverpool Hospital Car Parks

The following table summarises the capacity of the car parks, and peak occupancy during our site visit of 20 June 2018:

Table 17 - Capacity of Liverpool Hospital On-Campus Car Parks

Car Park	Comment	Capacity	Public	Staff & Fleet	Occupancy (cars)	Occupancy (%)	Vacant Spaces
1	100% Public	143	143		143	100%	0
2	40% Public, 60% Staff	597	239	358	585	98%	12
3	40% Public, 60% Staff	141	56	85	127	90%	14
4	100% Staff	780		780	702	90%	78
5	100% Staff	575		575	514	89%	61
6	HSB	35		35	35	100%	0
7	Fleet Vehicles only	24		24	11	46%	13
	Totals	2,295	438	1,857	2,117	92%	178

Comments:

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 likely to be little or no outpatient activity at the Hospital.

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, students etc.).

We note that, nominally, only 19%³⁷ of the on-site parking supply has been allocated to the public. Our experience with parking allocations at other hospitals indicates that this is a low proportion, with public typically allocated approximately 30% - 35% of the on campus supply (excluding LHD controlled spaces).

An analysis of individual parking shortfall by staff and public users is problematic due to some car parks being shared by both staff and public (Car Park P2 & P3). For example, during our occupancy survey of P2 car park, we observed public parking in staff bays and expect the reverse also happens in the early mornings, as public bays are more conveniently located.

As such, in the absence of a length of stay survey being conducted³⁸, we are unable to analyse the parking allocations on campus effectively. We note however, given the high occupancy rates observed in the public car parks and within the RPZ (see **Section 6**) that there could potentially be a current shortfall of public parking onsite.

³⁷ 438/2295

³⁸ Which is our preferred practice, but not in scope for this project

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 all car parks are operating close to or above 90% occupancy (with the exception of the Western Campus fleet car park).

We therefore conclude that parking at the Hospital is operating at practical capacity. Vacancies observed during our site visit were primarily in LHD controlled or staff car parks, which may indicate that some staff on the waiting list could be allocated passes, in order to maximise occupancy of staff car parks.

8 Parking Demand

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

- The data provided to us by HI³⁹,
- Our review of the transport environment and the extended RPZ, and
- Our surveys at the Hospital (see preceding section of this Report).

The data provided by HI (referred to above) is, according to that document, primarily sourced from the following:

- Clinical Services Plan for Liverpool Hospital to 2031 (CSP) v1.9 (30 August 2018)
- Mental Health FTEs from the SWSLHD⁴⁰ 2018/19 Initial Budget Allocation
- Draft LHAC⁴¹ Financial Impact Statement v4.0 (29 November 2018)
- Liverpool Hospital Car Park Operator Reports
- Information on Visiting Medical Officers and students and trainers on campus provided by SWSLHD, December 2018

8.1 Assumptions

The source of the data used in the preparation of the current and future demand estimates is summarised in **Table 18** below.

Table 18 - Key data source

Data	Provided by HI ⁴²	ptc. assumption based on occupancy survey / research / experience	Westmead Hospital Parking Demand Study ⁴³
Inpatient beds	✗		
Bed occupancy % ⁴⁴	✗		
Visitors (Avg. per bed)			✗
Emergency Presentations	✗		
Staff FTE	✗		
% staff present on Weekdays			✗
Staff split by weekday shifts			✗

³⁹ Primarily Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁴⁰ South Western Sydney Local Health District

⁴¹ Local Health Advisory Committee

⁴² Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4), unless stated otherwise

⁴³ Considered to be the best fit from our benchmark data i.e. is a major Sydney metropolitan hospital, with multiple service offerings, busy ED, Classification A1 Principal Referral Hospital etc

⁴⁴ Liverpool Health Campus Assumptions for Car Park Demand Study to inform Master Planning 30 May 2018 (v2)

VMO's present on weekdays	✖		
Admin / Support staff numbers	✖		
Retail Staff			✖
Volunteers			✖
Education and Training	✖		
Fleet vehicles		✖	
% Staff drivers requiring a space	See Section 8.2 below		
Staff people per car			✖
Staff space turnover		✖	
% Public drivers requiring a space			✖
Public people per car			✖
Public space turnover			✖

All assumptions are detailed in **Attachment 2** with a summary of the key items as follows:

Table 19 – Key Input Assumptions

Input assumptions	Current (2017/18)	2025/26
Total Staff FTE	4,354	4,989
VMO	238	273
Outpatients – Service Events	418,129	549,194
Inpatients – Beds	807	994
ED Presentations – weekday average	242	327

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.

8.2 Staff % driving and requiring a parking space

As noted earlier, an initial attempt at a staff online survey, to obtain car mode share data, proved ineffective (<100 responses).

Therefore, as agreed with HI⁴⁵ we have estimated the current % of staff driving to work and requiring a parking space using data in regard to current staff permits on issue⁴⁶ and staff parking waiting list⁴⁷, and comparing this with staff FTE, using the methodology outlined below:

Overview / Rationale of methodology

Compare number of permits on issue, plus waiting list, and compare to staff FTE

Permits on issue (Nov 2018)	5099	headcount		
Waiting list	754	headcount		
Total	5853			
Conversion factor headcount / FTE	1.45	per Workforce Plan 2018-2028 - Headcount 5527, FTE 3799		
FTE equivalent	4037			
Present on weekdays	70%	Assumption per demand modelling		
Permits utilised on weekdays	2826			
People (FTE basis) - per FTE data from HI and demand modelling	People	% driving & requiring a parking space	Sum	
Day shift & admin	2273	79.7%	1813	
Afternoon shift	436	100%	436	
Night shift	339	100%	339	
VMO	238	100%	238	
Totals	3286	86.0%	2826	
Total permits utilised on weekdays	2826			
Total people (FTE basis)	3286			
% driving & requiring a parking space	86.0%			

Assumptions / Notes:

Day shift and admin added together to make calculation easier. Actual is 1,646 & 627 respectively

Assumed that 100% of afternoon shift & night shift drive (for safety reasons, and because of lack of public transport options at start/end of shift)

Assumed that 100% of VMOs drive, as they often work in multiple locations during the day and usually are also given a staff permit as part of their contract

It can be seen that, overall, the % driving and requiring a parking space is estimated at 86%.

Afternoon shift, night shift and VMOs are all assumed at 100% driving and requiring a parking space, for the reasons outlined in the assessment above.

Therefore, using a simple weighted average calculation, the estimated % driving and requiring a parking space for day shift and administration staff is 79.7%.

By way of validation of the above, we estimated the % of day shift and administration staff using a different methodology, based on working out how many staff currently require parking at peak by taking the waiting list plus the current on campus parking supply, then dividing this number by the number of staff (all on an FTE basis). Using this methodology the result is 82.4% (or 62 spaces difference), therefore the delta is not considered material. For the purposes of this report we have adopted the more conservative approach, as set out above.

⁴⁵ See email from Laine Simpson, HI dated 5 December 2018

⁴⁶ Source: Wilson Parking monthly report, November 2018

⁴⁷ Source: Wilson Parking monthly report, November 2018

8.3 Summary of Demand Estimates

We have prepared four parking demand estimates, as follows:

Table 20 - Summary of Parking Demand Estimates

Demand Estimate	Overview of Content / Purpose	Attachment
Current (2016/17) – Base Case	Current situation, based on data from HI ⁴⁸ . % of day shift and administration staff drivers requiring a car space based on an assessment of staff permits currently on issue plus current waiting list (per Section 8.2 for details)	Attachment 3
Future (2025/26) – Base Case	Future estimate, based on data from HI ⁴⁹ including. <ul style="list-style-type: none"> General Hospital growth (187 additional inpatient beds⁵⁰) Growth in FTE Staff numbers by 14.6%⁵¹ 	Attachment 4
Future (2025/26) – Sensitivity Analysis 1	Assumed 10% reduction in day shift and administration staff drivers requiring a car space	Attachment 5
Future (2025/26) – Sensitivity Analysis 2	Assumed 10% increase in day shift and administration staff drivers requiring a car space	Attachment 6

⁴⁸ Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁴⁹ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁵⁰ Per clarification note from HI, December 2018 – current inpatient beds 807, 2025/26 inpatient beds 994

⁵¹ Per Liverpool Health Campus Assumptions for Car Park demand Study, Update 7 December 2018 (v4) – 2018/19 FTE 4,354 2025/26 FTE 4,989

8.4 How to interpret the Parking Demand estimates

We set out below the rationale for interpreting our demand estimates, adopting "Outpatients" as a worked example.

Reading from left to right across the spreadsheet:

- People x % requiring a car space⁵² / 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 follows⁵³:

1,659 people per day x 54% requiring parking / 1 person per car = 900 cars per day requiring parking / space turnover of 2.82 = 319 parking spaces required at peak.

8.5 Weekday Staff Parking Demand

Current and future staff Full Time Employee (FTE) data was provided by HI⁵⁴ (see **Attachment 8** for details).

In the absence of data specifically for Liverpool Hospital, weekday / weekend proportions, and % breakdown of staff on each shift was calculated using the ratios adopted in the Westmead Hospital Parking Demand study, as follows:

Table 21 – Weekday Breakdown of Staff per Shift

	Current
Weekday / Weekend proportion	70% / 30%
Day Shift	68%
Afternoon Shift	18%
Night Shift	14%

Note that the above data is based on Westmead Hospital, as a proxy⁵⁵. We recommend that Liverpool Hospital be requested to provide similar data, as the application of such data may result in a change to the estimated parking demand.

To the day shift and administration staff we applied a percentage driving to work and requiring a car space of 79.7% (see **Section 8.2**).

For afternoon and night shift staff we assumed a driving to work percentage of 100%, based on our experience at other hospitals, where safety is a major concern for these staff and public transport options are often not available at shift start / finish times.

Average people per car adopted for day shift and afternoon shift is 1.08 based on our surveys at Westmead Hospital. We assumed 1 staff per car for night shift based on our experience at other hospitals.

⁵² i.e. excludes those who arrive by car but are dropped off and do not park

⁵³ Current Base Case – Attachment 3

⁵⁴ Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁵⁵ Considered to be the best fit from our benchmark data i.e. is a major Sydney metropolitan hospital, with multiple service offerings, busy ED, Classification A1 Principal Referral Hospital etc

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. In the absence of data from the Hospital, we have assumed that 100% of afternoon shift staff arrive prior to the day shift leaving (as a handover is assumed), as per Westmead Hospital.

We note that there is currently no reserved parking for afternoon shift staff. We understand that staff park in P4 & P5 and are accompanied back to their vehicles at the end of their shift by Hospital Security⁵⁶.

Using the demand drivers and assumptions outlined above we estimate peak demand for staff parking to be as follows:

Table 22 – Staff Peak Parking Demand

Weekday staff peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Day Shift	1215	1396	1256	1535
Afternoon shift changeover allowance	403	463	463	463
Administration Staff	463	526	474	579
Total spaces	2081	2385	2193	2577

8.6 Weekday VMO Parking Demand

HI provided the current number of Visiting Medical Officers (VMOs), 238 people⁵⁷.

Future VMO numbers were estimated using the growth in staff FTE (14.6%) as a proxy.

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 at other NSW hospital sites.

Using the demand drivers and assumptions outlined above we estimate peak demand for VMO parking to be as follows:

Table 23 – VMO Peak Parking Demand

Weekday VMO peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Spaces	79	91	91	91

⁵⁶ Verbal advice from the Hospital during recent information gathering session re the Ministry of Health Car Park Operator Tender for 8 hospitals (of which Liverpool is one)

⁵⁷ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

8.7 Weekday Public Parking Demand

8.7.1 Weekday Outpatients Parking Demand

HI supplied current annual outpatient activity (defined as “service events”) of 418,129 and forecast activity of 549,194 in 2025/26.

We divided the volumes by 252 weekdays⁵⁸ to arrive at an average volume per weekday. This assumes no outpatient activity at weekends, which was confirmed by the Hospital.

In the absence of patient/visitor intercept surveys (not in scope), we applied a percentage of outpatients driving to the Hospital and requiring a car space (54.2%), based on our surveys at Westmead Hospital.

We then applied a space turnover of 2.82 times to the resulting number of vehicles per day (based on our Length of Stay surveys at Westmead Hospital), to arrive at the peak parking demand.

Applying the demand drivers set out above we estimate that the peak demand for parking from outpatients would be as follows:

Table 24 – Outpatient Peak Parking Demand

Outpatients peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Spaces	319	419	419	419

8.7.2 Weekday Visitor Parking Demand

HI provided the current and future number of beds (807 & 994 respectively⁵⁹) and a bed occupancy rate of 99% currently and 85% in the future⁶⁰.

To the resulting numbers we applied an average of 1.25 visitors per inpatient⁶¹ to derive the total number of visitors.

We applied an estimated percentage of weekday visitors driving to the Hospital and requiring a car space (69.1%) and average number of people per car (1.76) based on our surveys at Westmead Hospital.

We then applied a space turnover of 2.82 times per day (as for Outpatients).

Peak daytime demand from visitors was estimated on the assumption that 81% of visitors will require parking during the daytime peak hours (8am – 6pm), based on data used for the Westmead Hospital parking demand study.

⁵⁸ 260 weekdays minus 8 public holidays

⁵⁹ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁶⁰ Source: Liverpool Health Campus Assumptions for Car Park Demand Study to inform Master Planning 30 May 2018 (v2)

⁶¹ Per Westmead Hospital Parking Demand Study

Applying the demand drivers set out above we estimate that the peak demand for parking from visitors is as follows:

Table 25 – Visitor to Inpatient Peak Parking Demand

Visitor peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Spaces	113	119	119	119

8.7.3 Weekday Emergency Department Parking Demand

We were provided with average daily ED presentations data by HI as detailed in the table below⁶²:

Table 26 - Average ED Presentations per Weekday

ED Presentations	Current	Future (2025/26)
Average ED presentations per Weekday	242	327

To the average weekday ED presentations figure we applied a 90% car mode share requiring a car space, based on the Westmead Parking Demand Study. 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 assumed that the proportion of ED presentations that occur during peak parking hours would be the same as per information provided to us as part of Westmead Hospital Parking Demand Study (61%).

We applied a space turnover of 2.82 times (as for visitors) in order to estimate the peak weekday parking demand as follows:

Table 27 – Emergency Department Peak Parking Demand

ED Presentations peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Spaces	47	64	64	64

8.8 LHD Controlled Fleet Vehicles

The current total number of fleet vehicles at the Hospital was based on the number of allocated fleet spaces on campus (74).

We applied the same growth rate utilised to estimate future FTE (14.6%) to this figure to estimate the future data.

We assumed 100% drive and require a park on site, as spaces are allocated.

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

On this basis we estimate that the peak demand for parking from fleet vehicles is as follows:

⁶² Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

Table 28 – LHD Controlled Fleet Vehicle Peak Parking Demand

Fleet peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Spaces	25	28	28	28

8.9 Other Parking Demand

Other parking demand comprises Researchers, UNSW Clinical Students, WSU Medical and Allied Health Interns, Ngara Education Centre, Volunteers and Retail Staff.

Current data for Researchers, students, interns and Ngara Education Centre was provided by HI⁶³. We applied the same growth rate utilised to estimate future FTE (14.6%) to these categories to estimate the future data, except for additional Undergraduate Students (+90) which was provided by HI⁶⁴.

In the absence of data from SWSLHD/HI, current data for Volunteers and Retail Staff was estimated based the number of Volunteers and Retail Staff in the Westmead Hospital Parking Demand Study, adjusted proportionately based on the ratio of inpatient beds at both hospitals. Growth under the Future scenario was based on the FTE growth rate (14.6%) as above.

Some of these categories have different demand drivers and assumptions – see **Attachment 2** for details. In particular HI advised students are required to pay full parking fees and use of public transport is encouraged for students and researchers.

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

Table 29 – Other Peak Parking Demand

Weekday Other peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Researchers (Ingham Institute)	28	32	32	32
UNSW Clinical Students	26	29	29	29
WSU Medical and Allied Health Interns	7	8	8	8
Ngara Education Centre	7	7	7	7
Additional Undergrad Students	0	6	6	6
Volunteers	39	45	41	50
Retail Staff	42	49	44	53
Total spaces	149	176	167	185

⁶³ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

⁶⁴ Source: Liverpool Health Campus Assumptions for Car Park Demand Study, Update 7 December 2018 (v4)

8.10 Summary of Weekday Peak Parking Demand

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

Table 30 – Summary of Weekday Peak Parking Demand

Summary of weekday peak demand for parking	Current	Future (2025/26)	Sensitivity 1	Sensitivity 2
Staff (inc VMO)	2160	2476	2284	2668
Public				
Outpatients	319	419	419	419
Visitors	113	119	119	119
ED Pres	47	64	64	64
Public Total	479	602	602	602
LHD Controlled – Fleet Vehicles	25	28	28	28
Other	149	176	167	185
Total Spaces	2813	3282	3081	3483

8.11 Analysis of Parking Demand & Supply

Based on the above, a summary of the estimated current and future parking demand and supply is as follows. Note that, as is our usual practice for HI, the demand numbers below are total demand (i.e. all demand generated by the Hospital, irrespective of where it parks (on campus and/or off campus)):

Table 31 – Summary of Estimated Current & Future Parking Demand & Supply

Total Parking Supply/Demand Analysis	Current – Base Case	Future (2025/26)	Sensitivity Analysis 1 (10% reduction in staff car mode share)	Sensitivity Analysis 2 (10% increase in staff car mode share)
Total On Campus Supply (assuming no additional parking provision)	2295	2295	2295	2295
Demand (per Table 30 – Summary of Weekday Peak Parking Demand)				
Staff (inc VMO)	2160	2476	2284	2668
Public	479	602	602	602
LHD Controlled – Fleet Vehicles	25	28	28	28
Other users	149	176	167	185
Total Demand	2813	3282	3081	3483
Total On Campus Shortfall	518	987	786	1188
Additional spaces required (compared to current)		469	268	670
Less: Current unutilised Off Campus supply within RPZ – see Section 6.5⁶⁵		156	156	156
Net Requirement		313	112	514

- The current estimated on campus shortfall of 518 bays is currently met by off campus parking supply.
- Our analysis indicates that Hospital related users are utilising approximately 40% of the occupied off campus supply (696 of 1,746 off-campus spaces), noting there are competing demand drivers from the Sydney Southwest Private Hospital, other various medical service providers in the area, visitors / parents to Liverpool Girls High School, TAFE NSW Liverpool students and staff members, residences and businesses within the medical precinct which, overall, means that the RPZ is currently operating at practical capacity (92% - see **Section 6.5**) with, at most, only 156 spaces available (assuming people can find them, are prepared to pay for them etc).

⁶⁵ Assuming 100% utilization of RPZ

- Assuming a status quo in terms of the RPZ utilisation (i.e. no additional utilisation of the RPZ), an additional 469 spaces⁶⁶ would be required (in total) by 2026/27 (sensitivity analyses range is 268 – 670 additional spaces).
- In the absence of additional parking this will likely result in hospital-related users having to park beyond the RPZ or adopt a different mode share option (e.g. public transport).
- If the estimated **public** parking demand at 2025/26 is to be met in full (602 spaces) in the Hospital car parks, an additional 164 **public allocation** would be required⁶⁷.

These conclusions are subject to the following assumptions:

Demand

- We have not assumed any significant change in parking behaviour (i.e. %'s driving etc) of the public or staff in future, apart from the sensitivity analyses provided which assume a 10% reduction and a 10% increase in day shift and administration staff % driving and requiring a parking space.
- No changes to the % of outpatients and visitors who are dropped off and do not park.

Supply

- No changes to Hospital parking supply (so that the estimated future shortfall can be determined)
- No changes by Council to on-street parking regimes that result in fewer spaces being available to hospital-related users⁶⁸, such as:
 - 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. Private Hospital and Private Medical Practices and other entities).

8.12 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:

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

⁶⁶ Current demand 2813, 2026/27 demand 3282 = increase of 469

⁶⁷ Current public allocation 438

⁶⁸ We have researched the Draft Western City District Plan (March 2018) and Liverpool City Council's Development Control Plan but can find no definitive information to suggest any changes to current on-street parking controls. At a high level, the existing time restricted parking adjacent to the Hospital precinct is assisting to service the nearby retail and commercial areas, as well as the hospital, so is considered unlikely to be removed, or re-allocated to Unrestricted or No Parking by Council. The Unrestricted parking in the wider RPZ could be re-allocated to time restricted, however this would only likely be in response to resident complaints and we have not been able to locate any evidence of this.

8.13 Verification checks

We tested the veracity of the current parking demand model by comparing the estimated number of cars parking off campus at peak with the observed number of cars parking off campus at peak, as follows:

Table 32 – Verification Check

	Bays
Estimated Total Peak Parking Demand ⁶⁹ (A)	2813
Observed peak on campus occupancy ⁷⁰ (B)	2117
Balance assumed to be parking off campus (A – B = C)	696
Off campus <u>occupied</u> bays within RPZ during peak (D)	942
% of off campus <u>occupied</u> bays relating to hospital-related users (C / D)	73.9%

Comments:

- The above reality check shows that the current number of cars parking off campus is less than the observed peak occupancy in the RPZ. If the opposite were the case then the demand model would be inaccurate.
- The % of off campus bays relating to hospital-related users (74%) may be considered to be reasonable given (i) the competing user groups for these spaces, (ii) the current staff waiting list for a parking permit (754) and (iii) noting that during our surveys we observed both staff and public parking beyond the RPZ.
- It is not possible to identify which cars parking off campus belong to hospital-related users. Some may belong to other user groups such as:
 - Visitors to Sydney Southwest Private Hospital and other various medical service providers in the area
 - Visitors / Parents to Liverpool Girls High School
 - TAFE NSW Liverpool students and staff members and,
 - Residents and Visitors to residents.
- Our normal practice is to also verify the number of cars parking on campus by comparing the model output with the observed occupancy. However, to do this we would need to undertake comprehensive staff and patient/visitor surveys (to understand what % parked on campus).

⁶⁹ Per Table 31

⁷⁰ Per our surveys

9 Price Elasticity of Demand

We have been requested⁷¹ to comment on price elasticity of demand in relation to Liverpool Hospital, in particular for public parking given the new concessions policy that was implemented on 1 July 2017.

The existing public pricing structure at the Hospital is a legacy from the previous Private Public Partnership (PPP) arrangement which funded the construction of the P2 multi-deck car park. That arrangement has now expired.

A comparison of the current rates with the available on street and off street parking rates within the RPZ is as follows:

Table 33 – Comparison of Non-Concessionary Hospital Car Park Pricing & Off Campus Parking

Period	Hospital Car Parks Fee (inc GST)	Off Campus, On Street Parking Fee (inc GST)
0.0 - 0.5 Hours	\$4.00	\$2.50
0.5 – 1.0 Hours	\$8.00	\$2.50
1.0 – 1.5 Hours	\$12.00	\$5.00
1.5 – 2.0 Hours	\$16.00	\$5.00
2.0 – 2.5 Hours	\$20.00	Max stay 2 hours
> 2.5 Hours	\$24.00	Max stay 2 hours

In addition to the above, there is one off street car park within the RPZ which charges a flat fee of \$12 per day.

Just outside the RPZ there is also the Westfield Shopping Centre car park which offers 3 hours free parking then parking from \$6 thereafter (up to a maximum of \$50 per day).

⁷¹ Email from Laine Simpson dated 12 September 2018

Concessionary parking prices are available to eligible patients and visitors to inpatients, as follows:

Table 34 – Concessionary Parking Fees

Parking period	Fees (inc GST)
0.0 - 3.0 Hours	Free
Single entry >3 Hours	\$5.50
3 day ticket	\$11.10
7 day ticket	\$22.20

There are a number of factors which outpatients and visitors to inpatients may consider when attending the Hospital by car:

- Convenience - especially outpatients who have appointments to meet. Visitors to inpatients may be prepared to park a little further away if less expensive or free parking is available (e.g. Westfield)
- Parking availability – if outpatients and visitors to inpatients see an on-street parking space available reasonably close to the Hospital they will likely park there, especially on weekdays when available parking is in short supply and if they anticipate their stay being no more than 2 hours (the main time restriction on street), rather than continue to the Hospital and risk not being able to find a space
- Price – it can be seen from the tables and comments above that the cost of alternative parking (i.e. on-street, off-street and Westfield) is significantly less than the cost of parking at the Hospital. Therefore informed public (especially regular attendees) will likely choose this parking in preference to the Hospital car parks. Uninformed public (especially first time attendees) may be more inclined to try to park in the Hospital car parks. The contra argument to this logic is concessions (see next bullet point)
- Concessions – eligible patients/visitors to inpatients will likely have a preference for parking at the Hospital car parks, as the concessions policy makes it more attractive to do so from a financial perspective, and the Hospital car parks also provide the most convenient parking (i.e. a win/win in terms of cost/convenience for eligible users)

Comprehensive surveys of outpatients and visitors to inpatients would assist in understanding the key motivations at Liverpool Hospital, and the degree to which parking behaviours are driven by convenience, availability, price and, concessions availability.

The current NSW Hospital Car Park Fees Policy would, if implemented at Liverpool Hospital, offer significantly reduced fees to patients/visitors to inpatients, especially in the key 1 – 2 hour time period, as can be seen in the comparison below:

Table 35 – Comparison of Current Liverpool Hospital pricing with NSW Health Policy pricing

Period	Current Hospital Car Parks Fee (inc GST)	NSW Health Policy Fee (inc GST)
0.0 - 0.5 Hours	\$4.00	\$6.70 ⁷²
0.5 – 1.0 Hours	\$8.00	\$6.70
1.0 – 1.5 Hours	\$12.00	\$9.90 ⁷³
1.5 – 2.0 Hours	\$16.00	\$9.90
2.0 – 2.5 Hours	\$20.00	\$13.30 ⁷⁴
> 2.5 Hours	\$24.00	\$13.30
3 – 4 Hours		\$15.50
4 – 5 Hours		\$17.80
>5 Hours		\$19.90

Careful assessment of the key risks would be required if consideration was being given to implementing the NSW Health Policy pricing at Liverpool Hospital, as it would likely have considerable implications for revenue and demand, and also the allocation of available parking between staff and public.

For example, if lower prices at the Hospital (under the Policy pricing) increased public demand or decreased the public drop off numbers, more public parking spaces will be required. Depending on the mix of parkers in the car park, the increased demand may more than offset the reduced fees (i.e. if public were paying lower fees but more of them parked in the car park, the overall revenue from public may increase, and may even offset the reduction in staff parking (as a result of the change in allocations)).

⁷² First 15 mins is free, then \$6.70 for 15 mins – 1 hour

⁷³ 1 – 2 hours

⁷⁴ 2 – 3 hours

10 Operational Matters

10.1 Staff Parking Management

As noted in **Section 7.1** there appears, from our surveys, to be some vacancy in staff car parks at peak.

At the same time, we understand that there is a waiting list for staff access passes⁷⁵.

Working with the car park manager (Wilson Parking) the Hospital may consider issuing passes to some staff on the waiting list.

10.2 Public Parking

The Wilson Parking report for March 2018⁷⁶ indicates over 12,000 vehicles leaving the car park within the grace period (0 – 30 mins).

On weekdays, the volumes are around 500 – 600 per day.

Whilst some of this activity may relate to drop off and pick up activity, from our observations, we believe a significant number of these grace period tickets relate to vehicles which enter the car park(s), and then leave when they are unable to find an available space.

This activity results in poor customer service and adds to congestion in and around the car parks.

Simple “FULL” signs at the car park entries would provide patients and visitors with the necessary information to largely eliminate this issue.

⁷⁵ Source: Wilson Parking Liverpool Hospital Car Park Monthly Report November 2018

⁷⁶ Latest data available in June 2018 when our analysis commenced

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.

It is strongly recommended that comprehensive staff, public and length of stay surveys be undertaken to provide site specific data and to more accurately determine the parking demand generated by the hospital.

It is also strongly recommended that the Hospital be requested to provide data for key items where we have currently had to make assumptions (e.g. staff weekday/weekend proportion, staff shift splits, volumes of retail staff and volunteers 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,
- Adoption of new technologies / solutions such as ride-sharing or autonomous vehicles,
- 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.

Attachment 1	Occupancy Survey Results
Attachment 2	Current / Future Demand Drivers and Assumptions
Attachment 3	Current Base Case - Estimate of Parking Demand
Attachment 4	2025/26 Base Case - Estimate of Parking Demand
Attachment 5	2025/26 Estimate of Parking Demand – Sensitivity Analysis 1
Attachment 6	2025/26 Estimate of Parking Demand – Sensitivity Analysis 2
Attachment 7	Public Transport (Bus And Train) Schedule
Attachment 8	Raw source data

On Campus Parking Inventory
Date Surveyed: 20 June 2018
Weather: Fine

Car Park	Comment	Capacity	Public	Staff & Fleet	Occupancy (cars)	Occupancy (%)
1	100% Public	143	143		143	100%
2	40% Public, 60% Staff	597	239	358	585	98%
3	40% Public, 60% Staff	141	56	85	127	90%
4	100% Staff	780		780	702	90%
5	100% Staff	575		575	514	89%
6	HSB	35		35	35	100%
7	Fleet Vehicles only	24		24	11	46%
	Totals	2295	438	1857	2117	92%

On Street Parking Inventory
Date Surveyed: 20 June 2018
Weather: Fine

Location	Property types	Restriction	When enforced	Unrestricted Capacity	10am - 2pm Occupancy	Restricted Capacity	10am - 2pm Occupancy
Moore St (Bigge St to College St)	TAFE	2P (paid & free) Fees \$2.50ph, max \$5 (2 hours)	9am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			35	35
College St (Elizabeth St to Moore St)	TAFE	2P (paid & free) Fees \$2.50ph, max \$5 (2 hours)	9am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			53	53
George St (Campbell St to Elizabeth St)	Westfield (retail), school	Limited parking (taxi, disabled only)					
Campbell St (Forbes St to George St)	Hospital, light commercial, high density residential	1P & 2P (paid & free) Fees \$2.50ph	8.30am - 6pm, Mon - Fri 8.30am - 12.30pm, Sat			20	20
		Disabled	24/7			7	7
		Unrestricted	24/7	21	21		
Elizabeth St (George St to Hospital)	Light commercial, Hospital	1P (paid & free) Fees \$2.50ph	9am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			31	16
Bigge St (Moore St to Hume Highway)	High density residential, light commercial, school, hospital, private hospital	1P (paid & free) Fees \$2.50ph	10am - 6pm, Mon - Fri (paid) 9am - 12.30pm, Sat (free)			39	38
		Unrestricted	24/7	76	76		
Goulburn St (Elizabeth St to Hume Highway)	High density residential, light commercial, hospital	1P & 2P (paid & free) Fees \$2.50ph	8.30am - 6pm, Mon - Fri 8.30am - 12.30pm, Sat			61	61
		Unrestricted	24/7	87	86		
Forbes St (Hume Highway to Campbell St)	High density residential, school	Unrestricted	24/7	56	56		
Lachlan St (George St to Hart Ln)	High density residential, school	Unrestricted	24/7	89	89		
Drummond St (Lachlan St to Hart Ln)	High density residential	Unrestricted	24/7	50	49		
Lachlan Ln (Lachlan St to Hart Ln)	High density residential	Unrestricted	24/7	19	18		
Hart St (Lachlan St to Hart Ln)	High density residential	Unrestricted	24/7	54	54		
Scrivener Street	Industrial	Unrestricted	24/7	144	136		
Priddle Street	Industrial, some residential	Unrestricted	24/7	73	52		
			Unrestricted Occupancy %	669		95.22%	
			Restricted Occupancy %	246		93.50%	

Off Street Parking Inventory
Date Surveyed: 20 June 2018 & 30 January 2019
Weather: Fine

Car Park	Type	Operator	Capacity	Occupancy (cars) 10am - 2pm	Occupancy %	Fees
35 Bigge Street	At Grade	Care Park	80	75	94%	\$12 flat rate (all day)
						0 – 1 hr \$3 1 – 2 hrs \$5 2 – 3 hrs \$7 3 – 4 hrs \$10 4 – 5 hrs \$12 >5 hrs \$15 Weekly \$40 - \$50 (depending on level parked) Monthly Unreserved \$120 Monthly Reserved \$220 Annual \$1,200
Warren Serviceway	Multi-deck	Liverpool Council	634	531	84%	
						0 - 30 mins \$2 30 mins – 1 hr \$4 1 – 2 hrs \$6 2 – 3 hrs \$8 3 – 4 hrs \$12 4 – 5 hrs \$15 5 – 6 hrs \$17 Early Bird \$10
33 Moore Street	Basement	Secure Parking	273	273 (see note below)	100%	

33 Moore Street - Secure Parking are stack parking cars in the Early Bird section of the car park to increase utilization – Early Bird section (Level 2) has 35 bays but 49 cars were parked there. Remainder of car park appears to be largely reserved parking. Occupancy recorded as 100% as it would be incorrect to include the actual number in the total for all car parks, as this would artificially reduce the number of bays available in other car parks (e.g. Warren Serviceway).

HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL
CURRENT FUTURE DEMAND DRIVERS AND ASSUMPTIONS

						ASSUMPTIONS											
		Notes	Current 2017/2018	Notes	Future 2025/26	Notes		Base Case % drivers requiring a car space	Notes	Base Case - Minus 10% Sensitivity Analysis 1 % drivers requiring a car space	Notes	Base Case - Plus 10% Sensitivity Analysis 2 % drivers requiring a car space	Notes	People/ car	Notes	T/over	Notes
LIVERPOOL HOSPITAL																	
TOTAL FTE	FTE	21	4354	21	4989	21											
STAFF FTE (CLINICAL, MENTAL HEALTH, OTHER HEALTH SERVICES)	Weekdays (70%)	24															
	Day Shift (68%)	24	1646	2	1890	2		79.7%	18		71.8%		87.7%		1.08	13	1 6
	Afternoon (18%)	24	436	2	500	2		100.0%	4		100.0%		100.0%		1.08	13	1 6
	Night (14%)	24	339	2	389	2		100.0%	4		100.0%		100.0%		1	4	1 4
STAFF (EXEC, ADMINISTRATION, SUPPORT SERVICES ETC)	Weekdays	21	627	21	713	21		79.7%	18		71.8%		87.7%		1.08	13	1 6
VMO's	Weekday		238	21	273	11		100.0%	6		100.0%		100.0%		1	6	3 6
RETAIL STAFF (catering etc)	Weekdays		57	1	66	11		79.7%	18		71.8%		87.7%		1.08	13	1 6
OUTPATIENTS - WEEKDAYS	Service Events per annum		418,129	21	549,194	21											
	Days per annum		252	5	252	5											
	Outpatients per day		1659		2179			54.2%	2		54.2%		54.2%		1	8	2.82 2
VISITORS - WEEKDAYS	Total Inpatient beds		807	21	994	21											
	Bed occupancy		99%	15	85%	15											
	Average number of inpatients		799		845												
	Visitors per patient average		1.25	2	1.25	9											
	Total visitors per day		999		1056			69.1%	2		69.1%		69.1%		1.76	2	2.82 2
EMERGENCY DEPT	Daily presentations - weekday avg		242	21	327	21		90.0%	2		90.0%		90.0%		1	8	2.82 2
EDUCATION & TRAINING (INGHAM INSTITUTE)- RESEARCH	Weekdays		300	15	344	11		10.0%	2		10.0%		10.0%		1.08	13	1 6
UNSW CLINICAL STUDENTS	Weekdays only		387	15	443	11		8.3%	2		8.3%		8.3%		1.25	2	1 6
WSU MEDICAL AND ALLIED HEALTH INTERNS (STUDENTS)	Weekdays only		100	15	115	11		8.3%	2		8.3%		8.3%		1.25	2	1 6
NGARA EDUCATION CENTRE			105	21	120	11		8.3%	2		8.3%		8.3%		1.25	2	1 6
ADDITIONAL UNDERGRAD STUDENTS					90	21		8.3%	2		8.3%		8.3%		1.25	2	1 6
FLEET VEHICLES	Weekdays		74	23	85	11		100.0%	3		100.0%		100.0%		1	3	3 3
VOLUNTEERS	Weekdays		106	1	122	11		79.7%	18		71.8%		87.7%		1.08	13	2 6

NOTES	
1	Based on Westmead hospital staff/bed ratio (e.g. VMOs per bed, Volunteers per bed, retail staff per bed etc)
2	ptc. assumption based on Westmead Hospital . Use of public transport is encouraged for students and researchers.
3	Fleet vehicles likely to come and go. Assume space turnover of 3 times
4	Assume all night shift and afternoon shift drive, for safety reasons and lack of public transport options at shift start/finish times.
5	Assume 260 weekdays, less 8 public holidays
6	ptc. assumption. Staff / Students on site all day (i.e. turnover of 1). VMO's likely to come and go during the day so assume T/O of 3. Volunteers likely work two shifts (am & pm) so assume T/O of 2
7	Note not used
8	Outpatients / Emergency people per car more than 1, but only 1 likely to be the outpatient
9	Assume no change
10	In emergency situation, drivers more concerned about patient and will use most convenient/quickest mode share (car) and will park in hospital car park
11	As per growth in FTE numbers
12	Note not used
13	Per staff survey at Westmead Hospital
14	Note not used
15	Provided by HI per Assumptions for Car Park Demand Study to inform Master Planning 30 May 2018 (v2)
16	Note not used
17	Note not used
18	Calculated using bottom-up approach, comparing permits on issue plus waiting list, to staff FTE to derive % driving. See tab "Alt Staff % driving calc", and report
19	Note not used
20	Note not used
21	Per advice from HI - Assumptions for Car Park demand Study Update 7 December 2018 (v4)
22	Note not used
23	Based on number of fleet spaces on campus - Eastern Campus Fleet car park (50) + Western campus fleet car park (24)
24	Weekday and shift allocations based on Westmead Hospital

HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL
CURRENT - BASE CASE - ESTIMATE OF PARKING DEMAND

	TOTAL SPACES		2295	Excludes loading docks, pick-up and drop off, ambulance etc.			
Notes	Current Base Estimate	People	% drivers requiring a parking space	People per car (a)	Total cars per day	Turnover	Peak spaces required
	WEEKDAYS						
	STAFF						
	CLINICAL STAFF						
	Day Shift	1646	80%	1.08	1215	1.00	1215
	Afternoon Shift	436	100%	1.08	403	1.00	
A	Number of afternoon shift staff who arrive before day shift leave (changeover)						403
	Night Shift	339	100%	1.00	339	1.00	
	ADMINISTRATION STAFF	627	80%	1.08	463	1.00	463
	VMO's	238	100%	1.00	238	3.00	79
							2160
	PUBLIC						
	OUTPATIENTS	1659	54%	1.00	900	2.82	319
	VISITORS	999	69%	1.76	392	2.82	
C	Visitors during peak hours (81%)	809	69%	1.76	317	2.82	113
	EMERGENCY DEPARTMENT PRESENTATIONS	242	90%	1.00	218	2.82	
D	Emergency Dept presentations during peak hours 8am - 6pm (61%)	148	90%	1.00	133	2.82	47
							479
	FLEET VEHICLES	74	100%	1.00	74	3.00	25
	OTHER						
	RESEARCHERS	300	10%	1.08	28	1.00	28
	UNSW CLINICAL STUDENTS	387	8%	1.25	26	1.00	26
	WSU MEDICAL AND ALLIED HEALTH INTERNS	100	8%	1.25	7	1.00	7
	NGARA EDUCATION CENTRE	105	8%	1.25	7	1.00	7
	VOLUNTEERS	106	80%	1.08	79	2.00	39
	RETAIL STAFF	57	80%	1.08	42	1.00	42
							149
	SUB TOTAL WEEKDAYS	7031			4271		2813

Notes

A	Assume 100% of afternoon shift arrive before day shift leave, per Westmead Hospital	100%
B	Note not used	
C	Assume that only 81% of visitors present at peak period (per figure used in Westmead Hospital)	81%
D	Emergency Dept presentations during peak hours 8am - 6pm: 61%, per Westmead Hospital	61%

Weekday	Verification check against observed peak occupancy:	
	Estimated peak demand	2813
	Observed peak occupancy - on campus (14.00-15.00)	2117
	Number of hospital-related cars parking off campus	696
	Observed peak occupancy extended RPZ on street (14.00)	867
	Observed peak occupancy extended RPZ off street (14.00)	75
	Total off campus cars at peak	942
	% utilisation of off campus parking by hospital related users	73.9%

HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL
2025/26 ESTIMATE OF PARKING DEMAND - BASE CASE

Notes	Forecast 2025-26	People	% drivers requiring a parking space	People per car (a)	Total cars per day	Turnover	Peak spaces required
	WEEKDAYS						
	STAFF						
	CLINICAL STAFF						
	Day Shift	1890	80%	1.08	1396	1.0	1396
	Afternoon Shift	500	100%	1.08	463	1.0	
A	<i>Number of afternoon shift staff who arrive before day shift leave (changeover)</i>						463
	Night Shift	389	100%	1.00	389	1.0	
	ADMINISTRATION STAFF	713	80%	1.08	526	1.0	526
	VMO's	273	100%	1.00	273	3.0	91
							2476
	PUBLIC						
	OUTPATIENTS	2179	54%	1.00	1,182	2.82	419
	VISITORS	1056	69%	1.76	415	2.82	
C	<i>Visitors during peak hours (81%)</i>	855	69%	1.76	336	2.82	119
	EMERGENCY DEPARTMENT PRESENTATIONS	327	90%	1.00	294	2.82	
D	<i>Emergency Dept presentations during peak hours 8am - 7pm (61%)</i>	199	90%	1.00	180	2.82	64
							602
	FLEET VEHICLES	85	100%	1.00	85	3.0	28
	OTHER						
	RESEARCHERS	344	10%	1.08	32	1.0	32
	UNSW CLINICAL STUDENTS	443	8%	1.25	29	1.0	29
	WSU MEDICAL AND ALLIED HEALTH INTERNS	115	8%	1.25	8	1.0	8
	NGARA EDUCATION CENTRE	105	8%	1.25	7	1.0	7
	ADDITIONAL UNDERGRAD STUDENTS	90	8%	1.25	6	1.0	6
	VOLUNTEERS	122	80%	1.08	90	2.0	45
	RETAIL STAFF	66	80%	1.08	49	1.0	49
							176
	SUB TOTAL WEEKDAYS	8369			5049		3282

Notes

- A

Assume 100% of afternoon shift arrive before day shift leave, per Westmead Hospital

100%
- B

Note not used
- C

Assume that only 81% of visitors present at peak period (per figure used in Westmead Hospital)

81%
- D

Emergency Dept presentations during peak hours 8am - 6pm: 61%, per Westmead Hospital

61%

HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL
2025/26 ESTIMATE OF PARKING DEMAND - SENSITIVITY ANALYSIS 1
BASE CASE % STAFF MODE SHARE, MINUS 10%

Notes	Forecast 2025-26	People	% drivers requiring a parking space	People per car (a)	Total cars per day	Turnover	Peak spaces required
	WEEKDAYS						
	STAFF						
	CLINICAL STAFF						
	Day Shift	1890	72%	1.08	1256	1.0	1256
	Afternoon Shift	500	100%	1.08	463	1.0	
A	Number of afternoon shift staff who arrive before day shift leave (changeover)						463
	Night Shift	389	100%	1.00	389	1.0	
	ADMINISTRATION STAFF	713	72%	1.08	474	1.0	474
	VMO's	273	100%	1.00	273	3.0	91
							2284
	PUBLIC						
	OUTPATIENTS	2179	54%	1.00	1,182	2.82	419
	VISITORS	1056	69%	1.76	415	2.82	
C	Visitors during peak hours (81%)	855	69%	1.76	336	2.82	119
	EMERGENCY DEPARTMENT PRESENTATIONS	327	90%	1.00	294	2.82	
D	Emergency Dept presentations during peak hours 8am - 7pm (61%)	199	90%	1.00	180	2.82	64
							602
	FLEET VEHICLES	85	100%	1.00	85	3.0	28
	OTHER						
	RESEARCHERS	344	10%	1.08	32	1.0	32
	UNSW CLINICAL STUDENTS	443	8%	1.25	29	1.0	29
	WSU MEDICAL AND ALLIED HEALTH INTERNS	115	8%	1.25	8	1.0	8
	NGARA EDUCATION CENTRE	105	8%	1.25	7	1.0	7
	ADDITIONAL UNDERGRAD STUDENTS	90	8%	1.25	6	1.0	6
	VOLUNTEERS	122	72%	1.08	81	2.0	41
	RETAIL STAFF	66	72%	1.08	44	1.0	44
							167
	SUB TOTAL WEEKDAYS	8369			4843		3081

Notes		
A	Assume 100% of afternoon shift arrive before day shift leave, per Westmead Hospital	100%
B	Note not used	
C	Assume that only 81% of visitors present at peak period (per figure used in Westmead Hospital)	81%
D	Emergency Dept presentations during peak hours 8am - 6pm: 61%, per Westmead Hospital	61%

HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL
2025/26 ESTIMATE OF PARKING DEMAND - SENSITIVITY ANALYSIS 2
BASE CASE STAFF MODE SHARE, PLUS 10%

Notes	Forecast 2025-26	People	% drivers requiring a parking space	People per car (a)	Total cars per day	Turnover	Peak spaces required
	WEEKDAYS						
A	STAFF						
	CLINICAL STAFF						
	Day Shift	1890	88%	1.08	1535	1.0	1535
	Afternoon Shift	500	100%	1.08	463	1.0	
	Number of afternoon shift staff who arrive before day shift leave (changeover)						463
	Night Shift	389	100%	1.00	389	1.0	
	ADMINISTRATION STAFF	713	88%	1.08	579	1.0	579
	VMO's	273	100%	1.00	273	3.0	91
							2668
	PUBLIC						
C	OUTPATIENTS	2179	54%	1.00	1,182	2.82	419
	VISITORS	1056	69%	1.76	415	2.82	
	Visitors during peak hours (81%)	855	69%	1.76	336	2.82	119
D	EMERGENCY DEPARTMENT PRESENTATIONS	327	90%	1.00	294	2.82	
	Emergency Dept presentations during peak hours 8am - 7pm (61%)	199	90%	1.00	180	2.82	64
							602
	FLEET VEHICLES	85	100%	1.00	85	3.0	28
	OTHER						
	RESEARCHERS	344	10%	1.08	32	1.0	32
	UNSW CLINICAL STUDENTS	443	8%	1.25	29	1.0	29
	WSU MEDICAL AND ALLIED HEALTH INTERNS	115	8%	1.25	8	1.0	8
	NGARA EDUCATION CENTRE	105	8%	1.25	7	1.0	7
	ADDITIONAL UNDERGRAD STUDENTS	90	8%	1.25	6	1.0	6
	VOLUNTEERS	122	88%	1.08	99	2.0	50
	RETAIL STAFF	66	88%	1.08	53	1.0	53
							185
	SUB TOTAL WEEKDAYS	8369			5255		3483

Notes

- A

Assume 100% of afternoon shift arrive before day shift leave, per Westmead Hospital

100%
- B

Note not used
- C

Assume that only 81% of visitors present at peak period (per figure used in Westmead Hospital)

81%
- D

Emergency Dept presentations during peak hours 8am - 6pm: 61%, per Westmead Hospital

61%

ATTACHMENT 7

**HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL PARKING DEMAND STUDY
PUBLIC TRANSPORT (BUS AND TRAIN) SCHEDULE**

Table 1 - Bus Services Liverpool Hospital

Route	From	To	Frequency (approx.)	Weekdays	Weekends
801	Liverpool Station	Badgerys Creek	3 times a day on Weekdays	3:00pm – 5:55pm	NA
801	Badgerys Creek	Liverpool Station	3 times a day on Weekdays	7:15am-4:32pm	NA
802 /803	Parramatta Station	Liverpool Station	Weekdays every 15 to 30 minutes. Weekends every 30 to 60 minutes.	6:02 am–8:00 pm	Sat 7:04am–6:32pm Sun 8:00am-6:00pm
802 /803	Liverpool Station	Parramatta Station	Weekdays every 15 to 30 minutes. Weekends every 30 to 60 minutes.	5:16am-7:26pm	Sat 6:23am–6:17pm Sun 7:19am-5:15pm
804	Parramatta Station	Liverpool Station	Weekdays every 15 to 30 minutes. Weekends every 30 to 60 minutes	6:09am-10:33pm	Sat 6:42am – 10:47pm Sun 7:40am – 9:47pm
804	Liverpool Station	Parramatta Station	Weekdays every 15 to 30 minutes. Weekends every 30 to 60 minutes	4:56am-11:13pm	Sat 5:55am – 10:57pm Sun 6:55am – 9:57pm
805	Cabramatta Station	Liverpool Station	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	5:13am-9:51pm	Sat 7:06am – 8:06pm Sun 6:55am – 9:57pm
805	Liverpool Station	Cabramatta Station	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	5:32am-8:40pm	Sat 5:55am – 10:57pm Sun 8:06am – 7:06pm
806	Parramatta Station	Liverpool Station	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	6:15am-9:28pm	Sat 6:26am – 6:14pm Sun 8:25am – 5:14pm

ATTACHMENT 7

**HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL PARKING DEMAND STUDY
PUBLIC TRANSPORT (BUS AND TRAIN) SCHEDULE**

Route	From	To	Frequency (approx.)	Weekdays	Weekends
806	Liverpool Station	Parramatta Station	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	5:26am-7:27pm	Sat 6:39am – 6:30pm Sun 7:37am – 5:30pm
808	Fairfield Station	Liverpool Station	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	5:37am – 8:28pm	Sat 7:23am – 8:18pm Sun 8:23am – 7:18pm
808	Liverpool Station	Fairfield Station	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	5:20am – 7:28pm	Sat 7:52am – 5:52pm Sun 8:52am – 4:52pm
819	Liverpool	Orange Grove (Loop)	Weekdays every 30 minutes. Weekends every 60 minutes	6:11am-6:15pm	Sat 8:45am – 4:45pm Sun 9:45am – 4:45pm
823	Liverpool	Warwick Farm (Loop)	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	6:12am-6:12pm	Sat 9:09am – 6:13pm Sun 10:09am – 4:13pm
827	Liverpool	Carnes Hill	Weekdays every 30 minutes. Weekends every 30 minutes	5:25am-10:45pm	6:43am–9:45pm
827	Carnes Hill	Liverpool	Weekdays every 30 to 60 minutes. Weekends every 30 to 60 minutes	4:39am-9:44pm	5:47am-8:58pm
851	Liverpool Interchange	Carnes Hill Marketplace	Weekdays and Weekends every 60 minutes	8:00am-8:32pm	Sat 6:20am-7:00pm Sun 8:03am-7:00pm
851	Carnes Hill Marketplace	Liverpool Interchange	Weekdays and Weekends every 60 minutes	6:09am-9:12pm	Sat 6:46am-5:56pm Sun 8:50am-7:56pm
852	Liverpool Interchange	Carnes Hill Marketplace	Weekdays every 30 to 60 minutes. Weekends every 60 minutes	5:33am-9:32pm	Sat 6:46am-5:56pm Sun 8:50am-9:00pm
852	Carnes Hill Marketplace	Liverpool Interchange	Weekdays every 30 to 60 minutes.	4:52am-8:37pm	Sat 5:50am-8:52pm Sun 7:45am-8:54pm

ATTACHMENT 7

**HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL PARKING DEMAND STUDY
PUBLIC TRANSPORT (BUS AND TRAIN) SCHEDULE**

Route	From	To	Frequency (approx.)	Weekdays	Weekends
			Weekends every 60 minutes		
853	Warners Bay High School	Belmont Depot Yard	Once a day on Weekdays	3:28pm	NA
853	Belmont Depot Yard	Warners Bay High School	Twice a day on Weekdays	7:52am & 8:27am	NA
854	Liverpool Interchange	Carnes Hill	Weekdays every 10 to 60 minutes. Weekends every 30 to 60 minutes	5:00am-9:15pm	Sat 6:52am – 8:30pm Sun 8:47am-8:30pm
854	Carnes Hill	Liverpool Interchange	Weekdays every 10 to 60 minutes. Weekends every 30 to 60 minutes	4:52am-8:40pm	Sat 6:29am- 5:15pm Sun 8:09am – 8:31pm
855	Liverpool Interchange	Rutleigh Park	6 times a Weekday 4 times a Weekend	8:35am-6:40pm	Sat 8:15am- 8:32pm Sun 11:08am – 5:08pm
855	Rutleigh Park	Liverpool	9 times a Weekday 4 times a day on Weekends	5:17am-5:16pm	Sat 6:23am- 3:23pm Sun 8:57am – 2:57pm
902	Holsworthy	Liverpool	Weekdays every 30 to 60 minutes. Weekends every 60 minutes	5:35am-8:52pm	Sat 6:30am- 6:30pm Sun 8:00am – 6:00pm
902	Liverpool	Holsworthy	Weekdays every 30 to 60 minutes. Weekends every 60 minutes	5:14am-9:56pm	Sat 6:53am- 6:46pm Sun 8:44am – 4:44pm
903	Liverpool	Chipping Norton (Loop)	Weekdays every 30 to 60 minutes. Saturday every	6:20am-7:05pm	Sat 6:55am- 5:55pm Sun 9:17am – 5:17pm

ATTACHMENT 7

**HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL PARKING DEMAND STUDY
PUBLIC TRANSPORT (BUS AND TRAIN) SCHEDULE**

Route	From	To	Frequency (approx.)	Weekdays	Weekends
			60 minutes 5 times every Sunday		
904	Fairfield	Liverpool	Weekdays every 30 to 60 minutes. Saturday every 60 minutes 5 times every Sunday	6:13am-7:28pm	Sat 8:18am- 5:18pm Sun 9:25am – 5:25pm
904	Liverpool	Fairfield	Weekdays every 30 to 60 minutes. Saturday every 60 minutes 5 times every Sunday	6:34am-6:44pm	Sat 8:34am- 4:34pm Sun 8:52am – 3:52pm
M90	Burwood	Liverpool	Weekdays every 10 to 15 minutes Weekends every 15 and 30 minutes	6:07am-5:30pm	Sat 6:32am- 8:41pm Sun 7:32am – 7:30pm
M90	Liverpool	Burwood	Weekdays every 10 to 15 minutes Weekends every 15 and 30 minutes	5:20am-9:28pm	Sat 6:45am- 8:50pm Sun 7:30am – 8:00pm

ATTACHMENT 7**HEALTH INFRASTRUCTURE
LIVERPOOL HOSPITAL PARKING DEMAND STUDY
PUBLIC TRANSPORT (BUS AND TRAIN) SCHEDULE**

Table 2 - Train Services to Liverpool Station

Rail Route	From	To	Frequency (approx)	Services operate approx (weekdays)	Services operate approx (weekends)
T2 Inner West & Leppington Line	Leppington	City	Every 7- 20 mins	3:33am – 12:18am	3:38am - 12:08am
T2 Inner West & Leppington Line	City	Leppington	Every 7- 20 mins	4:38am - 11:58pm	4:28am - 12:28am
T3 Bankstown Line	Liverpool	City	Every 6 - 30 mins	3:54am – 11:24pm	4:06am – 11:36pm
T3 Bankstown Line	City	Liverpool	Every 6 - 30 mins	4:45am – 12:15am	5:00am – 1:00am
T5 Cumberland Line	Leppington	Richmond	Every 30 mins	6:21am – 12:18am	4:23am – 11:53pm
T5 Cumberland Line	Richmond/Blacktown /Schofields	Leppington	Every 30 mins	6:35am – 11:12pm	4:05am – 11:35pm

LIVERPOOL HOSPITAL
RAW SOURCE DATA

		NOTE	CURRENT (2017/2018)	2025/2026	SOURCE	ptc. comments
1	KEY HOSPITAL DATA					
	NUMBER OF INPATIENT BEDS		807	994	Provided by HI 17/12/18	Assumptions for Car Park Demand Study Update 7 December 2018 (v4)
	% BED OCCUPANCY (WEEKDAYS)		99%	85%	Provided by HI	
	VISITING HOURS (WEEKDAYS)					
	EXTENDED HOURS FOR MATERNITY? IF SO, PLEASE STATE WHAT THESE ARE					
	VISITORS (AVG. PER BED) WEEKDAYS		1.25	1.25	Based on Westmead Hosp	
	EMERGENCY DEPARTMENT PRESENTATIONS (AVERAGE PER DAY WEEKDAY)	A	242	327	Provided by HI - Assumption v4	Calculated based on per annum presentations
	OUTPATIENTS (SERVICE EVENTS, PER ANNUM)	B	418,129	549,194	Provided by HI - Assumption v4	Service Events
2	STAFF	C, E, F				
	FTE (per Draft FIS v4.0)		3729	4334	Per Section D, Assumptions for Car Park Demand Study Update 7 December 2018 (v4)	
	MENTAL HEALTH FTE		408	408	Per Section D, Assumptions for Car Park Demand Study Update 7 December 2018 (v4)	
	OTHER HEALTH SERVICES		187	217	Per Section D, Assumptions for Car Park Demand Study Update 7 December 2018 (v4)	
	OTHER (EXEC OFFICE)		30	30		
	TOTAL FTE		4354	4989		
	TOTAL NUMBER OF CLINICAL STAFF (FTE) INCLUDING RESIDENT DOCTORS BUT EXCLUDING VMO'S		3458	3971	Provided by HI 17/12/18	
	% OF STAFF PRESENT ON WEEKDAYS	70%	2421	2780	% weekday based on Westmead Hosp	
	WEEKDAY CLINICAL STAFF					
	No. staff on morning shift (am to pm)	68%	1646	1890	Shift allocation based on Westmead Hosp	
	No. staff on afternoon shift (pm to pm)	18%	436	500	Hosp	
	No. staff on night shift (pm to am)	14%	339	389	Shift allocation based on Westmead Hosp	
	PLEASE PROVIDE AN ESTIMATE OF HOW MANY AFTERNOON SHIFT STAFF ARRIVE BEFORE DAY SHIFT STAFF LEAVE (WEEKDAY)		100%	100%	Based on Westmead Hosp	
	NO. OF VMO'S PRESENT (WEEKDAYS)		238	273	Current provided by HI	Growth based on FTE staff growth
	TOTAL NUMBER OF ADMINISTRATION AND SUPPORT SERVICES STAFF ON SITE (WEEKDAYS - 70%)		627	713	Provided by HI 17/12/18	Weekday ratio as per Westmead Hospital study (70%)
3	RETAIL STAFF	G				
	TOTAL NO. OF RETAIL STAFF ON SITE WEEKDAYS		57	66	Growth as per FTE Growth	Based on Westmead Hospital ratio of Volunteers to beds 62/872 x no. of beds
4	VOLUNTEERS	G				
	TOTAL NO. OF VOLUNTEERS ON SITE WEEKDAYS		106	122	Growth as per FTE Growth	Based on Westmead Hospital ratio of Volunteers to beds
5	EDUCATION & TRAINING					
	TOTAL NO. OF EDUCATION & TRAINING PEOPLE ON SITE (WEEKDAYS) - RESEARCHERS		300	344	Provided by HI v4. Growth as per FTE Growth	
	UNSW CLINICAL SCHOOL PLACEMENT STUDENTS		387	443	Provided by HI v4. Growth as per FTE Growth	
	WSU MEDICAL AND ALLIED HEALTH INTERNS		100	115	Provided by HI v4. Growth as per FTE Growth	
	NGARA EDUCATION CENTRE		105	120	Provided by HI v4. Growth as per FTE Growth	
	ADDITIONAL UNDERGRAD STUDENTS			90	Provided by HI v4.	
6	FLEET VEHICLES					
	TOTAL NO. OF FLEET VEHICLES (WEEKDAYS)		74	85	Based on capacity of fleet car park at the Hospital. Growth as per FTE Growth	Based on Eastern Campus Fleet car park (50) + Western campus fleet car park (24)
	CAR PARK DETAILS	D				
	PLEASE PROVIDE A BREAKDOWN OF ALL PARKING ON SITE, INCLUDING:					
	TOTAL SPACES			TBC	Provided by HI - Assumption v4	
	STAFF SPACES				Provided by HI - Assumption v4	
	PUBLIC SPACES			TBC	Provided by HI - Assumption v4	
	MIXED USE			TBC	Provided by HI - Assumption v4	
	OTHER SPACES (E.G. EMERGENCY VEHICLES, CONTRACTORS, FLEET ETC) - LHD			TBC	Provided by HI - Assumption v4	