Health Infrastructure
Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA
Transport Report

Final
July 2018
Client: Health Infrastructure
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1 Executive summary

1.1 Proposed development

Nepean Hospital is the principal health services facility in the Nepean Blue Mountains Local Health District. The district covers the Blue Mountains, Hawkesbury, Lithgow and Penrith local government areas and their 400,000 residents. Nepean Hospital has approximately 500 beds and offers adult, paediatric and neo-natal inpatient and outpatient services. The hospital employs approximately 3,300 staff, of whom 2,400 work weekday shifts and 900 work weekend shifts.

To meet the demand for health services from the growing Greater Western Sydney population, Nepean Hospital is proposed to expand through the staged delivery of new assets and services. This transport strategy supports the State-Significant Development planning application for the first expansion phase, the Nepean Hospital and Integrated Ambulatory Services Redevelopment - Stage 1 Building.

The Stage 1 Building will deliver 200 additional beds and concomitant increases in medical facilities including the emergency department (and associated new helipad), birthing suites, chemotherapy treatment chairs, and community health clinics. On-site retail activities will be expanded. The Stage 1 Building will be preceded by the construction of a 735-space multi-storey car park (approved under a separate Development Application) that will accommodate the users of existing surface car parking displaced by the Stage 1 Building and provide additional parking capacity.

1.2 Strategic context and objectives

The Stage 1 Building is consistent with national, NSW and local policies and plans for the increased provision of services at their point of use in Greater Western Sydney communities which are already expanding under existing regional economic conditions and are forecast to grow at an even faster rate in response to the development of Western Sydney Airport. When considering the transport and traffic impacts and outcomes of major projects such as the Stage 1 Building, these policies and plans require an approach which integrates land use change with transport systems and encourages the use of public and active transport choices where appropriate.

This approach optimises the use of existing transport assets and services, reduces the rate of growth in congestion, and reduces costs to the wider community from having to pay for new transport infrastructure. Of particular relevance to new health facilities, increased walking and cycling for commuting and other trip purposes also deliver direct benefits for physical and mental wellbeing.

Considering this strategic context, this transport strategy works towards the following thematically grouped objectives:

- **Nepean Hospital: Improving community health and wellbeing**
  - Improve the delivery of health services to customers
  - Attract and retain a highly qualified workforce
  - Grow health-related education and research activities.

- **Greater Penrith: Becoming Western Sydney’s gateway**
  - Grow employment in the Penrith Health and Education Campus
  - Create a high-quality and active place to live
  - Enhance access to Penrith city centre and Western Sydney Airport.

- **Transport networks: Supporting the growth of Greater Penrith**
  - Meet travel needs with safe congestion management and investment solutions
  - Deploy and provide for new technology and service models
  - Increase physical activity as part of day-to-day personal transport.
1.3 Existing and future access

Making up the bulk of travel to and from its precinct, Nepean Hospital attracts each weekday – in addition to commuting workers – approximately 1,200 outpatient visits and upwards of 600 visitors to inpatients. Approximately one-third of workers live within 15km of the hospital; this increases to well over half for visitors and outpatients.

Most people access Nepean Hospital by car; 95% of staff drive to work (91% on their own) and approximately 85% of outpatients and visitors also drive. The balance uses public transport (train and/or bus), ride a bicycle or walk. There are approximately 1,500 priced, public car parking spaces within the immediate precinct of the hospital. Because peak demand for spaces totals over 2,000, and because most kerbside spaces outside the precinct offer free and untimed parking, many cars are parked on local streets within walking distance of Nepean Hospital. The additional on-site parking supply will meet the growth in demand associated with the proposed development.

Based on direct feedback from staff, outpatients and visitors, and on analysis undertaken for this transport strategy, there are many factors behind the currently high dependence on driving for travel to Nepean Hospital. Factors within the collective control of the NSW Transport and Health clusters, and Penrith City Council, include the following:

- There is generally limited user access to information on, and low awareness of, available public transport choices.
- The nearest train station to Nepean Hospital, Kingswood, is serviced by all-stops trains only, and is not directly serviced from stations west of Emu Plains.
- While a relatively attractive east-west bus service frequency (every 10 minutes in both directions) links Penrith and St Marys train stations to Nepean Hospital, the same connectivity is not available for suburbs which are quite close to the north and south of the hospital.
- Walking or bike-riding to Nepean Hospital is made challenging by discontinuous facilities, major road crossings, limited wayfinding and/or a generally unfriendly urban domain. This is particularly true of the walking trip between Kingswood station and the hospital, and during the hours of darkness when afternoon and night shift workers travel.
- Relatively low levels of road congestion, the low cost of car parking for staff with a permanent space and payroll deduction arrangements, and/or the availability of free parking on surrounding streets combine to make driving the most attractive and convenient transport choice.

The Stage 1 Building will increase the size of the hospital’s workforce and the number of outpatients and visitors coming to the site. In transport terms, this is forecast to mean that over a whole weekday, with all activities operating at a peak level, the movement of people only (not including goods and service vehicles) into and away from Nepean Hospital will increase from approximately 11,000 daily movements today to up to 13,500 in 2021. Following the completion of all hospital expansion stages, this would grow to 15,000 daily movements in 2026. While traffic analysis for the multi-storey car park project has found that additional travel demand can be accommodated by existing assets and services. In the longer term, it is important to facilitate a modal shift towards alternatives for three major reasons:

- First, the road network that provides regional access to Nepean Hospital and Penrith city centre will be loaded with additional traffic associated with the development and operation of Western Sydney Airport, and with the broader growth of the Penrith Health and Education Precinct.
- Second, the growth of that precinct will see the continuation of the urban renewal, which is already under way in Kingswood and other parts of the Penrith Health and Education Precinct. As the area becomes denser, both road space and kerb space will be at a premium, and uses such as untimed, free car parking will not be accommodated to the same degree as today.
- Finally, Nepean Hospital as a workplace and health facility, should be accessible to all members of the community including those who cannot drive and do not have access to a vehicle.
To avoid having to force changes in travel behaviour onto the different Nepean Hospital user groups as network capacity limits are approached, it is appropriate to start implementing a Green Travel Plan for the hospital as soon as the Stage 1 Building construction gets under way. The first user-facing actions should coincide with the closure of surface car parking to make way for building works.

This travel strategy finds that there are many opportunities to progressively promote a shift towards alternative transport choices for the significant proportion of Nepean Hospital users that travel at times of day, and from close enough to the hospital, to make this a viable proposition. These opportunities make use of existing assets and services; leverage current and programmed transport upgrades; draw from lessons learned at other major travel demand generators (including health campuses); and take advantage of new technologies and flexible business models for the delivery of demand-response services.

The actions detailed in chapter 6 of this transport strategy are summarised under the following recommendations.

### 1.4 Recommendations

- **Step one: Promote better use of available travel opportunities**
  - Improve the efficiency of existing on-site car parking operations
  - Promote the use of existing walking and bicycle connections
  - Promote the take-up of existing bus and train services.

- **Step two: Improve the customer experience, capacity and impacts of existing transport operations**
  - Actively manage motor vehicle movements to and within PHC
  - Manage local street network vehicle movements outside PHC in line with Movement and Place principles
  - Upgrade walking and bike-riding facilities, especially wayfinding, with a focus on connections to public transport
  - Rearrange existing bus services where possible to address network gaps.

- **Step three: Introduce new public and active transport products, and start to shift demand away from driving**
  - Deliver new walking and bike-riding connections within and outside PHC, including step-free access to Kingswood station
  - Deliver new on-demand public transport services to fill in remaining temporal, route and capacity gaps, and to penetrate the campus using low-impact vehicles
  - Relocate car parking to one or more satellite locations
  - Manage access to, and the cost of, car parking within and outside PHC based on user need and access to alternative travel options
  - Provide - or at a minimum protect the future opportunity for - bus priority access on the principal routes to PHC.
### 1.5 Secretary’s Environmental Assessment Requirements (SEARs)

The following table lists the relevant SEARs requirements.

<table>
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<th>SEARs</th>
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<tr>
<td>Address the relevant planning provisions, goals and strategic planning objectives in the following:</td>
<td>Refer Section 4</td>
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<tr>
<td>• NSW State Priorities</td>
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<td>• A Plan for Growing Sydney and Towards Our Greater Sydney 2056</td>
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<tr>
<td>• Greater Sydney Region Plan (2018)</td>
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<td>• Greater Sydney Commission’s Draft West District Plan (2017)</td>
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<td>• Western City District Plan (2018)</td>
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<td>• NSW Long Term Transport Master Plan 2012</td>
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<td>o Sydney’s Bus Future 2013</td>
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<td>o Sydney’s Walking Future 2013</td>
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<td>• Future Transport Strategy 2056</td>
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<td>• Building Momentum: State Infrastructure Strategy 2018-2038</td>
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<td>• NSW Planning Guidelines for Walking and Cycling</td>
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<td>• Healthy Urban Development Checklist, NSW Health.</td>
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**Item 5 - Transport and Accessibility**

Include a transport and accessibility impact assessment, which details, but not limited to the following.

- The current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development.  
  Refer Section 5 and PTC Traffic Impact Assessment (Appendix 27)

- The existing and proposed pedestrian and bicycle routes and facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principles.  
  Refer Section 5 and Southern Cross Protection CPTED Strategy (Appendix 26)

- An estimate of the total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips.  
  Refer Section 6 and PTC Traffic Impact Assessment (Appendix 27)

- The adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development.  
  Refer Section 6

- The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Roads and  
  Refer Section 6
<table>
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<th>SEARSs</th>
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<tr>
<td>Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network.</td>
<td>Refer Section 6</td>
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<td>• Details of travel demand management measures to minimise the impact on general traffic and bus operations and encourage sustainable travel choices and details of programs for implementation, such as a location-specific sustainable travel plan, provision of end-of-trip facilities, green travel plans and wayfinding strategies.</td>
<td>Refer Section 6</td>
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<td>• The daily and peak (AM, PM) vehicle movements impact on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works (if required), including traffic modelling and analysis.</td>
<td>Refer to the PTC Traffic Impact Assessment (Appendix 27)</td>
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<tr>
<td>• The proposed walking and cycling access arrangements and connections to public transport services.</td>
<td>Refer Section 6</td>
</tr>
<tr>
<td>• The proposed access arrangements, including car pick-up/drop-off facilities, pedestrian facilities, traffic control devices and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and cycle networks.</td>
<td>Refer Section 6 and PTC Traffic Impact Assessment (Appendix 27)</td>
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<td>• Proposed car and bicycle parking provision for staff and visitors, including consideration of the availability of public transport and the requirements of the relevant parking codes and Australian Standards.</td>
<td>Refer Section 6 and PTC Traffic Impact Assessment (Appendix 27)</td>
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<tr>
<td>• Provision of end of trip facilities (i.e. showers, lockers, change rooms etc.) for the use of employees who choose to walk or cycle to/from work as well as undertake activities during work hours.</td>
<td>Refer Section 6 and BVN Drawings</td>
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<td>• Details of emergency vehicle access arrangements.</td>
<td>Refer to the PTC Traffic Impact Assessment (Appendix 27)</td>
</tr>
<tr>
<td>• Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).</td>
<td>Refer to the PTC Traffic Impact Assessment (Appendix 27)</td>
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<td>SEARSs</td>
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<tr>
<td>• An assessment of road and pedestrian safety adjacent to the proposed</td>
<td>Refer to the PTC Traffic Impact Assessment (Appendix 27)</td>
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<td>development and the details of required road safety measures.</td>
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<tr>
<td>• Traffic and transport impacts during construction and how these</td>
<td>Refer to the PTC Traffic Impact Assessment (Appendix 27)</td>
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<td>impacts will be mitigated for any associated traffic, pedestrian,</td>
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<td>cyclists, parking and public transport and the cumulative impact of</td>
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<td>nearby construction projects, including the preparation of a draft</td>
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<tr>
<td>Construction Traffic Management Plan to demonstrate the proposed</td>
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<td>management of the impact.</td>
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2 Introduction

2.1 Background

2.1.1 Nepean Hospital: Current function

Nepean Hospital is the name given commonly and collectively to the Penrith Health Campus (PHC). PHC land uses comprise the public health service facilities operated by NSW Health (NSWH), private facilities including Nepean Private Hospital (NPH) and ancillary activities such as child care. PHC constitutes the western portion of the Penrith Health and Education Precinct (PHEP), which extends to the east to incorporate the Penrith Campus of Western Sydney University and TAFE NSW Nepean.

Nepean Hospital is the principal facility of the Nepean Blue Mountains Local Health District (NBMLHD), providing public health services to a large area of Western and Outer Metropolitan Sydney. The NBMLHD is served by several facilities in addition to Nepean Hospital, including Hawkesbury Hospital, Springwood Hospital, Blue Mountains Hospital and Lithgow Hospital.

Nepean Hospital (Figure 2-1) is the principal referral hospital and regional trauma centre in the NBMLHD and provides a diverse range of services to a population catchment of over 500,000 residents, a figure forecast to double by 2036. Nepean Hospital has 520 inpatient beds.

Along with health-related education, research and business activities, the health services provided by Nepean Hospital cover:

- 24-hour emergency department
- Surgical (including dental, neurosurgery, orthopaedic, plastic and reconstructive, thoracic, breast and endocrine)
- Acute interventional medicine (such as renal dialysis, aged care, gastroenterology and stroke services)
- Cardiology
- ENT, urology and vascular
- Cancer care (with the Nepean Cancer Care Centre being located on the hospital campus)
- Medical imaging
- Mental health
- Community health
- Drug and alcohol
- Sexual health
- Rehabilitation, pharmacy and allied health.

Specific named institutions located on the hospital campus are Tresillian Family Care Centre, the Nepean Cancer Care Centre and the Wentworth Centre for Drug and Alcohol Medicine. The 109-bed NPH, operated by Healthscope, is located adjacent to the public hospital and offers a broad range of services.
2.1.2 Nepean Hospital: Proposed redevelopment

New facilities are proposed to be developed on PHC, and additional services provided, through the redevelopment of land currently used for surface car parking. Under the NSW Government ‘Stage 1 Building’ project, NSW Health Infrastructure (NSWHI) is proposing to provide Penrith and its surrounding areas with contemporary, integrated clinical and community-based health services and strengthen the hospital’s position as a leading tertiary, research and referral hospital in NSW.

The proposed redevelopment of Nepean Hospital is consistent with the NSWHI vision and strategic objectives for PHC:

- **Vision:** To become an international destination for investment in education, health services, research and related technology over the next 10 years
  - Objective 1. Education, allied health and medical training:
    - To become a nationally recognised centre in allied health services and clinical medical training
Growing academic presence in engineering, arts and related sciences.

- **Objective 2. Health care and innovation:**
  - To improve community health and wellbeing through the development of new technology applications and models of community based health care and service delivery.

- **Objective 3. Research and technology:**
  - Linking community driven research in lifestyle related diseases with healthy lifestyles, local sporting excellence and facilities.

- **Objective 4. Business and lifestyle:**
  - To grow Western Sydney health technology sector through initiatives that support the region's emerging innovation ecosystem.

The timeline for the proposed redevelopment is at Figure 2-2. Following the approval of a Final Business Case in early 2017, NSWHI is preparing a State-Significant Development Application (SSDA) for the Stage 1 Building, for assessment by the NSW Department of Planning & Environment (DPE). As an asset requiring completion before the Stage 1 Building (see 3.2), a new multi-storey car park that will service the expanded Nepean Hospital is the subject of a separate Development Application (DA) that is currently being assessed for approval by Penrith City Council.

![Figure 2-2 Nepean Redevelopment Stage 1 project timeline](image)

### 2.2 Purpose of this transport strategy

It is a requirement that the SSDA be supported by a transport strategy that shows how the health, employment, education and business services offered by the redeveloped Nepean Hospital will be accessible to the community.

In general, this transport strategy must address:

- The broad strategic context for the transport and accessibility outcomes at a redeveloped Nepean Hospital
• Existing transport and accessibility conditions
• The potential impact of the Stage 1 Building on these conditions
• The transport demand management, operational and infrastructure improvements that are proposed to mitigate these impacts and optimise future transport and accessibility conditions.

In specific relation to the vision and strategic objectives for Nepean Hospital outlined at 2.1.2, this report addresses opportunities for the Stage 1 Building to achieve the following benefits:

• Benefits for customers (inpatients, outpatients, visitors and the local community) and businesses:
  o Reduced growth in congestion
  o Reduced and more reliable travel times
  o Improvements to a wider network of public transport services
  o Energy and other cost savings
  o Health benefits from increased use of active transport
  o Reduced local traffic and overspill parking in residential areas
  o General air quality and amenity benefits.

• Benefits for workers:
  o Reduced cost of travel
  o Reduced stress from less time spent travelling in local congestion
  o Improved access to public and active transport choices for work travel
  o Improved health from increased use of active transport
  o Improved workplace amenity.

• Benefits for NBMLHD:
  o Reduced growth in the demand for car parking
  o Reinvention of existing car parking areas for other purposes, maximising the utilisation of the site for health and education services
  o Reduced cost of operating and maintaining car parking facilities
  o Improved accessibility to individual PHC facilities, reducing internal congestion and benefiting operations
  o Improved emergency vehicle response and travel times
  o Increased productivity through a healthier and more motivated workforce
  o Widened regional and demographic base of potential employees and suppliers
  o Improved corporate reputation.

2.3 Consultation

This transport strategy is informed by preliminary consultation with major stakeholders as listed in Table 2-1. At the time of consultation NSW Government stakeholders were providing input to the DPE on Secretary's Environmental Assessment Requirements (SEARs) for the Stage 1 project SSDA. Consultation provided an early opportunity to ascertain issues of concern to stakeholders for this strategy to address.
<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Business area</th>
<th>Issues</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport for NSW</td>
<td>Land Use Planning &amp; Development</td>
<td>• Application of Austroads ‘Movement and Place Framework’ for road categorisation and management.</td>
<td>• See section 4.2.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Learnings from approach taken by other health campuses (e.g. Westmead) to management of public car parking.</td>
<td>• Car parking will be managed in line with NSW Health policy and consistently with management at other hospitals.</td>
</tr>
<tr>
<td>Service Design &amp; Development</td>
<td></td>
<td>• Scope for improvements to bus customer experience at southern entry to PHC.</td>
<td>• See section 6.5.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Opportunities for public transport patronage growth already offered by high standard of bus service between PHC and Penrith interchange (especially when latter is upgraded).</td>
<td>• See section 6.5.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Need to consider future direct bus connections to suburbs north and south of PHC, as well as east and west.</td>
<td>• See section 6.5.</td>
</tr>
<tr>
<td>Interchange &amp; Precinct Planning</td>
<td></td>
<td>• Connections to local walking and bike-riding routes.</td>
<td>• See sections 6.3 and 6.4.</td>
</tr>
<tr>
<td>Roads &amp; Maritime Services</td>
<td>Network Sydney</td>
<td>• Long-term consideration of potential upgrade of Great Western Highway / Parker Street intersection.</td>
<td>• Noted. No changes to the intersection of Great Western Highway / Parker Street are proposed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not supportive of signalisation of Great Western Highway / Somerset Street intersection.</td>
<td>• The Great Western Highway / Parker Street intersection is to be upgraded under the Western Sydney Infrastructure Package (see 6.7.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Need for design of new multi-storey car park to minimise impacts on network</td>
<td>• Signalisation is not proposed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The new multi-storey car park is the subject of a separate planning process and as such is</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Business area</td>
<td>Issues</td>
<td>Response</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Penrith City Council</td>
<td>Economic Initiatives</td>
<td>operation (e.g., from queuing to Parker Street).</td>
<td>not covered in this report.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interrelatedness of transport initiatives for PHC and for rest of PHEP (‘The Quarter’).</td>
<td>• Noted. These are long-term proposals. Chapter 6 of this report makes recommendations for future transport initiatives that seek to increase the take-up of alternatives to the car consistent with Council’s approach to ‘The Quarter’.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Council advocating for Australian Government Western Sydney Infrastructure Program funding for upgrade of The Northern Road to extend beyond Jamison Road to Penrith city centre.</td>
<td>• Noted. While this report highlights this route as a longer-term bus priority corridor, the operation of the Stage 1 Building does not rely on this.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Need for improved local area wayfinding, to minimise local network impacts from drivers looking for car parking spaces.</td>
<td>• See Section 6.8.2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potential medium-term rezoning of local area around PHC (including increased focus on employment generation) and expected changes to currently free and/or untimed car parking.</td>
<td>• Noted. Analysis in the Traffic and Accessibility Assessment (Parking and Traffic Consultants) shows Nepean Hospital is not reliant on the local on-street parking. Local on-street parking is popular because it is free, compared with paid parking on the PHC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Scope for long-term urban domain improvements to northern frontage of PHC, as this orients more towards its Great Western Highway ‘address’.</td>
<td>• Noted. To be addressed in future master planning of PHC.</td>
</tr>
</tbody>
</table>
2.4 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>Development Application</td>
</tr>
<tr>
<td>DIRD</td>
<td>Commonwealth Department of Infrastructure &amp; Regional Development</td>
</tr>
<tr>
<td>DPE</td>
<td>NSW Department of Planning &amp; Environment</td>
</tr>
<tr>
<td>DPI</td>
<td>NSW Department of Planning &amp; Infrastructure</td>
</tr>
<tr>
<td>GSC</td>
<td>Greater Sydney Commission</td>
</tr>
<tr>
<td>INSW</td>
<td>Infrastructure NSW</td>
</tr>
<tr>
<td>NBMLHD</td>
<td>Nepean Blue Mountains Local Health District</td>
</tr>
<tr>
<td>NPH</td>
<td>Nepean Private Hospital</td>
</tr>
<tr>
<td>NSWH</td>
<td>NSW Health</td>
</tr>
<tr>
<td>NSWHI</td>
<td>NSW Health Infrastructure</td>
</tr>
<tr>
<td>PCC</td>
<td>Penrith City Council</td>
</tr>
<tr>
<td>PHC</td>
<td>Penrith Health Campus (Nepean Hospital and Nepean Private Hospital)</td>
</tr>
<tr>
<td>PHEP</td>
<td>Penrith Health and Education Precinct</td>
</tr>
<tr>
<td>RMS</td>
<td>Roads &amp; Maritime Services</td>
</tr>
<tr>
<td>SSD</td>
<td>State-Significant Development</td>
</tr>
<tr>
<td>TIA</td>
<td>Traffic Impact Assessment</td>
</tr>
<tr>
<td>TfNSW</td>
<td>Transport for NSW</td>
</tr>
<tr>
<td>WSEA</td>
<td>Western Sydney Employment Area</td>
</tr>
<tr>
<td>WSIP</td>
<td>Western Sydney Infrastructure Plan</td>
</tr>
<tr>
<td>WSRNSS</td>
<td>Western Sydney Rail Needs Scoping Study</td>
</tr>
</tbody>
</table>

2.5 References

Except where otherwise noted, relevant strategic, policy and site-specific information in this transport strategy has been sourced from the documents listed below. Website addresses are included for the location of public documents.

Australian Bureau of Statistics (2017) QuickStats  

Australian Government (2011) Our Cities, Our Future: A national urban policy for a productive, sustainable and liveable future  

Australian Government (2018) Western Sydney City Deal  


BVN Architecture (2017) Nepean Hospital - Car Park: Development Application


DPE (2014) A Plan for Growing Sydney  

DPI (2017) Secretary’s Environmental Assessment Requirements: Nepean Hospital and Integrated Ambulatory Services Redevelopment (Stage 1)  

GSC (2018) Western City District Plan  
https://www.greater.sydney/western-city-district-plan
https://www.greater.sydney/greater-sydney-region-plan


Infrastructure Australia (2018) Infrastructure Priority List


NSW Bureau of Transport Statistics (2017) NSW and Sydney Transport Facts

NSW Government (2017) Premier’s Priorities and State Priorities

NSWH (2009) Healthy Urban Development Checklist: A guide for health services when commenting on development policies, plans and proposals


NSWHI (2017) Briefing: $550 million Nepean Redevelopment Stage 1 and $26 million multi deck carpark

NSWHI (2017) Nepean Hospital and Integrated Ambulatory Services Redevelopment (Stage 1) Request for Secretary’s Environmental Assessment Requirements

NSWHI (2017) NSW Health and Education Super Precincts: Strategic Recommendations Prepared for the Greater Sydney Commission

PCC (2014) Penrith Economic Development Masterplan

Parking & Traffic Consultants (2017) Nepean Hospital and Integrated Ambulatory Services Redevelopment - Concept and Stage 1 SSDA Traffic Impact Assessment (appended)

Parking & Traffic Consultants (2017) Integrated Nepean Hospital - Multi Level Car Parking for NSW Health Infrastructure: Traffic and Accessibility Assessment

Parking & Traffic Consultants (2017) Integrated Nepean Hospital and Community Based Services (Penrith) for NSW Health Infrastructure: Green Travel Plan

PCC (2017) ‘Derby St and Great Western Highway Intersection Upgrades’

RMS (2016) ‘Intersection improvements at Parker Street and Derby Street, Kingswood’


TfNSW (2012) Long Term Transport Master Plan


TfNSW (2013) Sydney’s Walking Future

TfNSW (2017) Travel Choices: Tomorrow’s Sydney

TfNSW (2017) ‘A bus stop outside your door: On demand transport is here’


TfNSW (2018) Western Sydney Rail Needs Scoping Study

TfNSW (2018) Outer Sydney Orbital corridor identification
3 Site context

3.1 Existing Penrith Health Campus

3.1.1 Local setting

The existing PHC is bordered by the Great Western Highway to the north, Parker Street (the name given to the section of the A9 The Northern Road within Penrith) to the west, Derby Street to the south and Somerset Street to the east. Motor vehicle, bicycle and (except where driveways directly connect to car parking areas only) walking access is available via Parker Street (two entrances), Derby Street (one entry) and Somerset Street (two entrances).

For pedestrians only, there are several additional informal entry points available across the relatively permeable southern (Derby Street) and eastern (Somerset Street) local road edges of the campus. The PHC’s north-eastern quadrant is 500m as the crow flies from Kingswood train station.

Immediately north-east of the PHC are car dealerships along the Great Western Highway; the areas east and west are characterised by mostly low-density housing; and south of Derby Street, opposite the hospital, is the Sydney Medical School Nepean (associated with the University of Sydney).

Approximately 34,400 people live in the suburbs which abut PHC; Penrith, South Penrith and Kingswood.

3.1.2 Subregional and district setting

PHC is located approximately 3km east of the Penrith CBD and train station, and to the western end of the PHEP (Figure 3-1), placing it between 2km and 6km west of the various tertiary education facilities located on the Kingswood, Werrington and Werrington South campuses of Western Sydney University and TAFE NSW.

This setting places Nepean Hospital in a strategically central position on the spine of major commercial, retail, health and education land uses that traverses the Penrith Local Government Area (LGA) and its approximately 196,000 residents.

At a broader scale the strategic importance of this spine is recognised in planning by the Greater Sydney Commission (GSC), which has nominated the Greater Penrith to St Marys corridor as a hub of economic activity that links Penrith city centre, and the PHEP, to development opportunities around St Marys.

![Figure 3-1 Nepean Hospital in context of Penrith Health and Education Precinct](image)
3.1.3 Regional setting

Nepean Hospital is the primary facility in the NBMLHD. This local health district (Figure 3-2) consists of both urban and semi-rural areas, covering over 9,000 square kilometres of the Blue Mountains, Hawkesbury, Lithgow and Penrith LGAs and their nearly 400,000 residents.

In contrast to its location at the south-eastern extremity of its local health district, which extends westwards, Nepean Hospital’s principal catchment is weighted in the other direction - towards developed and developing Western Sydney communities to its north-east and south-east.

Seen in a whole-of-Greater Sydney context (Figure 3-3) the strategic importance of Nepean Hospital is emphasised by the distance that separates it from the nearest other health facilities of equivalent scale, at Westmead, Liverpool and Campbelltown. Within the hospital’s catchment, the new Western Sydney Airport (and associated urban development) will rely on Nepean Hospital as the nearest such facility.
3.2 Stage 1 Building

The Stage 1 Building (shown in Figure 3-4) will comprise the delivery of:

- A new clinical services block
- A new and expanded emergency department
- Expanded and upgraded medical imaging facilities
- At least 12 new operating theatres
- 18 birthing suites in new accommodation, resulting in a net increase of 10 in addition to the existing eight suites
- A new neonatal intensive care unit
- More than 200 overnight beds in new accommodation
- A new helipad
- New community health services
- Expansion of medical oncology services with a doubling of chemotherapy chairs from 15 to 30
- Additional retail and other ‘front of house’ services.

The building will expand Nepean Hospital’s capacity to deliver health services to a growing population, while not substantially affecting the proportionate mix of different services offered, including the ratio of adult to paediatric beds.
The above project works will be preceded by the construction of a second 650-space multi-storey car park for PHC (Figure 3-5). This is required to be operational prior to the hospital expansion reaching the point of displacing existing surface car parking.

In November 2016, the NSW Government announced a commitment of $550 million to undertake the first phase of the Nepean Redevelopment, in addition to $26 million allocated to construct the new car park. Completion of the works will ensure the delivery of key service priorities that have been identified in the NBMLHD’s clinical services plan and confirmed through consultation with health and community stakeholders.

Currently, the following internal upgrades to the Nepean Hospital emergency department are being completed as the first elements of the overall redevelopment:

- Paediatric assessment and treatment area
- Safe assessment room
- Upgrade of the mobile duress and CCTV systems.
Figure 3-5 Site of new Penrith Health Campus multi-storey car park
4 Strategic context

4.1 National planning context

4.1.1 National Urban Policy

Selected objectives and actions stated under headline goals in the Australian Government’s National Urban Policy are relevant to a proposal at the scale of the Nepean Redevelopment Stage 1:

- **Goal: Productivity**
  - Objective 1. Improve labour and capital productivity by:
    - Supporting education, research and innovation.
  - Objective 2. Integrate land use and infrastructure by:
    - Integrating planning of land use, social and economic infrastructure.
  - Objective 3. Improve the efficiency of urban infrastructure by:
    - Maximising returns on new and existing infrastructure
    - Taking into account operational and maintenance costs of infrastructure and assets
    - Connecting private investment capital to infrastructure and assets of high public benefit
    - Utilising smart infrastructure.

- **Goal: Sustainability**
  - Objective 4. Protect and sustain our natural and built environments by:
    - Supporting sustainable development and refurbishment of our built environment.
  - Objective 5. Reduce greenhouse gas emissions and improve air quality by:
    - Sustainable urban planning.

- **Goal: Liveability**
  - Objective 10. Improve accessibility and reduce dependence on private vehicles by:
    - Improving transport options
    - Reducing travel demand by co-location of jobs, people and facilities.
  - Objective 11. Support community wellbeing by:
    - Providing access to social and economic opportunity
    - Improving the quality of the public domain
    - Improving public health outcomes.

- **Goal: Governance**
  - Objective 12. Improve the planning and management of our cities by:
    - Facilitating a whole-of-governments approach.

Australian Government policy objectives are further articulated in its *Smart Cities Plan*. This formulates the national aspiration of ‘30-minute cities’ where residents can access health and other essential services, jobs, schools, shopping and recreational facilities within 30 minutes of home. The
Smart Cities Plan also foreshadows the preparation of ‘City Deals’ under which governments, industries and communities will develop collective plans for growth and commit to the actions, investments, reforms and governance needed to implement them. This has led to agreement on the multilateral Western Sydney City Deal described at 4.6.

4.1.2 Infrastructure Priority List

Infrastructure Australia released the latest iteration of its Infrastructure Priority List in March 2018, providing an update to the Australian Government’s Australian Infrastructure Plan. The priority list includes projects of direct relevance to future demand for access to Greater Penrith and the Nepean Redevelopment, as outlined under different categories of priority in Table 4-1.

Table 4-1 Infrastructure Australia Infrastructure Priority List: Projects relevant to Penrith Health and Education Precinct access

<table>
<thead>
<tr>
<th>Proposed project</th>
<th>Problem category and description</th>
<th>Proposed delivery timescale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Priority Projects:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Potential infrastructure solutions for which a full business case has been completed and been positively assessed by the Infrastructure Australia Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Addresses a major problem or opportunity of national significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Sydney Airport</td>
<td>National Connectivity: Sydney aviation capacity</td>
<td>Medium term 5-10 years</td>
</tr>
<tr>
<td><strong>Priority Projects:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Potential infrastructure solutions for which a full business case has been completed and been positively assessed by the Infrastructure Australia Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Addresses a nationally-significant problem or opportunity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Northern Road upgrade</td>
<td>National Connectivity: Access to south-west Sydney growth area and construction access to Western Sydney Airport</td>
<td>Near term 0-5 years</td>
</tr>
<tr>
<td><strong>Priority Initiatives:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Potential infrastructure solutions for which a business case has not yet been completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Seeks to address a problem or opportunity of national significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Sydney Infrastructure Plan</td>
<td>National Connectivity: Access to Western Sydney and Western Sydney Airport</td>
<td>Near term 0-5 years</td>
</tr>
<tr>
<td>Western Sydney Airport public transport connection</td>
<td>National Connectivity: Access to Western Sydney Airport</td>
<td>Long term 10-15 years</td>
</tr>
</tbody>
</table>

4.1.3 Western Sydney Airport

The 2018 Infrastructure Priority List reconfirms the Australian Government’s commitment to the development of a second airport for Greater Sydney, as a High Priority Project.

Sydney is Australia’s primary aviation gateway, accounting for around 40% of the nation’s international services, 43% of domestic services and 45% of international air freight. Demand for airport services in Greater Sydney is forecast to grow beyond the capacity of Kingsford Smith Airport by the 2030s. The Western Sydney Airport project includes initial (within 10 years) construction of a 3,700m runway with a parallel taxiway, and associated aviation terminal infrastructure and support precincts.
The new airport itself will be located (Figure 4-1) roughly equidistant between the strategic centres of Penrith and Liverpool and their major hospitals. However, the extension and intensification of the Western Sydney Employment Area (WSEA) catalysed by the new airport’s development will place most of the more than 57,000 jobs forecast to be yielded by the WSEA over the next 30 years closer to Penrith, and therefore to Nepean Hospital.

![Figure 4-1 Western Sydney Priority Growth Area](image)

4.2 State planning context

4.2.1 NSW Premier’s Priorities and NSW State Priorities

The Stage 1 Building aligns with five of the 12 high-level NSW Premier’s Priorities. These are as follows, grouped and listed in order of the relative impact that the project can make on the achievement of the priority (assuming the priority is carried over in future reiterations of NSW Government commitments) and addressing the ways in which this may happen. Where there is additional relevance to one of the 18 subsidiary NSW State Priorities, this is also addressed.

- **NSW Premier’s Priority: Improving service levels in hospitals**
- **NSW Premier’s Priority: Improving government services**
- **NSW Premier’s Priority: Tackling childhood obesity**
The headline target for the first of the above priorities is to process 81% of patients through emergency departments within four hours by 2019. The second, generic priority aims for improved customer satisfaction with key NSW Government services year-on-year to 2019.

Achieving these types of outcome in the health sector is firstly a function of increasing the supply of medical services, a critical outcome in view of NSW’s ageing population and the growing number of people with chronic or complex health conditions. To this end, the Stage 1 Building adds important healthcare capacity in one of the state’s fastest-growing areas. The current upgrade of the Nepean Hospital Emergency Department contributes directly to achieving the 2019 target for the first NSW Premier’s Priority above.

Moreover, improving the operation of emergency departments, and enhancing customers’ experience of the health system, also relies on ‘upstream’ measures to reduce the number of people ultimately presenting in this costly context. These measures should make the right health services accessible to the right people at the right time, to reduce the likelihood of later reliance on emergency care.

This requires the design and operation of efficient and integrated health facilities that patients can reach easily, allied to initiatives that bring some services closer to the end-user in his or her own community. This approach also has benefits for the achievement of the NSW State Priority for the reduction in wait time for planned surgery.

Additionally, preventative health programs play a role in reducing the growth in demand for health services in the first place. These programs include initiatives to promote physical activity and healthy nutrition as part of daily life, including through workplaces.

Enjoying a healthy lifestyle is critical to achieving the last of the listed priorities, where the commitment is to reduce the overweight and obesity rates among children by five percentage points by 2025. Today’s overweight child may be tomorrow’s inpatient; reshaping day-to-day activities around community infrastructure that prioritises healthy, active travel can help to break this nexus.

Where all age groups are concerned, encouraging a larger share of travel to use public and active transport will contribute to the NSW State Priority for the improvement of road travel reliability.

- **NSW Premier’s Priority: Delivering infrastructure**
- **NSW Premier’s Priority: Creating jobs**

In line with these two priorities, the NSW Government is committed to delivering infrastructure projects on time and on budget, and to enabling the creation of 150,000 new jobs by 2019.

Investment by government in major infrastructure such as the Stage 1 Building results in the creation of both direct, construction-related employment and indirect jobs growth as the expenditure on new assets permeates other sectors of regional and local economies.

Direct and indirect jobs growth will also occur throughout the operating life of the redeveloped facility. The expanded facilities will provide the capacity for increased numbers of staff in both clinical and ‘back of house’ functions and will generate flow-on employment in a wide range of local and regional suppliers of services to the hospital.

### 4.2.2 A Plan for Growing Sydney (2014)

The NSW Government’s 2014 plan for the growth of Greater Sydney, *A Plan for Growing Sydney*, provided directions to guide the city’s productivity, environmental management and liveability, including the delivery of employment and infrastructure. A major action area for the plan aimed to transform the productivity of Western Sydney through growth and investment (Direction 1.4). *A Plan for Growing Sydney* has been a key part of the foundation for strategic planning for Western Sydney health assets over the past five years.

Under the plan, Penrith was designated as one of Western Sydney’s three regional city centres, along with Campbelltown-Macarthur and Liverpool (Figure 4-2). Separate but adjacent to Penrith city centre, the PHEP (Figure 3-1) - primarily Nepean Hospital and the Kingswood campus of Western
Sydney University - was designated a strategic centre. The plan classified strategic centres as locations that currently have or are planned to have at least 10,000 jobs, and are priority locations for employment, retail, housing, services and mixed-use development (Direction 1.7).

In this context, supporting the growth of the PHEP plays an important role in the achieving the following outcomes that A Plan for Growing Sydney has aspired to for Western Sydney:

- Providing new jobs close to centres that are accessible to large and growing residential catchments
- Diversifying the mix of job opportunities within these catchments
- In particular, improving access to ‘knowledge jobs’ in employment sectors characterised by technological or other forms of innovation and learning.

For the communities oriented towards Penrith city centre, the contribution to available knowledge jobs resulting from investment in Nepean Hospital, Western Sydney University and associated facilities will only be surpassed by the employment growth catalysed by Western Sydney Airport.

Given this, it is relevant to the ongoing growth and importance of Nepean Hospital that it is not only located between Penrith city centre and the Kingswood education campus, but strategically positioned on the extended regional corridor between Penrith city centre, the WSEA and the new airport (Figure 4-3). The importance of this extended regional corridor was recognised in the focus of A Plan for Growing Sydney on north-south transport connections servicing the new airport, including the upgrade of The Northern Road (reconfirmed as a Priority Project by Infrastructure Australia) and the Outer Sydney Orbital investigations referenced in 4.6.1.
At a subregional level, *A Plan for Growing Sydney* also reinforced the importance of Penrith as a provider of employment and services to benefit the North West and South West Growth Centres and highlighted it as a significant location for the complementary and coordinated growth of the health and education sectors in particular (Direction 1.10).

At a local level, the plan recognised that Penrith should be a focus for improved public transport services and walking and cycling accessibility. As the strategic centre complementing Penrith city centre’s CBD function within the plan’s West Subregion (Figure 4-4), the PHEP was highlighted as a priority location for investment. This was flagged as involving:

- A continuing primary role for Nepean Hospital
- Mixed use development to co-locate new offices, shops and housing with health and education facilities
• Focusing this type of development around Kingswood train station and the Great Western Highway corridor that connects the station to the hospital
• Improving the walking and cycling connectivity of Penrith city centre, Nepean Hospital, Kingswood train station and Western Sydney University
• Investigation of a longer-term direct rail connection between the precinct and Western Sydney Airport.

These aspirations for the PHEP are prime examples of *A Plan for Growing Sydney* calling out opportunities for the design of Sydney’s built environment to facilitate physical activity and social cohesion (Direction 3.3).

![Figure 4-4 West Subregion (A Plan for Growing Sydney)](image)

### 4.2.3 Greater Sydney Region Plan (2018)

The Greater Sydney Commission (GSC) is the lead delivery agency for *A Plan for Growing Sydney*, tasked with coordinating across agencies to deliver infrastructure and urban planning priorities for the metropolis.

The GSC released the final *Greater Sydney Region Plan* in March 2018. To support the Western Parkland City (Figure 4-5) the plan confirms the importance of Greater Penrith (Figure 4-6) as a ‘Metropolitan Cluster’.

This designation is based around existing and planned commercial, health and education assets. It signifies the role ahead for Greater Penrith - to support the Western Parkland City by providing a
northern focus for commercial activities and population services as the newest of Greater Sydney’s three metropolises develops over the next 20 years. As the Western Parkland City grows, so will housing, employment and other activities in Greater Penrith; this will be the key service centre relied on by the northern part of the Western Economic Corridor catalysed by the development of the Western Sydney Airport-Badgerys Creek Aerotropolis.

In the health services space, the Greater Sydney Region Plan identifies the opportunity to enhance the Western Parkland City’s economic growth through Greater Penrith’s development as one of a ring of university towns that also includes Liverpool and Campbelltown-Macarthur. Specific to this growth opportunity for Greater Penrith is the scope to anchor its tertiary education presence in investment in the $550 million upgrade of Nepean Hospital, facilitating the emergence of a health and education precinct.
Such precincts are described on the *Greater Sydney Region Plan* as transit-accessible areas where health and education assets are co-located, leading to the emergence of associated medical research institutions and a supporting mix of complementary industry tenants, housing, ancillary facilities and services. Under the right circumstances agglomeration benefits and improved urban productivity can flow from the proximity of these land uses and generate export growth in the form of overseas student enrolments.

**Figure 4-6 Vision for Greater Penrith (Greater Sydney Region Plan)**

For Greater Penrith, as for other Greater Sydney health and education precincts, the *Greater Sydney Region Plan* finds that realising these advantages requires coordinated action across:

- The development and implementation of integrated land use and transport plans for the PHEP (Figure 3-1) as a whole, placing PHC in the context of complementary education and ancillary activities
- Urban design and servicing decisions that promote high levels of accessibility at different scales across the PHEP, so that it is easy to move between different parts of the precinct by transit and active transport (improving local amenity) as well as by car
- The development of housing that can accommodate students and workers within 30 minutes by transit or active transport from the PHEP.

To help with this process, the plan states that the GSC will facilitate whole-of-government efforts by designating Greater Penrith a Collaboration Area, coordinating the establishment of governance arrangements and driving the delivery of place-based outcomes.

### 4.2.4 Western City District Plan

The GSC approaches its role on a district-by-district basis. Changes to the boundaries of these districts (compared with *A Plan for Growing Sydney* subregions) have resulted in Penrith LGA forming
part of the Western City District that comprises eight local council areas from north of the Hawkesbury River to Bargo in the south west and west into the Blue Mountains. The population of this Western Parkland City will grow from just over 1 million today to 1.53 million people in the next 20 years.

Following draft exhibition, the finalised Western City District Plan was released in March 2018. The Western City District Plan elaborates on the generic directions established under A Plan for Growing Sydney and further developed in the Greater Sydney Region Plan. In applying these directions to Penrith LGA the plan recognises the proximity of Greater Penrith to the Aerotropolis of urban development that includes, supports and is catalysed by the new Western Sydney Airport (Figure 4-4).

Relevant directions applied and actions stipulated by the GSC, and the relationship of these to the Nepean Redevelopment, are extracted and discussed below. This demonstrates how matters from the Greater Sydney Region Plan and the Western City District Plan have been considered in the Stage 1 Building planning proposal.

- **Direction 1: A city supported by infrastructure**
  - Objective 2: Infrastructure aligns with forecast growth - growth infrastructure compact.
  - Objective 7: Infrastructure adapts to meet future needs.
  - Action: Prioritise infrastructure investments to support the vision of A Metropolis of Three Cities.

- **Direction 3: A city for people - celebrating diversity and putting people at the heart of planning**
  - Objective 6: Services and infrastructure meet communities’ changing needs.
  - Objective 7: Communities are healthy, resilient and socially connected.
  - Action: Deliver social infrastructure that reflects the needs of the community now and in the future.
  - Action: Deliver healthy, safe and inclusive places for people of all ages and abilities...by providing walkable places at a human scale with active street life, prioritising opportunities for people to walk, cycle and use public transport [and] co-locating schools, health, aged care, sporting and cultural facilities.

- **Direction 6: A well connected city - developing a more accessible and walkable city**
  - Objective 14 - A Metropolis of Three Cities - Integrated land use and transport creates walkable and 30-minute cities.
  - Action: Support innovative approaches to the operation of...institutional establishments to improve the performance of the transport network.
  - Action: Investigate and plan for the land use implications of potential long-term regional transport connections.

- **Direction 7: Jobs and skills for the city - creating the conditions for a stronger economy**
  - Objective 20 - Western Sydney Airport and Badgerys Creek Aerotropolis are economic catalysts for Western Parkland City.
  - Objective 21 - Internationally competitive health, education, research and innovation precincts.
  - Action: In addition to the Collaboration Area process...reinforce, capitalise and support the expansion of the Penrith health and education precinct...capitalise on opportunities associated with the Western Sydney Airport including Western Sydney City Deal initiatives [and] improve transport connectivity, walkability and safe cycling connections within and to the Penrith City Centre.
The Western City District Plan places the PHEP at the heart of a Collaboration Area (Figure 4-7) that also comprises Penrith CBD and the tourism precinct to the west - a place where significant productivity, liveability and/or sustainability outcomes are best achieved through the collaboration of different levels of government and in some cases the private sector or landowners. Under this designation, and subject to resources, the GSC will directly facilitate the efforts of the many agencies, stakeholders and interest groups that are planning for Greater Penrith’s future.

Priorities under the Western City District Plan for the Greater Penrith Collaboration Area include:

- Growing employment by 35% to 45,000 jobs over the next 20 years
- Revitalising Penrith CBD
- Improving housing diversity and providing affordable housing
- Implementing healthy city initiatives and improving social infrastructure
- Protecting and expanding the PHEP.

Local employment in the PHEP grew by nearly 300% from 2001 to 2011, when it accommodated 6,000 jobs; as a tertiary education site the vision of the Western City District Plan is for the precinct to accommodate at least 10,000 students. The upgrade of Nepean Hospital will be the catalyst in enhancing innovation, research, health and education activities, such as the Nepean Clinical School that is one of the eight Clinical Schools of the University of Sydney.

To support the planned expansion of the PHEP, the Western City District Plan indicates that flexible land use zoning is required to attract mutually complementary businesses such as health and medical research activities, private hospitals, allied health, ancillary retail, and accommodation for visitors, carers and the aged.

The growth of Greater Penrith, including the PHEP, as a Metropolitan Cluster has implications for the land use and transport setting for the Stage 1 Building and additional Nepean Redevelopment stages.
The PHEP is at the centre of Greater Penrith (Figure 3-1) and Nepean Hospital is in prime position within this precinct, midway between a significant road intersection and a train station. The streets around the hospital are prime candidates for the development of housing choices to service hospital and other PHEP workers, plus co-located schools and other mixed used development components. To east and west, the hospital needs suitable transport connections to Penrith city centre, other parts of the PHEP and longer-distance transit services.

At a fine-grained level, the *Western City District Plan* finds that ‘place-based’ and design-led planning of the Greater Penrith public realm should result in places and streets that are safe and functional, supporting people’s choice to walk or ride a bike rather than drive. Walkable, well-lit places and paths can provide a sense of safety for the more vulnerable user groups who may be present in relatively higher numbers around health facilities, including women and older people. The most important active transport corridors for recreation and longer-distance bicycle travel will be created through the completion and interconnection of open space linkages in the Western Parkland City’s Green Grid.

Within the buildings that people are walking or riding to, end-of-trip facilities, such as workplace lockers and showers, will increase the incidence of physical activity within practical travel. This will improve the sustainability of Greater Penrith, enhancing access without flow-on growth in congestion.

Ultimately, safe and accessible environments will be conducive to more active lifestyles, helping to reduce obesity and the rate of chronic illnesses such as diabetes and cardiovascular disease. This is especially important for the long-term health of Penrith residents, given that the *Western City District Plan* reports that in 2015 nearly three in five adults in the previously designated West District (which correlates to the Western Parkland City) were overweight or obese.

### 4.2.5 Long Term Transport Master Plan and associated modal plans (2012-13)

The 2012 *Long Term Transport Master Plan*, including its supporting mode and place-specific plans, set out the NSW Government’s intentions to improve transport infrastructure and services to sustain growth in Greater Sydney. Key master plan directions and actions that have provided direction to planning for the Stage 1 Building include the following (in summary):

- Tailor transport and congestion solutions for Penrith that:
  - Recognise its status as one of Western Sydney’s three regional cities
  - Are developed in coordination with Penrith City Council
  - Facilitate access by Western Sydney residents to jobs that are located close to where they live
  - Improve north-south connections, including between Penrith and both the North West and South West Growth Centres
  - Increase public transport mode share for the high proportion of trips into Penrith city centre that originate within the subregion (Figure 4-8), thereby decoupling jobs growth from worsening traffic congestion
  - Improve public transport travel times between Penrith and other Western Sydney strategic centres including Campbelltown-Macarthur and Prairiewood and protect these from congestion-related decay.
Of the mode-specific plans supporting the *Long Term Transport Master Plan, Sydney’s Cycling Future* (2013) spoke specifically to local connectivity needs extending from Penrith city centre as far as Nepean Hospital (Figure 4-9). The cycling plan stated that the NSW Government would work with Penrith City Council on a bicycle network including an off-road path along the Great Western Highway between Penrith city centre, Nepean Hospital and Western Sydney University.
For longer trips, *Sydney’s Bus Future* (2013) has had the most relevance to improving public transport services within the subregional catchment of Nepean Hospital. The bus plan confirmed and expanded on deliverables for two relevant corridors initially flagged by the *Long Term Transport Master Plan*:

- Penrith-Mount Druitt (via Werrington and Great Western Highway)
- Penrith-Rouse Hill via Schofields and Marsden Park (route to be determined).

These two corridors were designated (Figure 4-10) in the bus plan as important ‘Suburban’ tier bus routes. Under this designation, each corridor would at full development and operation offer peak services running at least as often as every 10 minutes in both directions, and weekday off-peak and weekend daytime services timetabled for every 15 minutes. The travel speed and reliability of services would be enhanced through targeted investment in bus priority infrastructure.
4.2.6 Future Transport Strategy (2018)

The Long Term Transport Master Plan has been updated through the Future Transport initiative, which culminated in the release of a finalised suite of plans in March 2018. In terms of the prioritisation of different modal outcomes and the impact of these on specific places, the Future Transport Strategy and supporting Greater Sydney Services and Infrastructure Plan build on the directions established by the Long Term Transport Master Plan and relevant supporting modal plans as introduced in 4.2.5.

In its overarching intent, Future Transport addresses how the transport of people, goods and services in NSW will grow and change over the next 40 years. This has involved considering and responding to the major trends impacting on transport planning and operations in NSW. These trends can be summarised as follows, with observations on the implications of each for the Stage 1 Building:

- **Rapid technology change**
  - It is difficult to predict at this point in the lifecycle of proposals such as the Stage 1 Building what new technological solutions to its transport needs will become viable within the life of the project.
  - As part of the project, the design of new movement networks, and the land uses they connect, must allow for some adaptation to new technologies.
• **Customer demand**
  - Informed customers are demanding and obtaining more ‘personalised’ transport services.
  - Where limited-frequency scheduled public transport services might previously have been the only alternative to driving for medium-distance trips in lower-density areas like Penrith LGA, new operators are starting to offer affordable and attractive demand-responsive services in such markets.

• **Live, work and study anywhere**
  - Working and studying from home are becoming more feasible for more people. Workers in administrative and other non-frontline roles may be able to avoid commuting on one or more days each week.
  - In parallel, accessing treatment from, or closer to, home may reduce the need for face-to-face presentations for some health services.

• **Environmental sustainability and energy security**
  - The NSW Government aspires to net-zero emissions by 2050 in all service delivery sectors, including transport.
  - Public transport will need to transition to renewable sources of electricity. This will require new fleet and other assets - and will have flow-on benefits from the reduction in noise and tailpipe emission impacts (as traditionally associated with buses) on sensitive land uses such as hospitals.

• **Growing international trade**
  - The operation of Western Sydney Airport, starting in the next decade, will increase the flow of people travelling along major transport corridors south of Penrith.
  - Given uncertainty about the timing of construction of new rail links to service these movements, and the need to minimise car dependence, early investigation and delivery of high-quality road-based public transport services including rapid buses is required.

• **Our growing and ageing population**
  - There will be increasing demand for the health services provided through Nepean Hospital.
  - Older people are less likely to drive; a larger proportion of the hospital’s patients will face mobility challenges in accessing its services.

• **The need for healthier lifestyles**
  - There is growing awareness in all parts of NSW of the health impacts from road congestion and sedentary lifestyles.
  - Designing developments such as the Stage 1 Building in ways that make it easier for people to reach them by walking or riding a bike will help activate lifestyles and reduce chronic illness; ease congestion and lower emissions; and create great places that are competitive in attracting skilled workers.

The *Greater Sydney Services and Infrastructure Plan* includes specific Western Parkland City initiatives of direct relevance to future access conditions for the PHC. These are summarised in Table 4-2. These projects, and others proposed for other parts of Greater Sydney (or previously initiated under the Long Term Transport Master Plan) that have flow-on implications for Greater Penrith, are also addressed under relevant transport modes in chapter 6.
### Table 4-2 Greater Sydney Services and Infrastructure Plan: Projects relevant to Penrith Health and Environment Precinct access

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description and benefit</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Sydney Infrastructure Plan and Growth Roads Program</td>
<td>Include upgrades to The Northern Road and growth areas roads; will capitalise on economic benefits from developing Western Sydney Airport</td>
<td>0-10 years committed</td>
</tr>
<tr>
<td>Priority Cycleway links in the Western Parkland City</td>
<td>Priority Cycleway links connecting centres including Penrith, to be developed and delivered in partnership with local councils where appropriate; will support walking and cycling as most convenient option for short trips around centres</td>
<td>0-10 years committed</td>
</tr>
<tr>
<td>North-south rail link in Western Parkland City: Cudgegong Road-St Marys-WSA-Badgerys Creek Aerotropolis</td>
<td>New rail link linking Northwest and Southwest growth areas with WSA-Badgerys Creek Aerotropolis; will extend 30-minute train service catchment of Greater Penrith</td>
<td>0-10 years investigation (north of St Marys); 0-10 years committed (south of St Marys)</td>
</tr>
<tr>
<td>Infrastructure to support rapid bus connections and improved bus connections between WSA-Badgerys Creek Aerotropolis and Penrith</td>
<td>New dedicated bus links or implementation of bus priority on existing and new roads; will enable efficient and reliable rapid bus travel</td>
<td>0-10 years investigation</td>
</tr>
<tr>
<td>Outer Sydney Orbital from Great Western Highway to WSA-Badgerys Creek Aerotropolis</td>
<td>Reservation for future north-south motorway and freight rail operations, with first stage to connect Great Western Highway to WSA-Badgerys Creek Aerotropolis; will provide continuous bypass of Greater Sydney, ultimately connecting Illawarra, Sydney and Central Coast</td>
<td>10-20 years investigation</td>
</tr>
</tbody>
</table>

#### 4.2.7 Building Momentum: State Infrastructure Strategy 2018-2038

The *State Infrastructure Strategy 2018-2038* notes the budgeted commencement of the Nepean Hospital and integrated ambulatory services redevelopment and hospital car park at an estimated total cost of $576 million. The strategy finds that this will contribute towards over $1.5 billion worth of investment in more than 20 projects for the PHEP, which should generate an additional 12,000 jobs by 2036.

To support the growth of Greater Penrith and the larger Western Parkland City the strategy makes the following findings or recommendations relevant to the Nepean Redevelopment and/or PHEP:

- Strategic transport corridors should be planned and protected for road and rail connections to and through the Western Parkland City.
- Rail connections via the Western Sydney Airport should be a priority for construction once they are justified by patronage having reached a critical mass, which is forecast to occur around 2036.
- Pending that time, reallocating key corridor road space to efficient and sustainable modes is critical for the desire lines where rail is planned but a patronage base has not yet developed.
To this end, the existing and under-construction Western Parkland City arterial road network provides the opportunity to introduce a high quality rapid bus system to connect Western Sydney Airport to metropolitan centres including Penrith, as the new city takes shape.

As shown by corridor (3) on Figure 4-11 this network would potentially use The Northern Road, which passes Nepean Hospital, to access Penrith city centre.
• Staged investment in mass transit for the Western Parkland City should be undertaken in partnership with the Australian Government.
• A staged approach will help to shift personal travel demand away from congested roads and towards more efficient modes of transport. Complementary actions to reduce, re-time or re-route movement will unlock the capacity of existing assets.

4.2.8 Movement and Place Framework

A major new direction in integrated road network and land use planning that is reflected in *Future Transport* involves the application of a ‘Movement and Place Framework’. This framework is used to categorise roads according to their relative importance as corridors for the movement of people, goods and services, and places where people shop, live, work, socialise, walk and so on. The framework is illustrated in Figure 4-12, with Table 4-3 describing the five different road categories.

<table>
<thead>
<tr>
<th>Road category</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motorway</strong></td>
<td>Motorways are strategically significant roads that move people and goods rapidly over long distances.</td>
</tr>
<tr>
<td><strong>Movement corridor</strong></td>
<td>Movement corridors provide safe, reliable and efficient movement of people and goods between regions and strategic centres.</td>
</tr>
<tr>
<td><strong>Vibrant street</strong></td>
<td>Vibrant streets have a high demand for movement as well as place with a need to balance different demands within available road space.</td>
</tr>
<tr>
<td><strong>Place for people</strong></td>
<td>Places for people are streets with high demand for activities and lower levels of vehicle movement. They create places people enjoy, attract visitors, and are places communities value.</td>
</tr>
<tr>
<td><strong>Local street</strong></td>
<td>Local streets are part of the fabric of the suburban neighbourhoods where we live our lives and facilitate local community access.</td>
</tr>
</tbody>
</table>
4.2.9 Planning Guidelines for Walking and Cycling

The Guidelines, prepared in 2004, provide guidance on how urban development can be planned to encourage and support the increased take up of walking and cycling. The guidelines cover design at a neighbourhood scale to create accessible centres and connected streets. The detailed design of road reserves, transit stops and stations, developments and open space all contribute to the creation of a locality that supports and encourages people to walk and cycle.

4.3 Local planning context

4.3.1 Penrith Health and Education Precinct 2017-2021 Action Plan

Consistent with the focus of the Greater Sydney Region Plan and Western City District Plan on the importance of health and education precincts, a group of stakeholders including Penrith City Council
(PCC), NBMLHD and Western Sydney University has prepared an action plan for the PHEP, to advocate for priority directions and actions. The action plan has recently been released in the context of an announced rebadging of this precinct as ‘The Quarter, Penrith’. The announcement references stakeholders’ support for The Quarter becoming a major destination for investment and excellence in health care, medical research, education and related technology, supported by new infrastructure including Western Sydney Airport, major road upgrades and the expansion of Nepean Hospital.

The action plan includes a retrospective review of 2011-2016 outcomes for the precinct. This records the delivery in 2012 of a multi-storey car park in the PHC south-eastern quadrant; notes the growing need for additional car parking on the campus; and, looking ahead, acknowledges that travel demand management strategies are required to reduce reliance on driving among the PHC workforce.

In resetting the future transport and accessibility priorities for the precinct, as it grows from today’s 6,000 jobs to accommodate potentially 12,000 by 2036, the action plan advocates for relevant actions including the following:

- **Nepean Hospital and surrounding lands:** Focus on health services, clinical education and medical research. Focus also on private medical services, particularly where the Nepean Hospital campus directly interfaces with existing commercial zones.
- **Kingswood town centre:** Focus on providing precinct services and new forms of accommodation in a high amenity urban setting.
- **Connecting the Precinct to the North West and South West Growth Centres and the main Western Line via passenger rail with a dedicated station**.
- **Stronger transport and pedestrian links between PHEP and the Penrith City Centre including more bus services**.
- **Improved pedestrian access between Nepean Hospital campus and Kingswood station**.
- **Blue Mountains train services to stop at Kingswood Station**.
- **Public domain improvements to enhance amenity and safety**.

### 4.3.2 Local development conditions

The urban form immediately surrounding PHC is dominated by low-density residential areas with local retail, commercial and health-related elements, and some car parking facilities on vacant lots. However, there is visible evidence of this form currently increasing in density, with at least three 5 or 6-storey apartment buildings (which also provide for ground-floor commercial activities) at or near completion on sites within five minutes’ walk of the campus, on Derby Street, and (as shown on Figure 4-13) on the Great Western Highway (left) and on Parker Street (right) next to a midblock pedestrian crossing that directly accesses PHC.
4.4 Health-related planning context

4.4.1 NSW Government Healthy Urban Development Checklist

This resource was produced by NSWH in 2009 in recognition of the direct influence of the built environment on people’s levels of physical activity, social engagement, and personal safety and security. These are major factors governing the prevalence of both physical and mental ‘lifestyle diseases’ and risk-to-health factors, including overweight and obesity, diabetes mellitus type 2, heart disease and depression.

The checklist assists NSWH in developing its capacity to support healthy urban environments in several ways:

- By positively influencing policies, plans and proposals advanced by others
- By building and improving access to the evidence base on the relationship between the built environment and population health
- By ensuring that healthy population outcomes are considered when providing access to existing and new social infrastructure including hospitals, community health centres and allied health professionals.

Desirable outcomes from these activities are increased levels of walking and bike-riding to, from and within major urban facilities, and in combination with public transport use for access from across a broader region. Additionally, the increased presence of and interaction between people in open space and other public areas has benefits for social connectedness as well as individuals’ safety and security.

4.4.2 NSW Health Hospital Car Parking Fees Policy

PHC is subject to this 2013 policy, which applies to Greater Sydney campuses planning to undergo or undergoing significant car park expansion works. The policy stipulates these guiding principles:

- Support a sustainable model for the procurement, funding and operation of new hospital car parks.
- Support equitable, transparent and sustainable accessibility to health campuses for all users including patients, visitors and staff, including those with special needs.
- Recognise that the parking needs of many patients and visitors need to be met on-site.
- Ensure economic viability towards the development of new car park infrastructure.
• Improve traffic management around health campuses.
• Ensure the fees policy complements the Government’s State Plan to encourage greater public transport usage, particularly increasing the proportion of total journeys to work by public transport, while recognising that many health care workers are shift workers and public transport may not provide a suitable level of accessibility at all times.

In line with the above principles, the policy requires the following specific factors to be considered when setting and receiving car parking fees:

• Prevailing market rates for parking, to discourage non-hospital-related use
• The cost of alternative access modes, including public transport fares, to encourage these choices
• Opportunities for any car parking fee revenue to be allocated, once the capital cost of car parking construction has been met, to ancillary access improvements including lighting, signage, active transport end-of-trip facilities and shuttle bus services.

In 2013, the policy set minimum, time-based car parking fees in a range from $6 for 16-60 minutes (the first 15 minutes being free) to $18 for more than five and up to 24 hours.

4.5 Secretary’s Environmental Assessment Requirements

NSWHI’s request for SEARs from DPI included the site analysis at Figure 4-14. The request for SEARs stated that a traffic and parking study will accompany the SSD application. It has been necessary to complete that traffic and parking study ahead of this transport strategy, to inform planning and approvals for the new multi-storey car park that is a necessary precedent to the Stage 1 Building (see 3.2). The study assesses overall parking requirements for the building, the feasibility of proposed circulation and parking changes, and impacts on the surrounding road network.

SEARs provided by DPI to NSWHI in late October 2017 included the following requirements:

• Include a transport and accessibility assessment which details, but is not limited to, the following:
  o the current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;
  o the existing and proposed pedestrian and bicycle routes and facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principles;
  o an estimate of the total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips;
  o the adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development;
  o the impact of the proposed development on existing and future public transport and walking and cycling infrastructure within and surrounding the site and identify measures to integrate the development with the transport network;
  o details of travel demand management measures to minimise the impact on general traffic and bus operations and encourage sustainable travel choices and details of programs for implementation, such as a location-specific sustainable travel plan, provision of end-of-trip facilities, green travel plans and wayfinding strategies;
  o the daily and peak (AM, PM) vehicle movements impact on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works (if required), including traffic modelling and analysis;
the proposed walking and cycling access arrangements and connections to public transport services;

the proposed access arrangements, including car pick-up/drop-off facilities, pedestrian facilities, traffic control devices and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and cycle networks;

proposed car and bicycle parking provision for staff and visitors, including consideration of the availability of public transport and the requirements of the relevant parking codes and Australian Standards;

provision of end of trip facilities (i.e. showers, lockers, change rooms etc.) for the use of employees who choose to walk or cycle to/from work as well as undertake activities during work hours;

details of ambulance and emergency vehicle access arrangements;

service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times);

an assessment of road and pedestrian safety adjacent to the proposed development and details of any required road safety measures; and

traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport and the cumulative impact of nearby construction projects, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact.

This transport strategy addresses these issues, except for service vehicle arrangements and construction traffic management.
4.6 Western Sydney City Deal

The Western Sydney City Deal was announced in March 2018, bringing together the three levels of government, and drawing on policy directions, as referenced in the preceding sections of this chapter. The City Deal has been agreed between Australian, NSW and local governments; the eight Western Parkland City local councils, including Penrith, are signatories.

The Western Sydney City Deal captures a range of commitments to support the sustainable growth of the Western Parkland City, including investment to leverage regional benefits from the development of Western Sydney Airport.

Under the ‘Connectivity’ theme the City Deal focuses on Australian and NSW government joint support for the first stage of a North South Rail Link, from St Marys (east of the PHEP) to WSA-Badgers Creek Aerotropolis (Figure 4-15). Subject to investigation, further stages in this corridor will provide transport connections north to Marsden Park and Schofields, and south to Campbelltown-Macarthur.

In addition, and in parallel to rail link planning and development, the NSW Government will establish rapid bus services from metropolitan centres - including Penrith - that connect to WSA before it opens, and to the Aerotropolis.
4.6.1 Outer Sydney Orbital corridor identification

Complementing strategic and multilateral announcements in the Western Sydney City Deal, in March 2018 the NSW Government commenced public consultation on a recommended land corridor for a future north-south motorway and freight rail line bisecting the Western Parkland City. As foreshadowed by *Future Transport* this would accommodate a continuous, multimodal bypass of Greater Sydney, ultimately connecting the Illawarra, Greater Sydney and the Central Coast.

As shown in Figure 4-15 the recommended Outer Sydney Orbital corridor parallels the indicative alignment of a passenger North South Rail Link between WSA and Greater Penrith. The orbital corridor would potentially cross the M4 motorway and the Main Western rail line near Werrington, west of the indicative passenger rail crossing point and close to the eastern end of the PHEP. The Strategic Environmental Assessment of the corridor finds that the section south of the PHEP, between Orchard Hills and Cobbitty (and passing Western Sydney Airport) has the potential to be co-located with the North South Rail Link.

The implications for the PHEP and the Nepean Redevelopment of future Western Sydney City Deal and Outer Sydney Orbital rail and road futures are addressed in chapter 6.
5 Existing transport and access for Nepean Hospital

5.1 Overview

5.1.1 Nepean Hospital user groups

Table 5-1 lists the groups of users currently making trips to, from and within PHC.

<table>
<thead>
<tr>
<th>User Group</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff (clinical, administrative and support services; full-time equivalent)</td>
<td>3,364 (comprising 2,456 staff on weekday shifts and 909 staff on weekend shifts)</td>
</tr>
<tr>
<td>Inpatient beds (used at 95% occupancy rate)</td>
<td>486 (including 60 neonatal / paediatric)</td>
</tr>
<tr>
<td>Visitors (per weekday; see below)</td>
<td>577 to 1,400</td>
</tr>
<tr>
<td>Outpatient service events (per weekday)</td>
<td>1,172</td>
</tr>
<tr>
<td>Emergency department presentations (per weekday)</td>
<td>195</td>
</tr>
<tr>
<td>Other individual users (VMOs, retail staff, NBMLHD fleet, students and volunteers; per weekday)</td>
<td>213</td>
</tr>
<tr>
<td>Users not counted (deliveries, services, and clients of Tresillian and child care centres)</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Of the three main groups of Nepean Hospital users, staff and outpatient numbers can be validated to a high degree of accuracy by NSWH as the operator of the hospital. In contrast, NSWH has in the normal course of its operations less visibility of the number of people visiting inpatients at Nepean Hospital. Based on information available for health services across Greater Sydney, NSWH currently undertakes planning based on an assumption that each hospital bed generates 1.25 visitors per day. It is noted that this rate is likely to vary across different customer populations and clinical facilities, depending both on social factors and on the type of beds in question. For instance, it has been reported that each bed in the Children’s Hospital at Westmead generates up to 10 daily visitors, while an adult bed generates one visitor.

NSWH is in the process of obtaining data on the daily visitor generation rate specific to Nepean Hospital. Pending this, the quantity of visitors assumed for this transport strategy ranges from a lower figure (based on 1.25 visitors / bed) to a higher figure (based on an average 2 visitors / adult bed and up to 10 visitors / neonatal or paediatric bed).

5.1.2 Users’ trip origins

The surveys indicate that, based on postcode of residence, the three largest user groups are currently travelling to Nepean Hospital over the distances shown in Table 5-2. The larger proportion of both outpatients and visitors living within 15km of the hospital is to be expected given, respectively, the geographic definition of the NBMLHD area and the somewhat wider area still across which inpatients’ family and friends would live. However, it is noted that a significant number - over one in three - of hospital workers also live within this radius, notwithstanding the longer-distance commutes to Western Sydney facilities typically encountered among, especially, senior clinical staff. The distribution of staff home locations by postcode area, and the concentration within the Penrith LGA can be seen in Figure 5-1.
5.1.3 Staff time of travel

The staff survey indicates that, of all the people working in the hospital, on any weekday at least 40% travel to and from work during the daytime, if this period is defined as between 7am to 6pm and therefore comprises administrative staff and clinical staff on a day shift. In contrast, at most 60% travel to and/or from work outside of these hours; this percentage comprises all other shift workers, an unspecified number of whom - in non-clinical roles - work a day shift.

5.1.4 Users’ mode of travel

Based on November 2016 surveys of staff, outpatients and visitors, the current weekday mode of travel to Nepean Hospital for the three largest groups of users is as shown in Table 5-3.

While driving is the dominant access mode for these users, the occupancy level of cars driven to the hospital varies according to trip purpose. On average, both visitors and outpatients arrive with 2.2 persons per vehicle. In the case of visitors, this is to be expected based on the typical number of

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Table 5-2 Distance of travel to access Nepean Hospital by user groups

<table>
<thead>
<tr>
<th>User group</th>
<th>Living within 15km radius</th>
<th>Living within 15-30km radius</th>
<th>Living beyond 30km radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>&gt;35%</td>
<td>&gt;22%</td>
<td>&lt;43%</td>
</tr>
<tr>
<td>Visitors</td>
<td>57%</td>
<td>14%</td>
<td>29%</td>
</tr>
<tr>
<td>Outpatients</td>
<td>67%</td>
<td>16%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Note: Percentages rounded to nearest 1%
daily visits to an inpatient. For outpatients, a driver is required where the patient is a child or otherwise mobility-challenged; or the patient may require a support person during or after their appointment. In contrast, most staff drive to work on their own.

Table 5-3 Access mode share by Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User group</th>
<th>Active transport mode share</th>
<th>Public transport mode share</th>
<th>Car mode share (inc. solo driver)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>3.5%</td>
<td>2%</td>
<td>94.5% 91% solo driver</td>
</tr>
<tr>
<td>Visitors</td>
<td>4%</td>
<td>12.5%</td>
<td>83.5% 38.5% solo driver</td>
</tr>
<tr>
<td>Outpatients</td>
<td>6%</td>
<td>9%</td>
<td>85% 25.5% solo driver</td>
</tr>
</tbody>
</table>

Note: Percentages rounded to nearest 0.5%

5.1.5 Social and demographic characteristics of catchment population

Key socio-economic characteristics for each of the LGAs in the Nepean Hospital catchment are presented in Table 5-4. As can be seen the community in Lithgow and the Blue Mountains is older and through a comparison with historical census data it can also be seen that these communities are ageing, with reducing proportions of children and increasing proportions of the community in the older age groups. The labour force participation rate is relatively low and the unemployment rate higher than the state average (6%) amongst the Lithgow community. Consequently, the median household income is relatively low and the LGA has the lowest SEIFA1 score amongst the four LGAs.

Both the Blue Mountains and Hawkesbury have rates of unemployment lower than the state average and of the four LGAs the have the highest SEIFA scores. Within the Penrith LGA, more than one in five of the population was born overseas, making this the most ethnically diverse of the four areas. While unemployment is just below the state average the relatively low SEIFA score indicates there are likely to be pockets of disadvantage.

Table 5-4 Community profile data

<table>
<thead>
<tr>
<th>Population Characteristic</th>
<th>Lithgow</th>
<th>Blue Mountains</th>
<th>Hawkesbury</th>
<th>Penrith</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>21,524</td>
<td>78,705</td>
<td>66,136</td>
<td>201,400</td>
</tr>
<tr>
<td>Proportion born overseas</td>
<td>9.2%</td>
<td>16.8%</td>
<td>12.3%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Average household size</td>
<td>2.3</td>
<td>2.5</td>
<td>2.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Median household income</td>
<td>$984</td>
<td>$1,468</td>
<td>$1,668</td>
<td>$1,658</td>
</tr>
<tr>
<td>Average age</td>
<td>45</td>
<td>44</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>Labour force participation</td>
<td>48.3%</td>
<td>59.9%</td>
<td>65.3%</td>
<td>65.0%</td>
</tr>
<tr>
<td>Unemployment</td>
<td>7.8%</td>
<td>4.7%</td>
<td>4.3%</td>
<td>5.7%</td>
</tr>
<tr>
<td>SEIFA score (2011)</td>
<td>924.2</td>
<td>1038.6</td>
<td>1020.3</td>
<td>996.3</td>
</tr>
</tbody>
</table>

1 SEIFA Index of Disadvantage measures the relative level of socio-economic disadvantage based on a range of Census characteristics.
Figure 5-2 shows household vehicle ownership across the four LGAs. Hawkesbury has the highest level of household vehicle ownership, while Lithgow has the lowest. Across the catchment, just over 7,200 households (6%) do not have a vehicle.

Figure 5-2 Household vehicle ownership (2016 Census)

5.2 Site access

5.2.1 Walking

PHC (along with a privately-owned site adjacent to NPH in the campus’ north-western corner) occupies a rectangular site with the approximate dimensions of 500m north-south by 400m east-west. The campus is relatively compact and, where continuous pedestrian pathways are available, can be walked across within 10 minutes.

As a site which has taken shape over many decades and houses a diverse array of buildings, internal roads and pathways, scattered ‘pods’ of surface car parking and landscaping elements, PHC can be hard to find one’s way around. Some improvements to wayfinding for staff and customers entering and moving around the campus have been implemented over the past 10 years, following the construction of PHC’s first multi-storey car park in the south-eastern quadrant. Improvements include the display of a campus map and the linked colour-coding of destinations and wayfinding signage (Figure 5-3). Colour-coding has been rolled out to some but not all parts of PHC to assist wayfinding when pedestrian paths use internal corridors (Figure 5-4).
Figure 5-3 Nepean Hospital wayfinding signage

Figure 5-4 Colour-coding of Nepean Hospital internal pathways
Formal footpath access to PHC is via entrances shared with motor vehicles and bicycles that are on all sides of the campus except for the Great Western Highway. Some vehicle entrances that directly access car parking do not have adjacent footpaths. As the relatively open and permeable southern and eastern edges of the campus respectively, Derby Street and Somerset Street offer additional informal pedestrian entry points.

As shown in Figure 5-5 the Parker Street intersections at the two western corners of the site ([A] and [B]) are signalised with pedestrian phases on all legs. The south-eastern intersection ([C]; Derby and Somerset streets) is controlled by a roundabout with offset pedestrian refuges. The north-eastern T-intersection ([D]; Somerset Street and the Great Western Highway) is uncontrolled, except that no right turn onto the highway is permitted. Additional walking-only road crossing facilities comprise [E] a staggered midblock signalised crossing near the midpoint of the western Parker Street edge of the campus, and [F] an unsignalised midblock raised crossing on Derby Street, to the east of bus stops.
5.2.2 Motor vehicles and bicycles

Motor vehicle (and bicycle) access is provided to and from PHC via six separate entrances, comprising two each on the eastern, southern and western sides of the campus. There is no vehicular access from the Great Western Highway, to the north. See Figure 5-6. This also shows the speed zoning for each road accessing PHC; and the percentage of vehicles accessing the campus from each of three directions, indicating how this load is spread evenly across the local network.

![Figure 5-6 Penrith Health Campus motor vehicle / bicycle access and speed zoning](image)

5.2.3 Movement and Place categorisation of surrounding road network

Detailed categorisation of the public roads that set the boundaries for PHC under a Movement and Place framework (see 4.2.8) has not been undertaken for this transport strategy. This would require application of the process and technical tools dealt with in Austroads’ 2016 update of its Guide to Traffic Management Part 4: Network Management.

Based on preliminary observations only, the roads can be characterised under the framework as follows:

- **Great Western Highway**
  - Functions as Movement corridor at all times
• **Parker Street**
  - Functions primarily as Movement corridor as part of A9 The Northern Road, and to access PHC car parking
  - Has secondary local function as Local street for residents with street frontage, including new apartment block

• **Derby Street, Somerset Street and Barber Avenue**
  - Function primarily as Local streets
  - Derby and Somerset streets have additional Movement corridor function, dominating during peak and business hours for access to PHC car parking (both Derby and Somerset streets) and for bus services to Nepean Hospital (Derby Street)
  - Derby Street also provides 24/7 emergency vehicle access to Nepean Hospital.

5.3 **Transport safety**

Historical data for road crashes occurring during the five-year period between 2012 and 2016 on the road network adjacent to PHC (provided by the TfNSW Centre for Road Safety) are shown in Figure 5-7. The road network shown includes local streets east of PHC which are used by a significant number of staff and other PHC users for parking their car before walking to the campus.

Figure 5-7 highlights the intersections at which a concentration of crashes has been observed. These include the intersection of Parker Street and Barber Avenue (which will provide the principal point of access to the proposed multi-storey car park on the western side of PHC) and the intersection of the Great Western Highway with both Parker Street and Somerset Street.

Figure 5-8 shows the proportion of motor vehicle users to active transport users involved in minor, moderate and serious injury road crashes. As can be seen, more vulnerable road users - people walking or bike-riding - are particularly represented in crashes around PHC that have resulted in serious injury.
Figure 5-7 Road crash history on Penrith Health Campus surrounding road network (2012-2016)
5.4 Pre-trip travel information

The relevant webpage on the NBMLHD site is headed ‘Nepean Parking and Public Transport’ and contains the equivalent of over four A4 pages of material, with links to additional resources including the site map displayed on the campus. Most of this information is devoted to providing detailed data and directions for the availability, location, cost and means of accessing Nepean Hospital car parking, including information on accessible parking and concession rates. The webpage also includes information on drop-off zones, and on the operation of the hospital transit lounge where discharged patients can await pick-up.

Towards the bottom of the webpage, the information provided on public transport is as follows: ‘The community is encouraged to use public transport. Westbus 774, 775, 776 & 789 buses operate frequently and drop off at the front of the hospital and Kingswood station is a short walk from the hospital. Visitors can also contact a local taxi service as required.’

Inaccuracies in and omissions from this information include the following:

- Busways has replaced Westbus as the relevant bus operator
- The 789 bus route does not offer a frequent service, operating twice daily in each direction on weekdays only (and the linked site map does not show the bus stops served by this route)
- While the description ‘short walk’ is subjective, pedestrian access from Kingswood train station would be challenging for the mobility-impaired, at least
- No contact details are provided for local taxi service operators, or for further information on bus services.

5.5 Walking

Nepean Hospital is located within a relatively flat area, and - while this form is evolving as described above - surrounded by low-density and mostly single-storey housing, plus the local shops and businesses on Derby Street and the southern side of the Great Western Highway, and the light industrial and bulky goods retailing area to the north of the Great Western Highway. (The conditions
for people walking to and from the Derby Street bus stops, and along the highway from Kingswood train station to the hospital, are considered at 5.7.3 and 5.8.3 respectively.

Extrapolating November 2016 survey data gives the numbers of people walking to Nepean Hospital on a typical weekday in November that are shown in Table 5-5. A comparable mode share for walk-only commutes in Greater Sydney as a whole is also shown, based on 2011 Census data.

It is noted that the relevant Nepean Hospital user group surveys were undertaken on days in early November when the daytime temperature approached 30°C in Penrith. Walking is likely to be a more comfortable and attractive transport choice for access to Nepean Hospital between late April and early October, and conversely even less attractive than on the survey day between December and February.

Table 5-5 accounts for walk-only trips arriving at and departing from Nepean Hospital. Internal walking trips that occur within PHC (for example, by staff during work breaks, to and from internal car parking, and by outpatients required to move between different facilities) are not included; neither are walking trips by people who walk into PHC from public transport services or from cars parked outside the site. Walking trips by any persons accompanying outpatients are also not included.

Table 5-5 Use of walking by Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User group</th>
<th>Walk-only mode share (weekday)</th>
<th>Approximate number of walk-only trips to and from Nepean Hospital (weekday total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>2%</td>
<td>100</td>
</tr>
<tr>
<td>Visitors</td>
<td>3.4%</td>
<td>40 to 100</td>
</tr>
<tr>
<td>Outpatients</td>
<td>4.4%</td>
<td>100</td>
</tr>
<tr>
<td>Greater Sydney (journey to work)</td>
<td>4.1%</td>
<td>-</td>
</tr>
</tbody>
</table>

5.6 Bike-riding

The relatively benign topography of the area around Nepean Hospital is also relevant to access by bicycle. However, cycling infrastructure in the Penrith LGA is underdeveloped compared to longer-established and more densely settled areas of Greater Sydney.

The only designated bicycle route known of within the immediate vicinity of the hospital is the recently upgraded shared pedestrian and bicycle path along (for the section opposite PHC) the northern side of the Great Western Highway. The shared path runs along most of the length of the PHEP, connecting Western Sydney University Werrington Campus to the eastern perimeter of Penrith city centre.

Extrapolating survey data gives the current numbers of people riding a bike to and from Nepean Hospital on a typical weekday in November as shown in Table 5-6. A comparable mode share for bicycle-only commutes in Greater Sydney as a whole is also shown, based on 2011 Census data.
Secure and/or weather-protected bicycle parking facilities are not visibly available within PHC, although there appear to be available informal parking opportunities (Figure 5-9). End-of-trip shower and change facilities are available to clinical and some administrative staff.

Figure 5-9 Informal bicycle parking at Penrith Health Campus

5.7 Bus

5.7.1 Network and patronage summary

Busways operates bus services across Sydney Metropolitan Bus Service Contract Region 1, the area that includes Penrith. Figure 5-10 shows that part of the Region 1 network that extends roughly to
cover the urbanised areas within 15km of Nepean Hospital. This catchment is weighted to the east and north of Penrith. Areas to the west are part of the Blue Mountains National Park, while areas south of Penrith are characterised by rural residential and other low-density land uses such as market gardening (albeit this is set to change in association with the development of Sydney West Airport). The dark grey dashed line running north-south across Figure 5-10 indicates the approximate eastern limit of the NBMLHD area that is serviced by Nepean Hospital.

Bus use by different user groups for travel to Nepean Hospital is shown in Table 5-7, with a regional comparison.

Table 5-7 Use of buses by Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User group</th>
<th>Mode share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff (all public transport)</td>
<td>1.8%</td>
</tr>
<tr>
<td>Visitors</td>
<td>3.8%</td>
</tr>
<tr>
<td>Outpatients</td>
<td>4.4%</td>
</tr>
<tr>
<td>Greater Sydney (all trips)</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

Figure 5-10 Detail from Sydney Metropolitan Bus Service Contract Region 1
5.7.2 Bus routes to Penrith Health Campus

The subset of the Region 1 bus network shown in Figure 5-10 features many bus routes, which collectively provide geographic coverage across all the suburbs within 15km of Penrith. However, the visible density of this network conceals the reality that, in terms of practical connectivity to Nepean Hospital by bus, outcomes vary greatly across the area shown.

Of all the bus routes shown in Figure 5-10, six service bus stops adjacent to PHC - see Table 5-8. Of these routes, four (774, 775, 776 and 780) each provide all-weekday services with a minimum 30-minute frequency during daylight hours, plus an hourly frequency during the day on weekends. Two (677 and 789) carry very low-frequency services to outlying villages, with minimal or no weekend services.

Table 5-8 Bus routes that service Penrith Health Campus

<table>
<thead>
<tr>
<th>Route</th>
<th>Connects</th>
<th>Weekday service hours (to Penrith)</th>
<th>Weekday frequency (approximate; in both directions)</th>
<th>Weekend service hours</th>
<th>Weekend frequency (approximate; in both directions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>774</td>
<td>Mount Druitt and Penrith via St Marys and Claremont Meadows</td>
<td>6:02am–11:12pm</td>
<td>Every 30 minutes; late evening hourly</td>
<td>Sat 7.08am-9.55pm; Sun 8.32am-8.26pm</td>
<td>Hourly</td>
</tr>
<tr>
<td>775</td>
<td>Mount Druitt and Penrith via Erskine Park and St Marys</td>
<td>6.01am-10.22pm</td>
<td>Every 30 minutes; late evening hourly</td>
<td>Sat 7.15am-10.05pm; Sun 8.36am-7.31pm</td>
<td>Hourly</td>
</tr>
<tr>
<td>776</td>
<td>Mount Druitt and Penrith via St Clair and St Marys</td>
<td>5.31am-9.40pm</td>
<td>Every 30 minutes; late evening hourly</td>
<td>Sat 7.36am-10.27pm; Sun 8.52am-8.45pm</td>
<td>Hourly</td>
</tr>
<tr>
<td>780</td>
<td>Mount Druitt and Penrith via Ropes Crossing and Cambridge Park</td>
<td>5.22am-10.05pm</td>
<td>Every 30 minutes; late evening hourly</td>
<td>Sat 6.31am-9.31pm; Sun 8.59am-6.59pm</td>
<td>Hourly</td>
</tr>
<tr>
<td>677</td>
<td>Richmond and Penrith via Londonderry and Jordan Springs</td>
<td>6.17am, 7.20am, 7.56am, 9.48am, 10.28am, 1.58pm, 4.31pm and 5.26pm</td>
<td>Eight daily services</td>
<td>Sat 9.05am and 4.40pm; no Sunday service</td>
<td>Two Saturday services; no Sunday service</td>
</tr>
<tr>
<td>789</td>
<td>Luddenham and Penrith via Orchard Hills</td>
<td>7:28am and 4:08pm (to Penrith) 6.58am and 3:34pm (to Luddenham)</td>
<td>Two daily services</td>
<td>No weekend service</td>
<td>No weekend service</td>
</tr>
</tbody>
</table>
In the case of the 774, 775 and 776, their timetable has the cumulative effect of providing a 10-minute all-weekday frequency on the route section that is common to all - between Penrith interchange, Nepean Hospital, Kingswood TAFE and the Western Sydney University Werrington Campus. These routes were redesigned following review of the Region 1 bus network in 2009. Before then, a more circuitous route linked the listed locations and only operated every 30 minutes on weekdays (including peaks) and hourly on weekends.

5.7.3 Bus customer experience at Penrith Health Campus

As shown in Figure 5-11, routes 774, 775 and 776 stop on Derby Street, south of and a two-minute walk from the main pedestrian entrance to PHC. Route 780 stops on the Great Western Highway west of Parker Street, about six minutes’ walk from the hospital’s north-western entry. The very low-frequency 677 and 789 routes stop closest to the hospital on, respectively, the Great Western Highway, and Parker Street south of Derby Street (about five minutes’ walk from the main entrance).

![Figure 5-11 Location of bus stops adjacent to Penrith Health Campus](image)

While Nepean Hospital’s principal bus stops, on Derby Street, are close to destination facilities, the walk from them into the campus might not be easily navigable for people using this mode to travel to the hospital for the first time. As shown by Figure 5-12 and Figure 5-13, someone getting off a bus from Penrith needs to take a circuitous walking route on a sometimes narrow footpath, around car parking areas and via a marked road crossing that is offset from an internal roundabout, before they encounter a site map (highlighted on Figure 5-12) that is barely visible from the point of entry to the campus. Similarly, the location of the unsignalised midblock pedestrian crossing of Derby Street ([F] on Figure 5-5) requires backtracking as part of an indirect walking route out of the campus to reach the westbound bus stop to travel back to Penrith.
5.7.4 Bus travel outcomes by suburb of origin

Collectively the 774, 775, 776 and 780 routes service suburbs that include some of the more significant origins for numbers of hospital visitors, outpatients and, to some extent, staff; e.g., Penrith city centre, Cambridge Park and Erskine Park. Including walking, door-to-door access between home and the hospital by bus takes between 12 minutes (Penrith city centre) and 46 minutes (Erskine Park) for residents of these suburbs; see the list of sample journey start points in Table 5-9, which also includes comparator driving times.

While bus travel to Nepean Hospital takes longer than the driving alternative in all cases, where a single, direct bus service is available the travel time should be relatively predictable - given that average bus travel speeds vary less across the week in Region 1 than in most other parts of Greater Sydney - and especially so for a customer with access to an app showing real-time information on any service delay. Furthermore, a bus customer does not need to factor in either the time taken to
locate parking or the cost of this - assuming car ownership, which is in any event low in some of the suburbs connected by direct bus service to the hospital.

For the large number of other suburbs that are within a similar distance from Nepean Hospital to the localities serviced by the 774, 775, 776 and 780 routes, bus travel is not currently a viable proposition. This is the result of there being no direct bus route to the hospital from these suburbs, meaning that transferring between two or more scheduled bus services would be required, usually at Penrith interchange. Compared with a direct bus trip, or - even more - driving, this is a slow and unreliable travel choice, with the risk of delay to any one of several services compounding the likelihood that the best possible scheduled travel time by bus is not achievable in practice. This situation is true of some suburbs like Cranebrook and Glenmore Park where an especially high number of hospital staff live. (See Table 5-9)

Table 5-9 Comparative bus / motor vehicle travel times to Penrith Health Campus

<table>
<thead>
<tr>
<th>Origin bus stop</th>
<th>Bus route/s</th>
<th>Weekday business hours bus journey duration</th>
<th>Weekday business hours car journey duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penrith interchange</td>
<td>774 or 775</td>
<td>12 minutes</td>
<td>4 minutes</td>
</tr>
<tr>
<td>Allsop Oval, Cambridge Park</td>
<td>780</td>
<td>19 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Claremont Meadows Youth Centre</td>
<td>774 or 775 or 776</td>
<td>19 minutes</td>
<td>8 minutes</td>
</tr>
<tr>
<td>Werrington County Shopping Village</td>
<td>780</td>
<td>24 minutes</td>
<td>7 minutes</td>
</tr>
<tr>
<td>St Clair High School</td>
<td>775 or 776</td>
<td>36 minutes</td>
<td>16 minutes</td>
</tr>
<tr>
<td>Erskine Park High School</td>
<td>775</td>
<td>46 minutes</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Werrington County Shopping Village</td>
<td>780</td>
<td>24 minutes</td>
<td>7 minutes</td>
</tr>
<tr>
<td>St Clair High School</td>
<td>775 or 776</td>
<td>36 minutes</td>
<td>16 minutes</td>
</tr>
</tbody>
</table>

Notes: Bus journey time is best possible per transportnsw.info as at October 2017 and includes start / end walking links. Car journey time is per Google Maps, and does not include time taken locating and/or walking from car parking.

5.7.5 Penrith Health Campus internal shuttle minibus service

Nepean Hospital offers a volunteer-operated and donation-supported shuttle minibus service that provides an on-demand connection between points of entry to PHC and customers’ destination, for people with mobility difficulties. The service operates 8.30am-3.30pm daily subject to the availability of vehicle and drivers. The use of the service since 2014 is detailed in Table 5-10.
Table 5-10 Use of Penrith Health Campus internal shuttle minibus service (2014-2018)

<table>
<thead>
<tr>
<th>Year</th>
<th>Customers served</th>
<th>Kilometres travelled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total for year</td>
<td>Daily average</td>
</tr>
<tr>
<td>2014</td>
<td>6,080</td>
<td>82</td>
</tr>
<tr>
<td>2014/15</td>
<td>23,967</td>
<td>100</td>
</tr>
<tr>
<td>2015/16</td>
<td>14,445</td>
<td>103</td>
</tr>
<tr>
<td>2016/17</td>
<td>9,929</td>
<td>76</td>
</tr>
<tr>
<td>2017/18 (to date)</td>
<td>812</td>
<td>62</td>
</tr>
</tbody>
</table>

The service can be requested by mobile phone call or at a volunteer-staffed concierge desk. The shuttle is operated by an electric golf buggy-modelled vehicle (Figure 5-14) like the maintenance vehicles that service the campus. These vehicles are the only powered conveyances permitted to navigate the pathways and bollard-controlled service roads within the campus; they are not, however, permitted to be driven on the public roads that access PHC, except for Barber Avenue, the local road fronting NPH.

As at mid October 2017, the Nepean Hospital electric minibus was out of service for mechanical reasons, and the shuttle service was being provided by an ordinary sedan car instead.

The following general issues have been reported with the shuttle service:
- The service is hampered by the difficulty experienced in getting, and keeping, drivers.
- The shuttle offers no protection against heat, cold or rain.
• Most trips made by the service are between the existing multi-storey car park (in the south-eastern corner of PHC) and clinical facilities. Because the vehicle is not permitted to use external roads it may not pick up customers from the Derby Street public bus stops.
• The construction of the new multi-storey car park is expected to increase demand for the service.
• Due to grade issues the electric buggy vehicle is not permitted to travel to all levels within the existing multi-storey car park.
• While a replacement sedan car can service all levels of the car park, its use by customers is low compared to the electric vehicle, given its lower visibility.
• To avoid damage, volunteer drivers of the electric minibus must remember to manually stow the steps that provide access to its seating before driving between the bollards that prevent other vehicles from using campus service roads.

5.8 Train

5.8.1 Summary of services to Kingswood station

Kingswood train station is the closest to Nepean Hospital. From the east, Kingswood station is serviced by over half of the T1 Western Line trains that terminate in Penrith / Emu Plains. These services link Kingswood directly to major eastern Sydney centres (and connecting bus services) that include, in addition to the Sydney CBD, Chatswood, North Sydney, Burwood and Parramatta.

Most of the services to Kingswood stop at all stations between Strathfield and Blacktown. Express Penrith trains do not stop at Kingswood; nor do Blue Mountains trains, following the removal of a morning peak service from Springwood that previously stopped at Kingswood during a rail timetable redesign. This means that anyone travelling by train to the hospital from west of Emu Plains is required to interchange with another train or a bus at Penrith.

In addition, the time of day when Kingswood sees the most trains from the east is - due to the complexities of servicing Greater Sydney’s commute - not during the morning peak on weekdays, but after 9am (on weekends, trains are half-hourly). From this time on a weekday, a train stops at Kingswood four times an hour (albeit the interval between trains is rarely an easy-to-remember interval of 15 minutes); earlier in the morning, there are half-hourly services between 6am and 8am, and three services between 8am and 9am.

5.8.2 Patronage summary

In 2014, combined 24-hour ‘ins’ and ‘outs’ at Kingswood station totalled 6,380; the equivalent at Penrith station was 15,040. At both stations, there are more than twice as many ‘ins’ than ‘outs’ during the morning peak (i.e., a ratio of 2:1), suggesting a dominant purpose of carrying people to work elsewhere.

As shown in Figure 5-15, more customers were recorded as using Kingswood station in 2004 than in 2014, the latest year for which data have been obtained. Significant dips in usage were recorded between 2007 and 2012 - the lowest year in the decade up until then - before recovering somewhat.

It is noted that the following changes to public transport services occurred during the period in question:

• Under the 2004 rail timetable, the weekend daytime stopping frequency at Kingswood was reduced from four trains to two trains per hour.
• The 2005 rail timetable then halved the weekday off-peak stopping frequency at Kingswood from four trains to two trains per hour.
• The higher weekday off-peak stopping frequency at Kingswood was restored in the 2013 rail timetable.
• A 10-minute-frequency all-weekday bus service between Penrith interchange and the hospital was introduced in 2009.
The first two of the above changes would have had a significant impact in making train use less attractive for people travelling to Kingswood outside peak hours, including afternoon shift workers, while the last would have made Penrith station even more attractive compared to Kingswood.

Train use by different user groups for travel to Nepean Hospital is shown in Table 5-11, with regional comparisons.

Table 5-11 Use of trains by Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User Group</th>
<th>Mode Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff (all public transport)</td>
<td>1.8%</td>
</tr>
<tr>
<td>Visitors</td>
<td>3.8%</td>
</tr>
<tr>
<td>Outpatients</td>
<td>2.2%</td>
</tr>
<tr>
<td>Greater Sydney</td>
<td></td>
</tr>
<tr>
<td>All trips</td>
<td>5.3%</td>
</tr>
<tr>
<td>Journeys to work</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

Given that the use of public transport collectively (including bus and other modes as well as train) makes up 23.9% of all Greater Sydney commuting trips, the very low use of all public transport - and especially train - is marked among the pool of Nepean Hospital employees. In view of the more limited geographic catchment of NBHLMD clients, which is relatively better serviced by bus, their use of train services is as would be expected.

5.8.3 Walking between Kingswood station and Penrith Health Campus

In addition to the stopping pattern of train services to Kingswood, conditions for people wanting to walk between the station and the hospital are not such as to encourage use of this mode.

Kingswood station is approximately 600m walking distance from the nearest, north-eastern entrance to PHC - but (as shown in Figure 5-16) up to twice as far again from the primary hospital buildings within the campus that are the destination for the largest subset of staff, visitors and outpatients.

This effective walking distance is likely beyond the capacity of anyone with mobility difficulties, especially when part of the walk occurs next to and/or across the busy and noisy Great Western
Highway. This walk can be uncomfortable during the warmer months, and passes licensed premises and other land uses which contribute to the local environment being perceived as threatening, especially at night. Alternative routes which avoid the highway and use local streets are quieter but also have personal safety drawbacks due to low levels of passive surveillance.

Figure 5-16 Walking routes between Kingswood train station and Penrith Health Campus

Even potential walking trips between Kingswood station and their closest clinical facilities in the north-eastern quadrant of PHC are made (from a customer’s perspective) unnecessarily long by the single, eastern exit from the station platforms facing in the wrong direction for the desired direction.
of travel. This arrangement can result in people who want to access the hospital heading west along the northern side of the highway as soon as they exit the station, expecting to encounter a pedestrian crossing but then having to retreat to the Bringelly Road intersection once they realise the situation. This is not helped by the absence of conspicuous signage to guide customers before and immediately after they leave the station. Station platform signage references Western Sydney University, but not Nepean Hospital (Figure 5-17). On exiting the station there is no locality map or wayfinding signage, with the only directional sign being small, on the other side of the highway and illegible from the station exit (Figure 5-18).
Closer to the hospital, the walk passes through further areas where people perceive that their personal safety and security are at risk from antisocial behaviour. This perception is associated with facilities providing drug and alcohol services that are concentrated in the north-eastern quadrant of PHC, and with areas of public open space outside and adjacent to this corner of the campus. Finally, the intersection of Somerset Street and the Great Western Highway presents safety risks to pedestrians crossing; vehicles turn out of or into this at speed, with drivers primarily focused on entering or crossing two or three lanes of fast-moving traffic as they make their turn (Figure 5-19).

![Intersection of Somerset Street and Great Western Highway, Kingswood](image)

**Figure 5-19 Intersection of Somerset Street and Great Western Highway, Kingswood**

### 5.8.4 Train travel outcomes by station of origin

The service pattern and timetabling arrangements for trains to Kingswood vis-à-vis Penrith (5.8.1) result in the outcomes for customers shown in Table 5-12. For the purposes of comparison, this shows the fastest rail-based travel options available to persons who might come from some major origin stations to the east - and from Hazelbrook to the west, where a concentration of hospital staff lives - and who wish to arrive at Nepean Hospital in time for either a 7am or an 8am work start. As with bus, the alternative driving time (for an 8am arrival) is also shown for reference.
<table>
<thead>
<tr>
<th>Origin station</th>
<th>Total public transport journey duration to arrive by 7am on weekday</th>
<th>Total public transport journey duration to arrive by 8am on weekday</th>
<th>Journey components</th>
<th>Journey components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chatswood</td>
<td>90 minutes</td>
<td>92 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Driving: 45-60 minutes</strong></td>
<td></td>
<td></td>
<td>Leave 4.49am</td>
<td>Leave 6.19am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T1 to Strathfield</td>
<td>T1 to Strathfield</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BMT to Penrith</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>776 to hospital</td>
<td>774 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arrive 6.19am</td>
<td>Arrive 7.51am</td>
</tr>
<tr>
<td>Central</td>
<td>58 minutes</td>
<td>59 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Driving: 50-80 minutes</strong></td>
<td></td>
<td></td>
<td>Leave 5.21am</td>
<td>Leave 6.52am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BMT to Penrith</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>776 to hospital</td>
<td>774 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arrive 6.19am</td>
<td>Arrive 7.51am</td>
</tr>
<tr>
<td>Burwood</td>
<td>52 minutes</td>
<td>54 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Driving: 35-50 minutes</strong></td>
<td></td>
<td></td>
<td>Leave 5.27am</td>
<td>Leave 6.57am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T1 to Strathfield</td>
<td>T1 to Strathfield</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BMT to Penrith</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>776 to hospital</td>
<td>774 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arrive 6.19am</td>
<td>Arrive 7.51am</td>
</tr>
<tr>
<td>Parramatta</td>
<td>33 minutes</td>
<td>34 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Driving: 30-50 minutes</strong></td>
<td></td>
<td></td>
<td>Leave 5.46am</td>
<td>Leave 7.17am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BMT to Penrith</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>776 to hospital</td>
<td>774 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arrive 6.19am</td>
<td>Arrive 7.51am</td>
</tr>
<tr>
<td>Origin station</td>
<td>Total public transport journey duration to arrive by 7am on weekday</td>
<td>Journey components</td>
<td>Total public transport journey duration to arrive by 8am on weekday</td>
<td>Journey components</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Westmead</td>
<td>53 minutes</td>
<td>Leave 5.45am</td>
<td>40 minutes</td>
<td>Leave 7.11am</td>
</tr>
<tr>
<td></td>
<td>Driving: 28-45 minutes</td>
<td>T1 to Penrith</td>
<td>• T1 to Penrith</td>
<td>T1 to Parramatta</td>
</tr>
<tr>
<td></td>
<td></td>
<td>776 to hospital</td>
<td>• 776 to hospital</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>• 2-minute walk</td>
<td>774 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arrive 6.36am</td>
<td>• Arrive 6.36am</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Arrive 6.36am</td>
<td>Arrive 7.51am</td>
</tr>
<tr>
<td>Blacktown</td>
<td>37 minutes</td>
<td>Leave 5.59am</td>
<td>25 minutes</td>
<td>Leave 7.26am</td>
</tr>
<tr>
<td></td>
<td>Driving: 26-40 minutes</td>
<td>T1 to Penrith</td>
<td>• T1 to Penrith</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td>776 to hospital</td>
<td>• 776 to hospital</td>
<td>774 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>• 2-minute walk</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arrive 6.36am</td>
<td>• Arrive 6.36am</td>
<td>Arrive 7.51am</td>
</tr>
<tr>
<td>Hazelbrook</td>
<td>63 minutes</td>
<td>Leave 5.54am</td>
<td>65 minutes</td>
<td>Leave 6.54am</td>
</tr>
<tr>
<td></td>
<td>Driving: 35-50 minutes</td>
<td>BMT to Penrith</td>
<td>• BMT to Penrith</td>
<td>BMT to Penrith</td>
</tr>
<tr>
<td></td>
<td></td>
<td>774 to hospital</td>
<td>• 774 to hospital</td>
<td>775 to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-minute walk</td>
<td>• 2-minute walk</td>
<td>2-minute walk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arrive 6.56am</td>
<td>• Arrive 6.56am</td>
<td>Arrive 7.59am</td>
</tr>
</tbody>
</table>

Notes: Public transport journey time is best possible per transportnsw.info as at October 2017 and includes end walking link. Car journey time is per Google Maps, and does not include time taken locating and/or walking from car parking.

In reviewing Table 5-12, the following is of note:

- None of the fastest possible journeys uses Kingswood station. When this option is introduced, it requires additional travel time, due to a combination of - as relevant depending on the origin station - the slower travel time of frequently stopping T1 services compared with Blue Mountains trains, and the longer walking distance from Kingswood station compared with a Derby Street bus stop.

- In every case for journeys from the east, the fastest public transport option involves an element of ‘back-tracking’ (like the walk from Kingswood station to the hospital) - be that coming back on the bus from Penrith, or going back to Parramatta to catch a fast Blue Mountains train (BMT) to Penrith, or both.

- In the case of a 7am shift start, the early morning contra peak T1 and BMT timetables make eastern customers get to work more than 30 minutes before they want to be there.

- The above two disincentives do not apply to customers coming from the Blue Mountains. For these, the combination of relatively frequent Blue Mountains intercity express train and bus from Penrith provides options for arrival spaced at approximately 15-minute intervals over the hour leading up to 7am or 8am.
As a function of CBD road congestion, only customers coming from Central and Parramatta enjoy a public transport journey duration close to the low end of their predicted range driving time. All other customers, coming from Chatswood, Blacktown and points in between and to the west, can drive to work considerably faster, due to the combined effects of relatively poor counter-peak train and relatively good counter-peak motorway and/or state road travel times.

5.9 Motor vehicles

5.9.1 Patronage summary

Table 5-13 shows the incidence of driving to Nepean Hospital for personal transport purposes (i.e., excluding goods and service vehicles) with one or more persons in each car. Given this definition, the numbers include taxi trips where relevant. As with train use, the difference between Nepean Hospital staff and Greater Sydney commuting travel habits is marked.

Table 5-13 Use of motor vehicles by Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User Group</th>
<th>Mode Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>94.7%</td>
</tr>
<tr>
<td>Visitors</td>
<td>88.5% (including 4.8% taxi)</td>
</tr>
<tr>
<td>Outpatients</td>
<td>87.6% (including 2.2% taxi)</td>
</tr>
<tr>
<td>Greater Sydney</td>
<td></td>
</tr>
<tr>
<td>All trips</td>
<td>69%</td>
</tr>
<tr>
<td>Journeys to work</td>
<td>58.2%</td>
</tr>
</tbody>
</table>

5.9.2 Level of Service for local access

General traffic performance analysis has been completed for the three unsignalised intersections with the surrounding road network that provide vehicular access to the entrances to the western half of PHC, and for the two closest signalised intersections on approach to these. The existing Level of Service has been identified for these five intersections (Figure 5-20) as they provide access to the site of the multi-storey car park that is required to be delivered ahead the Stage 1 Building. Level of Service is a qualitative measure describing operational conditions within a traffic stream, and their perception by the drivers and/or passengers of motor vehicles. Level of Service definitions are in Table 5-14.
Table 5-14 Traffic Level of Service descriptions

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LoS A</td>
<td>A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.</td>
</tr>
<tr>
<td>LoS B</td>
<td>In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with Level of Service A.</td>
</tr>
<tr>
<td>LoS C</td>
<td>Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.</td>
</tr>
<tr>
<td>LoS D</td>
<td>Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.</td>
</tr>
<tr>
<td>LoS E</td>
<td>Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.</td>
</tr>
<tr>
<td>LoS F</td>
<td>In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.</td>
</tr>
</tbody>
</table>
Analysis shows that all five intersections perform at Level of Service A or B during both the morning and afternoon weekday peak periods, except for (4), the signalised intersection of Derby Street and Parker Street (the locally-named section of The Northern Road). This intersection performs at Level of Service D during the afternoon peak.

There are therefore excellent or close to excellent current conditions for most motor vehicle access requirements on the western side of PHC, used by 59% of drivers. At the Derby Street / Parker Street intersection, the lower Level of Service in the afternoon peak is a result of delays to three movements at these traffic signals:

- Right turn by vehicles travelling east on Derby Street and heading south on Parker Street
- Straight ahead by vehicles travelling east on Derby Street
- Right turn by vehicles (including those exiting PHC’s Derby Street access points) travelling west on Derby Street and heading north on Parker Street to access routes including the Great Western Highway.

5.9.3 Wider road network

Looking beyond the roads immediately adjacent to PHC, an established and connected network of state, regional and local roads links Nepean Hospital to Penrith city centre and the wider region. The major routes in this network are shown in Figure 5-21.

Without accounting for the time that may be taken to locate and/or walk from car parking once at PHC, and consistent with the data in Table 5-9 and Table 5-12, this network appears to provide for a shorter travel time by motor vehicle to Nepean Hospital than by public transport for trips from most origins across Greater Sydney.

The few exceptions would generally be peak period trips involving a single train journey from a distant origin served by an express to Penrith that connects to a direct bus service. In this case, the greater reliability and predictability of train travel may deliver a quicker outcome than a congested motorway and surface road network.

Figure 5-21 Penrith Health Campus in context of regional road network
5.10 Car parking

5.10.1 Location and cost of on-site spaces

The location of the different PHC public car parking facilities is shown in Figure 5-22. Not including Tresillian and child care centre parking, and courier bays, (sites 5, 7, 8 and 13) there are approximately 1,500 vehicle parking spaces available for public use on PHC.

After the first 15 minutes, which are free, the fee for using PHC public parking ranges from $6.60 for 16-60 minutes to $19.50 for more than five and up to 24 hours. This schedule of costs aligns with the NSW Health Hospital Car Parking Fees Policy (4.4.2), allowing for CPI-based increases since 2013.

For staff only, parking fees can be paid through fortnightly payroll deductions set at $44.40 for full-time employees and $34.20 for part-time employees. In the case of a full-time worker driving to Nepean Hospital on five days of the week, this equates to a daily car parking cost of $4.44.
Public parking additional to the facilities shown in Figure 5-22 is available at:

- Various time-restricted and uncontrolled kerbside spaces on streets outside but within walking distance of PHC
- Time-restricted spaces on Barber Avenue, within PHC (controlled by PCC)
- Competitively priced commercial facilities operated on vacant land adjacent to PHC (see for example Figure 5-23).

Figure 5-23 Privately operated commercial car parking facility adjacent to Nepean Private Hospital

5.10.2 Use of on-site and off-site parking

Table 5-15 shows, based on November 2016 survey responses, the relative percentages of vehicles parked within and outside PHC on a typical weekday by the various groups of Nepean Hospital users, plus the percentage of vehicles that do not need to be parked due to their passenger/s being dropped off.

The assumed absolute peak demand for parking on or near PHC is also shown, totalling approximately 2,150 vehicles that need to be parked. This demand has been calculated by NSWHI based on input assumptions that include 93% of daytime shift staff, and 100% of afternoon and evening shift staff, requiring access to car parking.

Finally included in Table 5-15 is the approximate peak quantity of off-site parking that is estimated (based on behaviour revealed by survey responses) to be occurring on local streets on a weekday. As approximately 16% of Nepean Hospital car parking - about 240 spaces - remains unoccupied even during the period of peak occupancy (1-2pm on weekdays) there is in principle the capacity for some of the relevant 900-odd PHC-related vehicles parked on local streets to be parked within PHC instead. In practice, while some users do not park on site because of the effort and time taken to locate an empty space among the dispersed facilities, a significant number choose for cost reasons to walk to the hospital after parking for free on a nearby street.
Table 5-15 Use of on-site / off-site car parking by Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User Group</th>
<th>Park within PHC</th>
<th>Park outside PHC</th>
<th>Dropped off</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>Peak on-site demand</td>
<td>%</td>
</tr>
<tr>
<td>Staff</td>
<td>58%</td>
<td>1,700</td>
<td>40%</td>
</tr>
<tr>
<td>Visitors</td>
<td>52%</td>
<td>260</td>
<td>20%</td>
</tr>
<tr>
<td>Outpatients</td>
<td>60%</td>
<td>100</td>
<td>25%</td>
</tr>
<tr>
<td>Other</td>
<td>N/A</td>
<td>100</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Notes: ‘Outpatients’ includes emergency department presentations, all of which are assumed to involve on-site parking. ‘Other’ comprises NBMLHD fleet vehicles, students, volunteers and retail staff. Numbers are rounded. Calculations based on survey responses so do not represent actual parking used at any specific time.

When given an open field response opportunity to provide any feedback on Nepean Hospital car parking as part of the November 2016 surveys, 109 (44%) of visitors and 68 (50%) of outpatients expressed a definitive opinion. Of these, over four in five respondents reported a negative view of the quantity, location, layout and/or cost of public car parking at Nepean Hospital; less than one in five respondents indicated satisfaction with current provisions.

5.11 Emergency vehicles

In 2015/16 there were over 67,000 presentations at Nepean Hospital Emergency Department. As shown in Table 5-16, over the four years up to then two-thirds of presentations arrived at the hospital in a private vehicle, and 30% were transported in a NSW Ambulance vehicle. Ambulance access to Nepean Hospital is via the roundabout-controlled southern vehicle entrance, off Derby Street.

Table 5-16 Mode of arrival for Nepean Hospital Emergency Department presentations (2012-2016)

<table>
<thead>
<tr>
<th>Mode of arrival</th>
<th>2012/13</th>
<th>2013/14</th>
<th>2014/15</th>
<th>2015/16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Private vehicle</td>
<td>39,626</td>
<td>67.4%</td>
<td>43,197</td>
<td>67.9%</td>
</tr>
<tr>
<td>Ambulance</td>
<td>17,772</td>
<td>30.2%</td>
<td>19,011</td>
<td>29.9%</td>
</tr>
<tr>
<td>Other</td>
<td>1,435</td>
<td>2.4%</td>
<td>1,383</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

Notes: ‘Other’ includes internal transfers, walk-ins, NSW Police, and Air Ambulance / Helicopter Rescue services
6 Future transport and access for Nepean Hospital

6.1 Overview

6.1.1 Demand growth

To this point, future increases in the demand for travel to PHC have been calculated for the purposes of planning the use and addressing the network impacts of the 650-space multi-storey car park that will be delivered prior to the Stage 1 Building. The estimate of increased levels of activity across different Nepean Hospital user groups resulting from this building, and requiring the prior upgrade of car parking, is shown in Table 6-1 for future years 2020/21 and 2026/27.

Based on these estimates, over the full 24 hours of a theoretical weekday with all activities operating at a peak level, the movement of people (i.e., not including goods and service vehicles) into and away from Nepean Hospital increases from approximately 11,000 daily movements today to up to 13,500 in 2021, and up to 15,000 in 2026.

Table 6-1 Future growth in Nepean Hospital user groups

<table>
<thead>
<tr>
<th>User group</th>
<th>Current quantity</th>
<th>2021/22 estimate</th>
<th>2026/27 estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff (clinical, administrative and support services; full-time equivalent)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekday shift workers</td>
<td>2,456</td>
<td>2,947</td>
<td>3,438</td>
</tr>
<tr>
<td>Weekend shift workers</td>
<td>909</td>
<td>1,090</td>
<td>1,272</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,364</td>
<td>4,037</td>
<td>4,710</td>
</tr>
<tr>
<td><strong>Inpatient beds (used at 95% occupancy rate; including not less than 60 neonatal / paediatric beds)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>486</td>
<td>693</td>
<td>693</td>
</tr>
<tr>
<td><strong>Visitors (per weekday; see note)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>577 to 1,400</td>
<td>823 to 1,850</td>
<td>823 to 1,850</td>
</tr>
<tr>
<td><strong>Outpatient service events (per weekday)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,172</td>
<td>1,404</td>
<td>1,682</td>
</tr>
<tr>
<td><strong>Emergency department presentations (per weekday)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>195</td>
<td>242</td>
<td>314</td>
</tr>
<tr>
<td><strong>Other individual users (VMOs, retail staff, NBMLHD fleet, students and volunteers; per weekday)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>213</td>
<td>256</td>
<td>299</td>
</tr>
</tbody>
</table>

Note: As per 5.1.1, quantity of visitors per weekday ranges from lower figure (based on NSWH assumption of 1.25 visitors / bed) to higher figure (based on average 2 visitors / adult bed and up to 10 visitors / neonatal or paediatric bed)

The following tables show future mode share and use of public transport and active transport for staff (daytime workers only), outpatients and visitors. Future staff mode share is based on planning for the new multi-storey car park that has assumed, for staff, 90% will drive to work in 2020/21 and 85% in 2026/27, representing respective reductions of approximately 5% and 10% from today. It has been assumed that outpatient and visitor mode shares will remain constant into the future.

It can be seen that the quantum of people using public and active transport remain relatively low for at least the next ten years.
Table 6-2 Future transport use 2021/22

<table>
<thead>
<tr>
<th>User group</th>
<th>Staff (3,438)</th>
<th>Visitors (823-1,850)</th>
<th>Outpatients (1,404)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>90%</td>
<td>83.5%</td>
<td>85%</td>
</tr>
<tr>
<td>Public Transport</td>
<td>6% (177)</td>
<td>12.5% (103 - 231)</td>
<td>9% (126)</td>
</tr>
<tr>
<td>Active Transport</td>
<td>4% (118)</td>
<td>4% (33 - 74)</td>
<td>6% (84)</td>
</tr>
</tbody>
</table>

Table 6-3 Future transport use 2026/27

<table>
<thead>
<tr>
<th>User group</th>
<th>Staff (2,947)</th>
<th>Visitors (823-1,850)</th>
<th>Outpatients (1,682)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>85%</td>
<td>83.5%</td>
<td>85%</td>
</tr>
<tr>
<td>Public Transport</td>
<td>10% (295)</td>
<td>12.5% (103 - 231)</td>
<td>9% (151)</td>
</tr>
<tr>
<td>Active Transport</td>
<td>5% (147)</td>
<td>4% (33 - 74)</td>
<td>6% (101)</td>
</tr>
</tbody>
</table>

6.1.2 Strategic directions

Having summarised the local and strategic context for the Stage 1 Building (chapter 3), and outlined current transport outcomes and issues affecting the site (chapter 5), several in-principle objectives, and related action focus areas, have been developed for this transport strategy, under three key themes. The proposed objectives and related areas for action are intended to:

- Provide a framework for assessing the relative effects of the building for transport and accessibility outcomes experienced by different user groups
- Guide the development and prioritisation of measures to address these effects where required
- Align these measures with relevant NSW Government urban management priorities.

Proposed objectives and areas for action are summarised in Table 6-4.

Table 6-4 Nepean Hospital transport strategy objectives

<table>
<thead>
<tr>
<th>Key theme</th>
<th>Strategic objectives</th>
<th>Focus areas for action in transport strategy</th>
</tr>
</thead>
</table>
| Nepean Hospital: Improving community health and wellbeing                 | Improve the delivery of health services to customers                                 | • Provide multi-modal, needs-based transport access to health services  
<p>|                                                                          |                                                                                       | • Address needs that vary by customer group, origin, demographics and/or time period                         |
|                                                                          | Attract and retain a highly qualified workforce                                       | • Increase the use of public and active transport by staff for whom this is a viable option                 |
|                                                                          |                                                                                       | • Make Nepean Hospital a pleasant place to move around through the working day                              |
|                                                                          |                                                                                       | • Maintain and manage appropriate access to staff car parking                                              |
|                                                                          | Grow health-related education and research activities                                 | • Strengthen transport linkages between the hospital and:                                                  |
|                                                                          |                                                                                       |   o Penrith city centre                                                                                   |
|                                                                          |                                                                                       |   o Western Sydney University                                                                           |
|                                                                          |                                                                                       |   o Western Sydney Airport-Badgerys Creek Aerotropolis                                                    |</p>
<table>
<thead>
<tr>
<th>Key theme</th>
<th>Strategic objectives</th>
<th>Focus areas for action in transport strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Greater Penrith: Becoming Western Sydney’s gateway</strong></td>
<td>Grow employment in the Penrith Health and Education Campus</td>
<td>- Improve access to the PHEC from:&lt;br&gt;  o Penrith city centre&lt;br&gt;  o Western Parkland City district&lt;br&gt;  o Greater Sydney</td>
</tr>
<tr>
<td></td>
<td>Create a high-quality and active place to live</td>
<td>- ‘Decouple’ urban growth from increased congestion and reduced amenity by:&lt;br&gt;  o Developing people-friendly places&lt;br&gt;  o Encouraging walking and bike-riding&lt;br&gt;  o Increasing public transport use</td>
</tr>
<tr>
<td></td>
<td>Enhance access to Penrith city centre and Western Sydney Airport</td>
<td>- Short-term: provide good private and public road-based connections, including rapid bus services parallel to future rail&lt;br&gt;  - Medium / long-term: reserve rail corridor/s and deliver new train services</td>
</tr>
<tr>
<td><strong>Transport networks: Supporting the growth of Greater Penrith</strong></td>
<td>Meet travel needs with safe congestion management and investment solutions</td>
<td>- First, maximise the capacity and productivity of existing transport services and assets&lt;br&gt;  - Then, deliver additional network capacity</td>
</tr>
<tr>
<td></td>
<td>Deploy and provide for new technology and service models</td>
<td>- Enable and pilot innovations in the design and operation of transport services&lt;br&gt;  - Ensure that new and upgraded transport assets ‘build in’ future technology opportunities</td>
</tr>
<tr>
<td></td>
<td>Increase physical activity as part of day-to-day personal transport</td>
<td>- Develop connected networks of walking and bike-riding routes&lt;br&gt;  - Promote active transport access to regional public transport services&lt;br&gt;  - Provide end-of-trip facilities at destinations</td>
</tr>
</tbody>
</table>

Achieving the above objectives requires many stakeholders to be accountable for emerging actions. It is unlikely that there is any single and unitary urban development project that can have as big an impact on regional travel patterns as a major hospital upgrade – apart from a large transport infrastructure project itself, such as a new motorway or rail line.

On this basis, NSWH should assume a proactive and continuing role in managing transport outcomes from the Stage 1 Building.

In terms of the evolving role of car parking in servicing PHC over time it is apparent that this responsibility is already accepted in principle, as the reliance on driving to the hospital is explicitly assumed by NSWHI to reduce over time, for administrative and day shift clinical staff at least. As stated above, planning for the new multi-storey car park has assumed that, for these users, 90% will drive to work in 2020/21 and 85% in 2026/27, representing respective reductions of approximately 5% and 10% from today. These aspirations are based on a stated desire to adopt as-yet unspecified travel demand management strategies at the campus, to reduce a reliance on driving and parking that presents increasing costs to the community.

Additionally, and in recognition of the expanded hospital’s unique role in shaping Penrith LGA and serving the health needs of the broader Western Sydney community, PCC and the NSW Government Transport cluster will also play significant roles in implementing this transport strategy.

Over the rest of this chapter, therefore, proposed measures to address the described transport and accessibility effects of the building are nominally assigned to accountable owners, and categorised in terms of their timeframe:
• Short-term: for implementation before the completion of the new multi-storey car park associated with the Stage 1 Building
• Medium-term: for implementation before the completion of the balance of the Stage 1 Building
• Long-term: for later implementation.

The following general principles apply to all measures:

• The more that demand for travel to Nepean Hospital can be shifted from driving to public or active transport use, while maintaining or improving transport safety outcomes, the better the hospital will function.
• Efforts to target this mode shift should be prioritised based on a combination of:
  o Understanding the travel choices realistically available to different hospital user groups at different times, based on when, from where and how often they are travelling
  o Weighing the relative need or prerogative of different user groups to be able to access certain travel choices with certainty.
• Measures to discourage car use will only be accepted and successful when accompanied or even preceded by the introduction of measures to encourage public or active transport use.
• The earlier that these encouragement measures can be in place, the easier it will be for NSWH to manage a reduction in the demand for car access if or when this becomes unavoidable for reasons of physical capacity.
• The most cost-effective measures to encourage public or active transport use will leverage any known accessibility advantages of PHC and optimise the use of existing and programmed transport services and assets ahead of delivering new ones.
• Wherever possible, use should be made of approaches and actions developed for and tested by use in other areas.

In relation to the last point above, there are in Greater Sydney several relevant precincts where localised actions and projects - or larger, integrated programs - have been implemented to encourage a greater share of sustainable travel, including:

• Sydney CBD
• Camperdown health and education precinct
• Westmead health and education precinct.

These examples are referenced in the following sections where they offer useful pointers for this transport strategy.
### 6.1.3 Movement and Place objectives for surrounding road network

This framework for the categorisation and management of different roads types is described in 4.2.8, and applied in 5.2.3 to the roads surrounding PHC. Table 6-5 reiterates the observed current function of each road and suggests what this function may need to be in future, in line with the strategic directions outlined above.

**Table 6-5 Future Movement and Place function of Penrith Health Campus surrounding road network**

<table>
<thead>
<tr>
<th>Road</th>
<th>Current function</th>
<th>Future function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Western Highway</td>
<td>Movement corridor</td>
<td>Movement corridor</td>
</tr>
<tr>
<td>Parker Street</td>
<td><strong>Primary:</strong> Movement corridor as part of A9 The Northern Road&lt;br&gt;<strong>Secondary:</strong> Local street for residents with street frontage</td>
<td><strong>Primary:</strong> Movement corridor, including Western Sydney Airport bus services&lt;br&gt;<strong>Secondary:</strong> Local street</td>
</tr>
<tr>
<td>Derby Street</td>
<td><strong>Primary:</strong> Local street&lt;br&gt;<strong>Secondary:</strong> Movement corridor for car parking access and buses</td>
<td>Vibrant street, with increased frontage activity and bus access</td>
</tr>
<tr>
<td>Somerset Street</td>
<td><strong>Primary:</strong> Local street&lt;br&gt;<strong>Secondary:</strong> Movement corridor for car parking access</td>
<td><strong>Primary:</strong> Local street, with special purpose as access to Emergency Department&lt;br&gt;<strong>Secondary:</strong> Movement corridor, with reduced dominance by non-emergency vehicles</td>
</tr>
<tr>
<td>Barber Avenue</td>
<td>Local street</td>
<td>Place for people, with primary pedestrian function</td>
</tr>
</tbody>
</table>
6.2 Travel Choices

Table 6-6 Travel Choices actions

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promote travel choices to staff:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provide information on Travel Choices purpose</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Conduct staff travel survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Investigate potential for flexible work practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Promote alternative travel choices</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Promote travel choices to visitors and outpatients:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Develop information to send with appointment confirmations</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Update online travel information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Include live links to real-time transport apps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disseminate travel information through (e.g.) referring GPs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manage travel by delivery and service providers:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Investigate retimed and/or combined deliveries</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Develop information for businesses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TfNSW has developed the ‘Travel Choices’ travel demand management and behaviour change model for implementation, initially, in the Sydney CBD. The primary driver for this has been the construction of the CBD and South East Light Rail project, and the need to support the continuing efficient functioning of the CBD in the face of major impacts on the road network and transport operations. The Travel Choices label, if not its detailed content and branding, is suitable for use when considering the actions that can be taken to encourage the more sustainable use of existing transport services and assets for travel to PHC.

Figure 6-1 shows the four headline components of Travel Choices as applied to the Sydney CBD. Figure 6-2 is the checklist of actions suggested for Sydney CBD businesses and other travel-generating land uses to implement as part of their site-specific travel action plan.

Figure 6-1 Major components of Travel Choices approach
Figure 6-2 Travel Choices interventions

Not all the actions in Figure 6-2 will be suitable to Nepean Hospital. In refining and implementing relevant actions for the site (Table 6-6) NSWH should consider the extent and outcomes of any travel demand programs implemented for other major health facilities in Greater Sydney - and, in turn, look to apply a new approach consistently across all health districts.

In the short term, actions should commence to coincide with the closure of existing surface car parking in PHC to make way for the new multi-storey car park. Over the longer term, in partnership with other PHEP stakeholders, opportunities should be explored to extend a Travel Choices approach across other land uses and activities in the recently rebranded ‘The Quarter’.
### 6.3 Walking

**Table 6-7 Walking actions**

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promote use of existing walking connections:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Update existing site map with clearer walking information</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Develop local area walking map with shortest-path routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Show access from station, bus stops and off-site car parking</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upgrade existing walking experience:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Install pedestrian wayfinding signage within PCH</td>
<td>S</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Improve width, surface, kerbs and edge lines on internal links</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Address any gaps in shade and lighting coverage within PCH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Roll out these improvements for route to Kingswood station</td>
<td>M</td>
<td>PCC/TfNSW</td>
</tr>
<tr>
<td>• Upgrade pedestrian phasing at traffic signals</td>
<td>M</td>
<td>RMS</td>
</tr>
<tr>
<td>• Install pedestrian refuges on boundary roads</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deliver new walking connections:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Complete east-west and north-south internal walking routes</td>
<td>M-L</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Provide Somerset Street midblock pedestrian crossing</td>
<td>M</td>
<td>PCC</td>
</tr>
<tr>
<td>• Provide step-free crossing over Great Western Highway</td>
<td>L</td>
<td>RMS/PCC</td>
</tr>
</tbody>
</table>

In principle, PHC enjoys some natural advantages in promoting walking access. The site and its surrounding local street network are on generally level terrain. During the winter and spring months, the climate is mostly conducive to outdoor life. Most importantly, the campus is of a rectangular shape which mirrors the grid layout of the surrounding road network and can be conceived of as divided into four quadrants with their own points of access.

This means that, in theory, the campus’ structure could facilitate pedestrians’ ability to orient themselves within the site - subject to ongoing adjustments to the internal layout of the campus, the provision and orientation of pathways through it, and improvements to wayfinding. Drawing on ideas for better wayfinding developed when PHC’s first multi-storey car park was built, the last of these would involve, as linked actions:

- Consistently applying the colour-coding of the different campus facilities, both in the décor of the assets themselves and on wayfinding signage
- Extending the colour-coding approach to connected walking paths (e.g., with a coloured surface treatment or edge lines)
- Physically protecting walking paths from motor vehicle incursion (e.g., with landscaping)
- Updating the site map (Figure 2-1) to more clearly show walking routes, differentiating these from vehicle roadways, and communicating their hours of access (e.g., pathways that pass through hospital buildings may only be useable by the public during business hours).
The test of these actions being successfully implemented will be whether someone walking into PHC by any of its entrances can walk on to their destination by the shortest route, without having to ask for directions.

In the long term, as shown in Figure 6-3 the vision for PHC is for a traffic-free ‘green street’ pathway to bisect the campus on a north-south axis.

![Figure 6-3 Future Penrith Health Campus north-south pedestrian route](image)

Uninterrupted north-south pedestrian access through PHC will only be possible when all future stages of the Nepean Redevelopment are completed. Continuous east-west access may be achievable sooner. As shown in Figure 6-4, this would connect Barber Avenue to the existing pedestrian entry off Somerset Street.

Required works to deliver this east-west access include footpath widening on Barber Avenue (displacing some two-hour angled car parking spaces managed by PCC) and rearrangement of other surface parking areas. The eastern end of this axis should connect to a new midblock pedestrian crossing of Somerset Street, aligned as closely as possible with a natural desire line that brings people to PHC from Kingswood train station along the southern side of the Great Western Highway and down the eastern side of Somerset Street before crossing at a point to be determined between Rodgers Street and Orth Street. This desire line avoids the need for pedestrians to cross Somerset Street at its T-intersection with the Great Western Highway, unless or until that is signalised (which is not supported by RMS) or otherwise made safer for walking.

Optimally locating a midblock crossing of Somerset Street would be most effectively achieved as part of a broader suite of traffic calming and urban domain improvements for this local road and its side street intersections. As detailed in 6.9, improvements would need to be integrated with the design and operation of relocated ambulance access to Nepean Hospital.
At Kingswood station itself, additional signage is needed to provide conspicuous guidance from the point of stepping off a train to the point of reaching and crossing the highway. In the longer term, the ongoing renewal of Kingswood south of the highway may create an opportunity to deliver a grade-separated crossing, with some funding potentially coming from advertising on an overbridge. Allowance should be made now for the future location of such a crossing.
6.4 Bike-riding

Table 6-8 Bike-riding actions

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promote use of existing bicycle connections:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Develop detailed bike-riding map with shortest-path routes</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Show access from points within 5km riding distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upgrade existing bike riding experience:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Install bicycle wayfinding signage and racks within PCH</td>
<td>S</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Connect east-west GWH route to Penrith interchange</td>
<td>M</td>
<td>TfNSW/RMS/PCC</td>
</tr>
<tr>
<td>• Upgrade access between this route and catchment suburbs</td>
<td>M</td>
<td>PCC</td>
</tr>
<tr>
<td><strong>Deliver new bike-riding connections and opportunities:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Introduce staff bike fleet for short internal and external trips</td>
<td>S</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Partner with operator of public bikeshare scheme for Penrith</td>
<td>M</td>
<td>PCC</td>
</tr>
<tr>
<td>• Provide bicycle access on Great Western Highway crossing</td>
<td>L</td>
<td>RMS/PCC</td>
</tr>
<tr>
<td>• Provide longer-distance ‘Green Grid’ connections between Nepean Hospital and WSEA north</td>
<td>L</td>
<td>GSC/RMS/PCC</td>
</tr>
</tbody>
</table>

To some extent, any site-specific factors that facilitate walking to Nepean Hospital will also assist the take-up of bike-riding. In this case, there is value in the greater comfortable range of bike-riding compared with walking for people who are not mobility-challenged. This means that - for some users, with appropriate infrastructure in place - the bicycle will be an attractive choice for some journeys, at some times of the year, between the hospital and (to the west) Penrith city centre and (to the east) Western Sydney University Kingswood campus. Both trips are a little over 2km in length and can be undertaken by bicycle in approximately 10 minutes.

Riding further, for up to 20 minutes, brings within reach by bicycle suburbs from which significant numbers of staff and customers access Nepean Hospital - including South Penrith, Cranebrook, Cambridge Park and parts of Glenmore Park. Following the completion of the Nepean River Green Bridge now under construction by RMS, Emu Plains will also fall comfortably within this 20-minute catchment. The new bridge will remove the need for both bike-riders and pedestrians to share the Victoria Bridge river crossing with busy regional traffic - and will elevate the general profile of active transport in Penrith. In the long term, the ‘Green Grid’ envisaged by the Western City District Plan will enable longer-distance bike-riding, e.g., south to the WSEA.

For bike-riding to be a viable proposition for as many people as possible, there is scope for some short-term improvements to the recently upgraded bicycle route along the city centre-hospital-university east-west axis, including the shared walking and bike-riding path that runs along a section of the Great Western Highway. Potential improvements include extending this route west of Parker Street (consistent with Sydney’s Cycling Future), connecting it via local streets to penetrate adjacent land uses, and improving major road crossings. Within PHC, designated bike-riding routes and end-of-trip facilities will be needed.
Subject to resources, and other priorities, the above improvements could be among the first projects delivered to deliver a complete and connected ‘safe cycleway network within 10km of Greater Penrith’ – a 10-20-year initiative for investigation that is included in the Future Transport Greater Sydney Infrastructure and Services Plan. Figure 6-5 indicates the area that would be covered by 40 years from now, incorporating a 10km catchment that extends out from Greater Penrith and Western Sydney Airport-Badgerys Creek Aerotropolis and is served in part by the Green Grid of open space active transport corridors envisaged by the GSC.

![Figure 6-5 Principal Bicycle Network Vision (Greater Sydney Services and Infrastructure Plan)](image)

Figure 6-5 Principal Bicycle Network Vision (Greater Sydney Services and Infrastructure Plan)
6.5 Bus

Table 6-9 Bus actions

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promote use of existing bus services:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Update online travel information</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Provide staff Opal tickets for (e.g.) lunchtime travel into Penrith</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upgrade existing bus network and services:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Improve bus customer access between Derby Street and PHC</td>
<td>S</td>
<td>NSWHI/PCC</td>
</tr>
<tr>
<td>• Use PTIPS to optimise bus services’ speed and reliability</td>
<td>S</td>
<td>TfNSW/RMS</td>
</tr>
<tr>
<td>• Consider bus priority for Parker / Derby Streets Pinch Point project</td>
<td>S</td>
<td>RMS/PCC</td>
</tr>
<tr>
<td>• Operate direct services to suburbs north / south of PHC</td>
<td>S-M</td>
<td>TfNSW/operator</td>
</tr>
<tr>
<td><strong>Deliver new on-road public transport services:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Introduce on-demand shuttle to Kingswood station</td>
<td>S-M</td>
<td>TfNSW/operator</td>
</tr>
<tr>
<td>• Consider new services and bus priority for corridor to St Marys</td>
<td>M</td>
<td>TfNSW/RMS</td>
</tr>
<tr>
<td>• Consider on-demand services</td>
<td>M</td>
<td>TfNSW/operator</td>
</tr>
<tr>
<td>• Enable minibus services through PHC</td>
<td>M-L</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Reserve / deliver bus priority, and operate rapid bus services, on The Northern Road / Parker Street</td>
<td>L</td>
<td>RMS/TfNSW</td>
</tr>
</tbody>
</table>

6.5.1 Bus travel outcomes at Westmead and Camperdown health campuses

Traditionally, scheduled buses are the public transport mode that does the most efficient job of servicing journeys that are beyond the scope of active transport and not served by trains. As indicated in Figure 5-10, this theoretical catchment takes in the suburbs within a 15km radius of PHC from which most customers and many staff travel to Nepean Hospital. 5.7.4 details how the current viability of bus travel varies significantly across these suburbs.

This is a major factor that distinguishes PHC transport outcomes from those observed at both the Westmead and Camperdown health and education precincts. Most parts of these two big precincts are beyond comfortable walking distance of their nearest train station (respectively, Westmead and Central / Redfern).

In Westmead’s case, access from its train station is supplemented by high-frequency bus services that feed from different origin suburbs onto the North West T-way, which starts at Rouse Hill and connects this large catchment directly to the core of the precinct and onwards to Parramatta city centre. The T-way provides a fully separated roadway for buses that delivers a competitive and reliable travel time compared with driving. In the future Westmead will also be serviced by Parramatta Light Rail, connecting the precinct to North Parramatta. The T-way features visible stops which offer a good standard of customer experience (Figure 6-6).
In central Sydney, customers and staff travelling to Royal Prince Alfred Hospital (RPA) and associated facilities in Camperdown have the choice of very frequent bus services operating to north (Parramatta Road) and south (City Road / King Street) of the precinct. There is also one route that offers an all-weekday 20-minute service frequency along Missenden Road and stops directly in front of RPA. Although buses to this precinct do not enjoy the same level of infrastructure provision as the North West T-way their use is competitive with driving given the congestion of the wider road network in this area and the high cost of car parking.

While respecting Penrith’s own transport conditions and culture, there are still lessons to be learned from the bus travel outcomes achieved in Westmead and Camperdown in response to investment in the speed, reliability and/or frequency of bus services.

6.5.2 Bus customer access improvements

Compared to other health campuses, and as shown in Figure 5-12 and Figure 5-13, the experience for bus customers arriving at or leaving PHC is not one that demonstrates a high value for this mode. Aspects of the short walk between Nepean Hospital buildings and Derby Street bus stops reinforce an impression of the bus as a low-status transport choice. This is at odds with both the (by Greater Sydney standards) high service frequency along this east-west spine and the improved experience which will be available to customers starting their bus journey at Penrith interchange, when the current upgrade is completed.

To address this, the improvements listed below should be considered for Derby Street:

- Relocate eastbound and westbound bus stops to be nearly opposite one another, offset from each (vehicle) approach side to a midblock unsignalised pedestrian crossing. (As detailed in 0 and shown in Figure 6-13, it is already proposed to relocate the eastbound bus stop as part of the Derby / Parker streets intersection upgrade.)
- Locate the bus stops and this crossing (as a replacement for the existing crossing of Derby Street) as closely as possible in line with the southern pedestrian entry to PHC and the future north-
south pedestrian spine through the campus (and with the local retail centre on the southern side of Derby Street).

- Provide pedestrian-scale wayfinding signage into PHC at the bus stops and immediately outside the pedestrian entrance.
- Complement this with wider paths and clearer visibility of internal road crossing points.
- Install new shelters, seating, lighting and landscaping.

Subject to resources, these improvements should not await the completion of all Nepean Redevelopment stages but start as soon as the long-term design for the southern edge of PHC permits the relocation of bus stops and other elements in their final position. In this way, bus access can be promoted as a transport choice that is already available to PHC staff and other user groups.

6.5.3 Bus priority opportunities

Delivering bus priority outcomes on key roads will make Nepean Hospital bus services faster and more reliable. In the short term RMS can use PTIPS, the system delivering bus-specific traffic network and signal operations, to provide marginal improvements where possible to the speed and reliability of existing bus services. Medium to long-term opportunities to achieve additional bus priority may be available through modifications or extensions to current road infrastructure projects.

In the short term (see Figure 6-12 and Figure 6-13, and 0, for current project details), the signalised intersection of Parker Street and Derby Street, at the south-western corner of PHC, has been and will be further upgraded under a combination of (for Parker Street) the NSW Government Pinch Point program and (for Derby Street) the Australian Government-funded Western Sydney Infrastructure Plan (WSIP).

This intersection is currently the only one immediately adjacent to PHC which was found (prior to its current upgrading getting under way) to be performing at a traffic Level of Service worse than level B. The intersection is used by the 774, 775 and 776 east-west routes that collectively provide a 10-minute service frequency to and from the hospital. The three routes service the ‘Penrith–Mount Druitt via Werrington and Great Western Highway’ corridor that has been identified by TfNSW (see 4.2.5 and Figure 4-10) as one of Greater Sydney’s 30 or so most important bus corridors and, as such, is a prime candidate for bus priority investment.

Given the concentration of bus routes through the Parker and Derby streets intersection, there would be additional benefits for bus customers from a bus priority lead-in lane and associated signal phase being provided on its eastern and/or western approach. Consideration could be given to this being achieved through the retention of No Parking Zones on Derby Street, on either side of the intersection, following construction. This would benefit the increased use and frequency of services on this important bus corridor that should be targeted and expected as PHC expands, delivering against NSW Government Long Term Transport Master Plan and Sydney’s Bus Future commitments.

As shown in Figure 6-15, the design for the medium-term upgrade of The Northern Road / Parker Street (to be delivered under the WSIP) already includes kerbside bus priority lanes. These bus lanes will provide a public transport connection between Penrith city centre and the new Western Sydney Airport (and associated urban development), preceding and complementing a longer-term rail link.

This bus connection, running near (or even, potentially, past) PHC, would constitute the northern section of a Penrith-Western Sydney Airport-Badgerys Creek Aerotropolis-Liverpool-Campbelltown-Macarthur rapid bus corridor. This priority link is referenced in transport planning for the new airport, and consistent with both Future Transport and the State Infrastructure Strategy 2018-2038. It also aligns with the Western Sydney City Deal action for the NSW Government to establish rapid bus services from Penrith to Western Sydney Airport-Badgerys Creek Aerotropolis before the airport opens.

The Greater Sydney Infrastructure and Services Plan refers to ‘infrastructure to support rapid bus connections and improved [local] bus connections between WSA-Badgerys Creek Aerotropolis and Penrith’ as a priority initiative for investigation, planning and possible delivery over the next
decade. As illustrated by the *Future Transport* map at Figure 6-7, the corridor between Greater Penrith and Western Sydney Airport has a ‘city-shaping’ function; it is one of the links needed for people living in the Western Parkland City to be able to access their nearest metropolitan centre within 30 minutes.

The *State Infrastructure Strategy 2018-2038* is specific regarding the route of a high-quality rapid bus system to connect Western Sydney Airport to Greater Penrith, to help shape the new Western Parkland City before and during rail construction; as shown in Figure 4-11 this city-shaping route would follow The Northern Road into Penrith city centre.

Figure 6-7 Existing and committed Greater Sydney city-shaping network (Greater Sydney Infrastructure and Services Plan)

For now, the proposed upgrade of The Northern Road / Parker Street corridor extends only as far north as Parker Street’s intersection with Jamison Road, approximately 400m south of Derby Street. If this corridor is to carry rapid bus services effectively from the south past Nepean Hospital and into
Penrith city centre through congested roads, bus priority will need to be extended along this section. Allowance should be made for this in the design and operation of the Parker Street / Derby Street intersection upgrade projects, in case PCC and TfNSW identify Derby Street as a preferred alignment for buses entering Penrith via The Northern Road to access the city centre.

In the longer term, bus priority needs should also be considered east of Nepean Hospital towards St Marys; and on the continuation of The Northern Road / Parker Street north of the hospital, for services turning off and/or crossing the Great Western Highway.

6.5.4 Bus network redesign opportunities

Complementing infrastructure upgrades, bus network design and service improvements should be assessed and implemented for the section of the Penrith-Mount Druitt via Werrington and Great Western Highway corridor that services Nepean Hospital. In the short term, it is understood from TfNSW that one imminent change to the Region 1 bus network that is relevant to PHC will involve redesign of the 778 route between St Marys and Caddens, extending this to Penrith interchange via Derby Street.

In future, if increasingly reliable scheduled bus services can be operated on the Derby Street / Second Avenue / Great Western Highway corridor that is common to the existing 774, 775 and 776 routes, customers accessing Nepean Hospital from stations east of St Marys can transfer to a 10 minute-frequency bus at that point. This option might be more attractive than either walking to the hospital from Kingswood or backtracking via Penrith.

As a long-term option, there may be scope for the 774 bus route (the shortest between Penrith and Mount Druitt) to be extended as far as Blacktown, along as direct an alignment as possible, via sections of the existing Region 1 723, 728 and 726 routes. The purpose of this would be to create a significant regional corridor anchored at both ends by a major rail-bus interchange serviced by express and BMT trains to both east and west, enabling longer-distance public transport travel to and along the full length of the PHEC. The viability of this approach would depend on train stopping patterns, and on extended bus stop spacing to help speed up travel times.

Turning to the bus service needs of suburbs to the north and south of the Great Western Highway, TfNSW has acknowledged the call for direct bus services to PHC that are comparable to east-west access. TfNSW has indicated that - subject to resources - these needs will be considered during ongoing review of the Region 1 network.

6.5.5 Demand-responsive public transport

Recent changes to the legislative and regulatory framework for the operation of public bus services in NSW have opened significant new opportunities for demand-responsive transport to connect Nepean Hospital to Penrith LGA suburbs which do not have a direct bus link to PHC currently. Under the Point to Point Transport (Taxis and Hire Vehicles) Act 2016 two major new road transport product types are now legally able to be offered to customers, as alternatives to private car use and in addition to taxi services.

First, Uber and other operators of app-based ride providers can be expected to grow in their presence and viability, and to offer a personalised and on-demand service competitive with taxi use for hospital users such as outpatients returning home after an appointment. Second and more significantly, it is now possible to operate vehicles carrying up to 12 people (including the driver) as a commercial, fare-charging service outside the framework of a NSW Government Bus Service Contract.

Strictures on such services include prohibitions on being hailed on-street or at a rank like a taxi, and on picking up customers at a fixed route bus stop. However, services can be pre-booked online, through an app or over the phone, and can respond to customer demand in terms of when and how often they run, and in diverting from a fixed route to pick up and drop off ‘at the customer’s front door’.
As announced by the NSW Government, eight pilots of on-demand transport services have been trialled from late 2017 in areas across Greater Sydney and the Central Coast. The pilots are being undertaken by a mixture of operators of traditional bus and community transport services.

One on-demand pilot scheme is being trialled by Punchbowl Bus Company and branded ‘POD’ (PBC On Demand). POD (Figure 6-8) is designed for Bankstown Hospital visitors, patients and employees, connecting the hospital both to Bankstown train station and to a satellite park-and-ride facility 1.4km west of the hospital. The service operates over 18 hours a day at a standard one-way fare of $4 for a trip between the hospital and the station or any other nearby location. For trips to and from the free car park this is discounted to $2.60 - lower than the cost of Bankstown Hospital short-term car parking for any period longer than 60 minutes. POD is booked and paid for via a smartphone app.

![Figure 6-8 Punchbowl Bus Company On Demand pilot for Bankstown Hospital](image)

TfNSW will use data from POD and other on-demand public transport trials to plan future public transport improvements across all parts of Greater Sydney - potentially including Penrith. If this were to occur, it is at this point possible to envisage two main areas of opportunity for on-demand public transport to offer an attractive travel choice to Nepean Hospital:

- A shuttle connection between Kingswood train station, PHC and the Derby Street bus stops would significantly improve the viability of train travel by staff and visitors and reduce walking distance from scheduled bus services to the northern side of the campus. The shuttle could be timed to connect with train services, and if feasible divert from a fixed route to meet customers at any location within a set radius of the campus. These other locations could include formal and informal satellite parking areas used by staff and/or visitors, providing an alternative to walking during wet weather and at night.

- On-demand services could also find a commuter market in suburbs north and south of Penrith city centre, such as Cranebrook and Glenmore Park, which are not on the 10-minute-frequency direct bus service ‘spine’ between Penrith, Nepean Hospital and St Marys. In the daytime, when it is
more feasible for customers to walk to and from their service, a more-or-less fixed route might operate, with the frequency of service responding to demand. During the evening, deviation from a fixed route to pick up and drop off customers would address safety concerns associated with waiting at a stop for a scheduled service.

In both cases, the design of vehicles would be an important consideration. With quiet electric propulsion technology fast becoming viable for all sizes of bus, a narrow-profile 12-seater electric minibus would even be able to drive at slow speed from one side of PHC to the other, with no more impact than existing golf buggy-style vehicles, when adequate internal pathway connections are in place.

If this were possible, a later stage in the broader Nepean Redevelopment project would need to include an internal ‘transit mall’ or similar space at the heart of the campus, and to designate minibus pick-up / drop-off spaces adjacent to car parks (Figure 6-9) and other new buildings. A minibus service that was operated as part of a commercial contract for a wider area and ran through - not just to the edge of - PHC, could replace the current volunteer-operated shuttle service.

Figure 6-9 Shuttle bus facility at new Penrith Health Campus multi-storey car park
## 6.6 Train

### Table 6-10 Train actions

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promote use of available train services:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Update online travel information, including Nov 2017 changes</td>
<td>S</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Upgrade wayfinding at and outside Kingswood station</td>
<td>S</td>
<td>TfNSW/PCC</td>
</tr>
<tr>
<td>• Introduce on-demand minibus shuttle to Kingswood station</td>
<td>S-M</td>
<td>TfNSW/operator</td>
</tr>
<tr>
<td>• Provide step-free crossing over Great Western Highway</td>
<td>L</td>
<td>RMS/PCC</td>
</tr>
<tr>
<td><strong>Upgrade and augment existing train services:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Increase frequency through rail timetable redesigns</td>
<td>M-L</td>
<td>TfNSW</td>
</tr>
<tr>
<td>• Consider St Marys-Penrith rail infrastructure upgrades</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deliver new train links:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Implement outcomes of Western Sydney Rail Needs Scoping Study</td>
<td>L</td>
<td>DIRD/TfNSW</td>
</tr>
</tbody>
</table>

### 6.6.1 Promoting travel via Kingswood station

Because of growing congestion and the reduced predictability of driving times, train travel to Nepean Hospital is well placed to become increasingly attractive to staff, and administrative and daytime shift clinical workers in particular.

The PHC staff catchment covers a broader area than is the case for the hospital’s outpatients and visitors, meaning longer average trips with more likelihood of being impacted by road traffic delays. The routine nature of commuting lends itself to public transport - if it sticks to timetable and competes with driving and parking in cost terms.

For this market, the opportunities to increase the use of train travel via Kingswood station have already been addressed in this transport strategy in the form of suggested travel information, urban domain, walking and shuttle bus improvements.

### 6.6.2 Increasing service frequency

Pending major rail infrastructure investment, the potential for peak period train services to stop more frequently at Kingswood is somewhat constrained by the complexity of and demands upon existing Sydney Trains operations. Notwithstanding these constraints on the network as a whole, from November 2017 more than 1,500 extra weekly Sydney Trains services were introduced (including more than 750 on weekends). For customers travelling to PHC this has meant:

- More trains in the AM peak direction for Penrith and Kingswood stations, with a service, on average, every seven and a half minutes, instead of every 10 minutes as today
- Four trains per hour in the AM counter-peak direction from approximately 6am at Kingswood, nearly doubling the existing frequency
- Double the services on weekends and late at night for customers between Penrith and Doonside, meaning a train at least every 15 minutes.

Subject to detailed trip planning, it appears that these changes already offer benefits to different user groups accessing Nepean Hospital. These include staff, visitors and outpatients travelling both during peak hours and on the weekend. Customers commuting during peak hours from east of the...
hospital may be particularly advantaged, given that they have for the past few years been serviced by an essentially counter-peak direction timetable.

Opportunities to further increase train service frequency at Kingswood should continue to be investigated through later rail timetable reviews enabled by programmed infrastructure improvements, including the completion of first the Northwest and later the Sydney Metro City & South West, and West, projects.

Additionally, there are unprogrammed and more local rail infrastructure upgrades which would be necessary to uplift not only service frequency but train travel speed, by enabling different stopping patterns. The principal requirement for achieving this would be additional track between St Marys and Penrith. There is currently only one track in each direction between St Marys and Penrith, and the line is shared between BMT intercity, suburban and freight trains.

### 6.6.3 Western Sydney Rail Needs Scoping Study

In the longer term, major improvements to Greater Western Sydney rail access, including the PHEP, will result from the construction of links to Western Sydney Airport. For Penrith, better rail connections will be experienced both as more frequent and/or faster services to existing stations such as Kingswood, as capacity consumed by longer-distance travel is provided for on new train links elsewhere, including Sydney Metro West; and because a train link is built that connects Greater Penrith to the new airport.

A joint initiative of the Australian Government’s Department of Infrastructure & Regional Development and TfNSW, the Western Sydney Rail Needs Scoping Study has recently completed its investigation of the need, timing and service options for rail investment to support Western Sydney Airport and the broader Western Sydney region. As shown in Figure 6-10, and confirmed in the Western Sydney City Deal, the number one priority corridor in the preferred rail network for Western Sydney is the North-South Link via Western Sydney Airport.

![Figure 6-10 Western Sydney Rail Needs Scoping Study preferred network](image)
The WSRNSS finds that the North-South Link would provide significant city-shaping benefits by connecting new growth, education and employment areas. It would also add much-needed cross-regional rail capacity to serve existing travel patterns.

St Marys is the key point at which the WSRNSS indicates the North-South Link will interchange with the Main Western Line. For travel to and from Nepean Hospital, this interchange point will be located two train stops and approximately 7km away, requiring interchange with T1 (at Kingswood), scheduled bus or demand-responsive services to reach the North-South Link.

This distance reinforces the continuing long-term need for focus on The Northern Road, immediately adjacent to the hospital, as a primary transit (as well as general traffic) connection from PHC to Western Sydney Airport-Badgerys Creek Aerotropolis. In fact Future Transport (Figure 6-11) confirms the need for both a ‘city-serving’ corridor to connect Greater Penrith to Western Sydney Airport-Badgerys Creek Aerotropolis when the Western Parkland City is at an advanced stage of development, and the North-South Link to extend beyond St Marys to Marsden Park, Schofields and Rouse Hill.

![Figure 6-11 Greater Sydney city-serving network vision, including city-shaping routes (Greater Sydney Infrastructure and Services Plan)](image-url)
**6.7 Motor vehicles**

**Table 6-11 Motor vehicle actions**

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mitigate and manage motor vehicle movements within PHC:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Remodel campus layout to remove general traffic through site</td>
<td>M</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Provide additional drop-off / pick-up locations</td>
<td>M</td>
<td>NSWHI</td>
</tr>
<tr>
<td>• Upgrade wayfinding signage at vehicle entrances</td>
<td>M</td>
<td>NSWHI</td>
</tr>
<tr>
<td><strong>Mitigate and manage local street network vehicle movements:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provide tailored pre-trip access information to customers</td>
<td>S</td>
<td>NSWH</td>
</tr>
<tr>
<td>• Upgrade wayfinding signage at main external intersections</td>
<td>M</td>
<td>NSWH/RMS/PCC</td>
</tr>
<tr>
<td>• Implement Local Area Traffic Management scheme</td>
<td>M</td>
<td>PCC</td>
</tr>
<tr>
<td><strong>Expand road network capacity:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Deliver Pinch Point upgrade at Derby / Parker streets</td>
<td>M</td>
<td>RMS/PCC</td>
</tr>
<tr>
<td>• Provide for additional capacity on wider network</td>
<td>M-L</td>
<td>RMS/PCC</td>
</tr>
</tbody>
</table>

**6.7.1 Road network demand**

A Traffic Impact Assessment (TIA) has been completed for the multi-storey car park that is a required precedent to the Stage 1 Building. The car park will increase the existing provision of approximately 1,500 on-site PHC spaces to 1,840 spaces during the expansion of the hospital. This will rise to approximately 2,010 spaces that will be available for public use (staff, outpatients and visitors) following completion of the expansion.

The growing demand for motor vehicle use to PHC that the expansion of car parking is intended to help meet is driven by the provision of additional health services to address local and regional health, and will be manifested in the following ways:

- Increased vehicle movements within the campus, including a substantial proportion of visitors and outpatients who may be unfamiliar with the internal road layout
- Increased traffic on surrounding local streets
- Increased traffic where the local street network intersects with regional routes, chiefly the Great Western Highway and The Northern Road / Parker Street.

When addressing the impact of project-generated travel demand on specific key road intersections, the TIA for the multi-storey car park forecasts Level of Service outcomes as shown in Table 6-10. (For Level of Service qualitative descriptions see Table 5-14).
Table 6-12 Existing and future Levels of Service at principal intersections on Penrith Health Campus surrounding road network

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2017</th>
<th>2021 business as usual (2017 + 1.5% growth p.a.)</th>
<th>2021 project (2017 + 1.5% growth p.a. + new car park)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Western Highway / Parker Street</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Parker Street / Barber Avenue</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Parker Street / PHC entrance (west)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Parker Street / Derby Street</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>Derby Street / PHC entrance (south)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

6.7.2 Road network management

Other sections of this transport strategy detail the travel demand management measures, and active and public transport improvements, which can collectively deliver more attractive non-driving travel choices to Nepean Hospital users. Offering these choices as an alternative to motor vehicle use of an increasingly congested and delay-affected network will be an important precursor to both the expansion of the hospital and - in the longer term - unavoidable increases in the real costs of driving.

In the short to medium term, mitigating and managing the local network impacts of growing motor vehicle use to, from and within PHC calls for these outcomes:

- Helping staff find alternatives to driving on their own to work
- Steadily reducing all opportunities for non-delivery and servicing motor traffic to penetrate PHC
- Making it easier for occasional drivers to PHC to know where they are going when they arrive at and enter the campus.

Actions will need to be coordinated across:

- The provision of pre-trip information - e.g., with online links to apps that tailor wayfinding help to an outpatient’s time, home origin and/or destination within the campus
- The installation of wayfinding signage with a consistent visual approach and an absence of clutter (such as any mixture of public health and directional messaging)
- The layout of the campus’ internal road network, including the provision of additional drop-off and pick-up areas
- The layout of the external local street network, including traffic calming to reduce non-emergency vehicle incursion from regional routes (e.g., from Great Western Highway to Somerset Street), protect local amenity and improve walking access from external car parking.
6.7.3 Road network capacity expansion

As shown in Table 6-10, the multi-storey car park TIA finds that the development of this project will add to the load on an intersection - of Derby and Parker streets - which would be operating at Level of Service E in 2021 given forecast background traffic growth (i.e., not including additional trips to the new car park). In response to this background traffic growth the intersection is already being upgraded through two initiatives.

First, a $1 million upgrade by RMS under the NSW Government’s Pinch Point Program was completed in August 2016, benefiting traffic approaching the intersection along Parker Street from the north and south. The Pinch Point Program aims to reduce traffic delays, manage congestion and improve travel times on Sydney's major roads, particularly during weekday peak periods. The upgrade project (Figure 6-12) included:

- Extension of the northbound and southbound right-turn bays on Parker Street
- Installation of CCTV to monitor traffic
- Adjustments to traffic light phasing
- New asphalt and line marking.

![Figure 6-12 Pinch Point upgrade of northern and southern approaches to Parker and Derby streets intersection, Kingswood](image)

Additionally, relevant projects by PCC are being funded through the Australian Government’s $200 million Local Roads Package that is part of the WSIP. This funding has been allocated to improve road safety and traffic flow efficiency at two intersections on The Northern Road / Parker Street; with Derby Street (eastern and western approaches) and with the Great Western Highway.

WSIP-funded deliverables at these two intersections are proposed to include:

- Derby Street and Parker Street intersection (Figure 6-13)
  - New designated left and right turn lanes on both Derby Street approaches
  - Adjustments to kerb lines and footpaths
  - Removal of some on-street parking on Derby Street to facilitate these additional turning lanes
  - Relocation of bus stops to facilitate turning lanes.
Figure 6-13 Western Sydney Infrastructure Plan upgrade of eastern and western approaches to Parker and Derby streets intersection, Kingswood

- Great Western Highway and The Northern Road / Parker Street intersection (Figure 6-14)
  - 50m extension of the right-turn lane northbound on Parker Street
  - 100m extension of the right-turn lane westbound on Great Western Highway
  - Widening of the right turn lane and realignment of median island, southbound on The Northern Road
  - New pedestrian fencing in the median island of the Great Western Highway.

Figure 6-14 Western Sydney Infrastructure Plan upgrade of Great Western Highway and The Northern Road / Parker Street intersection, Kingswood

As outlined in 6.5.3, consideration should be given to the uncompleted project to upgrade the Parker Street / Derby Street intersection (Figure 6-13) including or making allowance for an east-west bus priority through-movement on the important Derby Street alignment.

In the medium term, the pressure of increased traffic will be particularly experienced near PHC on The Northern Road, including its intersection with the Great Western Highway. For this location, RMS
should consider future land footprint requirements for an expanded intersection of these two regional routes and protect this with a corridor reservation extending north of the Jamison Road endpoint of the existing reservation.

In the longer term, traffic growth associated with the Stage 1 Building can be expected to form a minor share of overall demand increase associated with the ongoing development and urbanisation of Greater Western Sydney, including Western Sydney Airport. This is reflected in both the broader WSIP program of road upgrades (Figure 6-15) and Future Transport. The Greater Sydney Infrastructure and Services Plan includes the Outer Sydney Orbital motorway between the Great Western Highway and Western Sydney Airport (now the subject of consultation on a preferred corridor reservation that would also accommodate freight rail; see 4.6.1) as a project for investigation within a 10-20-year horizon. In the very long term, the orbital is shown as connecting north to the Central Coast and south to the Illawarra. See Figure 6-16.
### 6.8 Car parking

**Table 6-13 Car parking actions**

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Improve efficiency of existing on-site car parking operations:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Install new static wayfinding signage</td>
<td>S</td>
<td>NSWHI/NSWH/operator</td>
</tr>
<tr>
<td>• Enable online booking and pre-trip tailored wayfinding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Promote multiple-occupant car parking for staff</td>
<td>S-M</td>
<td></td>
</tr>
<tr>
<td>• Install dynamic car parking booking and management system</td>
<td>M-L</td>
<td></td>
</tr>
<tr>
<td><strong>Manage demand for on-site and off-site car parking:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Operate satellite staff / customer car park with shuttle bus</td>
<td>S-M</td>
<td>NSWHI/NSWH/PCC/operator</td>
</tr>
<tr>
<td>• Increase all-day parking costs above CPI</td>
<td>M-L</td>
<td>NSWHI/NSWH/operator</td>
</tr>
<tr>
<td>• Introduce car parking restrictions on local streets in PHEP</td>
<td>M-L</td>
<td>PCC</td>
</tr>
</tbody>
</table>
6.8.1 Future demand for car parking

As outlined in section 3.2, the staged expansion of Nepean Hospital on-site car parking from 1,509 to 2,009 public spaces will get under way ahead of the Stage 1 Building.

Calculation of the supply of and demand for car parking by hospital users, informing the business case for the second PHC multi-storey car park, has generated data on existing and forecast future shortfalls in parking availability, as shown in Table 6-14. The quantity of off-site spaces is based on a count of kerbside and other informal car parking (e.g. on vacant lots) within a 400m radius of the campus. Of these off-site spaces, totalling approximately 660 spaces, it has been assumed 83% (550 spaces) are and will continue to be available to hospital users. Most of these spaces are untimed, making them attractive for all-day staff parking.

The expansion of on-site car parking meets the additional parking demand generated by the Nepean Hospital and Ambulatory Services Redevelopment (Table 6-14), placing no additional burden on the streets surrounding Nepean Hospital.

Table 6-14 Existing and future Penrith Health Campus on-site / off-site car parking supply and demand

<table>
<thead>
<tr>
<th>Supply / demand / shortfall</th>
<th>Current</th>
<th>Post Development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On-site parking supply</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional parking supply</td>
<td>1,509</td>
<td>2,009</td>
</tr>
<tr>
<td>compared with current supply</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td><strong>Demand for car parking spaces at peak</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>1,740</td>
<td>1,967</td>
</tr>
<tr>
<td>Outpatients and visitors</td>
<td>409</td>
<td>501</td>
</tr>
<tr>
<td>Other</td>
<td>99</td>
<td>117</td>
</tr>
<tr>
<td>Total</td>
<td>2,248</td>
<td>2,585</td>
</tr>
<tr>
<td><strong>Additional parking demand</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>compared with current demand</td>
<td></td>
<td>337</td>
</tr>
</tbody>
</table>

Reference: PTC, 20 December 2017 (page 22)

Analysis shows that while the parking demand will increase, this increase is catered for through the additional parking provided through the increase in on-site parking supply.

While construction of PHC’s second multi-storey car park will increase the supply of on-site car parking to meet future additional demand, it is expected that it will become harder to drive to and park at or near Nepean Hospital in the future due to several factors including local apartment development and regional growth. It is also necessary to improve community access to the hospital and associated health facilities. Recognising this, a mixture of measures is needed that make existing on-site car parking work as well as possible and reduce the rate of growth in demand for new parking.

6.8.2 Improving efficiency of car parking operations

As reported by studies to inform the business case for the new multi-storey car park, approximately 16% of the public car parking spaces within PHC are unoccupied at any one time. Whether this is happening because the spaces are hard for users to locate, or because of the greater attractiveness of free parking on a local street, the increasing pressure on the latter source will make it more important over time that campus parking is easy to find. Initially this should be addressed through improved static wayfinding signage; in the medium to long term, active and dynamic management of campus parking will be both needed and viable.

Systems with the capacity to match free car parking spaces with user demand are becoming increasingly realistic in technological and cost terms for sites such as PHC where paid car parking is distributed across many ‘pods’ that may include both at-grade spaces and car park structures. As
illustrated in Figure 6-17 (which includes aspects of a system currently under operation by Mosman Council) the appropriate features of an active car parking management system for PHC would include:

- The installation of in-ground sensors in all parking bays, using wireless and battery or solar-powered technology which does not require cabling and is suited to indoor or outdoor use
- Connection of sensors to a directional system that guides drivers to available spaces at several points on approach - e.g., at an external intersection (to help the driver choose a point of entry to the campus), at a multi-storey car park (to show the floor/s where spaces are available) and above each available space
- The connection of sensors to parking payment facilities - and to enforcement personnel, who can be alerted to overstay vehicles
- The ability to be linked to an online and/or smartphone app-based booking system, enabling outpatients and visitors to reserve their space and be provided with detailed directions before setting out from home (or, even, at the time of making a medical appointment).

If consideration is given to the introduction of a dynamic parking management system, this should be aligned with the timetable for the retendering of the current commercial contract for the operation of PHC public car parking.

![Figure 6-17 Features of dynamic car parking guidance and management system](image)

There is also the opportunity to encourage high-occupancy vehicle use to PHC through the physical design of car parking - whether this were done as a stand-alone measure or as part of an active car parking management system as outlined above.

For instance, and subject to an adequate means of enforcement, some spaces for staff use can be designated for use by vehicles carrying two or more employees and located in preferential spots closest to workplace destinations. For periodic parking, payroll deduction schemes can be designed
to split the cost of a reduced car parking permit across more than one employee, and this type of permit can be treated preferentially when there is a waiting list for permanent staff spaces.

6.8.3 Managing demand for car parking

Under ‘Why work for us’, the NBMLHD seeks to appeal to potential new staff with the statement that ‘staff and visitor parking is readily available’ at Nepean Hospital. Even if that is true in 2018, it will become less and less the case during the stages of the broader Nepean Hospital redevelopment.

Assuming limits to the development of a third or more multi-storey PHC car parks, and/or commercial car parks outside the campus, parking-specific actions that are available to reduce the demand for this service on PHC itself comprise relocating hospital parking to a satellite location and increasing the real cost of parking in order to drive a shift to other modes.

For the first of these options, there may be lessons from (for example) the Bankstown Hospital ‘POD’ initiative reported at 6.5.5. In a Penrith setting, this approach would see PCC and NSWH jointly identifying a suitable satellite parking location within a shuttle bus ride of the hospital and cooperating with TfNSW and/or an operator to provide this ‘last mile’ connection. An ideal satellite car parking location would have these features:

- The site would enjoy easy access from the regional road network, and especially from roads which connect to suburbs not serviced by trains or direct buses to PHC.
- Easy access would be available from the site to one or more local streets that connect to PHC and are navigable by shuttle buses of different sizes.
- The site would already be configured for car parking (reducing the need for investment in new infrastructure such as asphalt, line-marking, lighting and CCTV) but used for this purpose mainly at times other than the hospital's peak demand period.

Other than that, it will be necessary to increase the cost of PHC car parking over and above the rate of CPI. This approach will need to be coordinated closely with PCC, to understand its implications for residential areas surrounding the campus (e.g., increased demand for staff parking on local streets) and council operations (e.g., parking enforcement and revenue).

Subject to these considerations, there is scope for a revised car parking fees regime for Nepean Hospital to align with the relevant NSWH policy framework outlined in 4.4.1, under the following conditions:

- **Support a sustainable model for the procurement, funding and operation of new hospital car parks.**
- **Ensure economic viability towards the development of new car park infrastructure.**
  - Any changed pattern in the use of car parking resulting from a new pricing model must be cost-neutral to NSWH.
  - For example, a reduction in the use of all-day staff parking (say) could be balanced against increased fees from short-stay visitors and outpatients.
- **Support equitable, transparent and sustainable accessibility to health campuses for all users including patients, visitors and staff, including those with special needs.**
  - Under any pricing model, protection will have to be maintained for users with special access needs, by designating disabled parking spaces and continuing to offer fee concessions.
- **Recognise that the parking needs of many patients and visitors need to be met on-site.**
  - In principle, this means that the finite stock of on-site PHC car parking will have to be priced under a model which - compared to today - makes it more expensive for all-day, permanent use and more accessible for shorter stays by users other than employees.
In practice, the consequently most affected users will be administrative and daytime shift clinical staff who (compared to workers coming to and/or leaving work in the dark) can walk to and wait for public transport services in relative comfort and safety.

- **Improve traffic management around health campuses.**
  - Increasing the relative cost of long-stay compared to short-stay car parking will increase turnover, and therefore the number of car movements to and from spaces over a 24-hour period.
  - However, it may reduce the share and number of parking entries and exits happening during commuter peak periods, with road network operating benefits.

- **Ensure the fees policy complements the Government’s State Plan to encourage greater public transport usage, particularly increasing the proportion of total journeys to work by public transport, while recognising that many health care workers are shift workers and public transport may not provide a suitable level of accessibility at all times.**
  - As noted above, a revised pricing regime for Nepean Hospital car parking can be designed to increase the cost experienced by workers for whom public transport is a practical proposition while not changing the fee for afternoon, evening and/or night shift workers.

In respect of the last points above, Table 6-15 compares the current cost of both short stay and all-day car parking for a Nepean Hospital full-time employee (with payroll deduction in place) to:

- Short stay and all-day PHC car parking for a casual user
- Short stay and all-day car parking for casual users at other Greater Sydney health campuses and major Penrith area land uses
- Public transport fares for typical journeys by public transport (both occasional off-peak and frequent peak).

Table 6-15 Commercial car parking costs at Penrith Health Campus and comparison locations

<table>
<thead>
<tr>
<th>Location and mode</th>
<th>Short stay</th>
<th>All-day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penrith Health Campus</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Staff user (full-time)</strong></td>
<td>$4.44</td>
<td>$4.44</td>
</tr>
<tr>
<td><strong>Casual user</strong></td>
<td>$13.00 (2-3 hours)</td>
<td>$19.50</td>
</tr>
<tr>
<td>Blacktown Hospital and Westmead Health Campus</td>
<td>$13.00 (2-3 hours)</td>
<td>$19.50</td>
</tr>
<tr>
<td>(casual users)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westfield Penrith (shopper)</td>
<td>Free (up to 3 hours)</td>
<td>$35.00 (up to 7 hours)</td>
</tr>
<tr>
<td>Western Sydney University Kingswood Campus</td>
<td>$7.00</td>
<td>$7.00</td>
</tr>
<tr>
<td>(casual user)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public transport (Adult; no concession)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return train from/to Springwood</td>
<td>$6.90 (occasional user; both trips taken between 9am and 4pm)</td>
<td>$12.32 (5 x weekday peak user; maximum, assuming no other Opal use)</td>
</tr>
<tr>
<td>Return bus from/to Claremont Meadows</td>
<td>$7.16 (occasional user)</td>
<td>$7.16 (5 x weekday user; maximum, assuming no other Opal use)</td>
</tr>
</tbody>
</table>
As demonstrated by this comparison, when the cost of owning and running a car is excluded, the fortnightly, payroll-deducted cost of staff car parking at Nepean Hospital equates to a significantly lower sum than public transport use.

6.9 Emergency vehicles

Table 6-16 Emergency vehicle actions

<table>
<thead>
<tr>
<th>Transport strategy action</th>
<th>Timing (S/M/L)</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maintain or improve speed and reliability of emergency vehicle access:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reconfigure Somerset Street/ Great Western Highway intersection</td>
<td>S-M</td>
<td>RMS/PCC</td>
</tr>
<tr>
<td>• Reduce non-emergency and local access use of Somerset Street</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As outlined in 5.11, approximately 30% of Nepean Hospital Emergency Department presentations arrive by ambulance, with most of the remainder coming in a private vehicle. Table 6-17 shows the projections for annual and average daily ambulance arrivals at the hospital in 2022/23 (i.e., following the completion of the Stage 1 Building) and two longer-term years.

Table 6-17 Future ambulance arrivals at Nepean Hospital Emergency Department

<table>
<thead>
<tr>
<th>Ambulance arrivals</th>
<th>2022/23</th>
<th>2027/28</th>
<th>2031/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual total</td>
<td>29,922</td>
<td>38,189</td>
<td>46,418</td>
</tr>
<tr>
<td>Daily average</td>
<td>82</td>
<td>105</td>
<td>127</td>
</tr>
</tbody>
</table>

Revised arrangements for access to the hospital Emergency Department are shown in Figure 6-18. Under these arrangements, access will be relocated from Derby Street to Somerset Street, and private vehicle drop-offs will be separated from ambulances.

While Somerset Street will be more readily accessible than Derby Street to ambulances coming from the Great Western Highway, there is the opportunity for the highway’s intersection with Somerset Street to be reconfigured so that other, non-emergency vehicles are prohibited from making some or all movements. This will reduce growth in general traffic using Somerset Street and enable the provision of a midblock unsignalised pedestrian crossing at a location integrated with new points of access to the Nepean Hospital Emergency Department.
Figure 6-18 Future Nepean Hospital Emergency Department and ambulance access
7 Conclusions

Analysis reported in this transport strategy shows that travel generated by the Stage 1 Building, including the new campus multi-storey car park, will be able to be accommodated by existing motor vehicle, public transport and active transport networks and services. The project will not require these to be expanded.

The need for substantial changes to access arrangements for Nepean Hospital does, however, change when a longer-term horizon is considered, including the completion of all stages of the hospital’s programmed expansion, and wider urban development across Western Sydney. Within this horizon, assuming no change to the existing patterns and modes of travel to PHC, local and regional road networks will require expansion and/or drivers will have to accept substantially slower travel speeds than today. In addition, and regardless of the time it takes to drive to PHC, the effort and cost associated with parking a car in or near the campus will increase as demand outstrips the capacity of both paid and free parking.

This transport strategy therefore outlines a program of short, medium and long-term transport actions to be embarked on now so that Nepean Hospital is well-positioned, when the time comes, to maintain its customers’ equitable access to health services while continuing to attract a qualified workforce. Under this ‘Green Travel Plan’ approach, taking sooner action to offer ‘carrots’ for sustainable travel choices will reduce the later pain and cost of using ‘sticks’ to discourage driving and parking.

In its detail, the Green Travel Plan to support the Stage 1 Building is made up of the actions listed in sections 0 to 0 of this strategy. The Green Travel Plan is summarised below under three principal steps and illustrated in Figure 7-1 as a process that achieves more sustainable travel outcomes for Nepean Hospital by selecting the most cost-effective initiatives in response to available resources.

The Green Travel Plan should be ready to start being implemented as soon as the new multi-storey car park begins being built on, and displaces, existing car parking areas. In this way, construction period access arrangements for the Stage 1 Building will be integral elements of a longer-term travel plan that will later govern the operation of PHC after expansion works have been completed.

7.1 Nepean Hospital Green Travel Plan

- Step one: Promote better use of available travel opportunities
  - Improve the efficiency of existing on-site car parking operations
  - Promote the use of existing walking and bicycle connections
  - Promote the take-up of existing bus and train services.

- Step two: Improve the customer experience, capacity and impacts of existing transport operations
  - Actively manage motor vehicle movements to and within PHC
  - Manage local street network vehicle movements outside PHC in line with Movement and Place principles
  - Upgrade walking and bike-riding facilities, especially wayfinding, with a focus on connections to public transport
  - Rearrange existing bus services where possible to address network gaps.

- Step three: Introduce new public and active transport products, and start to shift demand away from driving
  - Deliver new walking and bike-riding connections within and outside PHC, including step-free access to Kingswood station
- Deliver new on-demand public transport services to fill in remaining temporal, route and capacity gaps, and to penetrate the campus using low-impact vehicles
- Relocate car parking to one or more satellite locations
- Manage access to, and the cost of, car parking within and outside PHC based on user need and access to alternative travel options
- Provide - or at a minimum protect the future opportunity for - bus priority access on the principal routes to PHC.

**Figure 7-1 Nepean Hospital Green Travel Plan**