Station concepts and layouts

5.1 Introduction
The preferred HSR system has 20 stations:
- Four city centre stations – one each in Brisbane, Sydney, Canberra and Melbourne.
- Four city peripheral stations – one in Brisbane, two in Sydney and one in Melbourne.
- A regional terminal station at Gold Coast opposite the existing Robina station.
- Eleven regional through stations located throughout Queensland, New South Wales and Victoria.

This chapter describes the requirements that have informed the development of station concepts and the specifications designed to meet these requirements. It also illustrates how the requirements, specifications and concepts have been interpreted at each of the capital city locations. Station capital costs in Chapter 7 are based on the concepts and layouts described in this chapter.

At several stages throughout the study, emerging concepts for both city centre and city peripheral stations within the metropolitan areas were presented to the ACT and state jurisdictions. Feedback obtained from these presentations assisted in finalising the concepts and layouts presented in this chapter.

5.2 Station requirements and specifications

5.2.1 Station context
To assist with the station analysis, the requirements and specifications have been grouped into four categories, from the wider urban context to specific facilities requirements, as shown in Figure 5-1.
5.2.2 HSR system parameters

The system parameters cover all aspects arising from the passenger demand and transport product being offered as part of the HSR system, including the number of passengers per service (specifically the departure peak hour, as passengers tend to dwell at stations more in advance of departure than after arrival). The number and length of platforms is determined by the service patterns and types described in Chapter 3 and the rolling stock specified to deliver the service. Other factors featuring in the requirements include facilities for ticket purchase, luggage trolley provision and information provision.

The HSR demand forecast in Chapter 2, together with the volume of train services defined in Chapter 3, provides the basis for determining:

- Platform length (train length defined by train capacity requirement).
- Number of platforms (dependent on the number of services).
- Concourse size (defined by maximum number of passengers for the train services).

Demand in the year 2065 was used to determine the requirement. The resulting specification is shown in Table 5-1, which defines the passenger demand, required minimum concourse size and number of station platforms for all stations. Platform length is simply a function of the size
of train serving the station. However, in the city centre stations, greater flexibility during operations is provided by longer platforms, which would allow two trains to be berthed in one platform at the same time (known as ‘double stacking’), enabling shorter (200 metre) trains to be stabled overnight or services to be ‘double stacked’ if a platform is unavailable for any operational reason. Longer platforms have therefore been proposed at the busiest termini at Melbourne and Sydney (with some limitations), but cannot be accommodated at Brisbane due to space constraints and would not be required at Canberra.

Table 5.1 Station parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Number of platforms</th>
<th>Length of platforms (metres)</th>
<th>Peak hour passenger demand (2065)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brisbane</td>
<td>City centre</td>
<td>4 (2 sides, 1 island)</td>
<td>All 315 m</td>
<td>4,600</td>
</tr>
<tr>
<td>Brisbane South</td>
<td>City peripheral</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 315 m</td>
<td>1,400</td>
</tr>
<tr>
<td>Gold Coast</td>
<td>Regional</td>
<td>3 (1 side, 1 island)</td>
<td>All 215 m</td>
<td>2,600</td>
</tr>
<tr>
<td>Casino</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>500</td>
</tr>
<tr>
<td>Grafton</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>300</td>
</tr>
<tr>
<td>Coffs Harbour</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>800</td>
</tr>
<tr>
<td>Port Macquarie</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>500</td>
</tr>
<tr>
<td>Taree</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>500</td>
</tr>
<tr>
<td>Newcastle</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>1,700</td>
</tr>
<tr>
<td>Central Coast</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>1,300</td>
</tr>
<tr>
<td>Sydney North</td>
<td>City peripheral</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 315 m</td>
<td>1,700</td>
</tr>
<tr>
<td>Sydney Central</td>
<td>City centre</td>
<td>10 on two levels</td>
<td>From 380 m to 400 m</td>
<td>12,800</td>
</tr>
<tr>
<td>Sydney South</td>
<td>City peripheral</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 315 m</td>
<td>1,300</td>
</tr>
<tr>
<td>Southern Highlands</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>1,400</td>
</tr>
<tr>
<td>Canberra</td>
<td>City centre</td>
<td>3 (1 side, 1 island)</td>
<td>All 315 m</td>
<td>3,200</td>
</tr>
<tr>
<td>Wagga Wagga</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>500</td>
</tr>
<tr>
<td>Albury-Wodonga</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>1,100</td>
</tr>
<tr>
<td>Shepparton</td>
<td>Regional</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 215 m</td>
<td>600</td>
</tr>
<tr>
<td>Melbourne North</td>
<td>City peripheral</td>
<td>2 (2 sides, 2 through lines)</td>
<td>All 315 m</td>
<td>1,500</td>
</tr>
<tr>
<td>Melbourne</td>
<td>City centre</td>
<td>5 (1 side, 2 islands)</td>
<td>4 at 415 m</td>
<td>8,100</td>
</tr>
</tbody>
</table>
5.2.3 Station master plan and urban context

The nature of the station and its configuration is significantly affected by its locality, including geographic features, content of the existing station's master plan, local town planning requirements and constraining structures (where available or relevant). Specifically, planning compatibility with the town centre master plan and the effect on the social and natural environment surrounding the station location needs to be considered. Within the station itself, compatibility with the existing station master plan and the location of any constraining structures, such as roads and sewers, are important considerations. The value of the land required, disruption to existing station users and the wider community must also be considered.

These requirements are location specific and were derived on a site-by-site basis. They were more important for the city centre and city peripheral stations than for the regional stations.

5.2.4 Complementary access

Many passengers would join and leave the HSR service via other transport modes; therefore, how HSR would integrate with all arrival and departure modes (which is logically a function of the modes available, described as 'complementary access') is an important feature of the overall journey. Specific onward travel facilities to be considered include:

- Regional and suburban rail services provided by conventional trains on separate infrastructure.
- Light rail and trams.
- Bus services.
- Park and ride by private car.
- Pick up and set down via taxi or private car.
- Pedestrian connectivity to town centres, local buildings and other nearby facilities such as retail, offices, leisure, and public space.
- Cycling facilities including secure storage and changing facilities.

The predominant modes used would vary according to location. For example, at city centre stations located close to metropolitan CBDs (which excludes Canberra), no private car parking has been assumed. However, at regional stations and in Canberra, private car is expected to be the predominant mode and parking has been provided.

The transport product and the complementary access provision define the requirements for onward transit. Specification of onward transit capacity determines whether complementary access projects need to be specified to deliver the required level of accessibility for the HSR system. Two types of complementary projects were considered:

- Local projects within the vicinity of HSR stations.
- City-wide projects that form part of the broader transport network.

The transport services assessment included a review of currently planned transport projects for the cities and regions that were assumed in the forecasts of HSR demand. The demand model used data provided by the state authorities for access times by mode to the Brisbane, Newcastle, Central Coast, Sydney and Melbourne HSR stations.

The transport demand model developed in Chapter 2 used estimated private vehicle access times, calculated from the access distances, and assumed no public transport access for the HSR stations outside the areas covered by the state data. While it therefore provides some guidance on access requirements, its output was supplemented by an understanding of local conditions for each station, which would also be required to determine complementary access provisions for the HSR stations.

Access/egress modes were estimated separately in the demand model for the ‘home’ and ‘destination’ ends of an HSR journey, as passengers would be more likely to have a car available at ‘home’. Car is expected to be the dominant mode for access to HSR stations (other than city centre stations) by passengers at the ‘home’ end of their journeys. This reflects the wide geographical distribution of the residential catchment for regional HSR stations,
making public transport a less attractive access option. The geographical distribution of the access/egress trip ends differs significantly between the ‘home’ and ‘destination’ ends of the HSR trips.

Car parking provision was estimated from the forecasts of passengers accessing the HSR stations using park and ride. Based on the number of passengers in each car and the duration of their trip, the number of car parking spaces was derived. The factors used were derived from an analysis of the demand forecasting data.

5.2.5 Station facilities
Facilities for both passengers and staff that support HSR operation determine how much space is required within the station envelope and its immediate environs. Passenger facilities include waiting areas such as concourses and lounges, where public information including train departure boards, locality information, information points and ticket offices would be located. Public spaces would be connected by walking routes, lifts and escalators with appropriate circulation space and access to facilities such as toilets. Accommodation is also required for the staff at these facilities and for security provision.

The requirement for station facilities is based on the estimated number of passengers in a peak hour and the number of staff required to support the operation. Concourse support accommodation includes ticket offices, waiting lounges, retail units, toilets and other concourse-facing public facilities.

Back of house accommodation includes the train crew, station management, station control and other related facilities. The area occupied by these functions was assumed to be comparable to the concourse support accommodation.

5.3 Station configurations
The number of platforms noted in Table 5-1 is defined by the number of services using the station the type of service using the station, and whether that requires a 200 metre or 300 metre train set, defines the required length of the platforms. The 200 metre and 300 metre trains would require platform lengths of 215 metres and 315 metres respectively. Trains longer than 200 metres are only envisaged for inter-capital express services; therefore, all regional stations were specified at 215 metres.

The proposed configurations would accommodate the anticipated increased size of trains over time through to 2065.

5.3.1 Platform width and spacing
Over and under bridges located mid-platform were generally assumed for passenger circulation and platform access, and were designed to manage the maximum number of people carried by the longest train (300 metres). The platform width was derived as follows:

• 3.5 metre clearance zone from the edge of platform to any structure.
• One metre zone either side of vertical transportation (elevators and escalators) for seating and structure.
• 4.6 metre zone for vertical transportation.
• 0.9 metres to the safe ‘stand back’ line from edge of platform.

A generic station cross-section is shown in Figure 5-2 giving typical dimensions.

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1 The average vehicle occupancy for park and ride access was 2.1 passengers and the average parking duration was 3.1 days. A factor of 1.31 was applied to ensure sufficient parking for seasonal peak demand.
5.3.2 Station concourse

The concourse size is based on the maximum peak hour passengers and an estimated maximum number of passengers in the station at a given time (15 minutes of the peak hour). Typically, a new station concourse would provide one square metre per person. However, given the nature of the HSR product, an allowance of 1.5 square metres per person has been used to allow for a greater number of passengers travelling with luggage, comparable to domestic airline travel. This includes an additional ten per cent for people meeting and greeting passengers but not travelling.
5.4 Station concepts

5.4.1 City centre stations
All trains would terminate at the city centre stations. These stations would be located within the CBD of the capital cities (the main destination of the travel market visiting those cities) and would provide access to other metropolitan transport services. The city centre stations would be integrated with existing station facilities, with the exception of Canberra, which is a completely new station.

A typical layout is illustrated in Figure 5-3 and comprises HSR platforms and a central concourse that provides the link to onward travel modes including other rail services. Other modes, such as light rail or tram where appropriate, would generally be accessed via a public area outside the station. The station layout would also provide for access via bus, coach, cycling and the local pedestrian network.

5.4.2 City peripheral stations
City peripheral stations would be new stations on alignments into and out of capital cities (except Canberra), generally located on the outskirts of the metropolitan areas. Many services would pass through the station without stopping, so generally four tracks would be provided at these stations – two without platforms for the non-stopping services and an additional two tracks with platforms where passengers would board and alight stopping trains.
The city peripheral stations would provide access to the HSR system for a wider catchment of city residents through connections to suburban and regional transport links. They would, however, also attract passengers via car and taxi from the wider metropolitan area. Good access from expressways and the arterial road network was therefore an important consideration in their location. As well as park and ride facilities, they would also provide for access via bus, coach, cycling and the local pedestrian network.

A typical layout is illustrated in Figure 5-4.
5.4.3 Regional stations

One regional station is proposed at Gold Coast. This would be of a comparable scale and size to Canberra and is described further in section 5.6.2.

The other 11 regional stations would provide access to the HSR system for major regional population centres. As described in Chapter 4, regional through stations were located to provide access to existing and future centres without conflicting with town planning, and avoiding demolition of properties where possible.

Regional stations would generally provide park and ride facilities outside the developed urban area. They have been located to provide direct and easy access to major road networks connecting regional centres and regional public transport networks, including coach and bus transit.

These stations are relatively simple in design and consist of two platforms, each 215 metres in length, and through lines for non-stopping trains. The onward transit modes specifically provided for include car, taxi and bus.

A typical layout is illustrated in Figure 5-5.
5.5 City stations

This section describes how the above specifications were interpreted at each of the capital city locations.

5.5.1 Brisbane city centre station

The Brisbane HSR station would be the northern terminal of the preferred HSR system. It would offer inter-capital express services to Sydney and inter-capital regional services to locations between Brisbane and Sydney. It is forecast that 16.7 million HSR passengers would pass through Brisbane in 2065. Peak hour passenger demand is forecast to be 4,600 passengers per hour. In the busiest hour, there would be ten arrivals or departures of HSR services, requiring four platforms of 315 metres in length to accommodate the longer 300 metre inter-capital express services forecast to be required in 2065.

Trains 200 metres in length would be sufficient for inter-capital regional services.

An HSR station at Brisbane is proposed for the site currently occupied by the Brisbane Transit Centre. The station site is to the south of the existing Roma Street station, as shown in Figure 5-6, between the heritage station building and Roma Street, and is located approximately half a kilometre from the Brisbane CBD. The site is currently occupied, and acquisition and demolition of the existing buildings would be required. The station would be below ground, to fit with the track alignment approaching from the west, with a rail level approximately ten metres below Roma Street. Because the footprint is alongside the existing operational station, none of the existing platforms would be required for HSR and therefore construction interfaces with existing and future operations would be minimised. Redevelopment of the site above the station is anticipated.

Figure 5-6 Brisbane HSR station location plan
The concourse at street level, shown in Figure 5-7, would house the ticketing and public-facing facilities that include waiting rooms, retail premises and public toilets. Catering and plant would also be located within the station building on the Roma Street level. The platforms, shown in Figure 5-8, would accommodate a series of blocks, each providing plant and staff accommodation. Passenger egress is provided via escalators and elevators connecting the platform level to the concourse. Emergency exit cores are also provided at the eastern and western ends of the platforms, which exit to the surface.

As well as access from the central concourse that currently serves the suburban and regional platforms, there is potential for direct access to the Queensland Government’s proposed Cross River Rail (CRR) service, as shown in Figure 5-8. This access would be located to the southernmost end of the station, addressing the CBD and the proposed CRR station entrance. Bus access would be provided on a purpose-built structure over the western end of the station with taxi and pick up/set down facilities on Roma Street itself. Roma Street currently has short-term parking available, which would attract pick up and set down passenger access, but no longer term parking was assumed for HSR users.
Figure 5.7 Brisbane HSR station street level plan
Figure 5-8 Brisbane HSR station platform level plan
As described in section 5.2.4, travel to and from the HSR station is expected to be shared among modes, as shown in Figure 5-9. Public transport access/egress mode share for Brisbane was forecast to be the highest of the three metropolitan HSR CBD stations, at 71 per cent, although the passenger volumes at Brisbane were lower than at Sydney or Melbourne. HSR demand at the Brisbane HSR station would represent less than two per cent of the total South East Queensland transport demand. As the peak travel time for HSR access is unlikely to coincide with the peak commuter travel times\(^2\), it is estimated that this volume would be accommodated by recasting services on the public transport network, without the need for major new infrastructure.

No park and ride facility for HSR is proposed at the Brisbane HSR station.

The Brisbane Transit Centre, a major interchange hub serving the city, currently occupies the proposed HSR station site. The proposed station aims to enhance the existing interchange capacity, and connect to Roma Street train station, bus and coach terminal, various local bus ways, and to the proposed Cross River Rail station. Pedestrian connectivity between the various modes would also be enhanced. A visualisation of the Brisbane HSR station to the right of the existing Roma Street station is illustrated in Figure 5-10, which shows the HSR station highlighted in blue, next to the existing Roma Street platforms.

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\(^2\) Peak HSR departures are likely to be between 5.30am and 7.30am and peak HSR arrivals between 8.30am and 10.30am (allowing for travel time between Brisbane and Sydney). The commuter peak is 7am to 9am.
5.5.2 Brisbane South peripheral station

The preferred option at Brisbane South is a station located to the west of the Motorway Business Park, south of the M2 between Browns Plains and Forest Lake, as shown in Figure 5-11. Motorway access would be provided to most of outer Brisbane by links to the South East Gateway and Centenary Motorway. The station would be accessed from existing intersections at Stapylton Road, as shown in Figure 5-11, with new local access roads required to service the site. The station would be located on the western side of the proposed rail corridor with access from Stapylton Road. The nearest Citytrain stations are at Richlands (ten kilometres north) and Loganlea (12 kilometres east). The station would provide two platforms 315 metres in length to allow the inter-capital express services to stop at the station. A platform level plan is provided in Figure 5-12.
Figure 5-11 Brisbane South station location plan
Figure 5-12  Brisbane South station platform level plan

KEY

- Concourse
- Waiting lounge
- Staff and administration
- Vertical transportation (e.g. escalators, stairs, lifts)
- Ticketing
- Toilets
- Plant and services
- HSR new platforms
- Taxi rank
- Pick up / set down
- Bus and coach stops
- Carparking

Not to scale
Forecast demand at the Brisbane South station is five million passengers in 2065; 1,400 passengers in the peak hour. This amounts to 23 per cent of the HSR passenger demand in Brisbane overall. There would be no requirement for additional complementary access infrastructure at these demand volumes. Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-13.

Park and ride is the most prominent access mode (accounting for about 46 per cent of all HSR passengers using this station), and 6,200 parking spaces would be required. Pick up and set down has a share of 20 to 25 per cent.

The peak hour passenger volumes are insufficient to justify a rail link connecting with the Citytrain network. However, the public transport access mode share would be improved by a dedicated HSR bus link service from the HSR station to the Citytrain stations at Richlands and Loganlea, while the potential Beaudesert rail line would offer a more direct interchange with the metropolitan rail network.

The connecting coach service would provide two to three trips per hour, to connect with up to seven HSR arrivals and departures per hour. These services would carry, on average, 12 to 18 passengers per trip into and away from the HSR station, capturing up to ten per cent of HSR passengers accessing and egressing the station.
5.5.3 Sydney city centre station

Sydney would be the hub of HSR operation on the east coast, serving locations to the north and south. The forecast HSR demand for Sydney Central station is 46 million passengers per year in 2065; 21 million using the line to the north and 25 million the line to the south. In addition, a further 12 million passengers would be transferring between the two\(^3\). About 12,800 HSR passengers are forecast to enter or leave the HSR station at Sydney during peak hour in 2065. The total number of HSR services arriving and departing Sydney in the peak hour would be 32, with 17 using the line to the north and 15 using the line to the south. The smaller number of services travelling south, despite the greater number of passengers, is accounted for by the fact that, by 2065, longer trains are planned to be in use between Sydney and Melbourne. This number of services arriving and departing Sydney, coupled with provision for commuter services, requires a minimum of ten platforms – five for each of the northern and southern railways.

The proposed HSR station for Sydney is located within the building envelope of Central station. Central station is located to the south of the CBD, as shown in Figure 5-14, and is the largest station in NSW. The area surrounding Central station is currently undergoing urban renewal,

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\(^3\) As transfer passengers will alight and board, this implies 70 million boardings and alightings forecast for Sydney Central station in 2065 (46 million origin/destination passengers + 2 x 12 million transfer passengers).
with major developments occurring at Central Park (the former Carlton United Brewery) and the University of Technology City campus. While the areas around Central station and the southern CBD contain heritage buildings and recently constructed developments, there are likely to be further opportunities for urban regeneration, urban intensification, economic development and value capture created as the result of an HSR station and integrated land use/transport developments.

All Central station platforms are currently in operational use, and a number of these would need to be re-assigned to HSR, requiring the station to be reconfigured. Construction of facilities to serve HSR operations at Central would be complicated by the ongoing operation of existing rail services, and would require a considerable amount of planning and preliminary work to relocate existing tracks and services.

It was not feasible to locate all platforms on one level within the existing structure, so a split-level facility was developed, as illustrated in Figure 5-15.

The HSR station would consist of newly built infrastructure, five platforms at surface aligned with the existing main hall concourse, and five platforms approximately 16 metres below main hall level, with a new HSR concourse level in between. The proposed location of the HSR platforms is the Lee Street side of the station. The five platforms serving the southern line would be at the same level as the existing platforms, with those for the northern line beneath the new concourse, as shown in Figure 5-16 and Figure 5-17.

These platforms would generally be 400 metres long to provide operational flexibility through double stacking trains of 200 metres in length, but in the lower level the presence of an existing outfall sewer limits two platforms to a maximum of 380 metres. All HSR passengers travelling through Sydney would need to change trains and move from one platform level to the other. Lifts and escalators along the length of the platforms would ensure ease of movement between the two platform levels and to/from the HSR mid-level concourse at Lee Street level.
Figure 5-16 Sydney HSR station upper platform level

KEY
- Concourse
- Toilet
- HSR new platforms
- Ticketing
- Plant and services
- Staff and administration
- Retail

Not to scale
Figure 5-17  Sydney HSR station lower platform level

KEY
- HSR new lower level platforms
- Toilets
- Retail
- Staff and administration
- Plant and services

Not to scale
A mid-level concourse level is proposed to facilitate connection and interchange with the external precinct and existing regional rail network, and the existing basement of the station would be redeveloped to an internal retail concourse and precinct. There is potential for the current western forecourt to be opened up to the Lee Street level to incorporate a bus, coach and taxi interchange.

On the mid-level concourse level shown in Figure 5-18, the undercroft of the existing heritage building would be redeveloped to provide extensive retail and commercial premises. The current pedestrian connection from Elizabeth Street to Railway Square, known as the Devonshire Street tunnel (which is heritage listed in part), would be maintained and would pass above the concourse, while proposed future interchange connections to the suburban and regional train platforms would provide access from Lee Street and Lower Carriage Lane (formerly Ambulance Avenue) to the regional train services beyond the HSR platforms.

Vehicular access and loading would be along Lower Carriage Lane, and catering storage facilities would be provided to the west wing of the station. The lower level platforms would be staggered to avoid the major existing drainage sewer that crosses the site. The sewer is listed under the heritage register for Central station, and is currently in use. There would be minimal provision for station and customer facilities on this platform level. Accommodation blocks would be allocated to provide plant, retail and staff facilities.

All of the structural changes to Central station would have to be implemented for the first stage of HSR development. It is proposed that, initially, only the upper level be equipped for HSR services for the southern railway. The lower level could subsequently be equipped with minimal interference to the operational upper level.
Central station would provide very high accessibility to transport networks because of the extensive pedestrian access and connectivity to the bus, rail, and light rail networks. Potential extensions to the rail and light rail networks that would further improve the accessibility of Central station as a transport node are being investigated by the NSW Government.

Sydney Central HSR station is therefore expected to attract a high public transport access/egress mode share of around 61 per cent in 2065. The Sydney metropolitan public transport (bus, ferries, CityRail and light rail) network carries 1.8 million passengers per day\(^4\). The NSW Government expects this to grow at a rate of 1.7 per cent per year up to 2036. HSR access would account for approximately 2.1 per cent of the total network transport task in the HSR forecast years. As the peak travel time for HSR access is unlikely to coincide exactly with the peak commuter travel times, this volume could be accommodated on the city’s metropolitan transport network without additional new infrastructure\(^5\). The high taxi access volumes would require significant taxi pick up and drop off and holding areas at the station. Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-19. No park and ride facility for HSR is proposed at the Sydney HSR station.

A visualisation of the Sydney HSR station within the existing Central station is illustrated in Figure 5-20.

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\(4\) Transport for NSW, *Rail options for the Sydney Greater Metropolitan area, Draft options paper*, November 2011, p. 4

\(5\) Peak HSR departures are likely to be between 5.30am and 7.30am and peak HSR arrivals between 8.30am and 10.30am (allowing for travel time between Brisbane or Melbourne and Sydney). The commuter peak is 7am to 9am.
5.5.4 Sydney North peripheral station

The preferred Sydney North HSR station is located adjacent to the CityRail station at Hornsby, as shown in Figure 5-21. This station is a major junction on the CityRail network with frequent services to/from:

- North Sydney via Gordon and Chatswood.
- North Sydney via Macquarie Park and Chatswood.
- Sydney CBD via Epping and Strathfield.
- Central Coast/Newcastle.

The HSR station would also be close to the F3 Freeway. There have been proposals to extend the F3 south to provide a motorway link to the Sydney Orbital M2 and M7. The station, as shown in Figure 5-21, is to the immediate west of the existing railway station, parallel to the Pacific Highway, and would facilitate an effective interchange.

The CityRail network offers a high level of connectivity; therefore, parking demand is proportionately lower than at other city peripheral stations (around 26 per cent of Sydney residents would use park and ride to access HSR services at Sydney North station, compared with almost 50 per cent at Sydney South station, for example).

Forecast demand at the Sydney North HSR station is 6.2 million passengers per year in 2065. Public transport has an 18 per cent share of the access modes for passengers using this station, which is equivalent to 160 passenger trips in the peak hour for departing trips in 2065. There would be no requirement for additional public transport access infrastructure at these demand volumes.

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6 This link is a recommendation of Infrastructure NSW’s State Infrastructure Strategy, 2012-2032, released 3 October 2012.
The station entrance would be at street level, as shown in **Figure 5-22**, but the station platforms would be constructed within a cut-and-cover box with track level approximately ten metres below. Vehicular access would need upgrading to connect the car park to the Pacific Highway. Parking would be accommodated in a multi-deck structure.
Figure 5-22  Sydney North station ground level plan

KEY
- Concourse
- Waiting lounge
- Staff and administration
- Retail
- Vertical transportation (e.g. escalators, stairs, lifts)

V.T. =
- Ticketing
- Toilets
- Plant and services
- Taxi rank
- Pick up / set down
- Bus and coach stops
- Carparking

Not to scale
This station is forecast to attract 6.2 million passengers per year and a peak hour demand of 1,700 passengers in 2065, which amounts to 11 per cent of the peak HSR demand in Sydney overall. The station would provide two platforms of 315 metres in length to allow the inter-capital express services to call at the station. Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-23. Park and ride would require 4,200 parking spaces at 2065 demand levels.
5.5.5 Sydney South peripheral station

The Sydney South peripheral station would be located at Holsworthy, west of Moorebank Avenue, to the south of Cambridge Avenue, as shown on Figure 5-24 and Figure 5-25, and between the CityRail stations at Glenfield and Holsworthy. It would be located approximately three kilometres south of the M5 Motorway and ten kilometres east of the M5/M7 junction, providing motorway access from most parts of the metropolitan region.

Sydney South is forecast to attract 4.6 million passengers per year and a peak hour demand of 1,300 passengers in 2065, which amounts to eight per cent of the peak demand in Sydney overall. The station would provide two platforms of 315 metres in length to allow the inter-capital express services to call at the station.

The station would be located on ground level or in a shallow cut to suit the track alignment, which would then dive into a tunnel below Moorebank on approach to Sydney. The would be accessed by Moorebank Avenue. Car parking would be provided with a multi-deck structure. The freeway would facilitate access from locations across the western suburbs including Parramatta, which is also connected to nearby Glenfield station via the Cumberland line. Road access could be constrained, and additional road infrastructure may be required to provide capacity for vehicles accessing the HSR car park.
Figure 5-25  Sydney South station platform level plan

KEY
- Concourse
- Waiting lounge
- Staff and administration
- Vertical transportation (e.g. escalators, stairs, lifts)

Not to scale
- Ticketing
- Toilets
- Plant and services
- HSR new platforms
- Taxi rank
- Pick up / set down
- Bus and coach stops
- Carparking

V.T. to overbridge
Overbridge
Surface carpark
Station
Surface or multilevel carpark (future)
It is likely that the public transport network in the area would be refocused to provide improved links to the HSR station, particularly from Glenfield. However, even if the access mode share for public transport is significantly increased from two per cent to ten per cent, just over 50 passengers would be accessing HSR by public transport per peak hour.

Forecast demand at the Sydney South HSR station is 4.6 million passengers in 2065, of which just under 400 passengers per day are expected to arrive or leave by public transport. There would therefore be no requirement for additional access infrastructure at these demand volumes. The level of HSR demand at the Sydney South station is more than five times higher for Sydney residents than for visitors to Sydney. Parking demand is driven by the high rate of private car access for Sydney residents (over 45 per cent).

Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-26. Park and ride is the most prominent access mode (about 48 per cent of all HSR passengers using this station) and would require 5,800 parking spaces.

5.5.6 Canberra city centre station
Canberra HSR station would be served by trains from Sydney and Melbourne, some also calling at intermediate stations. Canberra HSR station is forecast to attract 11 million passengers per year and 3,200 in the 2065 peak hour. In 2065, there would be up to eight HSR service arrivals or departures in any one hour and this would require three platforms.
A station of this size could be accommodated within the median of Ainslie Avenue, as shown in Figure 5-27. The station is close to the Canberra Centre, and has good vehicular connection to local and arterial roads. The site inclines to a high point in the east and falls to the west, so the station would be part cut-and-cover, part surface construction. Some of the roads crossing the Ainslie Avenue median that would need to be closed for the construction period would be re-opened on completion to maintain local accessibility and Canberra’s road layout. The station entry for passengers would be to the westernmost part of the site, providing public access from Cooyong Street and the Canberra Centre. Three 315 metre platforms are proposed to accommodate the 300 metre trains, as shown in Figure 5-28.

Travel to and from the HSR station is expected to be shared among modes, as shown in Figure 5-29.
Taxi would be the most significant access and egress mode with 74 per cent share. Given the geographically dispersed catchment area, no specific additional transport corridor infrastructure is proposed to improve public transport access mode shares. The recently announced light rail scheme, which has a hub at Civic, would add to the proposed station’s connectivity and the creation of a major transport hub. The station location is less than 600 metres walking distance from Northbourne Avenue, the route of the proposed Canberra light rail line (Stage 1). The introduction of HSR services from Civic should help support the goal of improving public transport mode share within the ACT.

A car parking charging regime and the provision of some dedicated HSR access bus services, to and from other town centres and the Queanbeyan CBD (similar to the current SkyBus service that links the airport and CBD in Melbourne), could constrain the upper limit of the car parking requirement to a maximum of 6,000 in 2065.

A mixed-used development with a multi-level car park would be located to the north of the station, between Cooyong Street and Currong Street North, creating a new public station precinct and interchange. This site is currently occupied by multi-storey social housing, although it has been designated for renewal. Should capacity be exceeded, additional parking could be located towards the eastern end of Ainslie Avenue, with a shuttle bus service connecting the station precinct and car park. Coaches and buses serve a significant proportion of the Canberra tourism market and access to the station building would be provided as shown in Figure 5-27. Traffic management during and after construction of the HSR station in the median of Ainslie Avenue are discussed in Chapter 4.

A visualisation of the Canberra HSR station is illustrated in Figure 5-30.
5.5.7 Melbourne city centre station

Melbourne would be the southern terminal of the preferred HSR system. The proposed HSR station site is within the envelope of Southern Cross station, which is positioned on the edge of the CBD, as shown in Figure 5-31.

Forecast HSR demand for Melbourne’s Southern Cross station is 29 million passengers per year in 2065, with a peak demand of 8,100 passengers per hour. This would require five platforms: four new platforms on the site of the existing platforms two to five, plus a reconfiguration of the existing platform one.

Southern Cross station has recently undergone redevelopment and operates well as an interchange. It would provide good accessibility between HSR and suburban and regional train services. Additionally, a number of bus and tram routes currently operate on Spencer Street outside the station.

The HSR platforms would be located on the east side of the station. The construction of HSR platforms would require possession of existing platforms one to five. Analysis of the utilisation of these platforms indicates this could be achieved by relocating the services currently using these platforms to other platforms within the station. This would need to be confirmed through more detailed operational modelling, should the HSR proposition be progressed through further stages of design development.

The proposed works at Southern Cross station have been split into two stages. The initial stage would include construction of full-length platforms, and is arranged to suit passengers accessing the trains from the ticket barrier end of the platform. When the longer 300 metre trains are introduced, additional platform lengths would be used and the existing passenger overbridge would be modified to accommodate the increased patronage expected from the HSR service. This also provides vertical circulation as shown in Figure 5-32. The overbridge would also house additional ticketing and concourse facilities, as well as staff and plant rooms.
Figure 5-32  Melbourne HSR station platform level plan
Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-33. No park and ride facility is proposed at the Melbourne HSR station.

Public transport would be the main access mode at Southern Cross, with 51 per cent accessing HSR services this way. In 2010-11, the Melbourne metropolitan public transport network (including trams, buses and suburban trains but excluding regional train services) carried 517 million passengers, equivalent to an average weekday total of 1.7 million trips\(^7\). Since the peak hours for HSR access and egress are not expected to coincide exactly with the Melbourne commuter peaks, it is assumed that this volume can be accommodated on the public transport network without major additional infrastructure\(^8\).

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\(^8\) Peak HSR departures are likely to be between 5.30am and 7.30am and peak HSR arrivals between 8.30am and 10.30am (allowing for travel time between Melbourne and Sydney). The commuter peak is 7am to 9am.
5.5.8 Melbourne North peripheral station

The preferred option for a city peripheral station to the north of Melbourne is located north of Gowrie, to the west of the Camp Road and Hume Highway intersection, as shown in Figure 5-35.

The station would be located adjacent to the Upfield metropolitan rail line between Upfield and Gowrie stations. Broadmeadows station on the Craigieburn line is three kilometres west of the HSR station. Four bus routes serve the area, including the orbital Smartbus route 902 which links with Broadmeadows station in the west and Doncaster, Glen Waverley and Chelsea in Melbourne’s east and south. If the access route via Jacana were to be adopted, then the peripheral station would be at Craigieburn.
The HSR station would be constructed at surface level and oriented north–south with access from Northcorp Boulevard. Two platforms, 315 metres in length, would be provided to allow the inter-capital express to Sydney to serve the station, as shown in Figure 5-36.
Figure 5-36   Melbourne North station platform level plan
Forecast demand at the Melbourne North HSR station is 5.4 million passengers per year and up to 1,500 HSR passengers in the peak hour by 2065. This amounts to 16 per cent of the overall demand for HSR in Melbourne. There would be no requirement for additional access infrastructure at these demand volumes.

Parking demand would be driven by the high private car access for Melbourne residents (over 50 per cent) requiring 7,300 parking spaces. Public transport would be used by few HSR passengers to access Melbourne North HSR station. Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-37.

5.6 Regional stations

5.6.1 Regional station characteristics

These stations are relatively simple in nature, located on the outskirts of the towns that they serve and, with the exception of Gold Coast, consist of two 215 metre platforms and through lines for non-stopping trains.

There are 12 regional HSR stations proposed, as shown in Table 5-2. The demand forecasts assume no fixed link public transport access to HSR stations, as most stations (apart from the Gold Coast station) are remote from frequent local public transport routes. To provide an attractive alternative to private car use for HSR passengers, a high quality coach link is proposed (similar, for example, to the existing Melbourne SkyBus service) between the regional centres and the
HSR station to meet the key trains each day. This approach would help to encourage the use of public transport to access the HSR system.

A visualisation of an indicative regional station is illustrated in Figure 5-38.

Table 5-2  Regional station summary

<table>
<thead>
<tr>
<th>Regional station</th>
<th>Proposed location</th>
<th>Distance to the nearest town centre by road</th>
<th>Car park spaces (2065)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Coast</td>
<td>Adjoining existing Robina railway station</td>
<td>12 km to Burleigh Heads 13 km to Surfers Paradise 18 km to Southport 25 km to Coolangatta/Tweed Heads</td>
<td>3,700</td>
</tr>
<tr>
<td>Casino</td>
<td>West of Casino, north of Bruxner Highway</td>
<td>9 km to Casino 40 km to Lismore</td>
<td>2,200</td>
</tr>
<tr>
<td>Grafton</td>
<td>Southeast of Grafton, south of Grafton Airport</td>
<td>13 km to Grafton</td>
<td>800</td>
</tr>
<tr>
<td>Coffs Harbour</td>
<td>West of Bonville, south of Valery and Gleniffer Rds</td>
<td>15 km to Coffs Harbour</td>
<td>1,900</td>
</tr>
<tr>
<td>Port Macquarie</td>
<td>West of Pacific Highway, north of Oxley Highway</td>
<td>10 km to Port Macquarie</td>
<td>1,200</td>
</tr>
<tr>
<td>Taree</td>
<td>East of Taree, north of Old Bar Rd</td>
<td>9 km to Taree</td>
<td>1,100</td>
</tr>
<tr>
<td>Newcastle</td>
<td>Cameron Park, east of Sydney-Newcastle Freeway</td>
<td>20 km to Newcastle City Centre 25 km to Maitland</td>
<td>8,400</td>
</tr>
<tr>
<td>Central Coast</td>
<td>West of Sydney-Newcastle Freeway, north of Ourimbah interchange</td>
<td>10 km to Wyong 12 km to Gosford</td>
<td>6,600</td>
</tr>
<tr>
<td>Southern Highlands</td>
<td>North east of Mittagong Airport</td>
<td>5 km to Mittagong 10 km to Bowral 20 km to Moss Vale</td>
<td>8,300</td>
</tr>
<tr>
<td>Wagga Wagga</td>
<td>South of Wagga Wagga City Airport, east of Elizabeth Avenue</td>
<td>13 km to Wagga Wagga</td>
<td>2,300</td>
</tr>
<tr>
<td>Albury-Wodonga</td>
<td>Barnawartha North, northwest of Murray Valley Highway/Hume Highway interchange</td>
<td>20 km to Wodonga 25 km to Albury</td>
<td>4,200</td>
</tr>
<tr>
<td>Shepparton</td>
<td>East of Shepparton, north of Midland Highway, west of Pine Lodge South Rd</td>
<td>10 km to Shepparton</td>
<td>2,600</td>
</tr>
</tbody>
</table>
5.6.2 Gold Coast station
The Gold Coast HSR station would be located on a spur off the main line, and would be served by trains travelling from Sydney. This station is forecast to attract 9.5 million passengers per year and 2,600 in the peak hour in 2065. There would be up to seven HSR service arrivals or departures in any hour and this would require three platforms.

The Gold Coast station is proposed to be located near to the existing Robina station, as shown in Figure 5-39. The station is close to Robina Hospital, and has good vehicular connection to local and arterial roads.
The HSR station location is well served by local public transport and is adjacent to the Citytrain station at Robina. Travel to and from the HSR station is expected to be shared among modes as shown in Figure 5-40.

The taxi mode share is the highest for any of the HSR stations, apart from Canberra. For over two-thirds of HSR passengers using this station, the Gold Coast is the ‘destination’, as opposed to the ‘home’, end of the trip. Since car availability is likely to be highest at the ‘home’ end, the park and ride mode share for HSR passengers is relatively low. To meet the projected demand, 3,700 car parking spaces would likely be required. The Gold Coast HSR station is expected to become a significant public transport interchange for bus and local rail services, with public transport potentially capturing up to ten per cent of the Gold Coast station access/egress for HSR passengers.
5.7 Conclusion

HSR demand would be strongly focused on the capital cities. Location of HSR stations at existing main termini would provide good accessibility and promote public transport for onward travel to and from HSR stations.

Further analysis of station capacity would be required should the HSR program progress through subsequent development stages. However, analysis in this study indicates that, with careful planning, the capital city termini could accommodate HSR demand and facilities as the network develops.

At Brisbane this would require the provision of new platforms on the site of the existing transit centre, and at the Gold Coast a new station would be provided adjacent to the existing Robina station. Sydney would require construction of new platforms and facilities beneath the existing concourse at Central station. At Canberra, a completely new station could be provided in the median of Ainslie Avenue, providing good access to Civic. The area occupied by the existing platforms one to five at Melbourne’s Southern Cross station would need to be reconfigured and extended.

There is no requirement for significant additional major public transport infrastructure to provide access to the preferred city centre stations. Modifications would, however, be required at all city locations to cater for the increased demand from HSR.

Regional stations have generally been located outside existing developed areas, where they would be well served by the regional highway network and where parking could be provided with minimal impact on existing communities. Access to regional stations would be predominantly by car and taxi.