

the  
opportunity

# 2.0 Urban public transport

## STRATEGIC OBJECTIVE

**Connect a growing population to Sydney's job centres, support mobility and minimise the productivity impacts of poor connectivity and increasing congestion**

## KEY CHALLENGES

- Serve Sydney's growing population and provide the mobility and connectivity needed to sustain economic growth and urban productivity
- Improve access to Global Sydney and support growth in Sydney's emerging centres
- Optimise the performance of the existing network
- Build future network capacity that keeps pace with demand and meets the needs of businesses and households

## OPPORTUNITY

### KEY Infrastructure NSW RECOMMENDATIONS

### COSTS & FUNDING

#### Sydney's Rail Future

- Deliver the Sydney's Rail Future Stage 2 program, including the Western Sydney Rail Upgrade Program
- Consider non-capital options to relieve pressure on the system during peak periods

Reservation of up to \$1 billion from the *Rebuilding NSW* initiative

#### Sydney Rapid Transit

- Fund Sydney Rapid Transit
- Complete the final business case for the project by early 2016
- Consider additional stations to support urban renewal

Reservation of \$7 billion from the *Rebuilding NSW* initiative

#### Improve connectivity to global centres

- Invest in Bus Rapid Transit and Bus Priority programs
- Assess how Sydney Light Rail could be extended over a 10-20 year timeframe, including whether it could support urban renewal and densification along key corridors
- Develop a Mainline Acceleration Program to improve journey times between Sydney and the Central Coast and Illawarra, focusing on operational and fleet improvements and potential long-term targeted infrastructure upgrades
- Commence feasibility studies for the long-term future augmentation of the rail network (in greenfield and established areas) and reserve identified corridors

Reservation of \$300 million from the *Rebuilding NSW* initiative

Cost of planning is not material

Cost of planning is not material

See *Corridor Reservation Funding Program* (Chapter 11)

#### Improve connectivity to Parramatta and Western Sydney

- Improve public transport provision between Parramatta and other major employment centres (including Sydney's CBD) and residential areas
- Develop a long-term transport improvement program for the Parramatta CBD and to service Western Sydney by the end of 2015

Reservation of \$600 million from the *Rebuilding NSW* initiative (in addition to \$400 million announced in the 2014 State Budget)

## Snapshot

- In 2013, 635.4 million public transport trips were made in the metropolitan Sydney area, with the average person travelling 12,400 km.
- 17.6 million trips are made every work day in Sydney, of which:
  - 945,000 are by rail
  - 1,058,000 are by bus
  - 3.5 million are walking, ferry and light rail
  - 12.1 million are by vehicles
- The proportion of journeys to work by public transport in the Sydney Metropolitan Region is 23.4 per cent.
- 65 per cent of rail journeys and 64 per cent of bus journeys are made in the peak.
- 50 per cent of rail passengers during the morning peak alight in the Sydney CBD.
- Overall rail usage increased by 2.6 per cent in 2013/14, although morning peak rail patronage grew by 3.0 per cent. Looking ahead, rail patronage in the morning peak is forecast to grow by 2.7 per cent a year over the next 20 years.
- Bus usage grew at 1.9 per cent in 2012/13 and is forecast to grow at 1.4 per cent a year to 2031.

## 2.1 Summary

Public transport is critical to urban productivity, expanding labour market catchments, supporting job-matching between firms and employees, reducing congestion and increasing economic and social mobility across the city. Public transport is best suited to serving concentrated, high volume flows of people to and from established centres. It is less suited to serving dispersed cross-city or local trips.

Demand for public transport in the metropolitan area, particularly for rail, is forecast to grow faster than general transport demand over the next two decades. Operational improvements and capital investment will be needed to tackle projected overcrowding and maintain service reliability on key rail lines.

Infrastructure NSW supports the Government's plans to accommodate growth in rail demand through the implementation of Stage 2 of Sydney's Rail Future (SRF2). Infrastructure NSW considers that the SRF2 program is being planned thoroughly, has strategic merit and – subject to detailed business case development of its constituent projects – should be a priority for additional investment in Sydney's rail network. Infrastructure NSW recommends reserving \$1.0 billion from the *Rebuilding NSW* initiative to accelerate the SRF2 program, including the Western Sydney Rail Upgrade Program.

While the SRF2 program is a priority, Infrastructure NSW notes the cost of planning the rail investment program to accommodate peak hour demand and recommends that Transport for NSW give further consideration to non-capital options to relieve pressure on the system during peak periods prior to the Western Sydney Rail Upgrade program being fully delivered.

Sydney Rapid Transit aims to make a 'step change' in the capacity of the rail system to connect people to the CBD. Infrastructure NSW considers that the Sydney Rapid Transit (SRT) project has strategic merit and recommends reserving \$7 billion from the *Rebuilding NSW* initiative to enable the delivery of this once-in-a-generation investment.

Improved transport connections to Parramatta will support its role as Sydney's second CBD and support access to the region's university and health precincts and urban renewal areas. Bus rapid transit and, potentially, light rail will support better connectivity between Parramatta and its surrounding suburbs and centres. Infrastructure NSW recommends a reservation of \$600 million from the *Rebuilding NSW* initiative (in addition to existing commitments) to improve public transport provision between Parramatta and other major employment centres and residential areas.

Infrastructure NSW also recommends giving priority to a number of investments to improve connectivity to Sydney's global centres, built around the centrepiece of the Core Bus Network. A reservation of \$300 million should be made from the *Rebuilding NSW* initiative for investment in Bus Rapid Transit (BRT) and Bus Priority programs, with detailed business cases informing relative BRT priorities in the Sydney metropolitan area.

Through integrated transport and land use planning, public transport can improve land use productivity – for example, by supporting urban renewal and higher population densities around rail stations. Capturing some of this benefit could provide an important funding source for future infrastructure investment. A test case for this approach could be the proposed long-term extension of the Sydney Light Rail project along Anzac Parade to Maroubra and Malabar.

Other recommended initiatives include:

- A Mainline Acceleration Program for the Central Coast and Illawarra regions, recognising that train speeds between Sydney and communities in these regions are slow by international standards
- The commencement of feasibility studies for the long-term future augmentation of the rail network (in greenfield and established areas), with identified corridors reserved for the future.

## 2.2 Progress since 2012

Since 2012, the NSW Government has sought to modernise the State's public transport network by:

- Restructuring transport agencies and creating separate operating agencies to provide metropolitan and Intercity/regional rail services
- Prioritising a customer-centric culture through initiatives such as the Fixing the Trains and the Station Refresh programs
- Implementing new timetables that have added an extra 1,190 weekly train services, 9,200 weekly bus services and 220 weekly ferry services since 2011<sup>33</sup>
- Introducing 78 new Waratah trains on the Sydney rail network
- Progressing the roll out of Opal electronic ticketing
- Progressing the construction of the South West Rail Link (due to open in 2015) to connect the South West Growth Centre to the existing Sydney Trains network and to support greenfield housing growth
- Awarding contracts for the delivery of the North West Rail Link (due to open in 2019), which will offer a rapid transit service for one of the fastest growing subregions of Sydney
- Progressing the procurement of Sydney Light Rail (due to open in 2019), which aims to better connect the key education, health care and sports precincts of south east Sydney while encouraging the ongoing revitalisation of the western flank of Sydney's CBD.

33. NSW 2021 Performance Report 2014/15

### Opal electronic ticketing

As of October 2014, the Opal electronic ticketing system has been rolled out to all ferry wharves, Sydney Trains and NSW TrainLink Intercity stations, and 3,860 buses. There has been a step-change in use, up from 45,000 registered users at the start of the year to one million by October.

Experience from other jurisdictions suggests that Opal will have a profound impact on how people use the public transport system. In London, the introduction of the Oyster smart ticketing system led to a significant growth in off-peak use, as people took advantage of the system's convenience for leisure trips.

Opal also offers the additional opportunity to better manage demand across the system – for example, by increasing the use of pricing signals to encourage those who can to travel outside of peak periods.

## 2.3 Ongoing challenges

Sydney's increasing population requires improved mobility to sustain the city's economic growth and urban productivity. The population of the metropolitan area is expected to grow from 4.3 million to 5.9 million by 2031,<sup>34</sup> with infill development expected to accommodate a significant proportion of this growth (see Figure 2.1).

Consistent with a growing population, employment activity is also forecast to grow, with the number of jobs expected to increase from 2.2 million to 3 million by 2031. As in other major cities, economic growth in Sydney is increasingly concentrated in key centres, particularly the Sydney CBD and the wider Global Economic Corridor.

Jobs located in these clusters contribute more to the economy than jobs elsewhere, with the average productivity of a job in Sydney's CBD being 64 per cent higher than the median for the overall metropolitan area.<sup>35</sup> To date, there is no evidence that technology is undermining the value people place on face-to-face interaction or reducing the need for people to travel to major centres for employment and wider business activity.

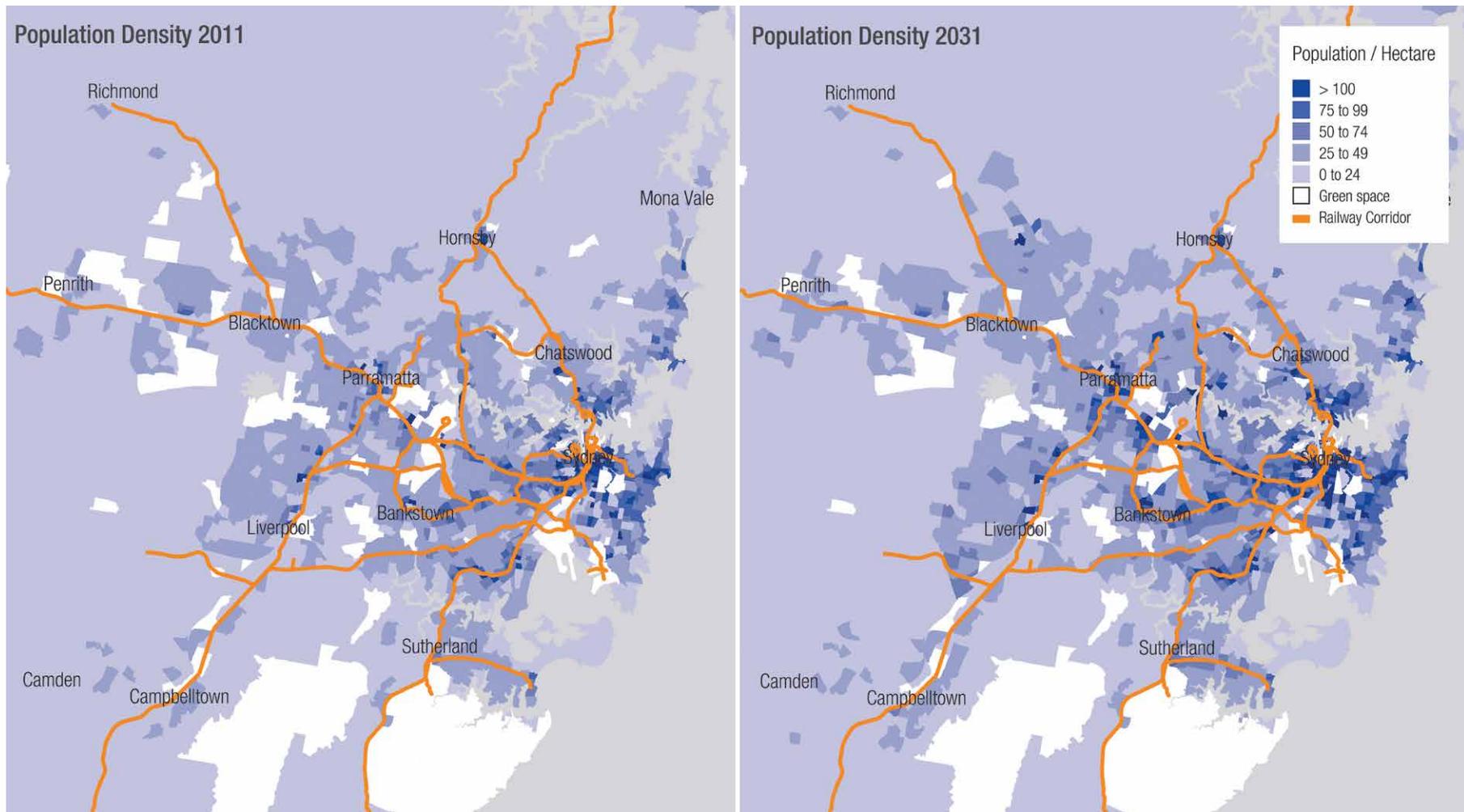
Around the world, effective public transport has been shown to be important in enabling and reinforcing urban densification and economic agglomeration. This is reflected in the mode share to Sydney's key employment centres, with public transport already accounting for around three-quarters of journeys to work to the CBD.<sup>36</sup> Rail is the most effective mode for enabling access to

34. NSW Department of Planning and Environment, 2014 population projections

35. Grattan Institute 2014, *Mapping Australia's Economy*

36. BITRE 2013, Information Sheet 59

**Figure 2.1 Forecast population density change in the Sydney metropolitan area (2011-31)**



Source: Infrastructure NSW

the CBD, with just two passenger trains able to carry more people than a single motorway lane carries in a typical peak hour.<sup>37</sup>

### 2.3.1 Keeping pace with demand

Transport for NSW forecasts that demand for public transport, particularly for rail, in the metropolitan area will grow faster than general transport demand over the next two decades.

Demand for rail travel is forecast to grow by 2.6 per cent a year over the next 20 years – a cumulative increase of over 50 per cent – compared with 1.4 per cent a year for the transport system as a whole.<sup>38</sup>

Demand for peak travel to the Sydney CBD and North Sydney is expected to grow at a comparable rate, with forecast growth of up to 2.7 per cent a year for morning peak rail journeys to these centres over the next 20 years.<sup>39</sup>

This strong forecast growth in demand is driven by various factors, including urban densification, congestion on parts of the road network and the anticipated opening of new rail links (the North West and South West Rail Links) serving established and greenfield areas.

Without intervention, this growth in demand will lead to significant and sustained overcrowding on key rail lines and at major stations during peak periods. For example, at Town Hall Station, passenger movements during the morning peak hour are forecast to rise from

approximately 34,000 in 2011 to 46,000 in 2031.<sup>40</sup> Train and platform overcrowding can delay passengers alighting, with systemic impacts on the reliability and capacity of the wider rail network as shown in Figure 2.2.

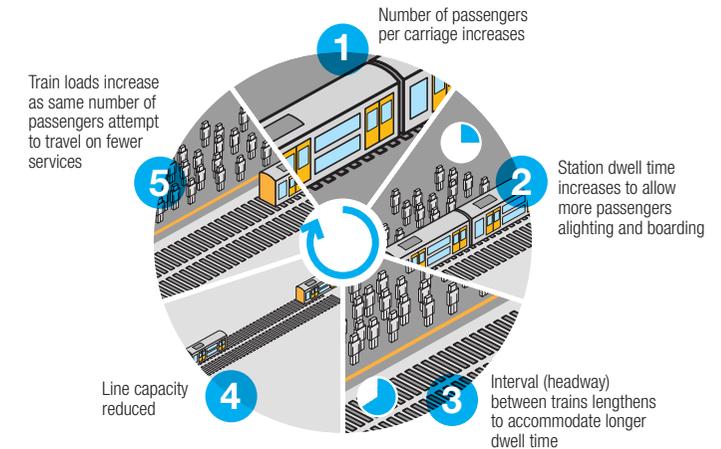
Figures 2.3 and 2.4 show the forecast change in the morning peak hour crowding across the rail network under a ‘do minimum’ investment scenario from 2011 to 2036.

This analysis shows that the most significant areas of overcrowding are forecast to be on the Western Line and East Hills Line, and, to a lesser extent, the Bankstown, Lower Northern and North Shore Lines.

Infrastructure NSW has viewed the rail demand forecasts and, on balance, considers them reasonable and consistent with expected land use change, the extension of the rail network into new areas and the growth experienced in Sydney and on equivalent networks elsewhere. Sydney’s rail network experienced morning peak demand growth of 3.0 per cent in 2013, while patronage growth in Melbourne averaged 5.1 per cent per annum over the last decade.<sup>41</sup>

Infrastructure NSW notes the importance of addressing rising peak demand on Sydney’s rail network. The Government’s investment plan for accommodating this growth is evaluated below, along with a discussion of potential options that could be advanced in parallel to spread peak demand and make better use of existing capacity outside of peak periods.

**Figure 2.2 Impact of crowding on reliability**



Source: Transport for NSW

37. Bureau of Transport Statistics 2014 (based on average vehicle occupancy of 1.1 for trips to work)

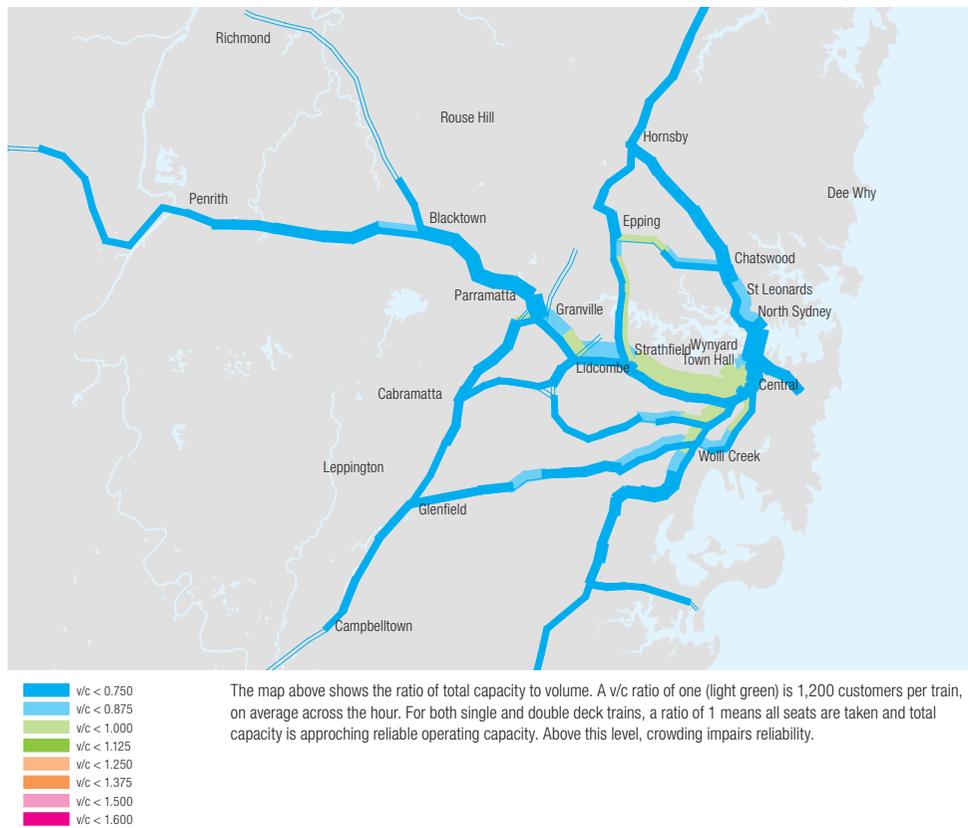
38. Transport for NSW

39. Transport for NSW

40. NSW Government 2012, *Sydney’s Rail Future*

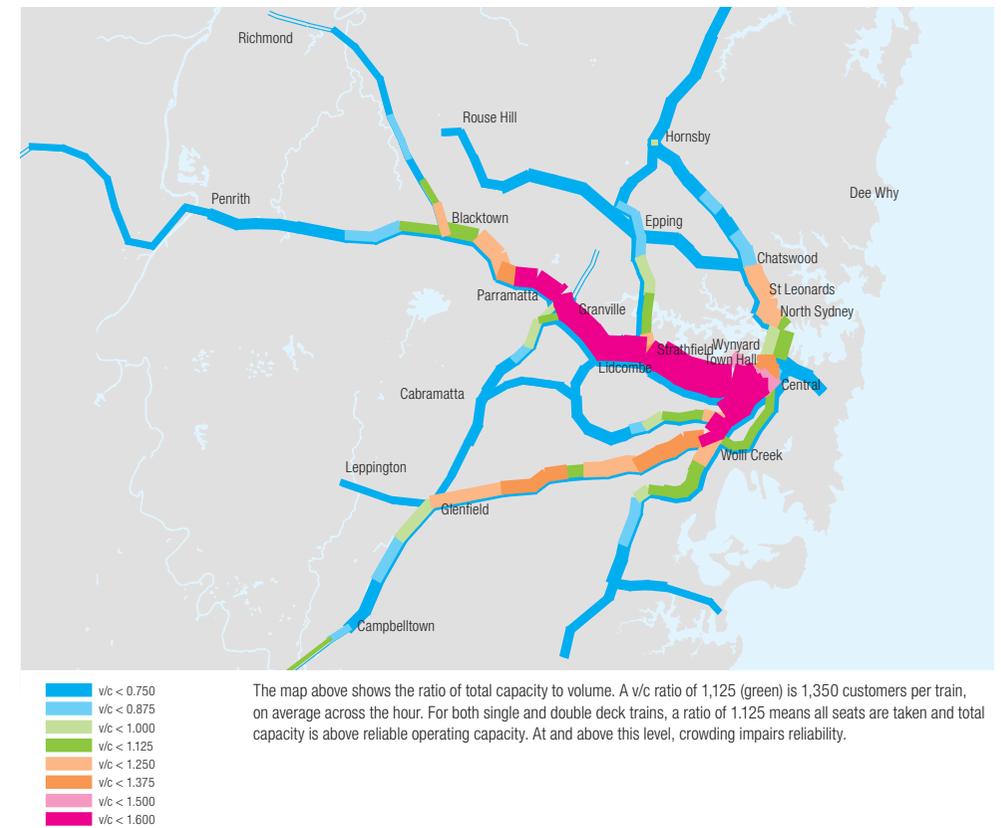
41. Public Transport Victoria Annual Report 2012/13

**Figure 2.3 Train crowding morning Peak Hour (2011)**



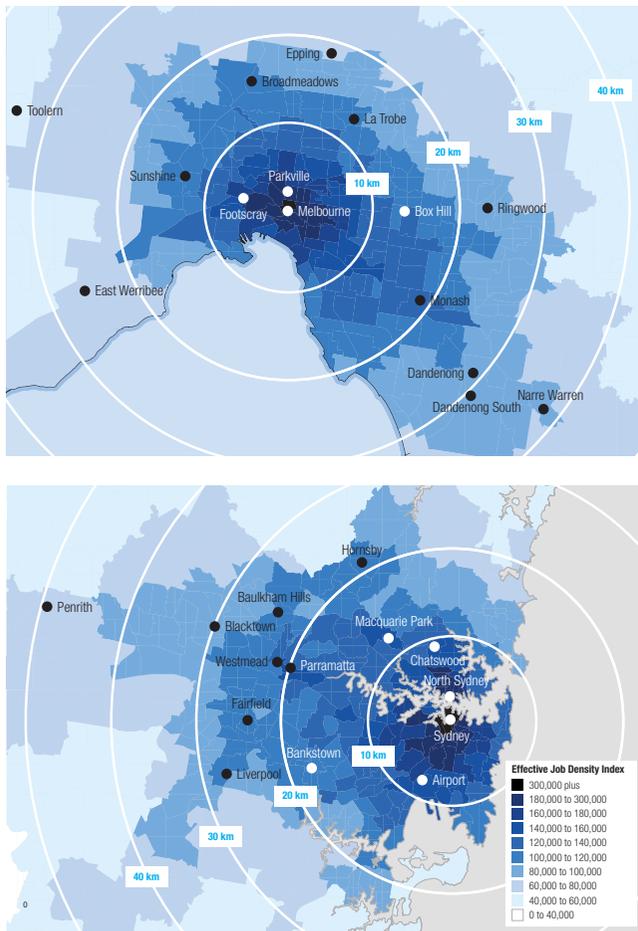
Source: Transport for NSW

**Figure 2.4 Train crowding morning Peak Hour (2036), 'do minimum' scenario.**



Source: Transport for NSW

**Figure 2.5 Effective job density in Melbourne and Sydney**



Source: SGS Economics and Planning

### 2.3.2 Access to Sydney's global centres

Sydney benefits from having an established public transport network, including 176 rail stations<sup>42</sup> and over 600 bus routes,<sup>43</sup> along with ancillary modes such as light rail and ferries.

While this network is extensive, the level of service it offers varies considerably by area. Figure 2.5 compares the effective job density of Sydney with Melbourne. Effective job density is a measure of the ability of a given location to access the overall economic mass of a city. Sydney scores relatively poorly on this measure, primarily due to the limitations created by the city's extensive topographical pinch points against Melbourne's simpler concentric geography.

Sydney's geography – and its implications for rail provision in particular – result in large parts of the metropolitan area, such as outer Western Sydney and the Northern Beaches region, being relatively poorly connected by public transport to Sydney's global employment centres.

Partly as a result, around two-thirds of CBD commuters live in Sydney's inner sub-regions of the Eastern Suburbs, Lower North Shore, City and Inner West, despite these areas comprising only about a quarter of the metropolitan area's total population.<sup>44</sup>

Lack of access to employment impairs productivity by reducing the labour pool upon which employers can draw. It has also been shown to correlate with higher rates of social exclusion.

Increasing access to Sydney's Global Economic Corridor can be achieved through improvements to transport and through land use changes, such as transit-orientated development around existing rail stations. For example, 1,150 dwellings have been built on brownfield sites near Wollri Creek station in the past decade,<sup>45</sup> taking advantage of this suburb's 15 minute commute to the CBD.

Improving public transport provision will also help improve accessibility to employment. However, as the \$8.3 billion North West Rail Link scheme has shown, major projects are expensive and have long lead times in a hilly, harbour city with few preserved corridors.

In the short to medium term, for areas of Sydney without access to light rail or rail, high costs and long lead times mean that the focus should be on improving the speed and reliability of bus services – for example, by implementing bus priority measures. Bus priority investment can be delivered as part of a long-term, staged approach to increasing corridor capacity, as and when required. This can involve a continuum of services, where bus capacity is progressively improved through infrastructure and service enhancements before an upgrade to BRT and, beyond that, to light rail or heavy rail.

The benefit of this approach is that investment can be optimised by increasing capacity as required, using existing assets and avoiding premature capital outlay. However, it is critical that infrastructure upgrades are planned and delivered commensurate with increases in

42. Sydney Trains, [www.sydneytrains.info/about/facts](http://www.sydneytrains.info/about/facts)

43. Transport for NSW 2013, *Sydney's Bus Future*

44. Bureau of Transport Statistics, 2011, *Journey to Work Data*

45. Australian Bureau of Statistics, *Census of Population and Housing 2001 and 2011*

demand and in a way that considers the potential long-term transition to BRT, light rail or heavy rail to minimise sunk costs.

### 2.3.3 Supporting the growth of Sydney's emerging centres

Public transport has an important role to play in supporting the development of emerging centres outside of Global Sydney and the revitalisation of their surrounding neighbourhoods.

As Chapter 1 notes, Parramatta is pre-eminent in this regard, acting as an important second CBD and the largest employment centre for Western Sydney. The Parramatta LGA already employs over 114,000 people and is forecast to grow by 30 per cent by 2031.<sup>46</sup> However, in 2011, just 37 per cent of work journeys to the Parramatta CBD were by public transport.<sup>47</sup>

Supporting the development of Sydney as a polycentric city requires improved public transport access to centres such as Parramatta, as well as better connections between these centres and the Global Economic Corridor.

46. Bureau of Transport Statistics 2014, Employment Forecasts

47. Bureau of Transport Statistics 2011, Journey to Work Data

## 2.4 Addressing the challenges

Addressing the challenges described above requires action on a number of fronts including optimising the network's performance, build capacity and improve connectivity to Sydney's established and emerging global centres.

### 2.4.1 Optimising network performance

#### Sydney's Rail Future

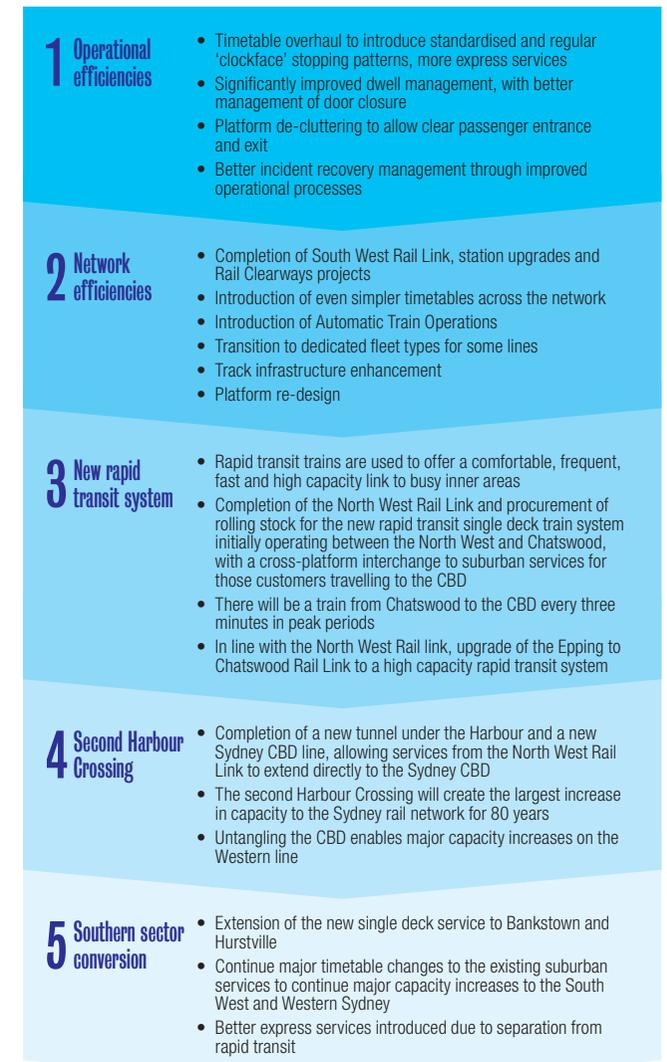
The Government's strategy to accommodate demand growth across the rail network is set out in Sydney's Rail Future. This long-term plan, published in June 2012, aims to improve the customer experience, network reliability and service frequencies across the network though investment in new services, increased capacity and upgraded infrastructure.

A key feature of Sydney's Rail Future was the proposal to introduce a three-tier rail network, reflecting the different types of services needed for different market segments: a rapid-transit service, a conventional suburban service and an intercity service. This segmentation of the rail network will also simplify some of the operational challenges associated with the current network, and improve its efficiency and reliability.

Sydney's Rail Future sets out five stages of network development, shown in Figure 2.6.

With Stage 1 (operational efficiencies) largely implemented, and Stage 3 (North West Rail Link) under construction, Infrastructure NSW has focused in this Report on assessing the proposed investments in Stages 2, 4, and 5.

Figure 2.6 Sydney's Rail Future stage of development



Source: Sydney's Rail Future 2012, Transport for NSW

Stage 2 of Sydney's Rail Future (SRF2), which encompasses the Western Sydney Rail Upgrade Program and procurement of new Intercity rolling stock, focuses on providing greater capacity for the rail network, reducing overcrowding, network capacity constraints, and operational complexity at key points on the network. It is also designed to integrate the North West and South West Rail Links into the wider network.

Stages 4 and 5 of Sydney's Rail Future focus on the extension of the Rapid Transit System to the CBD and Sydney's south west and south, through the construction of a second Harbour Crossing and a western extension to Bankstown – collectively referred to as 'Sydney Rapid Transit'.

### **Delivering network efficiencies: Sydney's Rail Future Stage 2**

SRF2 features a number of separate projects at varying stages of development for implementation over the next decade. The key elements of the program include:

- The Western Sydney Rail Upgrade Program, which includes:
  - the T1 Corridor Infrastructure Program, which targets capacity constraints on the Western and Northern Lines (representing 30 per cent of all Sydney rail journeys) by upgrading traction supply, amplifying track and lengthening platforms on the corridor. Demand is forecast to grow faster for the T1 rail lines than for the rail network as a whole

- Advanced Train Control, an integrated system for signalling, train protection and train control that focuses on increasing service frequencies and capacity on parts of the network

- New rolling stock for Intercity services to replace ageing trains and deliver improved reliability and resilience.

The Western Sydney Rail Upgrade Program will deliver civil and electrical infrastructure on the T1 corridor to enable longer (12 car) Intercity trains to operate and to improve the separation of Intercity and suburban services, increasing capacity west of Strathfield. This is intended to complement the Sydney Rapid Transit project, which is Transport for NSW's preferred option for addressing constraints between Strathfield and the Sydney CBD.

In conjunction with Sydney Rapid Transit, the SRF2 program, as currently costed, has an indicative benefit-cost ratio of 1.6.

Infrastructure NSW considers that the SRF2 program is being planned thoroughly, with Transport for NSW preparing a separate business case for each element and establishing governance structures to coordinate the overall investment program. This process should seek to maximise value for money by testing alternatives for each element and identifying potential efficiencies for this program as its development moves to the implementation stage.

## Recommendation

Infrastructure NSW recommends a reservation of up to \$1 billion from the *Rebuilding NSW* initiative should be made for the Western Sydney Rail Upgrade Program (SRF2).

Overall, Infrastructure NSW concludes that the SRF2 including the Western Sydney Rail Upgrade Program has strategic merit and, subject to detailed business case development of its constituent projects, should be a priority for additional investment in Sydney's rail network. The program effectively addresses the immediate challenges created by rapidly growing demand on the T1 corridor, while providing for key upgrades including North West Rail Link and, longer-term, Sydney Rapid Transit.

Further development work is required on individual projects within the SRF2 program, as would be expected for a 10-year delivery program. Final business cases for many of the more complex elements of the program, such as signalling upgrades, will not be complete for up to 18 months. Individual projects will need to be justified on their merits within the overall program as part of this investment assurance process.

While the SRF2 program is identified as a priority, Infrastructure NSW has concerns over the longer term about the sustainability of matching the rail investment program to accommodate peak hour demand. Relative to other major cities, rail demand is ‘peaky’ in Sydney, suggesting it could be possible to spread demand at the margins without unduly inconveniencing rail users.

Non-capital measures that could assist in relieving peak demand include:

- **Extending pricing differentials for journeys outside of the peak hour** – The new Opal card offers off-peak prices on trains, as well as caps and loyalty rewards. Transport for NSW is currently assessing how far these measures have spread demand. There may be opportunities to increase the pricing differential offered between services in the one-hour AM peak and shoulder peak services, taking account of any social equity implications.
- **Additional services in the ‘shoulder peak’** – More frequent services in the shoulder peak tend to correlate to higher demand as passengers benefit from ‘turn up and go’ services. For example, the 2013 timetable scheduled additional services on the Western Line, which led to a 5 per cent shift in demand out of the morning peak hour, the equivalent of more than two years of patronage growth.<sup>48</sup> This option is not ‘cost free’: additional rolling stock may be required to provide these services on some lines.

48. Transport for NSW

## Recommendation

Infrastructure NSW recommends that the Government give further consideration to non-capital options to relieve pressure on the system during peak periods prior to the Western Sydney Rail Upgrade program being fully delivered.

### 2.4.2 Building future capacity: Sydney Rapid Transit

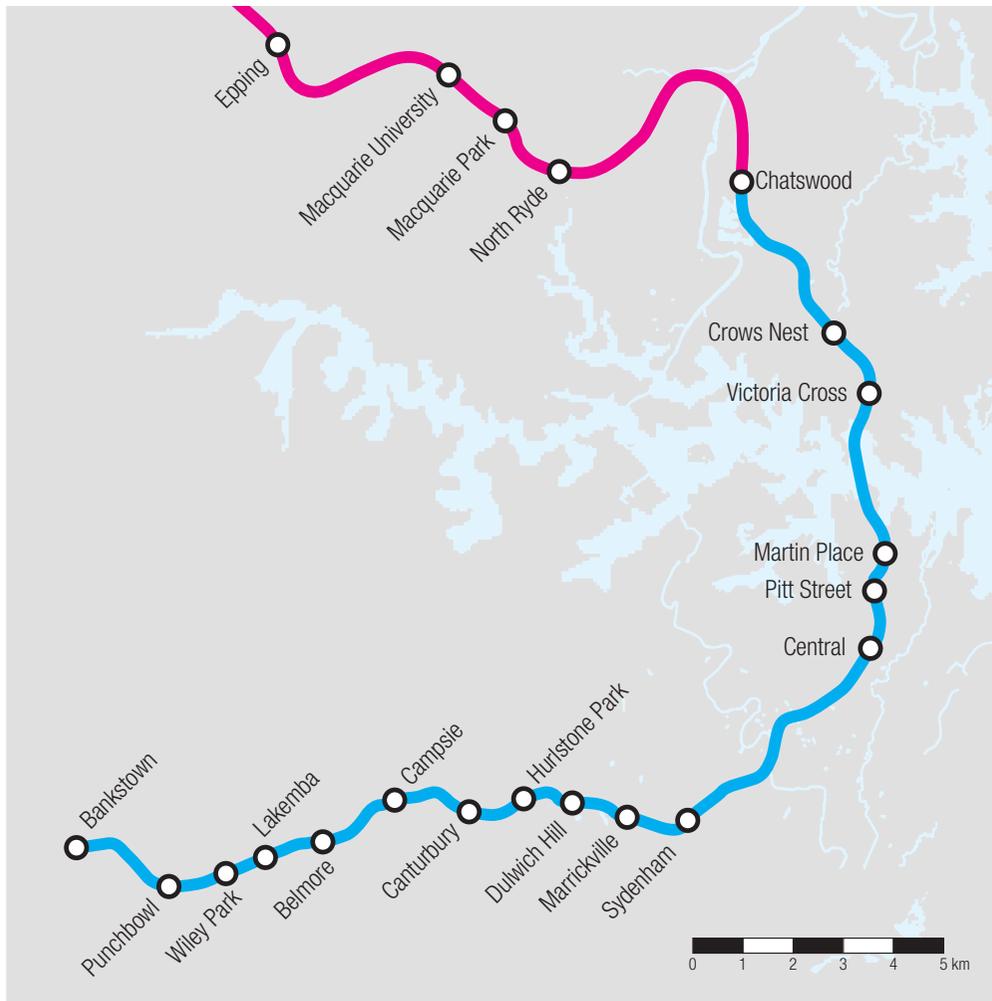
The Premier has identified Sydney Rapid Transit (SRT) as a strategic priority for consideration in the 2014 State Infrastructure Strategy Update.

This major project, currently estimated to have a capital cost of between \$9.6 billion and \$11 billion (factoring in planned property sales), proposes to extend the North West Rail Link rapid transit service under Sydney Harbour, through the Sydney CBD and west to Bankstown. Funding of \$3.4 billion is already earmarked for the project in Transport for NSW’s 10 year capital plan; \$10.4 billion represents a reasonable mid-range estimate of the project’s total costs.

The project comprises:

- Northern Corridor Works – a three kilometre above ground section of new track in the existing rail corridor between Chatswood and the St Leonards area
- Sydney Harbour Crossing – a 12.5 kilometre tunnel section from the St Leonards area under Sydney Harbour to Sydenham, including new underground rapid transit stations on the North Shore (Crows Nest and Victoria Cross) and in the CBD (Pitt Street), and rapid transit platforms at Martin Place and Central stations)
- A Western Extension to Bankstown – upgrading the existing 13.4 kilometre rail line from Sydenham Station to Bankstown Station to support rapid transit operations.

**Figure 2.7 Sydney Rapid Transit – Core Scope**



Source: Transport for NSW

Figure 2.7 shows the proposed core scope for SRT in blue.

SRT targets a ‘step change’ in the capacity of the rail system to connect people to the CBD during peak periods, with two additional tracks through the CBD providing capacity for up to 30 trains per hour in each direction.

Combined with the Western Sydney Rail Upgrade program, the project will allow a 60 per cent increase in the number of trains accessing the CBD during the peak hour and provide the capacity to cater for an additional 100,000 passengers per hour.

Prospective benefits from this investment include:

- Growth capacity, overcrowding relief and improved network resilience across the wider rail system, benefiting users on the Western Line, Northern Line, North Shore Line, Inner West Line, Airport and East Hills Line and South Line
- Less crowded stations, with 12,000 fewer customers exiting at Wynyard and Town Hall in the morning peak hour with SRT
- End-to-end journeys on the North West Rail Link without need for interchange at Chatswood
- Enhanced connectivity through reduced travel times within the Global Economic Corridor.

Transport for NSW has recently completed a preliminary business case setting out the case for the investment, project definition, strategic options to expand the scope, project benefits and an initial delivery strategy. The economic assessment completed for the business case identifies an indicative benefit cost ratio of 1.3 – or 1.8 when wider economic and land use benefits are taken into account.

Infrastructure NSW considers that the SRT project has strategic merit. It will benefit North West Rail Link users by reducing transfer penalties at Chatswood interchange and will provide significant relief for the Western Line, North Shore Line and City Circle corridor, as well as to crowded CBD stations (which would otherwise need expensive upgrades). It will also deliver significantly improved capacity and performance across the wider network.

Critical issues relate to the precise timing and sequencing of the project, the rate at which peak period demand will increase and the ability of lower cost measures to spread demand or otherwise mitigate these impacts. Much depends on the levels of crowding on the train system that commuters are prepared to tolerate, and the impact of those crowding levels on the overall reliability of the system. The SRT project highlights the challenges associated with planning new infrastructure capacity around narrowly concentrated periods of peak usage.

With additional funding being made available, Transport for NSW estimates that the project can be brought forward by several years, commencing construction in 2017, prior to the completion of the North West Rail Link, with services to be operational by 2024–25.

The case for accelerating the delivery of SRT is that, on the basis of Transport for NSW's forecasts for growth in peak period train travel under current policy settings, the carrying capacity of significant parts of the rail network will be reached or exceeded during the busiest parts of the day within 10 years.

Despite the additional capacity that SRF2 provides, without SRT all heavy rail lines are forecast to reach capacity between 2017 and 2024. Patronage forecasts also indicate that, within the next 10 years, significant overcrowding will be experienced at Wynyard, Town Hall and Central stations for the majority of the morning peak.<sup>49</sup>

Transport for NSW's assessment of alternative, incremental improvement options is that alternatives to SRT would be costly relative to the marginal additional capacity provided. In addition, the SRF2 program alone would not address the issue of capacity constraints on the City Circle Line.

Given the scale of the costs involved, the final business case for the project, which is due for completion in early 2016, should include a thorough assessment of timing and sequencing options, robust and sensitivity-based demand forecasts and a comprehensive funding and delivery strategy, noting the depth of concurrent construction activity planned for the transport sector over the next decade. This will allow the Government to make informed decisions on the project's precise timing, scope (taking account of potential urban renewal opportunities, discussed below) and options to improve its affordability.

49. Transport for NSW 2014, Sydney Rapid Transit Business Case

## Recommendation

Infrastructure NSW recommends a reservation of \$7 billion from the *Rebuilding NSW* initiative to fund the delivery of Sydney Rapid Transit.

In finalising the scope of SRT, Infrastructure NSW believes it is important that longer term 'city shaping' considerations are taken into account as well as more immediate transport priorities.

Transport for NSW has undertaken an initial assessment of the urban regeneration opportunities that SRT could offer. A number of potential station enhancement options have been identified, as set out overleaf. As with any other investment option, each potential enhancement should be subject to rigorous cost benefit analysis prior to its inclusion in the final Sydney Rapid Transit proposal.

## SRT scope enhancement options

Infrastructure NSW sees potential merit in a number of station enhancement options under assessment by Transport for NSW for Sydney Rapid Transit:

- **Waterloo or Victoria Park** – this could support redevelopment of the rapidly regenerating Waterloo inner urban area or serve a growing employment and education area (over 50,000 students) in the University of Sydney precinct.
- **Barangaroo North** – a station in this area would support this important employment zone, along with the wider Sydney CBD and Cultural Precinct.
- **Artarmon Industrial Area** – This could help redevelop the industrial lands in this precinct, consistent with land use change.

While these options could be funded from general revenue, their nexus to land use development suggests some costs could be borne by local beneficiaries. A discussion of infrastructure funding options is included in Chapter 11.

### 2.4.3 Improving connectivity to Sydney's global centres

#### Bus Priority Infrastructure and Rapid Transit

*Sydney's Bus Future* is Transport for NSW's long-term plan to redesign the city's bus network to improve connectivity and accessibility. The centrepiece is the Core Bus Network of 13 'Rapid' and 20 'Suburban' routes, which will be the focus of service and infrastructure investment. This includes bus rapid transit (BRT) and bus priority measures.

The Bus Priority Infrastructure Program is a rolling program of infrastructure and traffic management works to improve bus network reliability and travel speeds in Sydney. To date, this program has reduced average bus travel times on corridors where it has been implemented by up to 30 per cent.<sup>50</sup>

BRT is a package of infrastructure, route, service level and fleet improvements that together provide a higher quality of bus travel for customers and support denser, public transport oriented development. In Sydney, BRT already operates on the western Sydney T-ways, connecting Rouse Hill to Blacktown and Parramatta, and Liverpool to Parramatta.

With a relatively high carrying capacity, BRT offers a mass transit solution for priority bus corridors where demand is high, but not high enough to make investing in a rail-based solution a viable alternative. BRT offers customers a 10 minute 'turn up and go' service during daytime hours and uses dedicated roadway and higher average stop spacing to achieve faster average speeds of 25 to 30 km/hour. As a measure of value, international research shows that BRT at its furthest extent can deliver similar capacity to certain rail-based services at around a quarter of the capital cost.<sup>51</sup> Transport for NSW reports that the use of dedicated busway infrastructure has led to increased average travel speeds and improvements to service reliability, with services on the Parramatta-Liverpool T-way operating at an average speed in excess of 30 km/hour.<sup>52</sup>

*Sydney's Bus Future* identifies more corridors for potential bus priority and BRT investment. These are key corridors where buses could provide mass transit services between major centres that are not served by light rail.

In the short-term, Infrastructure NSW supports a targeted program of bus priority measures for these important transit corridors focused on addressing significant 'pinch points' that can have a disproportionate impact on bus journey times in peak periods. Consistent with the continuum approach outlined above, for some corridors bus priority measures may form part of a long-term, staged approach to increasing capacity.

50. Transport for NSW 2014, Bus Priority Infrastructure Program Business Case

51. SYSTRA 2006

52. Transport for NSW 2013

**Figure 2.8 Northern Beaches BRT route**



Source: Northern Beaches Transport Action Plan

Transport for NSW has identified seven corridors where BRT may be an appropriate infrastructure solution. Analysis of potential investment options is at varying stages of development.

Figure 2.8 shows the proposed alignment for Northern Beaches BRT along the region’s north-south corridor. The adopted solution includes high-frequency services, continuous kerbside bus lanes (for peak periods initially), and dedicated customer interchange infrastructure.

While the Northern Beaches BRT appears to have strategic merit, other priority bus corridors (including along Victoria Road and Parramatta Road) also appear promising. More detailed business case development is required before final decisions are taken on the relative priorities for BRT investment across Sydney over the next two decades.

## Recommendation

Infrastructure NSW recommends a reservation of \$300 million from the *Rebuilding NSW* initiative for investment in Bus Rapid Transit and Bus Priority Infrastructure programs.

### Extending Sydney Light Rail

The CBD and South East Light Rail project, as currently scoped, extends from Circular Quay along George St to Central and then along Anzac Parade to Kingsford and Alison Road to Randwick.

An extension south of Kingsford along Anzac Parade was identified in *Sydney's Light Rail Future* as a priority corridor for further investigation. With the Government considering plans to increase urban density along the southern Anzac Parade corridor, initial analysis has been undertaken to determine whether the extension of light rail could support this initiative. This analysis examined three potential options, shown in Figure 2.9:

- A 1.9 kilometre extension to Maroubra Junction
- A 5.1 kilometre extension to Malabar
- An 8.2 kilometre extension to La Perouse.

The initial analysis shows that all three options have the potential to support higher population densities and additional jobs in the Anzac Parade South corridor while mitigating increased road congestion. Each option can also remove the 'transfer penalty' for those in the extension catchment by removing the need to interchange at Kingsford.

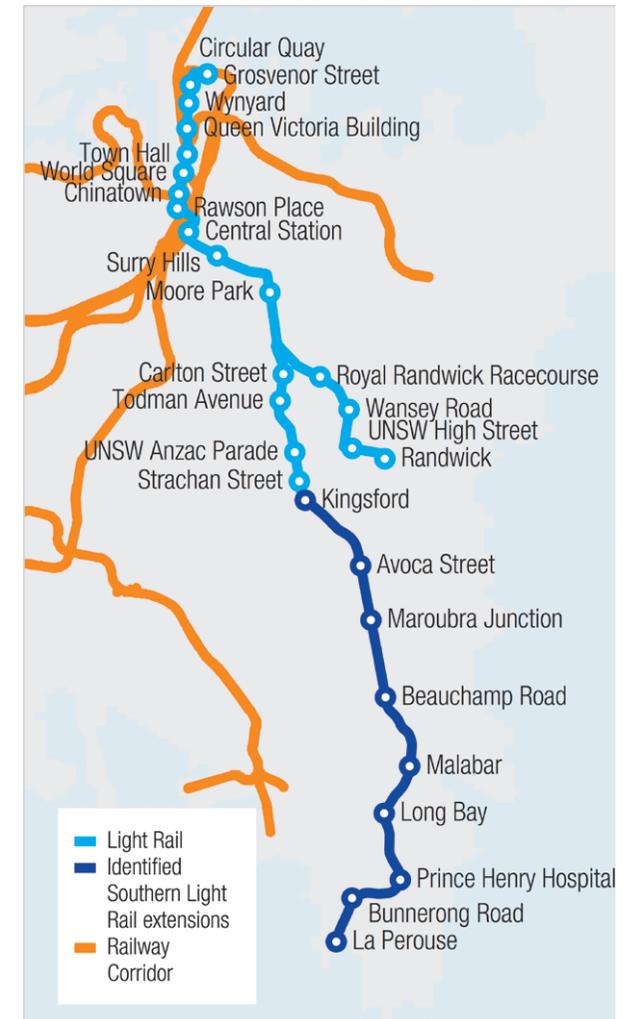
While this early analysis favours an extension to Maroubra Junction or Malabar, the option to extend to La Perouse may deliver greater urban renewal benefits as well as improved outcomes with respect to government land holdings along the corridor. Capturing some of this benefit could help to fund in part or in whole the light rail extension. A detailed preliminary business case will assist in better understanding the urban renewal and funding opportunities that each option is likely to generate.

## Recommendation

Infrastructure NSW recommends that Transport for NSW undertake a preliminary assessment of how Sydney Light Rail could be extended over the period of a 10-20 year timeframe, including whether it could support more productive land use.

The approach of integrating light rail with urban densification may also be appropriate for other urban regeneration areas. For example, in the Bays Precinct, an extension of the light rail system to White Bay may be able to be funded by – and, in turn, enable – the planned development on Government owned land in this area.

Figure 2.9 Potential Anzac Parade Light Rail extensions



Source: Transport for NSW

### **Mainline Acceleration Program for the Central Coast and Illawarra**

First Things First noted that, relative to global norms, train speeds in Sydney are slow, particularly to exurban communities such as the Central Coast and Illawarra. A trip to Wollongong, 80km from Sydney, takes 90 minutes. This limits the feasible commuter market from these areas.

Infrastructure NSW remains of the view that achieving cost effective reductions in travel times between Sydney and the Central Coast and Illawarra is desirable, notwithstanding the significant topographical constraints presented by the Hawkesbury River and Illawarra escarpment.

Analysis undertaken for Transport for NSW indicates that a substantial reduction in average journey times between Sydney and the Central Coast and Illawarra regions could be achieved over the next two decades, through a combination of:

- Operational improvements, including timetable rationalisation through the reduction of excess timetable recovery times, improved dwell management and enhancements to driver training
- New Intercity rolling stock with capacity to operate at speeds of 160km/h;
- Targeted Infrastructure upgrades, including track realignments to reduce travel distances, remove restrictive curves and reduce gradients.

Analysis to date suggests the combination of measures required to achieve the desired travel time savings would cost billions of dollars. Given significant investment commitments over the next decade, Infrastructure NSW sees merit in further assessment of options to reduce journey times without significant fixed infrastructure investment.

## **Recommendation**

Infrastructure NSW recommends Transport for NSW develop a Mainline Acceleration Program to improve journey times between Sydney and the Central Coast and Illawarra. This program should be focused:

- in the short- to medium-term, on operational and fleet improvements that can be implemented without significant additional investment.
- over the longer term, on a potential program of targeted fixed infrastructure upgrades.

### **Future extensions to the rail network**

Over the longer term, following the completion of SRT, there is potential for the rail transit network to be extended to parts of the metropolitan area currently underserved by rail and further into key growth centres (such as the South West Growth Centre and the North West Growth Centre).

Rail provision, while offering substantial connectivity benefits, is expensive to provide in an established urban area.

For many established transport corridors, heavy rail will only be economically viable with substantial increases in residential densities, particularly in areas immediately surrounding train stations ('transit-oriented development'). However, the near-term protection of rail corridors in greenfield areas will allow extensions of the network to be developed more cost effectively in the future. Priorities for corridor protection could include:

- North West Rail Link extension to St Marys/Mt Druitt via Marsden Park
- South West Rail Link extension to St Marys via Second Sydney Airport and from Bringelly to Macarthur via Narellan

## Recommendation

Infrastructure NSW recommends Transport for NSW commence feasibility studies for the long-term future augmentation of the rail network (in greenfield and established areas) and report back to the Government by the end of 2015.

## Recommendation

Infrastructure NSW recommends that once future rail network augmentations are identified and considered by the Government, those corridors are reserved for future network development.

### 2.4.4 Improving connectivity to Parramatta and Western Sydney

#### Parramatta Light Rail

Transport for NSW has begun initial planning on a Parramatta Light Rail scheme, building upon the initial feasibility work undertaken by Parramatta City Council during 2012 and 2013, which estimated the cost of construction at \$1.5 billion.<sup>53</sup> A strategic needs assessment and a corridor assessment have been completed to identify the preferred corridors. A Strategic Business Case is expected to be completed in 2015/16, which will include cost estimates and economic appraisals of options on the preferred corridors.

Initial analysis suggests that the most viable corridors for light rail (shown in Figure 2.10) are:

- To Macquarie Park, improving connectivity to the specialised employment precincts of the northernmost centres of the Global Economic Corridor
- To Castle Hill, supporting the high levels of commuter flows from the Hills District to Parramatta
- To Bankstown, supporting commuter flows to Parramatta and broader educational and social journeys
- To Sydney Olympic Park, supporting movements between Parramatta and this recreational and employment centre.

53. Parramatta City Council 2013, Western Sydney Light Rail Network Feasibility Report Part 2

As Infrastructure NSW observed in *First Things First*, Parramatta's ability to serve as Sydney's second CBD risks being constrained by poor public transport links to its north and south. The 2014/15 State Budget earmarked \$400 million to progress the development of the light rail project.

Infrastructure NSW supports a 'modally agnostic' approach to planning Parramatta's transport needs – an approach that does not give preference to one particular mode over another and that assesses light rail solutions alongside other potentially less expensive options such as BRT. Consideration is also needed of the potential benefits that a light rail solution could offer in stimulating urban regeneration – for example, by offering developers greater certainty over future service configuration and the potential to capture this value to improve project affordability.

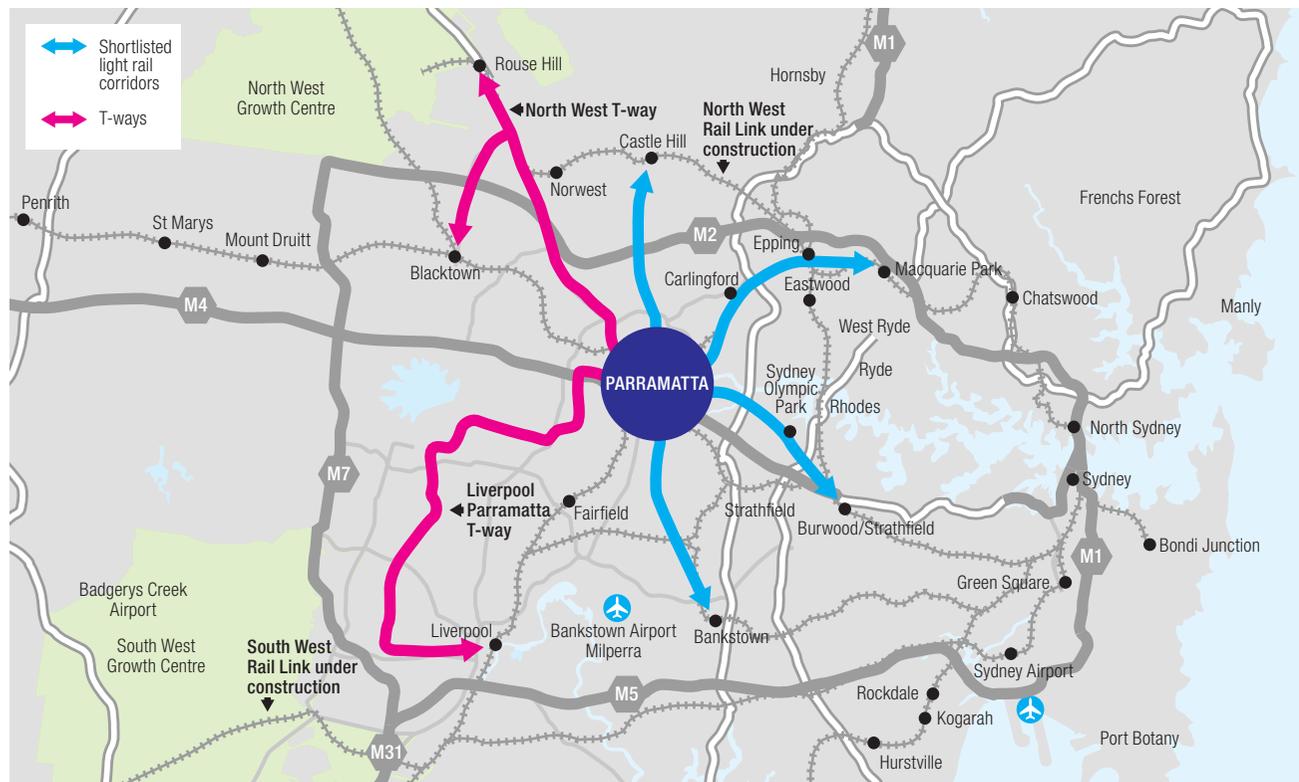
#### Faster journeys between Sydney's CBD and Parramatta

At present, rail journeys between Wynyard and Parramatta take approximately 30 minutes. A rail trip from Parramatta to Sydney Airport takes around 40 minutes, compared with 10 minutes from Central Station.

These constraints limit the potential of Parramatta to benefit from clustering that occurs elsewhere in the Global Economic Corridor and to connect to the city's global economy, hampering commercial development.

Transport for NSW has taken steps through the reworked 2013 timetable to improve the frequency of off-peak services between Sydney's CBD and Parramatta, consistent with Infrastructure NSW's recommendation in *First Things First*.

**Figure 2.10 Viable corridors for light rail**



Source: Transport for NSW

In the short- to medium-term, the SRF2 program will marginally reduce travel times between Parramatta and Sydney’s CBD. Further operational measures, including more frequent express services in the off-peak, should also be considered to improve connectivity between the Sydney CBD and Parramatta during business hours. This is critical to more effectively integrate the two CBDs and provide greater access from Parramatta to key destinations in the Global Economic Corridor, including Sydney Airport.

Over the longer-term, the aim should be to substantially reduce journey times, aiming for a 20 minute ‘CBD-to-CBD’ service.

## Recommendation

Infrastructure NSW recommends a reservation of \$600 million from the *Rebuilding NSW* initiative should be directed towards improving public transport provision between Parramatta and other major employment centres (including Sydney’s CBD) and residential areas.