

Infrastructure NSW

State Infrastructure Strategy Update 2014

**Recommendations to the NSW Government
November 2014**

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Chairman's foreword



It is with great pleasure that I provide the State Infrastructure Strategy Update to the NSW Government on behalf of Infrastructure NSW, in accordance with the Infrastructure NSW Act 2011.

Dear Premier,

On behalf of the Board of Infrastructure NSW, I am pleased to submit this update to the 2012 State Infrastructure Strategy.

This Report responds to your request that Infrastructure NSW assist the Government to identify the highest value, most needed and most productive new infrastructure projects that could be delivered if substantial additional funding becomes available from the *Rebuilding NSW* initiative.

In the two years since the 2012 State Infrastructure Strategy, many important projects have moved from concept to business case, from business case to planning approval and from planning to construction. *Rebuilding NSW* provides the opportunity for the Government to advance funding for many more high value projects and deliver benefits to the citizens and businesses of the State much earlier than would otherwise be possible.

The priority projects recommended in this Report must now be subject to the strengthened disciplines that apply to the State's major infrastructure investments to ensure best value for money for taxpayers. With clear long-term project commitments, however, several of the

recommended projects may now attract private sector capital which would, where cost-effective, leverage the funds available to Government and further accelerate delivery of benefits for the people of NSW.

The Infrastructure NSW Board believes that this updated Strategy presents the Government with an exciting set of opportunities to improve, and in many ways transform, the productivity and efficiency and the liveability of Greater Sydney and of communities across NSW.

We commend this Report to you.

Yours sincerely



Graham Bradley AM

**Chairman
Infrastructure NSW**

Executive summary

In June 2014, the Premier announced the *Rebuilding NSW* initiative, a \$20 billion program of infrastructure investment to be funded from the long-term lease of 49 per cent of the State's electricity network assets. This Report is Infrastructure NSW's independent advice to Government on the next round of critical infrastructure priorities for NSW.

The one-off capital injection provided by *Rebuilding NSW* represents a significant opportunity to accelerate a program of infrastructure investment and lock in long-term and higher rates of economic growth and productivity than would otherwise be achievable.

The funds provided through *Rebuilding NSW* must be invested wisely, and with a full understanding of where, when and how maximum value can be extracted from their allocation.

In preparing this Report, Infrastructure NSW has found that there is considerable capacity to deliver elements of the Government's infrastructure program sooner – in transport, health, education, water, and cultural, sporting and environmental infrastructure – provided there is an equal focus on fiscal discipline and achieving value for money.

This Report identifies projects and reforms which, given funding certainty in the near term, could be delivered earlier, to accelerate growth and deliver benefits to the community sooner. It has been prepared at a time of rejuvenation for the State economy. Growth in State Final Demand in NSW in 2013-14 was more than twice as strong as any other State and almost six times the national average.¹ Close to 200,000 jobs have been added in the State's economy over the past five years.² And the State's housing sector is expanding, with dwelling starts in 2013-14 around 36 per cent – or 12,500 dwellings a year – higher than in 2011-12.³

Infrastructure NSW delivered its first State Infrastructure Strategy *First Things First*, in 2012. Two years on, many of its key recommendations are being progressed. With *Rebuilding NSW*, the State has the opportunity to go further and faster, equipping itself with the infrastructure it needs to remain vibrant, liveable, productive and globally competitive.

1. Australian Bureau of Statistics (2014a), Australian National Accounts: National Income, Expenditure and Product, June Quarter 2014, Cat. No. 5206.0

2. Australian Bureau of Statistics (2014b), Labour Force, Australia, October 2014, Cat. No. 6202.0

3. Australian Bureau of Statistics (2014c), Building Activity, Australia, June Quarter 2014, Cat. No. 8752.0

Sydney's roads are some of the most congested in Australia. Congestion imposes costs on the economy and the community through longer commutes, higher operational costs and restricted access. Currently, the indirect costs of congestion represent 8 to 12 per cent of total transport costs incurred by Sydney businesses. Sydney's congestion costs are currently around \$5 billion per year – equivalent to annual losses of \$1,100 per Sydneysider – and are forecast to increase to around \$8 billion per year by 2020. Without corrective action, congestion will worsen – and the costs to business and the community will escalate – as the city's population grows.

Infrastructure NSW commissioned Deloitte Access Economics to model the economic benefits of the *Rebuilding NSW* initiative, including the accelerated infrastructure investments recommended in this Report. The model found that effective implementation of these recommendations could increase Gross State Product by \$30.9 billion by 2035, a 3.6 per cent increase, and add about 122,000 more jobs.

The investments and reforms that Infrastructure NSW recommends are anchored to three critical priorities: a competitive, global Sydney, supporting population and economic growth in Greater Sydney, and ensuring a competitive and connected regional economy. The total claim on *Rebuilding NSW* of these proposed investments is \$18.9 billion over 10 years. A full list of funding recommendations is set out in Chapter 12.

The funding recommendations in this Report are in addition to the forecast State infrastructure expenditure of \$61.5 billion over the four years to 2017/18.

A competitive Global City

Sydney is Australia's global city, generating around one-fifth of national GDP. The city has a competitive advantage in higher value-added industries and services, which are concentrated in the Global Economic Corridor.

From 2011 to 2031 Sydney will grow by another 1.6 million people, with more than 27.5 million journeys occurring every weekday, as well as around 1.6 million freight and commercial trips.⁴ Against this backdrop, Sydney's transport congestion costs are forecast to increase from \$5.6 billion a year to around \$8 billion a year by 2020.⁵ It is also estimated that diverted freight travel will cost NSW businesses almost \$20 billion over the next 20 years and require an additional 900,000 driver hours.⁶

This Report supports Sydney's long-term growth by improving public transport connectivity to the city's major employment centres, lifting urban productivity by reducing congestion across the transport network and supporting transit-oriented urban renewal in inner city areas to improve accessibility and land use productivity.

Infrastructure NSW recommends that the following priorities are progressed:

- **A transformative upgrade to Sydney's passenger rail network:** \$8 billion to deliver a step change in the capacity and reliability of the city's train system, including upgrades to lines in the city's north

4. Transfigures, March 2014, Travel forecasts 2011-2014 and Transfigures, July 2010, Freight movements in Sydney

5. Deloitte Access Economics, November 2014, Economic Impact of the SIS including Rebuilding NSW

6. Transport for NSW 2014, Fixing Country Roads: Expression of Interest Guidelines

and west, and *Sydney Rapid Transit* extending from Chatswood to the CBD via a second Harbour rail crossing and out to Bankstown.

- **An expedited program of major motorway projects:** development and delivery of the next stages of the Sydney's economically critical motorway network, including Northern and Southern Extensions of WestConnex and the Western Harbour Tunnel, providing a third crossing of Sydney Harbour. Infrastructure NSW recommends that these motorways be toll roads with significant user funding.
- **Congestion mitigation measures to optimise existing road infrastructure:** \$1 billion for upgrades to the existing road network, including works to relieve congestion at pinch points across the city and extend clearways, with improvements to real-time traffic and congestion management and the implementation of the capacity-enhancing Smart Motorways system on key parts of the system.

Supporting population and economic growth in Greater Sydney, including Parramatta

Western Sydney is Australia's third largest economy, and its major centre, Parramatta, is potentially Sydney's second CBD. The region is experiencing more rapid population growth than the rest of Sydney. By 2031, one million more residents will live west of Homebush.⁷

7. <http://www.planning.nsw.gov.au/en-au/deliveringhomes/population-and-housing>, last updated 20 August 2014

Growth will place increasing pressure on Western Sydney's infrastructure, which is less well served by Sydney's historically radial public transport network, dispersed settlement patterns and poor north-south integration between precincts. These challenges require many residents to travel across town to access high-skilled jobs and are a deterrent to commercial development in Western Sydney centres.

This Report focuses on improving connections to Parramatta to enhance its attractiveness as an employment hub and commercial centre, and to support longer term planning for new economic activity across Western Sydney, specifically around Badgerys Creek, the western employment precinct and the region's cultural and sport precincts. Infrastructure NSW also recommends new approaches to investing in education and health infrastructure to support population growth.

Infrastructure NSW's recommendations to accelerate projects for Western Sydney include:

- **Support Parramatta's economic potential:** A reservation of \$600 million, in addition to \$400 million reserved in the 2014 Budget, to improve public transport provision between Parramatta and other centres and residential areas – to be supported by a long-term transport improvement plan by the Government.
- **A major cultural precinct in Parramatta:** As part of the Parramatta North Urban Renewal Project, a cultural precinct should be developed around the Old King's School site, potentially including a relocated Powerhouse Museum.

- **Education and health infrastructure that supports growth:** A combined reservation of \$1.4 billion for a new Schools Growth Program and to progress business cases for the Hospitals Growth Program for hospital investments such as the Campbelltown Hospital and a new health facility at Rouse Hill. These investments should be matched by improved delivery and expenditure models that will manage growing demand by 'bending the cost curve', support urban densification and improve value for money through innovative partnerships with the private sector.
- **A major review of sporting infrastructure:** Planning for a new or upgraded rectangular sports stadium in the Central Western Sydney area.

Infrastructure NSW also recommends that funding sources be identified to deliver flood mitigation and evacuation works for the Hawkesbury-Nepean Valley in anticipation of the Task Force report to Government in mid-2015.

Ensuring a competitive and connected regional economy

Regional freight supports production worth more than \$80 billion a year to the NSW economy, with the Hunter and Illawarra alone producing almost a third of the State's GSP.

Around 100,000 jobs rely on the agricultural and mining sectors of NSW, which in turn rely on critical water and freight infrastructure to remain productive and competitive.

Provisional funding of \$6 billion from *Rebuilding NSW* has been allocated to productive regional infrastructure, focusing on efficient road and rail connections, secure water supplies for regional industries and communities, and investment in health and education infrastructure to support the regional workforce and meet the needs of regional communities.

Infrastructure NSW recommends reservations from the *Rebuilding NSW* initiative for the following regional priorities:

- **Efficient freight transport to ports and markets:** A combined reservation of at least \$3.1 billion to improve existing road and rail networks, including freight productivity improvements along four critical corridors (the Newell, Golden, New England and Great Western Highways) and to extend three major sub-programs: Bridges for the Bush, Fixing Country Roads and Fixing Country Rail.
- **Increased connectivity for regional centres:** \$1 billion to improve the road network to meet the demands of regional growth areas, including the Illawarra, Lower Hunter, North Coast and Central Coast.
- **Water supply and water security:** A \$1 billion program of investment based on economic need for enhanced water security, with priority investment for the Gwydir, Macquarie and Lachlan inland river catchments and the coastal catchment of the Upper Hunter, and 71 projects to bring regional towns up to water quality and environmental standards. The regional towns of Broken Hill and Cobar are given high priority for water security upgrades. These

investments will be supported by a new catchment needs assessment framework, best practice planning and price recovery, and consideration of options to take advantage of unutilised flows and underutilised infrastructure.

- **Equip regional populations with modern schools, training and health infrastructure:** \$300 million for a new 10 year Regional Schools Renewal Program to modernise and upgrade classrooms and facilities for future-focused learning, and \$300 million for the delivery of a multipurpose health services strategy for rural and regional NSW.
- **Develop regional cultural and tourism infrastructure:** \$300 million to invest in an Environment and Tourism Program to support the regional visitor economy and allocations from a State-wide \$600 million cultural infrastructure strategy to develop regional creative hubs and cultural infrastructure.

The way forward

The investments proposed in this Report are ambitious. Their breadth and pace of delivery must be supported by a commitment across Government to continuously pursue greater value for taxpayers, by improving planning and delivery capacity, managing growing demand and operational costs, working with the private sector to maximise value for money outcomes, and managing existing assets to make the most of past investments.

NSW's track record has demonstrated that selecting the *right* infrastructure projects and planning, delivering and managing them well, is critically important.

Infrastructure NSW has identified seven major opportunities to improve the way NSW plans, delivers and uses infrastructure across sectors:

- **Long-term infrastructure planning:** reducing the long-term costs of infrastructure provision by identifying and reserving future corridors, and ensuring agencies have the capability and resources to plan and prioritise effectively.
- **Optimising asset utilisation:** using relatively low cost interventions to optimise the performance of existing infrastructure, unlocking network-wide benefits in the process.
- **Harnessing technology:** using information and communications technologies (or 'Smart ICT') to revolutionise how infrastructure should be designed, constructed and operated.
- **Reforming project governance:** improving the management of major capital projects in areas such as risk assessment, budget setting and project management across the project lifecycle.
- **Identifying new approaches to funding and procurement:** developing value capture mechanisms, additional commercial revenue streams, infrastructure pricing strategies and asset recycling as ways to bridge the funding gap between the infrastructure we have and the infrastructure we want.

- **Delivering 'whole of government' outcomes:** coordinating place-based planning to support population growth and housing acceleration in urban renewal areas.
- **Working with the Commonwealth Government:** harnessing cooperation between governments on infrastructure projects to improve the quality of project planning and delivery, and improve affordability for national-scale projects.

All the potential investments Infrastructure NSW recommends in this Report have demonstrated their strategic merit and should now be developed further by agencies. Business cases should be developed over the coming 18 months, to enable final investment decisions to be taken by Government in a timely fashion, if and when the proceeds from the electricity network transaction are realised.

Adopting the investments and reforms recommended in this Report will ensure that *Rebuilding NSW* initiatives are allocated responsibly, targeted carefully, and delivered where they will generate the greatest benefits.

The opportunity provided by *Rebuilding NSW* is an important one. With the benefit of considered analysis – and building on a strong platform of current infrastructure investment – Infrastructure NSW considers that the leasing of 49 per cent of the State's electricity networks will translate into substantial economic and social benefits that extend across the State, and the delivery of vital public infrastructure that will serve NSW for many decades to come.

Global Sydney

Greater Sydney

Regional NSW

Facts	<ul style="list-style-type: none"> • 39% of the economy and 16% of the population • Sydney is Australia's global city, generating around one-fifth of national GDP • Global Sydney is an international leader in high value, knowledge-based service industries • Sydney Airport and Port Botany are NSW's principal international gateways 	<ul style="list-style-type: none"> • 32% of the economy and 44% of the population • Western Sydney is now Australia's third largest economy • Parramatta is potentially Sydney's second CBD. • Western Sydney is growing more rapidly; by 2031 one million more people will live west of Homebush 	<ul style="list-style-type: none"> • 29% of the economy and 40% of the population • Australia's largest and most diverse regional economy • Regional freight supports production worth \$80 billion per annum • Internationally significant primary production: coal, grain, livestock, viticulture
Conclusions	<p>A competitive, global Sydney</p> <ul style="list-style-type: none"> • Global Sydney must out-compete cities in the Asia-Pacific region for liveability and business attractiveness • Should maintain Sydney CBD as a world renowned cultural destination • Sydney's transport congestion costs are forecast to increase to around \$8 billion a year by 2020 • Accelerated investment in passenger rail capacity and roads is essential to meet the congestion and transport task 	<p>Supporting population and economic growth in Greater Sydney, including Parramatta</p> <ul style="list-style-type: none"> • Parramatta and other centres require investment to realise their potential • Transport investment is required to support urban regeneration, housing acceleration and connect people to jobs • Investment in education and health infrastructure to support population growth and ageing • Develop a major cultural precinct in Parramatta and review sports stadia 	<p>Ensuring a competitive and connected regional economy</p> <ul style="list-style-type: none"> • Regional producers require efficient and reliable access to markets • Improvements to water security and quality are required • Regions adjacent to Sydney will benefit from better transport links • Investment required for multi-purpose Health facilities and to modernise schools • Develop regional cultural and tourism facilities

Infrastructure NSW 2014 SIS Update: key recommendations for development of final business cases

<p>Funding from 2016 brings projects forward over next 10 years. \$18.9 billion from the Rebuilding NSW initiative</p>	<ul style="list-style-type: none"> • \$8 billion to deliver a step-change in capacity and reliability of Sydney's rail system: <ul style="list-style-type: none"> – Western Sydney Rail Upgrade Program (SRF2) \$1 billion – Sydney Rapid Transit \$7 billion • \$6.3 billion to expedite the critical motorways as toll roads: <ul style="list-style-type: none"> – WestConnex Nthn & Sthn extensions \$1.8 billion – Western Harbour Tunnel \$4.5 billion <p>Note: \$6.3 billion paid for as tollroads.</p> • \$1 billion to reduce congestion in the road network: <ul style="list-style-type: none"> – Urban Pinch Points Program \$300 million – Expanded Clearways Program \$100 million – Smart Motorways: \$400 million – Transport management systems \$200 million 	<ul style="list-style-type: none"> • \$600 million for the Parramatta CBD Public Transport Improvement Program • \$300 Bus Rapid Transit and Bus Priority Program • \$300 million Pinch Point Upgrade Program Sydney – Illawarra • \$100 million Corridor Reservation Program • \$1.4 billion for Education and Health facilities in Greater Sydney: <ul style="list-style-type: none"> – Schools Growth Program \$700 million – Hospitals Growth Program \$600 million – Care Co-location Program \$100 million • \$1.2 billion for cultural and sporting investment for Global and Greater Sydney: <ul style="list-style-type: none"> – Cultural Infrastructure Program \$600 million – Sports Stadia Infrastructure Program \$600 million 	<ul style="list-style-type: none"> • \$3.1 billion for efficient freight transport to ports and markets: <ul style="list-style-type: none"> – Freight Road Corridor Program \$2 billion – Bridges for the Bush \$200 million – Fixing Country Roads \$500 million – Fixing Country Rail \$400 million • \$1 billion Regional Growth Roads Program • \$1 billion Regional Water Security and Supply Fund • \$300 million Regional Schools Renewal Program • \$300 million Regional Multi-Purpose Health Facilities Program • \$300 million Regional Environment and Tourism Program
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Rebuilding NSW

\$12.9 billion for Global and Greater Sydney plus \$6.3 billion in toll roads

\$6 billion for Regional NSW

**the
context**

1.0 The context

1.1 Why Infrastructure NSW has prepared an updated State Infrastructure Strategy

On 31 July 2014, the NSW Premier directed Infrastructure NSW to prepare and submit a revised 20 year State Infrastructure Strategy under section 16(3) of the *Infrastructure NSW Act 2011* (the Act).

The Premier also directed that, in developing this Report, Infrastructure NSW should take into account the following State strategic priorities in accordance with section 17(3) of the Act:

- Allocation of \$20 billion to Restart NSW for investment in infrastructure over the term of the Strategy, established from the proceeds of the long-term lease of 49 per cent of the State's 'poles and wires' electricity network businesses
- *Sydney Rapid Transit*, comprising the extension of rapid transit services between Bankstown and the North West Rail Link, via the CBD and a second harbour crossing
- *Sydney Roads Renewal* – major projects to address congestion on key arterial routes across Sydney, including in Southern Sydney, the West and Northern Beaches, and the augmentation of WestConnex with greater north/south connectivity

- A *Regional Roads Fund* with an expected contribution of at least \$1 billion in funding to invest in upgrades to the regional road network
- A *Regional Water Fund* with an expected contribution of at least \$1 billion in funding to improve water quality and security in regional NSW
- A *Schools and Hospitals Building Fund* with an expected contribution of a least \$2 billion to provide health and education infrastructure to improve services and support population growth in Sydney and across NSW
- A *Sporting and Cultural Infrastructure Fund* with an expected contribution of at least \$500 million to build and improve sporting and cultural infrastructure that will increase the economic capacity of the State and have both strategic and social value.

This Report contains Infrastructure NSW's revised assessment of the State's long-term economic and social infrastructure needs and priorities, and its advice to the NSW Government, in accordance with Section 16 of the Act. The Report covers metropolitan public transport, urban roads, international gateways, regional and interstate transport, water, health, education, energy, and sports and cultural infrastructure.

Infrastructure NSW's findings represent independent advice to the NSW Government in the context of the *Rebuilding NSW* initiative and do not constitute Government policy.

The recommendations in this Report relate both to the Premier's stated strategic priorities and to other investments and initiatives which Infrastructure NSW considers will grow the State's economy and enhance its productivity. For consistency with the Government's strategic planning settings, this Report has generally adopted a planning horizon to 2031.

It is proposed that the net proceeds from the *Rebuilding NSW* initiative to lease 49 per cent of the State's electricity network assets will be deposited in the Restart NSW Fund (see box, right) to accelerate delivery of priority projects identified by Infrastructure NSW in this Report.

Restart NSW Fund

The NSW Government established Restart NSW to fund infrastructure projects that improve economic growth and productivity for NSW. The Restart NSW Fund receives money from asset sales, Waratah Bonds, interest income and windfall tax revenue. By the end of 2013/14, around \$6.7 billion had been deposited in the Restart NSW Fund.

Infrastructure NSW is responsible for independently assessing project proposals and making recommendations to the NSW Government for use of the funds. To date, the Fund has supported a range of projects including the Bells Line of Road Improvement program, the Bridges for the Bush program, Pacific Highway upgrade and the WestConnex motorway scheme.

Thirty per cent of Restart's investment portfolio is directed to projects in regional NSW (outside the cities of Newcastle, Sydney and Wollongong). This includes the allocation of 3 per cent to the Resources for Regions program for mining affected communities.

Infrastructure NSW has implemented an enhanced investment review of the business cases and gateway assurance processes to support the development of recommendations for these and all future Restart investments.

Functions of Infrastructure NSW

Infrastructure NSW was established to advise the Premier on the needs and strategic priorities for infrastructure in NSW.

Infrastructure NSW's purpose is set out in the *Infrastructure NSW Act 2011*, which tasks the agency with 14 functions, including:

- Preparation and submission to the Premier of a 20 year State Infrastructure Strategy
- Preparation and submission to the Premier of annual rolling five year infrastructure plans (or at any other time requested by Premier) and other plans as requested by the Premier
- Preparation of sectoral State infrastructure strategy statements
- Review and evaluation of proposed major infrastructure projects by Government agencies or the private sector
- Advice on infrastructure planning and delivery assessment, economic or regulatory impediments and funding models
- Coordination of infrastructure submissions by NSW to the Commonwealth Government.

Part 4, Section 17 of the Act provides that Infrastructure NSW's 20 year State Infrastructure Strategy must assess the current State of infrastructure in NSW and the needs and strategic priorities for infrastructure in NSW for the next 20 years. In doing so, Infrastructure NSW is to have regard to any State strategic priority advised by the Premier.

1.2 Developments since the 2012 State Infrastructure Strategy

Infrastructure NSW's inaugural 20 year State Infrastructure Strategy, *First Things First*, was provided to the NSW Government in September 2012. It outlined a forward program of urban and regional projects and reforms across the State's social and economic infrastructure over the next 5, 10 and 20 years. A summary of the Government's progress in delivering the strategy is provided below.

The focus of *First Things First* was on transport and social infrastructure projects and initiatives designed to improve State productivity and competitiveness, reduce urban congestion, improve regional connections and enable the efficient delivery of critical public services. The broader infrastructure imperative was to stimulate and support growth.

The Government has made significant early steps towards implementing its 20 year vision for State infrastructure, set out in its response to *First Things First*. In each of the past two Budgets, progress in implementing key commitments has been tracked in the annual State Infrastructure Plan (Budget Paper 4), based on the advice of Infrastructure NSW.

While good progress is being made, the *Rebuilding NSW* initiative offers a once-in-a-generation opportunity to accelerate capital investment and infrastructure reform to sustain long-term improvements in productivity and workforce participation, support strong population growth and meet the challenges emerging from a rapidly changing global marketplace.

Progress in delivering the 2012 State Infrastructure Strategy

The NSW Government's 2012 State Infrastructure Strategy progresses the recommendations it adopted from *First Things First*, prioritising major projects aimed at improving productivity growth and contributing to economic growth across transport, utilities, health and education.

The Strategy commits the Government to commencing delivery of 39 projects within the first five years. Two years into implementation, Infrastructure NSW finds good progress is being made, including on the following projects:

- **Pinch point solutions** to improve congestion and road efficiency around growing urban centres – the 'Urban Roads Pinch Point Program, Greater Metropolitan Area received \$121 million of Restart funding in 2013–14 and a further \$125 million from the Government, with projects on-track for delivery.
- **F3 to M2 link (NorthConnex)** – the Government expects to consider the final bidding offer from Transurban and Westlink M7 to deliver the motorway in late 2014.
- **WestConnex** – environmental assessments are being prepared for Stage 1 of the project, with a short list of companies to construct the M4 widening announced in March 2014.
- **North West Rail Link** – the project is in delivery phase, and is on-track for completion by 2019.
- **Opal Card** (integrated ticketing) and incentives to encourage off-peak travel – progressive roll out of the Opal Card is under way and expected to be completed by the end of 2014.
- **Bridges for the Bush** – staged construction of a program of works to replace and upgrade bridges on key freight routes in NSW commenced in 2013–14.
- **A corridor for the Bells Line of Road and the Castlereagh Freeway** – corridor investigation studies have commenced. Restart funding of \$28 million was provided in the 2013/14 budget to commence Bells Line of Road Corridor improvements.
- **Health care precincts with clusters of related private and public health services** – the Northern Beach Hospital is being delivered under this model. Construction is commencing in 2014 and is expected to be completed by 2018.
- **Sydney International Convention, Exhibition and Entertainment Precinct** – the project is in construction phase and on-track for completion in 2016.

1.3 NSW's economy is resurgent

NSW has a diverse economy, led by a large services sector that makes up about 80 per cent of all of the State's economic activity.⁸

Knowledge-based industries such as finance and insurance and professional, scientific and technical services are a particular economic strength, accounting for nearly a quarter of State production.

The NSW unemployment rate, at 5.8 per cent, is below the national average of 6.2 per cent,⁹ with about 130,000 jobs added in the NSW economy since April 2011.¹⁰

The economic diversity of NSW is minimising the impact of the broader national transition away from resource-driven growth. Recent economic data confirms that NSW is re-emerging as the engine room of the national economy, reflecting strong growth in household demand for goods and services, a resurgent housing sector and low interest rates.

While the NSW economy is well positioned, challenges remain.

1.3.1 The three Ps: population, productivity and participation

The drivers of economic growth are the three Ps: population, productivity and workforce participation. Securing the economic future of NSW is a long-term process and indicators suggest that more needs to be done, particularly to improve the productivity of the State's labour force. To secure a more prosperous future, the investment strategy for *Rebuilding NSW* should aim to unlock and enable higher rates of productivity and economic growth than would otherwise be achievable.

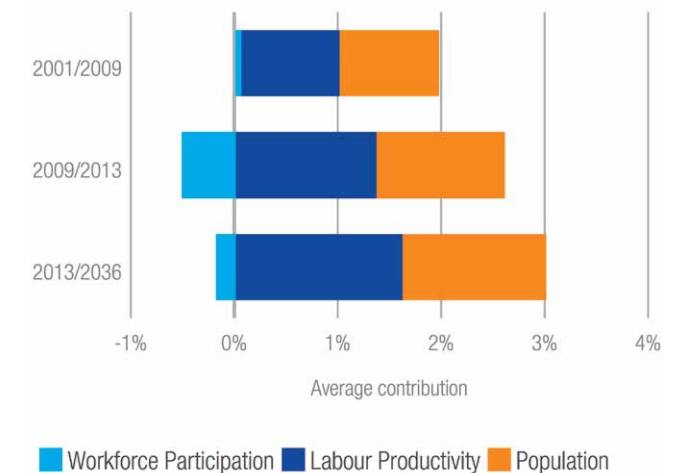
Figure 1.1 shows the relative historical contributions of population growth, labour productivity and workforce participation to the growth of the NSW economy.

Population growth increases the size of markets. Larger markets indirectly support productivity through greater specialisation, diversity and innovation, spreading fixed costs across a broader consumer base and deepening the pool of businesses competing to service consumer needs.

However, population growth brings challenges. More people can increase pressures on infrastructure and public amenity – pressures that must be managed effectively if they are not to have an adverse impact on economic performance and quality of life.

Figure 1.1 shows the relative historical contributions of population growth, labour productivity and workforce participation to the growth of the NSW economy. The graph shows that in the last five years, average annual labour productivity growth has risen from 1.0 per cent to almost 1.4 per cent. This has meant average economic growth rates have been sustained, despite

Figure 1.1 Average contributions to NSW's economic growth, 2001 – 2036



Source: Deloitte Access Economics

lower workforce participation (which has detracted from growth by around 0.5 per cent a year). In other words, greater labour productivity has offset declining workforce participation.

This will need to continue over the life of the State Infrastructure Strategy. By 2030 the proportion of the population aged 65 and over will be nearly 20 per cent, up from 13 per cent in 2010 – leading to further reductions in workforce participation. As our population ages, the imperative will be to drive the productivity enhancements needed to sustain economic growth and improved living standards.

8. Deloitte Access Economics
 9. Australian Bureau of Statistics, Cat No. 6202.0, *Labour Force*, October 2014 seasonally adjusted data, published 6 November 2014
 10. Australian Bureau of Statistics, Cat No. 6202.0, *Labour Force*

Infrastructure is critical to unlocking productivity growth by:

- **Reducing key input costs:** Reducing the cost and improving the reliability of the infrastructure-based services on which NSW businesses depend improves their competitiveness. For instance, properly targeted transport investments reduce congestion costs for freight and logistics industries; export industries such as agriculture and mining depend upon reliable supplies of water; and manufacturing processes require affordable sources of energy.
- **Supporting better uses of land:** Infrastructure shapes the urban form, improving the use of scarce, well-located land and minimising everyday transaction costs. For instance, greater transport accessibility enables warehousing and manufacturing firms to relocate to cheaper land without sacrificing connections to markets and suppliers. Higher density infill housing development needs a transport system capable of accommodating additional travel without causing excessive congestion.
- **Better connecting and skilling workers:** Efficient transport links to major employment centres improve the efficient functioning of labour markets. The right investments in health and education services (and supporting infrastructure) can also support the economy by improving skills and workforce participation.
- **Supporting export industries:** Efficient transport connections help link the State's producers to overseas markets through international gateways

Rebuilding NSW will boost the NSW economy

Modelling undertaken for Infrastructure NSW by Deloitte Access Economics suggests that the *Rebuilding NSW* initiative and the investments proposed in this Report could effectively increase NSW Gross State Product (GSP) by \$30.9 billion to 2035 – an increase of 3.6 per cent over the level of GSP that would occur without the plan – and add about 122,000 more jobs. The increase in GSP comes largely from the reinvestment of funds into productive infrastructure.

Reinvestment in infrastructure will allow Sydney to better manage the increase in population and economic activity that will occur over the coming decades. Better infrastructure will also help to attract more people and business to Sydney by creating easier access to jobs and markets– boosting economic growth and productivity. The Deloitte Access Economics report titled Economic Impact of the SIS including Rebuilding NSW outlines the impact on population, jobs and the economy and is available on Infrastructure NSW's website.

such as Sydney Airport and NSW's key ports, while investment in high quality cultural and sporting infrastructure boosts the visitor economy and makes NSW a more attractive place to live and work, boosting business and skilled migration.

Given the challenges ahead over the next 20 years, and the fact that productivity is the key long-run driver of economic performance, it is critical that NSW directs its limited resources to where they will be most effective.

Infrastructure NSW's advice to the Government in implementing the *Rebuilding NSW* initiative – and in relation to each of the investments proposed in this Report – pursues the twin priorities of enabling productivity gains and supporting sustainable population increases.

However, given the challenges posed by population increases, productivity gains represent the least-cost path to a better quality of life in NSW and should be the primary focus of economic and infrastructure policy.

1.4 Metropolitan Sydney – a growing population and productive urban economy

Sydney is home to 4.5 million residents and more than 451,000 businesses. It is the economic capital of Australia. By 2031, Sydney's economic output is forecast to almost double to \$586 billion a year.¹¹ From 2011 to 2031, Sydney's population is forecast to grow by 1.6 million people, with 900,000 of the population growth occurring in Western Sydney.¹² This report outlines a strategy to:

- Make it easier for Sydney's residents to move between their homes and jobs in the Global Economic Corridor
- Ensure that Western Sydney, particularly Parramatta, can 'hook in' to the agglomeration economies in the city
- Improve the delivery of goods to markets and business-to-business transactions

11. Deloitte Access Economics

12. NSW Department of Planning and Environment

- Support a creative and vibrant city that attracts and retains skilled people and businesses.

1.4.1 Ensuring a competitive Global Sydney

Sydney is Australia's global city. It generates more than one-fifth of Australia's Gross Domestic Product,¹³ competing with other international cities such as Singapore and Hong Kong as a home for global investment.¹⁴ Sydney also generates over 70 per cent of NSW's total Gross State Product.¹⁵

One of Sydney's key strengths is high value economic clusters within the Global Economic Corridor, extending from Macquarie Park through the Sydney CBD to Port Botany and Sydney Airport.

Recent research by the Grattan Institute found that half of Sydney's economic activity is generated in the Global Economic Corridor, which makes up less than one per cent of the Greater Sydney area.¹⁶

Many companies in the Global Economic Corridor specialise in activities higher up the value chain, such as offering advanced business services in the finance and insurance sectors and providing professional, scientific and technical services across a range of industries.

These businesses depend on highly skilled workers and locating themselves in the heart of large cities gives them access to the largest possible pool of labour. Proximity to suppliers, customers and partners also helps businesses to work efficiently, identify new market opportunities, develop partnerships and collaborations, and come up with innovations and new ways of working.

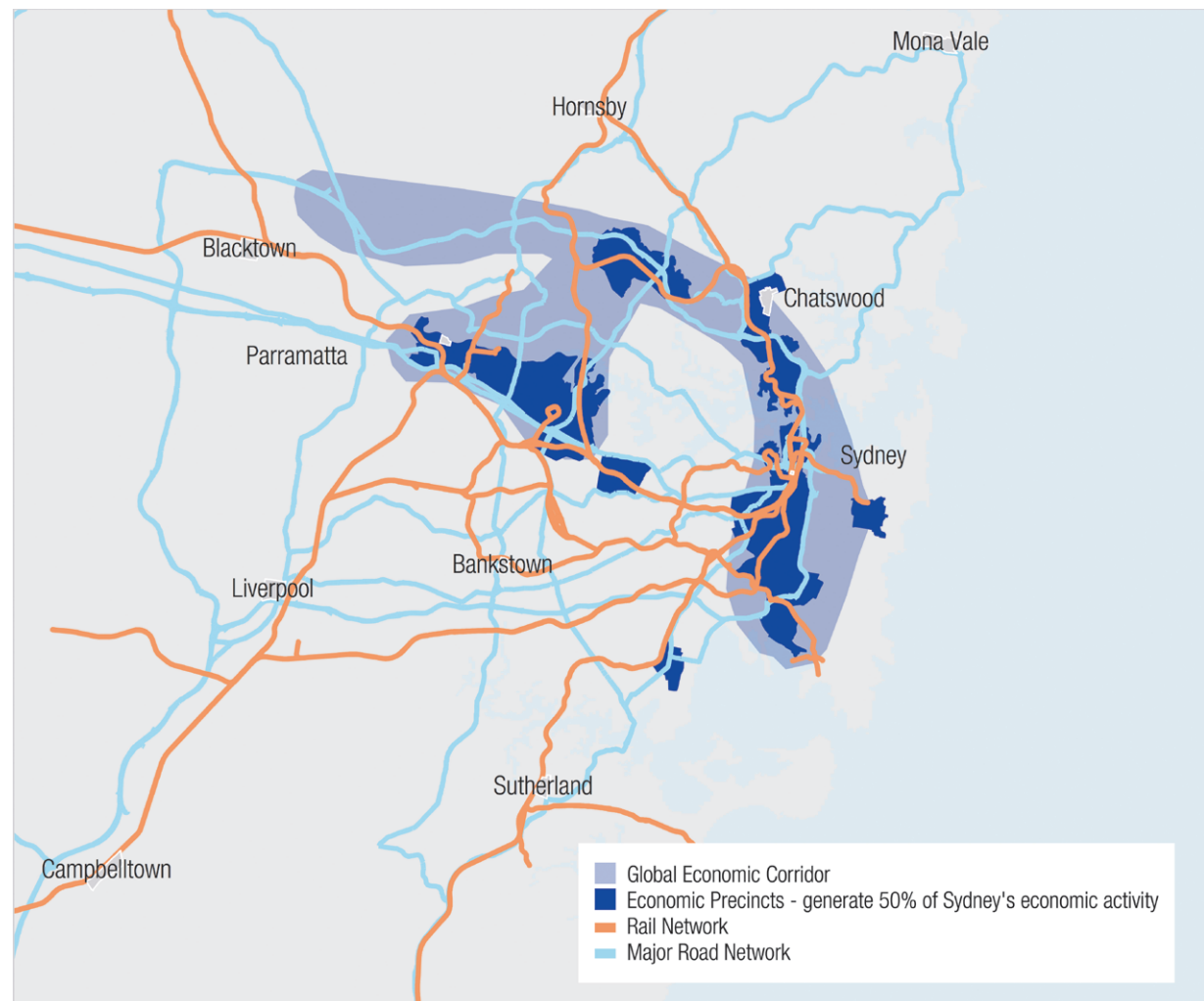
13. SGS Economics 2014, Australian Cities Accounts 2012/13

14. NSW Now website www.nsw.gov.au/now

15. Grattan Institute 2014, Mapping Australia's Economy

16. Grattan Institute 2014

Figure 1.2 Sydney Global Economic Corridor



Source: Grattan Institute and NSW Department of Planning and Environment

The significance of the Global Economic Corridor to Sydney's prosperity is substantial and will remain so into the future. To continue to drive productivity across the Global Economic Corridor, it is critical that the NSW Government:

- Facilitates development to enable people to choose to live in areas with access to large numbers of jobs, which will also give employers a wide choice of employees
- Ensures that transport networks better connect employees with employers via mass transit and motorway networks, and support better connections between businesses and their customers, suppliers and partners.

If this does not occur, NSW will lose out to other economies that do this better.

1.4.2 Growing Greater Sydney, including Parramatta

Sydney will experience strong population growth over the next 20 years to 2031, increasing from 4.3 million to 5.9 million residents. On recent trends, almost 80 per cent of this population growth will occur in existing areas.

The demographics in the city will also change, with more than one million more people over the age of 65 and almost the same number under the age of 15 by 2031. This means that less workers will be required to deliver more growth.

To keep up with this level of population growth, the NSW Department of Planning and Environment's population and dwelling projections suggest that Sydney will need 664,000 new homes – or around 33,200 new homes each and every year – a level of housing construction never previously achieved.¹⁷

If this housing acceleration is not achieved, people will seek to live elsewhere in Australia, at an estimated cost to the NSW economy of around \$6 billion by 2031.¹⁸

The economic imperative for Greater Sydney is to manage population growth by accelerating housing supply, improving efficient land use and urban renewal around transport corridors, and delivering integrated improvements to transport and social infrastructure within the existing urban area.

A further challenge relates to the population and jobs imbalance between the eastern and western halves of Sydney. While the economy of Western Sydney is the third largest in the country, adding over \$90 billion a year to the nation's GDP, it contains 47 per cent of the city's residents but only 37 per cent of its jobs.¹⁹

Western Sydney is well placed to address this imbalance with a diverse, growing and relatively young working age population, maturing employment centres such as Parramatta, a stock of employment lands with high quality motorway infrastructure, and world class healthcare facilities and educational institutions.

17. Department of Planning and Environment, *NSW Population, Household and Dwelling Projections*, June 2014

18. EY Research 2014

19. Department of Planning and Environment, *NSW Population, Household and Dwelling Projections*, June 2014

Although the declining manufacturing sector remains the dominant employing industry, Western Sydney will increasingly need to 'hook in' to and reap the benefits of the agglomeration economies in the expanding Global Economic Corridor. In the long term, the development of a second Sydney Airport at Badgerys Creek will also help to reshape the economy of Western Sydney.

Improved transport links will be crucial to the growth of Greater Sydney in terms of connecting people with jobs and improving business-to-business interactions.

1.4.3 Deepen and improve the freight and logistics economy

The reliable, efficient and cost effective movement of goods around an economy is a critical enabler of business productivity and competitiveness.

The freight logistics industry accounts for approximately 13.8 per cent or \$58 billion of NSW's economy.²⁰ The scale of the freight task over the next 20 years will be significant, with an expected doubling of the volumes of freight moving through NSW to nearly 800 million tonnes by 2031. Sustaining and improving productivity in the face of this massive increase requires a strategic focus to ensure that policy, infrastructure and land-planning initiatives deliver a freight network with the capacity and performance to meet demand.²¹

The international gateways of Port Botany and Sydney Airport will accommodate much of the rapid growth forecast for containerised cargo and air travel over the next 20 years. Significant planning has taken place to manage additional freight throughput (mainly

20. Transport for NSW

21. Transport for NSW, November 2013, NSW Freight and Ports Strategy

imports) at the port and airport. The completion of WestConnex will provide additional capacity and enhance movements from these gateways. Intermodal terminals and associated distribution centres at Enfield and Moorebank are being opened progressively and upgrades to the Southern Sydney Freight Line are increasing freight rail capacity.

However, forecast growth in population, housing and employment, coupled with network challenges such as congestion, availability of infrastructure and land use planning, make it even more critical to address the pressures created by NSW's future freight task.

Each day, around 300,000 heavy vehicle trips and over 1 million light commercial vehicle trips occur on the metropolitan road network.²² Most of the containerised freight moving between Port Botany and other parts of Sydney does so by road.

Road and rail freight within the metropolitan area operate largely on networks that are shared with passenger vehicles and public transport. Many of these journeys occur at similar times of day, resulting in highly variable travel speeds and journey times. For example, along the M4 Motorway and Parramatta Road, average morning peak speeds are as low as 38 km/h and 17 km/h respectively.²³

Moving much greater volumes of freight efficiently around the city will require a sustained focus on completing 'missing links' on the motorway network, optimising the existing road network and planning for land uses (including in Western Sydney) that provide delivery points close to end users or distribution centres.

It will also require astute targeting of those markets best suited to transporting goods by rail, as well as improvements to rail freight reliability, to make the best use of metropolitan freight rail network capacity.

1.4.4 The visitor economy and liveability

Arts, cultural and recreational facilities support a vibrant and creative city, and are vital for attracting and retaining the skilled people and businesses that NSW needs to compete in the global economy.

Sydney is home to some of the nation's most iconic cultural facilities, world-leading institutions and international sporting centres. Recreation facilities in Sydney and across NSW include sporting venues, beaches, parks and reserves. Many of these facilities have strong links to the community and are a core component of a high quality of life.

The tourism and visitor economy enhances Sydney's status as a global city and contributes significantly to economic activity. Tourism contributes \$11.1 billion to State GSP.²⁴ In 2012, Central Sydney's cultural institutions alone attracted 4.8 million paying visitors,²⁵ who contributed an estimated \$8.3 billion to the NSW

economy.²⁶ The Sydney Opera House attracts more than 8.2 million visitors each year.²⁷ International education, research and training contributes \$5.5 billion in exports to the economy annually and is the leading export services industry for the State and second only to coal in terms of overall export share.²⁸ However, global competition and a high Australian dollar have seen NSW lose its relative share of international visitors from growth markets.

A priority for Sydney's long-term infrastructure planning will be to improve the liveability of the city and ensure the visitor economy is supported with timely and economic investments in cultural, sporting and recreational infrastructure.

1.5 Regional NSW – a competitive and connected economy

In 2013, the Gross Regional Product (GRP) for Regional NSW was \$138 billion or 29 per cent of NSW's total Gross State Product.

The agriculture and mining sectors continue to be the key drivers of regional growth. Regional NSW is also underpinned by strong manufacturing, energy and service sectors, particularly in the Hunter and Illawarra regions.

Over the last decade, regional NSW has experienced a 'two-speed' economy, with increasing demand for coal and minerals on one hand and greater downward

22. Bureau of Freight Statistics 2010, TransFigures

23. Roads and Maritime Services 2013, Key Roads Performance Report

24. NSW Tourism Satellite Accounts (2008/09), quoted in Department of Trade and Investment 2012, Final Report of the Visitor Economy Taskforce

25. Arts NSW

26. *Rebuilding NSW* 2014, Sports and Cultural Fund: Fact Sheet 7

27. Sydney Opera House

28. NSW Now, StudyNSW Business Plan 2014-2015

pressure on other industries such as manufacturing on the other. As a result, the coastal regions are forecast to experience the highest growth in GRP per capita (of around 1.5 per cent), while west of the Divide, the Murray and Inland NSW are expected to experience lower annual growth rates.²⁹

Regional production is heavily reliant upon efficient and effective transport and water infrastructure to be competitive.

Approximately 260 million tonnes of goods start their journeys in NSW regions, heading for destinations in other NSW regions, metropolitan Sydney, interstate or internationally. This represents around 65 per cent of the total NSW freight task by volume.³⁰

Many key freight routes in regional areas are constrained by relatively minor bottlenecks such as ageing bridges or sections of road not fit for use by heavy vehicles. There are deficiencies in the capacity and condition of some sections of the regional road and rail networks.

A major driver of infrastructure planning over the coming decades is the reduced availability of water for use in productive sectors of the economy and for the security of supply in some communities, due to changing rainfall patterns and increases in the allocation of water for environmental uses.

The recent signing of the Murray Darling Basin Agreement, which sets enforceable limits on the quantities of surface water and groundwater that can be taken from the Murray-Darling Basin, has important ramifications for making decisions about where to direct capital investment to sustain regional production.

By 2031, the population of regional NSW will have grown to 3.4 million people, almost half a million higher than it was in 2011.³¹ However, this growth will not be evenly spread. Lower densities and more dispersed communities will create challenges for the provision of economic and social infrastructure and the delivery of services.

Over the next 20 years, planning for the economic and social infrastructure needs of regional NSW will require the adoption of innovative delivery and funding methods that take advantage of technology and new service models. This is likely to include e-enabled health and education services, heavy vehicle road charging and more efficient procurement of regional infrastructure.

1.6 How this Report was prepared

Infrastructure NSW's recommendations for investment and reform build on its analysis undertaken in 2012, with the latest population and household projections,³² and updated project information.

Infrastructure NSW has applied the following principles that support and deliver on the proposition of 'better value infrastructure', including:

- **Long-term, integrated planning** that draws the right links between demographic trends, aligns land use and infrastructure planning, achieves integrated network-level improvements and enables long-term investments to be planned and scoped well ahead of time
- Within those plans, seeking **non-infrastructure approaches to make the most efficient use of existing assets** through better planning, the use of technology, efficient market regulation and, where appropriate, improved pricing and cost recovery
- Where capital investment is required, ensuring that it targets new or upgraded infrastructure that will enhance economic competitiveness, and that **best practice investment prioritisation** is undertaken across government
- More **strategic use of the government's balance sheet**, including recycling mature and underutilised assets to free up investment resources where possible to support worthwhile investments in new infrastructure and innovative build and delivery models

29. Infrastructure NSW 2012, *First Things First*

30. Transport for NSW 2013, *NSW Freight and Ports Strategy*

31. Deloitte Access Economics 2014, based on data from the Department of Planning and Environment

32. <http://www.planning.nsw.gov.au/en-au/deliveringhomes/population-and-housing>, last updated 20 August 2014

- Encouraging **private sector investment** and competition wherever possible to deliver better value and leverage scarce government funding
- Achieving **excellence in the development** and delivery of projects from their concept stage through to procurement, delivery and operation.

The recommendations in this Report focus on opportunities to accelerate infrastructure investment and reform in the following areas:

- **Urban public transport** (Chapter 2): to connect a growing population to Sydney's job centres, support mobility and minimise the productivity impacts of poor connectivity and increasing congestion
- **Urban roads** (Chapter 3): to optimise passenger and freight movements on the existing roads network and facilitate broader economic development through selective extensions to the Sydney motorway network
- **International gateways** (Chapter 4) to connect Sydney and NSW regions to national and global markets and suppliers
- **Regional transport** (Chapter 5): to improve regional producers' access to markets through investments supporting greater freight productivity
- **Water** (Chapter 6): to support the critical needs of regional industries and communities, by ensuring water security and quality of supply

- **Education** (Chapter 7): to equip growing urban and regional populations with the modern schools and training infrastructure required to deliver educational services for a competitive, innovative economy
- **Health** (Chapter 8): to support the health, wellbeing and economic participation of our growing population and contribute to the attractiveness of NSW as a place to live and do business
- **Culture and sport** (Chapter 9): to deliver targeted upgrades to the State's cultural, sporting and environmental infrastructure to drive growth in the visitor economy; realise the economic and social benefits of strong cultural and sporting sectors; support local participation, creativity and liveability; and maintain competitiveness in the events market through investment in stadia
- **Energy** (Chapter 10): to ensure reliable and affordable supply for the State's businesses and households.
- **Overarching themes and opportunities** (Chapter 11): improving the way infrastructure is planned, procured and used across government.

A summary of funding recommendations from these chapters is set out in Chapter 12.

1.7 Recommendations

In this report, Infrastructure NSW makes two types of recommendations to the State Government – for funding or for other actions, such as planning or review. Chapter 12 contains a detailed summary of the funding recommendations in this Report.

Infrastructure NSW recommends the reservation of a specified amount of funding under *Rebuilding NSW* to support a particular project or program. *Rebuilding NSW* is the term used to describe the forecast proceeds from the proposed long-term lease of 49% of the State's electricity network assets. Where Infrastructure NSW makes a recommendation to reserve funding in this way, it does so on the basis that the proposed project or program has demonstrated strategic merit and that Infrastructure NSW considers it a high priority for funding and implementation over the next ten years or so.

In preparing this Report, Infrastructure NSW has assessed whether each project or program has strategic merit based in part on its level of consistency with existing Government strategies such as the 2012 State Infrastructure Strategy and Long-Term Transport Master Plan. Strategic merit has also been assessed using the Infrastructure NSW major project assurance framework described in the following and illustrated in Figure 1.3.

At the project level, Infrastructure NSW applies an independent, three part test:

- **Strategic fit** – alignment with the principal State planning instruments such as the 2012 State Infrastructure Strategy, the State Plan, Long-Term Transport Master Plan and Regional Growth Plans.
- **Economic merit** – as demonstrated through a cost benefit analysis and reflected in the benefit-cost ratio or net present value of net benefits.
- **Completed assurance processes** – including a compliant business case, completed Gateway review process and appropriately implemented risk mitigation and management strategies.

Final decisions on infrastructure projects and programs – on their precise scope, budget, timing and means of procurement – should always be guided by final business cases. This is an important element of good governance in infrastructure planning and a number of Infrastructure NSW’s recommendations relate to the development of detailed business cases.

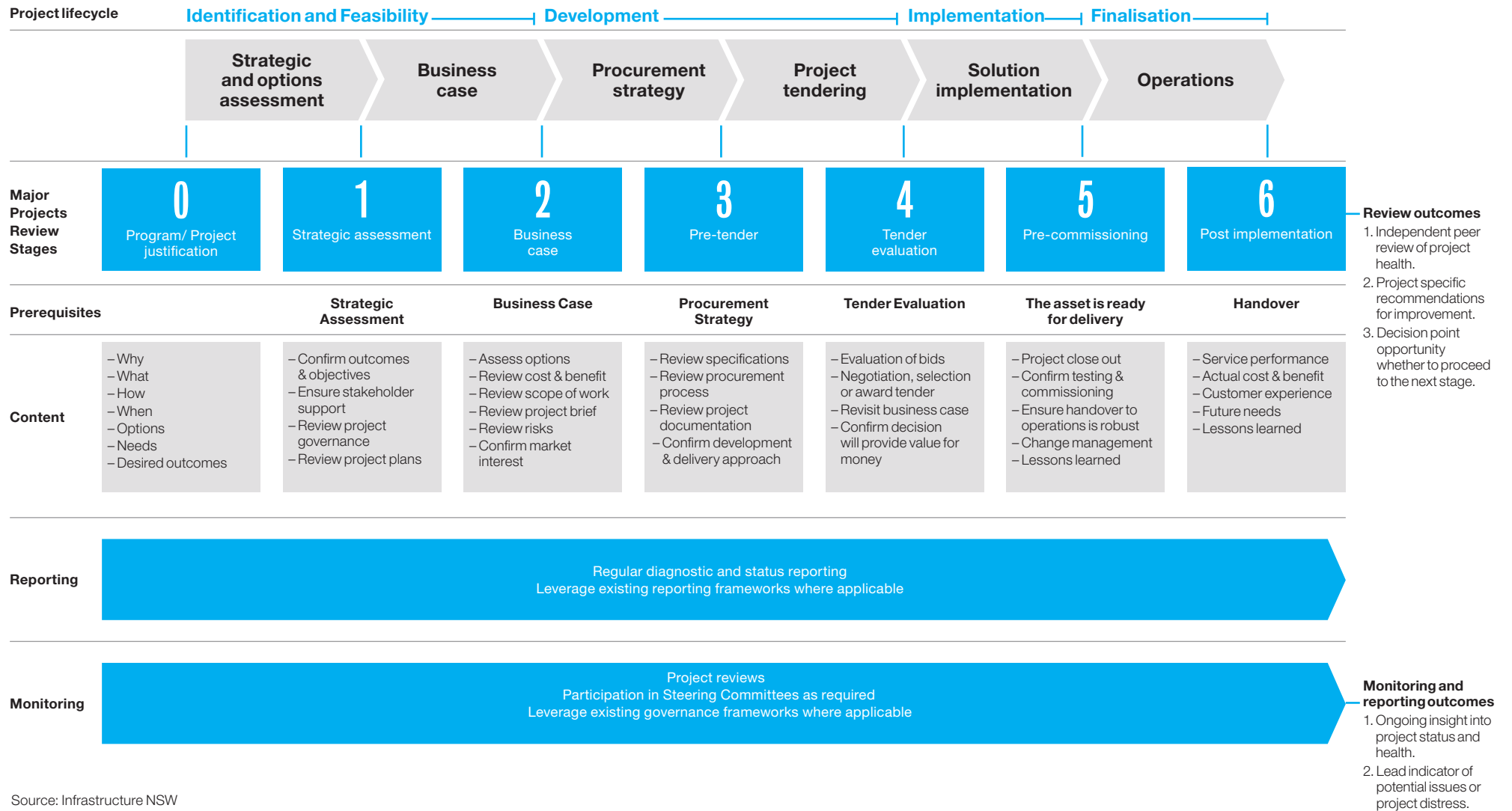
It is now accepted policy in NSW to prepare business cases for major projects prior to final decisions being made by the Government on their funding and implementation. Agencies generally develop project proposals in a staged manner, moving progressively towards the production of a final, detailed business case that contains all the data and analysis the Government requires to take properly assured decisions on a particular project or program’s scope, budget, timing and means of procurement.

In a number of instances, Infrastructure NSW recommends a timeframe within which a business case should be prepared; such recommendations are intended to enable the Government to ensure that critical infrastructure projects and programs are ‘investment decision ready’ at the point where funding for them becomes available. Projects are deemed to be ‘investment decision ready’ when they have passed through Stage 2 of the major project assurance framework. At this point, funding can be substantively committed to the project and the process of procurement can commence.

As noted earlier in this section, not all of the infrastructure-related challenges and opportunities facing NSW require capital investment. A number of the recommendations in this report relate to improved asset planning, utilisation and design, without specific financial commitments and without the need to prepare specific business cases.

In total, the recommendations in this Report represent a capital cost to be funded by *Rebuilding NSW* of \$18.9 billion over 10 years. Recommendations have regard to the affordability of capital commitments within the \$20 billion program envelope specified by the Premier, to the potential operational cost impacts of projects and to the maintenance of the State’s AAA rating.

Figure 1.3 Infrastructure NSW major project assurance framework



Source: Infrastructure NSW

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 2011³³
- 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 2031,³⁴ 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.³⁵ 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.

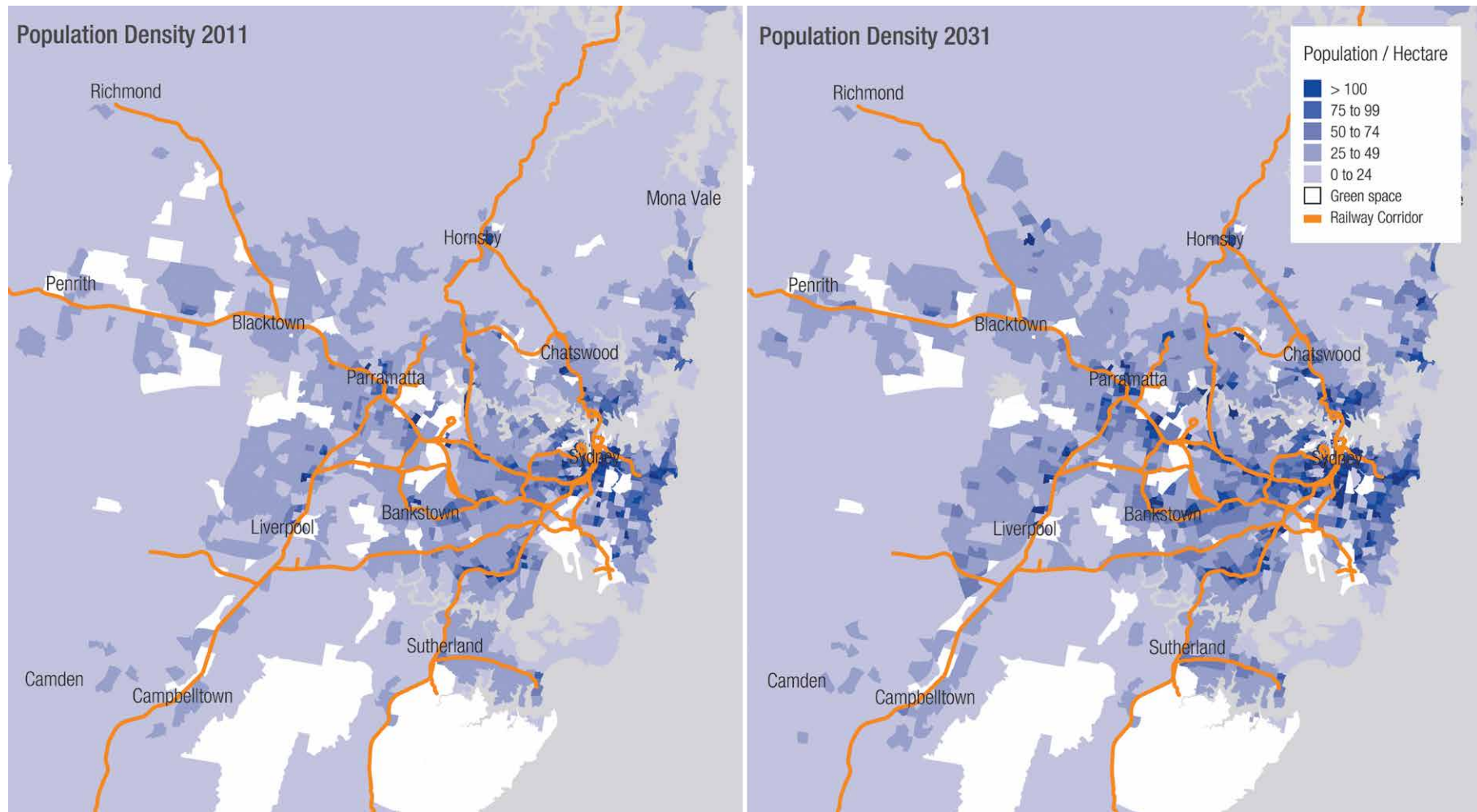
Around the world, effective public transport has been shown to be important in enabling and reinforcing urban densification and economic agglomeration. This is reflected in the mode share to Sydney's key employment centres, with public transport already accounting for around three-quarters of journeys to work to the CBD.³⁶ 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.³⁷

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.³⁸

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.³⁹

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 2031.⁴⁰ 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.

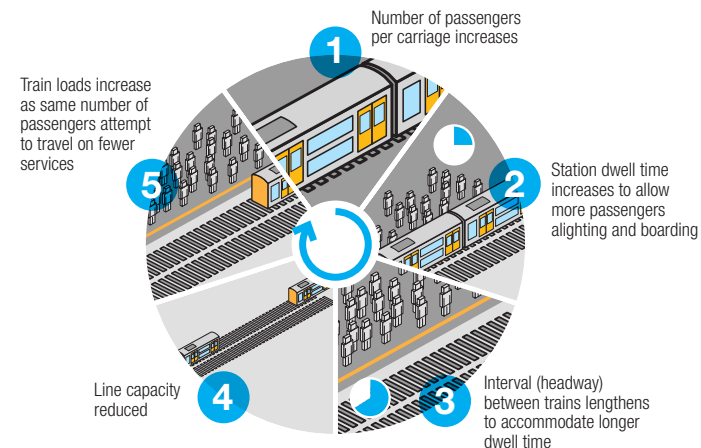
Figures 2.3 and 2.4 show the forecast change in the morning peak hour crowding across the rail network under a ‘do minimum’ investment scenario from 2011 to 2036.

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.⁴¹

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)

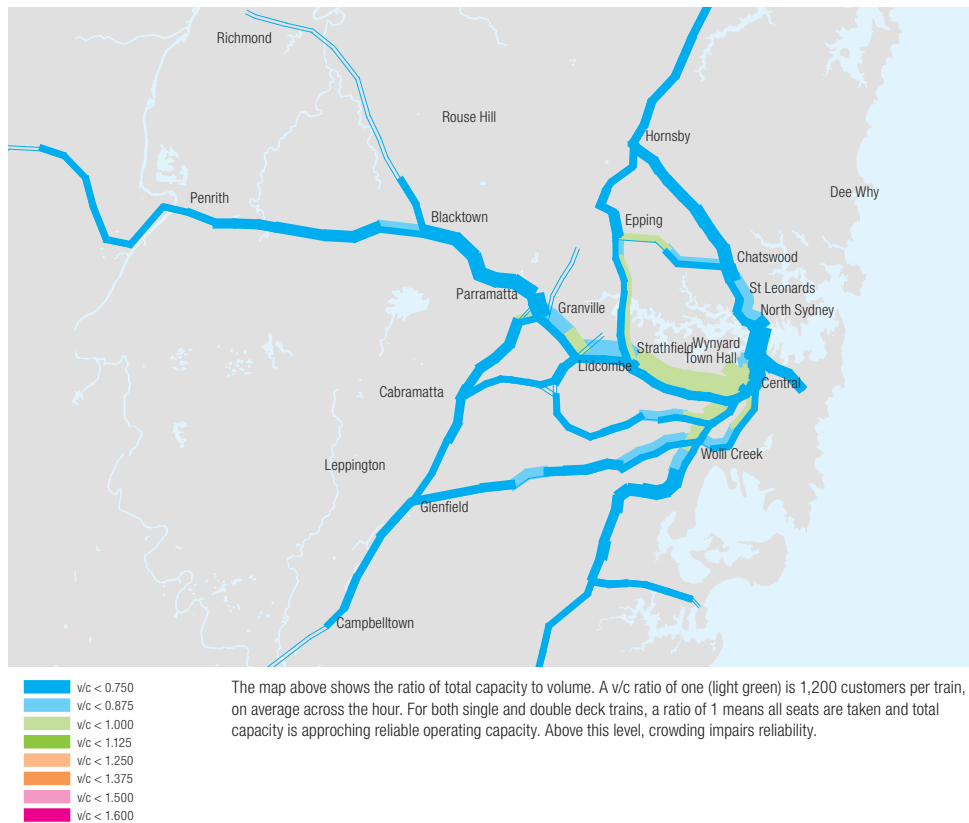
38. Transport for NSW

39. Transport for NSW

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

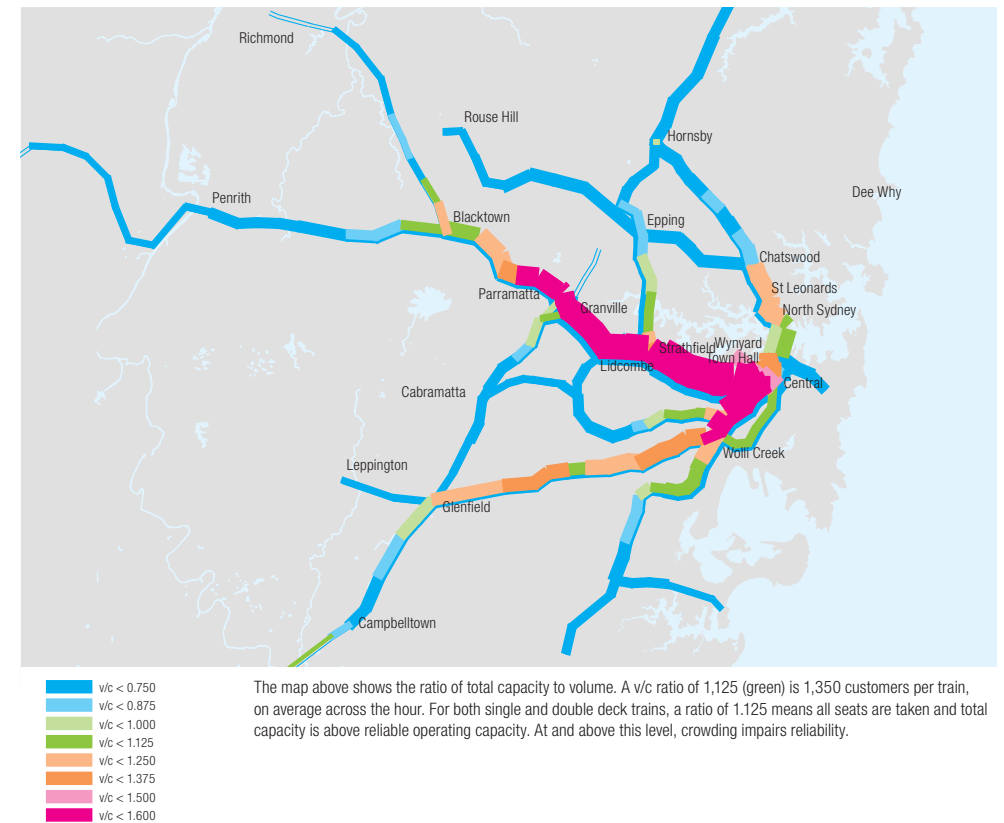
41. Public Transport Victoria Annual Report 2012/13

Figure 2.3 Train crowding morning Peak Hour (2011)



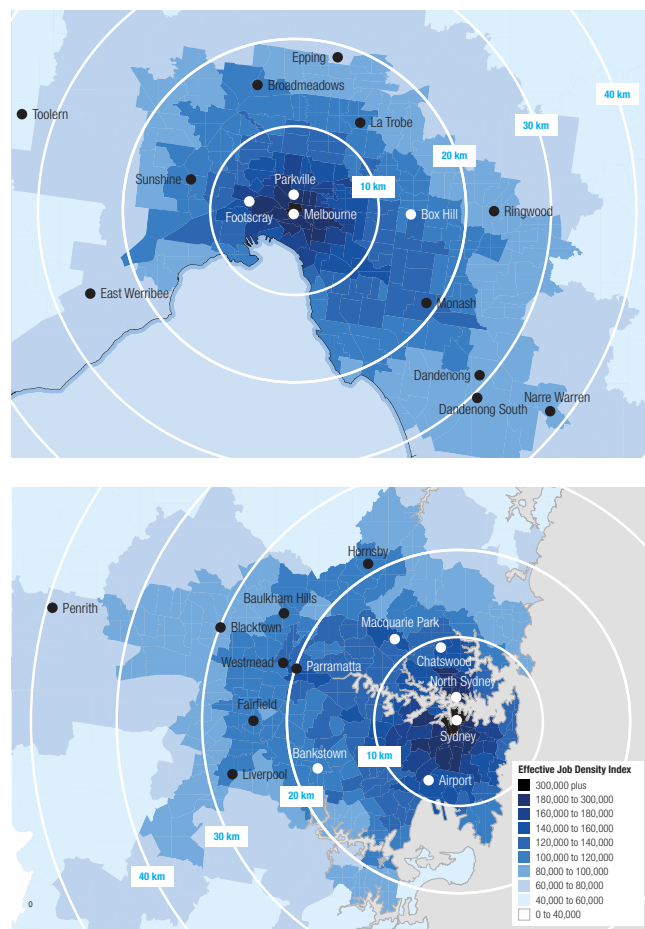
Source: Transport for NSW

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 stations⁴² and over 600 bus routes,⁴³ 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.⁴⁴

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,⁴⁵ 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

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 2031.⁴⁶ However, in 2011, just 37 per cent of work journeys to the Parramatta CBD were by public transport.⁴⁷

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

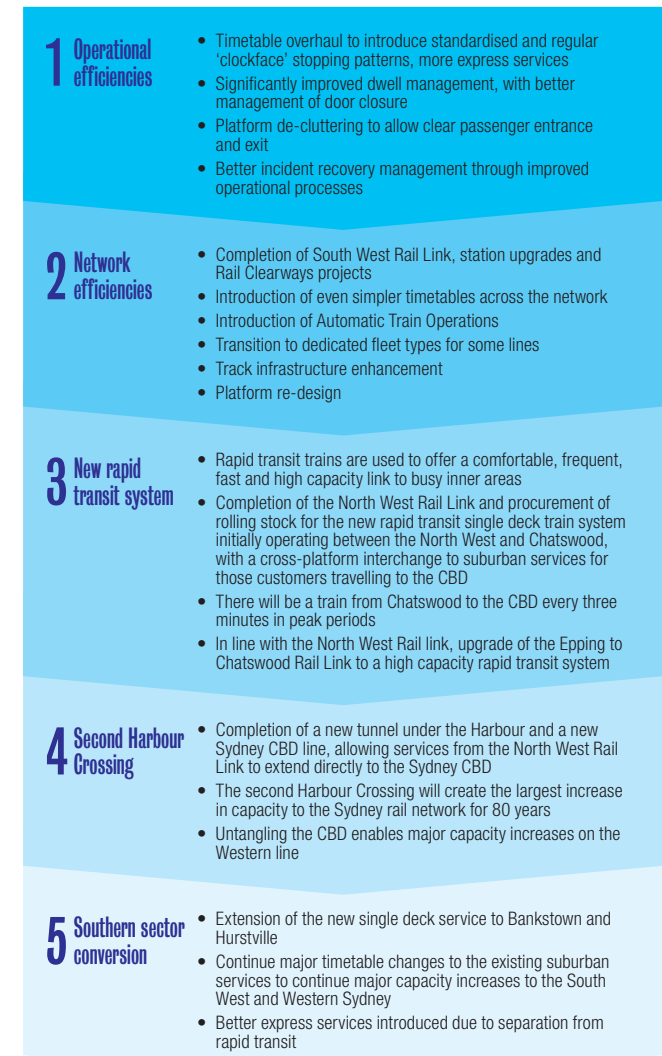
The Government's strategy to accommodate demand growth across the rail network is set out in Sydney's Rail Future. This long-term plan, published in June 2012, aims to improve the customer experience, network reliability and service frequencies across the network though investment in new services, increased 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.⁴⁸ 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

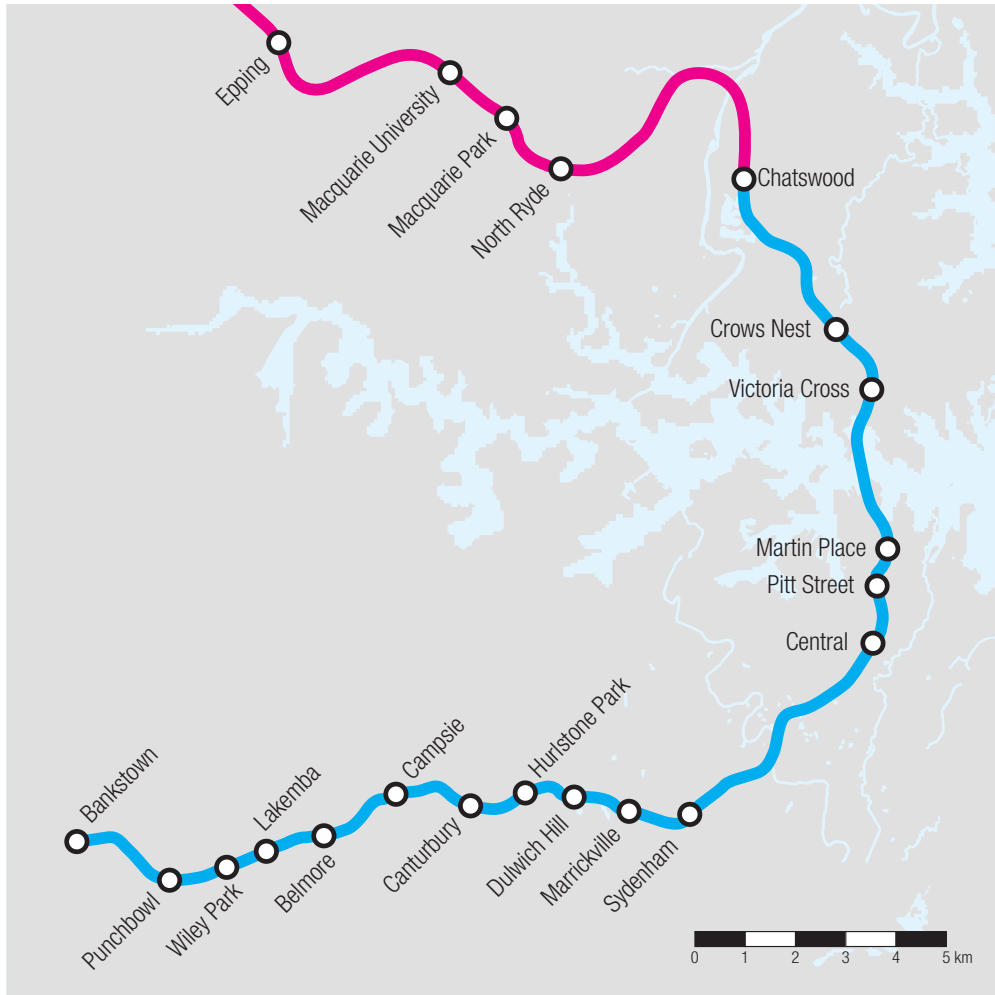
The Premier has identified Sydney Rapid Transit (SRT) as a strategic priority for consideration in the 2014 State Infrastructure Strategy Update.

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.⁴⁹

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.⁵⁰

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.⁵¹ 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.⁵²

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.⁵³ 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.

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

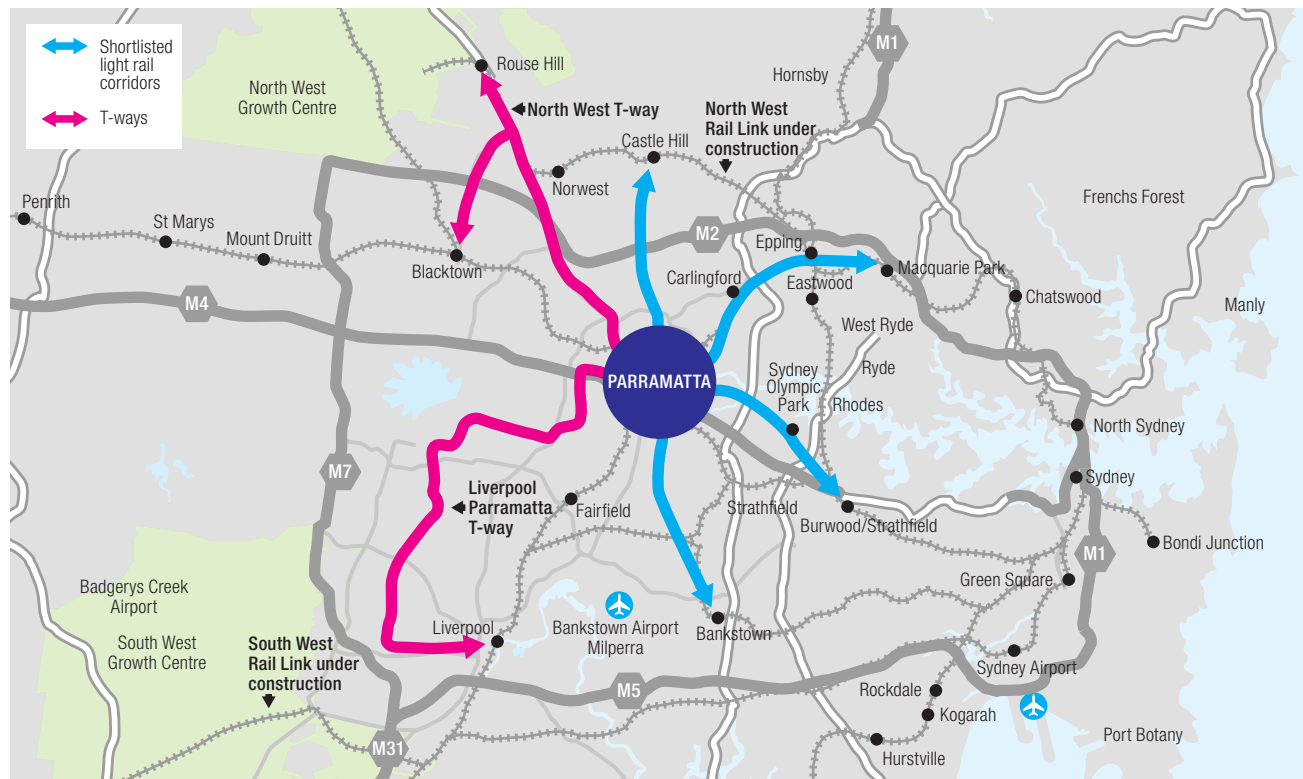
At present, rail journeys between Wynyard and Parramatta take approximately 30 minutes. A rail trip from Parramatta to Sydney Airport takes around 40 minutes, compared with 10 minutes from Central Station.

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*.

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

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.

3.0 Urban roads

STRATEGIC OBJECTIVE

Optimise passenger and freight movements on the existing roads network and facilitate broader economic development through selective extensions to the Sydney motorway network

KEY CHALLENGES

- Keep Sydney's roads moving and tackle congestion
- Cater for a growing demand for road travel without reducing safety, efficiency and amenity
- Extract the optimum performance from the existing road network
- Build future network capacity and protect potential future road corridors
- Enhance access to Sydney from growing regional cities
- Plan for population growth and integrate transport and land use planning more effectively

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Optimise the existing road network

- Relieve pinch points across the urban road network
- Provide additional investment in the clearways program over five years
- Make Smart Motorways investments on the M4, the Warringah Freeway and Southern Cross Drive-General Holmes Drive
- Upgrade the Sydney Coordinated Adaptive Traffic System and the Transport Management Centre

Reservations of \$300 million, \$100 million, \$400 million and \$200 million respectively from the *Rebuilding NSW* initiative

Expedite major motorway projects

- Refine the scope, alignment and procurement strategy for the WestConnex Northern and Southern Extensions to deliver these projects as toll roads within the next decade
- Develop a final business case for the Western Harbour Tunnel by the end of 2015, with the aim of delivering the project with, or immediately after, WestConnex Stage 3
- Undertake further review and development of Beaches Link, with a view to delivering the project over a 10 to 20 year timeframe

Improve access through Sydney from the Illawarra

- Improve access to Sydney from the Illawarra by unblocking critical constraints on Sydney's southern road corridors
- Undertake detailed assessments of larger scale investment options, including motorway options on the F6 and A6 corridors

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

Plan and protect future corridors

- Complete corridor identification work for the Outer Sydney Orbital (including the M9) and Bells Line of Road – Castlereagh Connection to the M7 by mid-2016 to enable protection of these corridors

Implement an integrated approach to infrastructure for urban renewal

- Implement a framework for integrated infrastructure planning, funding and delivery from 2015–16 to accommodate future population growth
- Align transport infrastructure planning with urban renewal projects

Snapshot

- Urban roads serve a critical economic function, supporting around 278,000 heavy freight vehicle trips and more than 1.2 million light commercial vehicle trips each day. Roads support around 86 per cent of container movements to Port Botany.
- Motorways provide key support for freight movements. Around 27 per cent of all Heavy Commercial Vehicle kilometres are travelled on the orbital network.
- Road transport is best suited to non-centre based trips and multi-stop private journeys by car. However, roads also support bus and light rail services, as well as enabling walking and cycling.
- Growing demand for road travel reflects economic and population growth. The Household Travel Survey reports a 24 per cent increase in the number of private vehicles, with average distances travelled in vehicles rising 2 per cent in 10 years.
- Increases in road congestion increase travel time and reduce reliability. Congestion costs Sydney around \$5 billion a year, set to grow to \$8 billion a year by 2020.

3.1 Summary

Sydney's roads are a critical part of the city's transport network, directly supporting around 75 per cent of the 17.6 million trips made every weekday.⁵⁴ Across the city, people depend on the road network to get to work, deliver goods and services, move freight and carry out many other personal and business activities. As Sydney's population grows, so too is the demand for travel on the road network.

While measures can be taken to encourage more travel by other modes, it is clear that the road network will continue to accommodate the vast majority of journeys in the city for the foreseeable future. This means that keeping Sydney's roads moving is one of the principal infrastructure challenges facing the city.

Sydney's roads are some of the most congested in Australia. Congestion imposes costs on the economy and the community through longer commutes, higher operational costs and restricted access. Currently, the indirect costs of congestion represent 8 to 12 per cent of total transport costs incurred by Sydney businesses.⁵⁵ Sydney's congestion costs are currently around \$5 billion per year – equivalent to annual losses of \$1,100 per Sydneysider – and are forecast to increase to around \$8 billion per year by 2020⁵⁶ if nothing is done. Without corrective action, congestion will worsen – and the costs to business and the community will escalate – as the city's population grows.

54. Bureau of Transport Statistics, 2012/2013 Household Travel Survey

55. Centre for International Economics 2006, *Business Costs of Traffic Congestion*

56. Bureau of Transport and Regional Economics [BTRE] (2007), *Estimating urban traffic and congestion cost trends for Australian cities*, Working Paper 71, BTRE, Canberra ACT

Infrastructure NSW acknowledges the current and planned investment being made in Sydney's road network. Infrastructure NSW considers there are a number of targeted, high value congestion-mitigating investments that would improve the performance of the existing road network. Most of these projects are already identified and are in the planning pipeline: they should be brought forward using *Rebuilding NSW* proceeds.

Infrastructure NSW proposes reserving a total of \$1 billion from the *Rebuilding NSW* initiative for:

- Relieving pinch points and extending clearways on the urban road network
- Implementing Smart Motorways on the M4, the Warringah Freeway and Southern Cross Drive-General Holmes Drive
- Upgrading Sydney's traffic management system.

First Things First identified the expansion and extension of the M4 corridor and expansion of M5 East as the two highest priorities for enhancing Sydney's motorway network. To complement these critical projects, Infrastructure NSW recommends refining the scope, alignment and procurement strategy for the WestConnex Northern and Southern Extensions with a view to their delivery as toll roads within the next decade.

Infrastructure NSW also recommends progressing the Western Harbour Tunnel – the third road crossing of Sydney Harbour – as a priority that could be delivered along with or immediately after Stage 3 of WestConnex.

A further \$300 million should be reserved from the *Rebuilding NSW* initiative to improve access to Sydney from the Illawarra through a program of smaller scale investments that target critical constraints along the A1 and A3 corridors.

More broadly, as Sydney grows to be a city of 6 million people by 2031, Infrastructure NSW urges the implementation of integrated infrastructure planning to ensure that the impacts on the road network of population growth and changing patterns of land use are addressed in a timely and appropriate way.

3.2 Progress since 2012

In the last two years, the Government has begun implementing its program for Sydney's road network. Significant milestones include:

- Completion of M2 widening in August 2013, with M5 widening set to be completed before the end of 2014
- The development and initiation of WestConnex, integrating the two highest motorway priorities (the M4 and M5 corridors) identified in 2012 within a single scheme
- Agreement in-principle to a project framework and funding for private delivery of NorthConnex, *First Things First's* third-ranked motorway enhancement, linking the M1 and M2
- State and Commonwealth agreement to a \$3.5 billion package of road works supporting a second Sydney airport at Badgerys Creek, including a motorway link connecting the new airport with the M7.

3.3 Ongoing challenges

In recent decades, significant focus has been directed towards the potential detrimental impacts created by the road network in cities, including local safety, environmental and amenity effects and, more broadly, the global challenge of managing transport-related carbon impacts.

As noted in *First Things First*, Infrastructure NSW recognises these challenges and supports attempts to address them. These impacts can be addressed through measures such as the adoption of electric and fuel efficient car technologies, incentives to encourage higher vehicle occupancy and initiatives to moderate traffic flows on urban streets – as WestConnex aims to achieve on and around Parramatta Road.

However, Infrastructure NSW has identified no viable alternative to the road network over the life-time of this Report for the vast majority of journeys in Sydney. Road-based transport is, and will remain, critical to moving people and goods across the city efficiently.

Of the 17.6 million trips made each average weekday in Sydney, around 75 per cent are by road.⁵⁷ Even with the significant investment and high levels of patronage growth forecast for Sydney's public transport network, 72 per cent of 27.5 million journeys in 2031 will be made on the road network each week day by vehicle – or 4.3 million new trips compared to today.⁵⁸

Keeping Sydney's roads moving as demand grows is one of the principal infrastructure challenges faced by Sydney and is the focus of this chapter.

57. Bureau of Transport Statistics, 2012/2013 Household Travel Survey

58. Bureau of Transport Statistics 2013, Household Travel Survey: Sydney Strategic Travel Model

While in theory there is an 'efficient' level of congestion – where the costs of tolerating congestion are outweighed by the costs of addressing it – it is clear there is a strong argument for initiatives to mitigate congestion in the Sydney context.

Infrastructure NSW has examined congestion mitigation programs that aim to get the most out of existing road networks and assessed potential major projects that could build future road and economic capacity in Sydney.

3.3.1 Optimising the performance of the existing road network

Sydney already has a substantial program of investment planned for the city's road network over the next decade. A relatively modest program of well-targeted, small scale investments can make much better use of existing roads and resolve localised congestion problems that impair broader network and economic outcomes.

A key way to respond to congestion is harnessing traffic information more effectively. This includes updating existing road management systems and modernising the Transport Management Centre's traffic control technology. Contemporary real time information systems can also enable more effective management of Sydney traffic and defer the need for major roads investment.

These information management programs work in tandem with demand side measures – such as real time traffic messaging and smart parking technology – to influence people's use of the transport network. Together, this suite of measures (described in the following sections) would deliver a holistic, integrated package to tackle Sydney's congestion.

The case for action on congestion

Congestion on Sydney's streets is not new – and is unlikely to ever be eliminated. In some ways, it is a symptom of economic growth and vibrancy, reflecting the vitally important role of roads in the city's social and economic activities. However, congestion imposes real costs on NSW's economic productivity and competitiveness, particularly in time-sensitive commuter and freight markets. Without intervention, these costs are expected to rise significantly.

Sydney's congestion costs are currently around \$5 billion per year – equivalent to annual losses of \$1,100 per Sydneysider – and are forecast to increase to around \$8 billion per year by 2020.⁵⁴

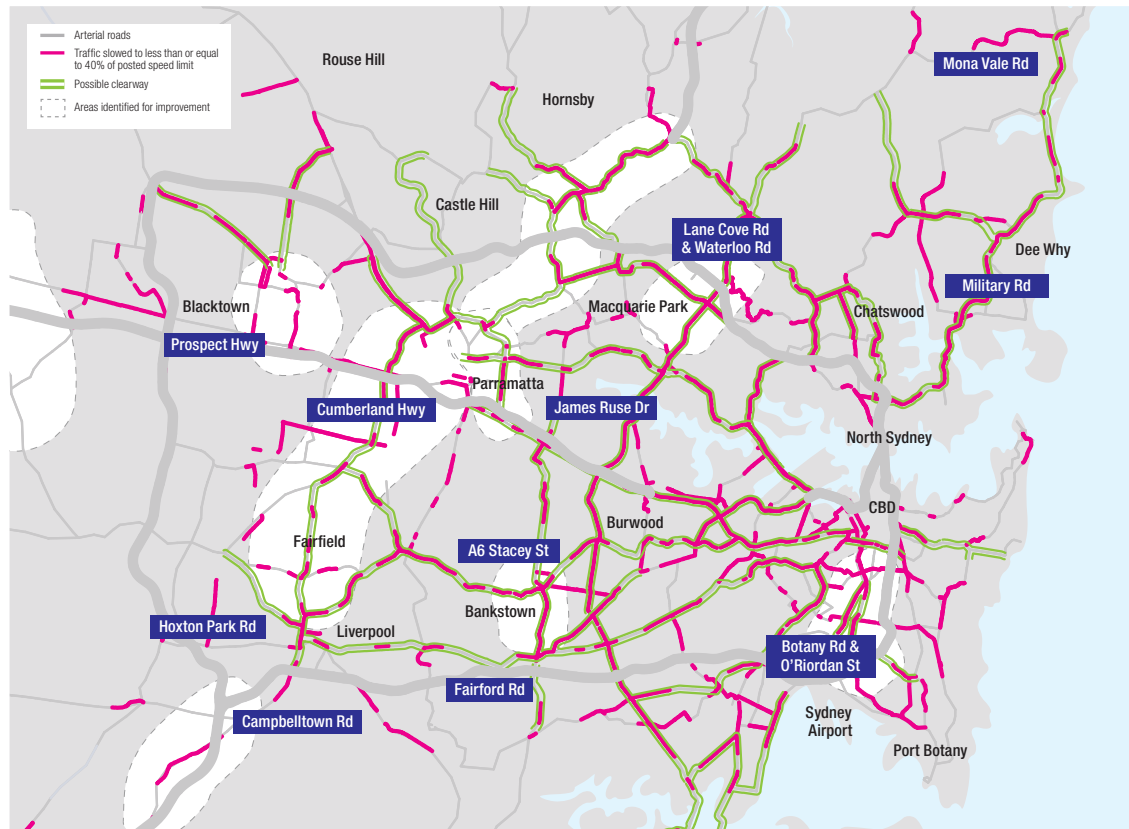
Projected population increases suggest that, in the absence of corrective action, congestion will become a worsening problem. More congestion means greater delays for businesses, motorists and bus commuters, higher costs to operate a vehicle and a reduction in air quality, with adverse health outcomes.

Rising congestion also creates a less reliable transport network, with more redundant, dead time needed to be built into logistical tasks.

Sydney's congestion problems can be set against those in other cities. A recent benchmarking study that compared actual travel speeds of GPS users with free-flow travel speeds ranked Sydney's congestion worst out of the nine benchmarked major Australian and New Zealand cities.⁵⁵ Congestion in Sydney increased average travel times by 34 per cent compared to free-flow traffic, and morning and afternoon peak hour travel times by up to 66 and 62 per cent respectively compared to free flow-traffic.

Sydney's congestion also compares unfavourably in a wider context: it equates to the sixth most congested city in the Americas and the twelfth most congested in Europe.

Figure 3.1 Morning road congestion patterns across Sydney



Source: Transport for NSW

54. BTRE (2007) op. cit.

55. Tom Tom 2014, *Australia & New Zealand Traffic Index*

Pinch Points

Targeted changes to road configuration at congestion ‘pinch points’, such as improvements to intersection design, turning lane approaches and lane widening and bus priority treatments, can deliver network-level productivity improvements.

Transport for NSW estimates that every dollar invested from its first Pinch Point program produced \$6 worth of travel time savings.

Following *First Things First*, \$130 million of Restart NSW funding was provided in the 2013/14 Budget to improve pinch points across the network, including around Parramatta and the Northern Beaches.

Areas of growing pressure to be addressed as priorities within the next stage of pinch point investments include the following major and minor works:

- Prospect Highway from Prospect to Blacktown
- Campbelltown Road from Campbelltown to the Cross Roads
- Cumberland Highway (A28) from Warwick Farm to Northmead
- James Ruse Drive from Clyde to Northmead
- A6 Stacey Street, Bankstown and grade separation at Hume Highway (see also the Southern Sydney Access Investigation below)
- Lane Cove Road and Waterloo Road, Macquarie Park grade separation

- Hoxton Park Road between West Hoxton and Liverpool
- Mona Vale Road between Terrey Hills and St Ives
- Fairford Road / Rookwood Road between Padstow and Yagoona

Roads and Maritime Services (RMS) has indicated that additional funding will allow corridors serving the Airport and south of the Sydney CBD to be progressed. Measures that could be considered include intersection upgrades and turning lanes, road widening, CCTV cameras and variable messaging signs.

Recommendation

Infrastructure NSW recommends that a reservation of \$300 million should be made from the *Rebuilding NSW* initiative for the Urban Roads Pinch Points Program.

Clearways

Clearways prevent stopping and parking on key corridors during peak periods, making the full road corridor available for traffic movement during the heaviest periods of congestion. Clearways have been in place for several decades in Sydney. The Government’s December 2013 Clearways Strategy confirms that corridor management measures must play an increasingly important role in addressing congestion in the future.

Extended clearways have the same benefits as road widening, but without the costs of constructing additional lanes. A preliminary benefits assessment from the extension of the Rozelle clearway suggests it has reduced travel times by up to 40 per cent.

The potential impacts of clearways on local businesses and communities mean that their implementation should include measures to mitigate local impacts, including alternative parking arrangements. Over time, additional investment in the clearways program will enable the extension of clearways across longer periods of the day, on weekends and to a broader number of major road segments.

Recommendation

Infrastructure NSW recommends that a reservation of \$100 million should be made from the *Rebuilding NSW* initiative for the Expanded Clearways Program.

Smart Motorways

'Smart Motorways' involves implementing technologies and other measures aimed at enabling real time, integrated management of motorway performance.

Smart Motorway technologies have been shown to enable greater throughput on the road network, higher travel speeds and more reliable travel times. Smart Motorway initiatives include:

- Ramp metering – regulating traffic flows at points of entry to the motorway, smoothing disruptions associated with merging traffic during periods of high demand
- Lane use management and variable speed limits – reallocating lanes and managing speed to minimise the need for heavy braking and sudden lane change manoeuvres
- Vehicle detection technologies – monitoring traffic and providing information to allow operational adjustments to be made to maintain optimal motorway flow
- CCTV cameras – allowing early detection and rapid management of congestion issues or accidents
- Enhanced motorist information – advising drivers of real time traffic conditions, empowering them to make informed decisions in determining which route they will take.

Smart Motorways are proposed to be first introduced on the M4, Sydney's busiest untolled motorway, from west of Church Street in Parramatta to Russell Street in Emu Plains. The works will integrate ramp metering and lane use and speed management measures with civil works to increase capacity on ramps and a section of motorway widening.

The M4 Smart Motorway investment is costed at just over \$400 million and is projected to deliver a \$5.4 billion benefit, suggesting an indicative benefit cost ratio of 13.1.

Subsequent smart motorways investments should include the Warringah Freeway and Southern Cross Drive-General Holmes Drive. The Warringah Freeway investment is costed at \$42 million, with an indicative benefit cost ratio of 6.7. Southern Cross Drive-General Holmes Drive investment is costed at \$73 million, with an indicative benefit cost ratio of 7.7.

Recommendation

Infrastructure NSW recommends that a reservation of \$400 million should be made from the *Rebuilding NSW* initiative for Smart Motorways investments on the M4, the Warringah Freeway and Southern Cross Drive-General Holmes Drive.

Smart Motorways deliver economic benefits

Smart Motorways measures have the effect of providing extra road capacity at relatively low cost and in shorter timeframes compared to new build solutions.

Smart Motorways initiatives provide capacity at rates equivalent to \$5 to \$10 million per kilometre. By comparison, new motorways and tunnels can cost between \$50 and \$350 million per kilometre.

Domestic and international experience bears out the economic potential of Smart Motorways initiatives, returning between \$3 and \$20 for every dollar invested.

In Melbourne, M1 Monash Freeway ramp signalling reduced peak travel times by 42 per cent and crashes by 30 per cent, with economic benefits of more than \$1 million a day.*

Auckland Motorway ramp signalling reduced peak travel times by 22 per cent and crashes by 24 per cent, and improved daily travel time reliability by 91 per cent.**

* ITS International 2012, *Integrating Traffic Management improves Management and Control*

** Transit New Zealand

Intelligent transport control systems

Intelligent transport control systems use technology to manage the road network in more efficient ways. Roads and Maritime Services operates the Sydney Coordinated Adaptive Traffic System (SCATS), a traffic management system that seeks to optimise road utilisation – for example, by adjusting traffic light changes to demand patterns.

Updating SCATS to best international practice could further improve Sydney’s traffic management capabilities by:

- Monitoring real time travel speeds of vehicles, with continuous feedback to traffic control systems to optimise the flow of traffic along corridors and across the network
- Understanding where vehicles are travelling to and from, and predicting the most efficient and reliable route for customers
- Warning vehicles when they are too tall to safely pass under a bridge or enter a tunnel, preventing crashes and infrastructure damage that contribute to delays across the network.

Transport management centres (TMCs) help to avoid or delay the onset of congestion and mitigate the impacts of incidents and service outages. However, Sydney’s existing TMC systems constrain the speed and adequacy of responses to network incidents, adversely impacting the safety and efficiency of road operations

Replacement of the TMC’s existing road network management system will improve the Centre’s capability to integrate and respond to network information and reduce delays to motorists.

Recommendation

Infrastructure NSW recommends a reservation of \$200 million from the Rebuilding NSW initiative to upgrade the Sydney Coordinated Adaptive Traffic System (SCATS) and the Transport Management Centre (TMC).

Empowering customers

Customers are able to make better travel decisions when equipped with accurate, real time information about network conditions. Customers can be informed in a variety of ways, including smartphone apps, on-road Variable Message Signs that provide real time traffic and road condition information to road users and smart parking technologies that provide real time information about available parking spaces, making searches for parking easier.

Recommendation

Infrastructure NSW recommends that Transport for NSW, working with RMS and consistent with the Government’s ICT strategy, develop a program of customer empowerment initiatives for potential investment from within their capital program from 2015.

3.4 Building future network capacity

WestConnex enhancements

First Things First identified the expansion and extension of the M4 corridor and expansion of M5 East as the two highest priorities for enhancing Sydney’s motorway network. Infrastructure NSW proposed they be delivered within a single integrated transport and urban regeneration scheme, WestConnex, within a 10-year period.

As noted in section 3.2, the Government has made substantial progress in developing WestConnex over the last two years. A dedicated agency, the WestConnex Delivery Authority (WDA) is progressing the three stages that make up the scheme. Work is on track to begin widening the M4 in early 2015, as part of the first stage of WestConnex.

In June 2014, the Government requested that WDA assess the potential for enhancing the scope of WestConnex through northern and southern extensions to the scheme, depicted conceptually in Figure 3.2.

The **Northern Extension** is scoped as a link to the former Rozelle Goods Yards, enabling connection to the Victoria Road corridor to the North and Anzac Bridge / Western Distributor to the East.

The **Southern Extension** is scoped as a connection between the new M5 East tunnels being built as part of Stage 2 of WestConnex and President Avenue, Rockdale.

These proposed extensions aim to offer a western bypass of Sydney’s CBD, alleviating pressure on the existing north-south corridor of Sydney’s orbital network and reducing journey times from the city’s south.

Figure 3.2 WestConnex extensions



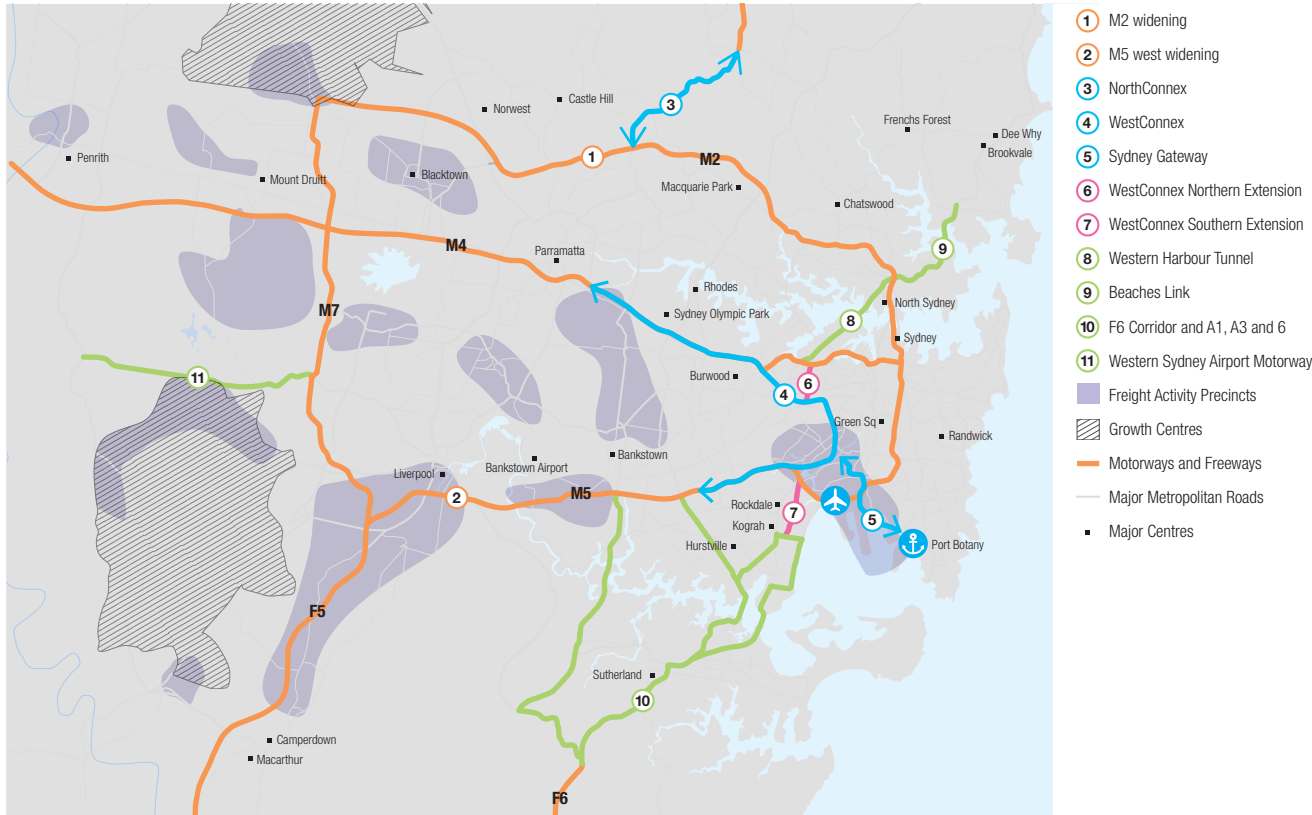
Source: WestConnex Delivery Authority

Over the longer term, through the Western Harbour Tunnel project (discussed below), the proposed northern extension to WestConnex could potentially connect to a third harbour road crossing, alleviating pressure on Sydney’s most constrained ‘pinch point’.

WDA has completed a preliminary business case for the Northern and Southern Extensions that sets out their

strategic and economic rationale and indicates a path for their further development. Work undertaken by WDA shows strong incremental traffic forecasts for these connections, suggesting toll revenues could significantly reduce the need for Government contributions towards the cost of delivery.

Figure 3.3 Long-Term Transport Master Plan: vision for Sydney's motorway network



Source: Long-Term Transport Master Plan (2012)

Further work is required to refine the scope of these extensions prior to any investment decision being made, particularly the Northern Extension which will interface with both the third stage of WestConnex and a potential third harbour road crossing.

Recommendation

Infrastructure NSW recommends the WestConnex Delivery Authority develop final business cases for the Northern and Southern Extensions to WestConnex by the end of 2015, with a view to their procurement and delivery as toll roads within the next decade.

Recommendation

Infrastructure NSW recommends any future State investment in the Northern and Southern Extensions utilise the increase in the State's financial flexibility created by the *Rebuilding NSW* initiative in a manner consistent with maintaining the AAA rating.

Sydney's long-term motorway strategy

The Government's Long-Term Transport Master Plan, published in 2012, set out a 20-year vision for Sydney's motorway network (shown in Figure 3.3).

Transport for NSW has been progressing initial planning into these 'missing links' in the motorway network to assess their relative priority and potential timeframes and identify the next steps. The options under assessment are described in the following sections.

Western Harbour Tunnel

A third road crossing of Sydney Harbour, the Western Harbour Tunnel, is under investigation as part of the Government's strategic motorway planning program. As with the existing harbour crossings, the Western Harbour Tunnel is expected to be a tolled motorway.

The Western Harbour Tunnel would provide a tunnel from WestConnex across Sydney Harbour to North Sydney, creating another bypass of Sydney's CBD and easing demands on the Sydney Harbour Bridge, Eastern Distributor and other approaches to the city. The southern portal at Rozelle would connect with the WestConnex Northern Extension and its northern portal would be in the corridor between the Gore Hill and Warringah Freeways.

The pre-feasibility assessment of the Western Harbour Tunnel highlights that by 2031 travel demand on the existing harbour crossings and Anzac Bridge will significantly exceed capacity in peak periods. Traffic modelling indicates that around 13 per cent of demand – or almost 2,000 vehicles per hour – would divert to the new tunnel during the morning peak, easing congestion on the Harbour Bridge and the existing Tunnel.

The Western Harbour Tunnel's indicative cost is estimated at up to \$4.5 billion. Initial assessment suggests that the project would be expected to raise significant toll revenues from motorists.

Recommendation

Infrastructure NSW recommends that Transport for NSW should develop a business case for the Western Harbour Tunnel by the end of 2015 to enable the project's procurement and delivery as a tollway with, or immediately after, the delivery of WestConnex Stage 3.

Recommendation

Infrastructure NSW recommends that any future State investment in the Western Harbour Tunnel utilise the increase in the State's financial flexibility created by the *Rebuilding NSW* initiative in a manner consistent with maintaining the AAA rating.

Beaches Link investigation

A potential Beaches Link toll road (currently being assessed) would provide a direct connection from Seaforth to the Warringah Freeway corridor, improving journeys from the Northern Beaches to the major employment centres of Sydney's Global Economic Corridor.

Beaches Link would likely use a tunnel connection for its full length, although the option of a combined tunnel and bridge over Middle Harbour is also under consideration.

The project is estimated to significantly alleviate congestion on one of the slowest corridors of Sydney's road network – potentially reducing morning peak traffic movements from the Spit Bridge by around 30 per cent and improving the local amenity of Military and Spit Roads.

Beaches Link could also improve public transport journeys from the Northern Beaches by offering a 'Mosman Bypass' for express bus services to the CBD and other centres.

Beaches Link is likely to be connected to the Western Harbour Tunnel, noting that both projects serve related travel demands for access to and from the CBD, gateways and western Sydney from the north of the city. Beaches Link is best viewed as a longer term complement to the Western Harbour Tunnel, given the heavy congestion currently experienced on the Warringah Freeway and harbour crossings during peak periods.

Pre-feasibility work undertaken to date suggests that Beaches Link would cost between \$2.4 billion and \$3.1 billion (\$2014). Projected toll revenues are unlikely to fully offset the cost.

Infrastructure NSW considers that the Western Harbour Tunnel represents a higher medium term priority than Beaches Link. Initial analysis indicates that the Western Harbour Tunnel – by alleviating pressure on the existing harbour crossings and Warringah Freeway – is an essential precursor to Beaches Link.

Recommendation

Infrastructure NSW recommends that Transport for NSW undertake further review and development of Beaches Link, with a view to a potential investment being made over a 10 to 20 year timeframe.

Southern Sydney Access Study

The Southern Sydney Access Study is also under way as part of the Government's strategic motorway planning program. The Study is reviewing ways of enhancing access between Sydney and the Illawarra through improvements to Sydney's southern road corridors. The Government has previously indicated that providing a 'Gateway to the South' is a priority which merits detailed investigation.

The Study is looking at the principal traffic flows along Sydney's southern road corridors (A1 Princes Highway, A3 King Georges Road and A6 Alford's Point Road), including demand for:

- Journeys from Sutherland Shire which make up 93 per cent of vehicle movements crossing the Georges River in the morning peak

- Journeys from Wollongong and the wider Illawarra Region, which make up 7 per cent of vehicle movements crossing the Georges River in the morning peak.

Infrastructure NSW recognises the benefits that would come from improving intra-urban and inter-urban journeys along Sydney's southern road corridors. However, initial findings suggest substantial upgrades to these corridors is likely to be very expensive. For example, the F6 corridor faces significant topographical constraints. The Study is yet to be completed.

Infrastructure NSW considers that in the interim, focus is best placed on targeted investments that address critical pinch points along these corridors, in tandem with the Southern Extension of WestConnex.

A package of 13 minor intersection upgrades across A1, A3 and A6 corridors has been indicatively costed at around \$45 million, with additional bus infrastructure works costed at \$11 million. Subject to the completion of project development and assessment processes, works should be delivered in parallel with, or ahead of, the Southern Extension of WestConnex.

\$ Recommendation

Infrastructure NSW recommends a reservation of \$300 million from the *Rebuilding NSW* initiative for a Sydney-Illawarra Pinch Points program to improve access to Sydney from the Illawarra by unblocking critical constraints on Sydney's southern road corridors.

Future corridor definition and protection

Work is under way to define and protect a north-south Outer Sydney Orbital corridor that would comprise future motorway (the M9), a freight rail line and, where practical, passenger rail in the form of the South West Rail Link extension (see Chapter 2).

Studies are also under way to define and protect a road corridor between the Sydney Motorway Network (M7) and the Bells Line of Road at Lower Hawkesbury. This corridor will provide for a future high quality east-west route connecting the Central West with Sydney.

Recommendation

Infrastructure NSW recommends that Transport for NSW should complete corridor identification work for the Outer Sydney Orbital and Bells Line of Road – Castlereagh Connection corridor identification work by mid-2015 to enable these corridors to be protected for future longer term development.

Outer Sydney Orbital

The Outer Sydney Orbital (M9) is a 76 kilometre multi-modal transport corridor running from the Central Coast to the Illawarra via a corridor west of the M7. Once complete, it will connect the North West and South West Growth Centres, provide links to the future Western Sydney Airport, support the NSW freight network and deliver potential benefits as a flood evacuation route for the Hawkesbury Nepean Valley.

While the actual delivery of the M9 is not planned to occur during the timeframe of this Strategy, the strategic need for the corridor is clear. Accordingly, further work is planned in 2015 to refine the M9 alignment and ensure the corridor can support future growth.

A more certain alignment will also enable stronger protection of the corridor through appropriate planning mechanisms. Earlier statutory preservation of all or parts of the corridor would prevent future urban development encroaching on it. There may also be potential for the Government to acquire and manage sites or sections along the corridor if this delivers the best economic outcome.

An economic appraisal of the corridor is also planned to inform the optimum approach and next steps for this important corridor. If undertaken at the right time, better corridor planning and investment could result in substantial savings in future land acquisition costs and broader benefits for local and State economies.

3.5 Enabling Sydney's growth

As Sydney heads towards a population of 6 million, the Department of Planning and Environment has projected a need for an additional 664,000 dwellings will be required over the next 20 years to house Sydney's growing population – equivalent to sustaining an annual rate of production of 33,200 dwellings a year.⁵⁹

While a significant number of Sydney's new dwellings will be located in greenfield areas, the majority of housing growth is expected to be infill within existing urban centres.

Infill development is a desirable and appropriate land use planning outcome, offering the dual advantages of using the capacity of existing transport links and infrastructure and locating dwellings in highly amenable locations close to established social and economic hubs of activity.

However, increasing population densities will put pressure on transport infrastructure, even where public transport mode shares are relatively high. Responding to these impacts is a challenge given that the urban environment is constrained and infrastructure responses are typically expensive and difficult to implement.

Integrated infrastructure planning, funding and delivery will be critical to ensuring impacts on the road network are addressed in a timely and satisfactory way. Infrastructure priorities identified through subregional growth infrastructure planning must be fully integrated with the Government's central processes for allocating resources.

The initial Subregional Delivery Plans are to be finalised in the near future. With the benefit of these plans, and further development of the Urban Activation Precinct program and the Major Urban Renewal Program, agencies like Transport for NSW will be able to ensure their capital priorities align with the Government's objectives for land use in general and housing supply in particular.

Recommendation

Infrastructure NSW recommends the progressive implementation of a framework for integrated infrastructure planning, funding and delivery from the 2015/16 financial year to help accommodate and plan for population growth. As part of this integrated approach, agency capital plans should include explicit provisions for growth infrastructure funding requirements, including Priority Precincts and Major Urban Renewal portfolio projects.

59. Department of Planning and Environment, *NSW Population, Household and Dwelling Projections*, June 2014

4.0 International gateways

STRATEGIC OBJECTIVE

Connect Sydney and NSW regions to national and global markets and suppliers

KEY CHALLENGES

- Ensure landside infrastructure supports rapid growth in freight and air travel at Port Botany and Sydney Airport
- Get the right infrastructure in place to move more freight by rail
- Protect existing and future freight corridors from inappropriate development
- Address constraints and ‘pinch points’ on routes to major export gateways
- Plan and prepare for the new Badgerys Creek Airport

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Manage the growing freight task at Port Botany

- Develop a detailed proposal for a Sydney Gateway linking the new WestConnex M5 to Sydney Airport and Port Botany
- Assess and prioritise projects that ensure efficient road connections from the front gate at Port Botany to Moorebank Intermodal Terminal

Cost of planning is not material
Cost of planning is not material

Support the modal shift from road to rail

- Encourage the ARTC to increase the capacity of the Southern Sydney Freight Line to enable additional train paths to Moorebank
- Reserve the corridor and site for the planned Western Sydney Freight Line and Eastern Creek Intermodal Precinct and commence assessment of these proposals

Assume delivery by ARTC based on user funding model
No assessment of land acquisition costs has been made
Cost of planning is not material

Secure freight paths to Port Kembla

- Assess and prioritise projects that secure freight paths for regional exporters at Port Kembla
- Encourage the ARTC to amplify the Southern Sydney Freight Line between Moorebank and Macarthur to enable regional exporters to secure freight paths to Port Kembla
- Gauge private sector interest in the potential to construct, operate and maintain the Maldon Dombarton rail link

Cost of planning is not material
Assume delivery by ARTC based on user funding model

Assume delivery by the private sector

Maximise the economic potential of Badgerys Creek Airport

- Take action to maximise the potential of the new Badgerys Creek Airport, including protecting the future operating capacity of the airport, preserving land for complementary activities and protecting future transport corridors related to the site

Cost of planning is not material

Remove rail freight constraints at Newcastle

- Reserve the Lower Hunter Freight Rail Corridor as a priority

No assessment of land acquisition costs has been made

Snapshot

- Port Botany, Port Kembla and the Port of Newcastle handle approximately 44 per cent of the NSW freight task by volume.
- Mining makes up half of the freight task and is anticipated to grow at 4 per cent a year to 2031.
- Rail mode share for containers through Port Botany fell from 21 per cent to 14 per cent in the last 10 years.
- Approximately 85 per cent of containers originate or are destined for locations within 40 kilometres of Port Botany.
- The Port Botany Landside Improvement Strategy improved on-time performance of trucks from 72 per cent to 93 per cent over the last four years.
- Container volumes are anticipated to grow by 5-8 per cent a year over the next 25 years.
- Sydney Airport moves more than 38 million passengers and 630,000 tonnes of airfreight annually and this is forecast to grow by 2031 to 70 million passengers and 965,000 tonnes of airfreight annually.

4.1 Summary

NSW's international gateways are vital economic assets. Efficient, reliable access to and from these gateways supports some of the State's most important economic journeys and is a critical element in sustaining the future productivity and competitiveness of Sydney and NSW.

As the freight task grows, the major infrastructure challenge facing our international gateways is the limitations of landside infrastructure – the roads and railway lines – that connect the gateways to the Sydney metropolitan area and regional NSW. As the freight task grows, constraints on this infrastructure will undermine the competitiveness and productivity of exporters, as well as freight and logistics businesses.

Infrastructure NSW is urging a more concentrated focus on landside infrastructure programs to improve rail and road freight distribution out of Port Botany, recognising that more containers will need to be transported to Western Sydney as most new distribution centres and warehousing will be located in the city's south-west.

While the WestConnex scheme will mitigate the road transport challenges in the Port Botany and Sydney Airport precinct, road congestion continues to be a significant issue affecting productivity at the port and airport. Infrastructure NSW recommends commencing work to assess and prioritise projects that will improve the efficiency of road connections from the front gate at Port Botany to the new WestConnex M5 and from the port to Moorebank Intermodal Terminal.

The NSW Government has a goal of doubling rail's share of container movements through the port (from the 2010/11 level of 14 per cent) and has made investments designed to encourage the movement of containers by rail, taking advantage of available capacity on the rail network. However, this has proven challenging because road freight continues to be more cost effective and reliable for the short haul journeys that make up most port container movements.

The opening of new intermodal terminals at Enfield and Moorebank and the expanded use of existing terminals at Chullora, Minto and Yennora may provide an impetus for movement of containers by rail within the Sydney metropolitan area. A number of capital projects and operational improvements could be undertaken in partnership with the Commonwealth Government and the private sector. Work should also commence to assess options for the full development of the planned Western Sydney Freight Line and Eastern Creek Intermodal Precinct, with the corridor and site for these important projects being reserved now.

Even with more freight using the rail network, most movement of cargo and passengers to and from the gateways will remain by road. Infrastructure planning will need to ensure there are adequate linking roads that connect to the motorway.

Once Port Botany reaches capacity, Port Kembla will become NSW's second container port, in addition to continuing to accommodate an increasing number of bulk exporters and motor vehicle imports. Growth at

Port Kembla will require rail upgrades in the longer term to secure freight paths for regional exporters, given the increasing number of passenger trains on the shared network. Infrastructure NSW recommends that work commence immediately on projects designed to secure these freight paths to ensure they are available and unconstrained when needed.

Action should also be taken to reserve the planned Lower Hunter Freight Rail Corridor, which will divert freight services from urban areas and improve journey time and reliability for regional and interstate rail freight movements through the Newcastle region.

Infrastructure NSW notes that planning is under way to construct a second airport in Western Sydney by the mid to late 2020s. Accordingly, planning should continue to develop the significant landside infrastructure that will be needed to support Badgerys Creek Airport and connect the proposed new airport to the wider Sydney metropolitan area.

4.2 Progress since 2012

The past two years have seen significant developments associated with the State's international gateways.

Major improvements have taken place in the ports and logistics sector:

- The sector has undergone significant change in ownership and operators, reflecting increased aggregation in the market.
- In May 2013, the NSW Government awarded a 99 year operating lease to NSW Ports for Port Botany and Port Kembla and in April 2014, a 98 year operating lease was awarded to Port of Newcastle Investments.
- The Cargo Movement Coordination Centre, established by Transport for NSW in July 2014, is building on the Port Botany Land Side Improvement Strategy and expanding its scope to the wider NSW network. The first stage focused on improving road freight performance, reducing truck turnaround times from 53 minutes in early 2011 to an average of 27 minutes in 2014.⁶⁰
- The Port Botany Expansion Project has been completed, involving the construction of a third container terminal that has been leased to Hutchison Port Holdings. This terminal opened at the end of 2013.

Enabling works have begun for the WestConnex scheme, with \$282 million provided to improve freight and traffic flows by:

- Replacing the General Holmes Drive rail level crossing with a road underpass that links General Holmes Drive, Botany Road and Wentworth Avenue
- Improving Mill Pond Road intersections with General Holmes Drive and Botany Road
- Widening Joyce Drive and General Holmes Drive between O'Riordan Street and Mill Pond Road to three lanes in each direction.

Measures to improve passenger transport to and from the airport precinct have been implemented, including cheaper and more frequent passenger rail services, new bus services to the airport from southern and northern Sydney and more bus and transit lanes and traffic signal priority systems.

A procurement process for Moorebank Intermodal Terminal has commenced. The Commonwealth Government's Moorebank Intermodal Company called for registrations of interest in May 2013 and direct negotiations are under way with the Sydney Intermodal Terminal Alliance. The Environmental Impact Statement is on exhibition until 8 December 2014.

In 2014, the Government announced Badgerys Creek as the site of a second airport in the Sydney basin. The NSW and Commonwealth Governments are delivering a \$3.5 billion program to upgrade major and local roads around the new Badgerys Creek Airport including upgrades to Bringelly Road, The Northern Road and the Elizabeth Drive Corridor.

4.3 Ongoing challenges

The major infrastructure challenge to NSW's international gateways continues to be constraints on the landside roads and rail lines that connect the gateways to Sydney and regional NSW. Reducing congestion on the transport network and tackling specific pinch points and constraints will support economic growth and productivity and encourage more productive land use.

4.3.1 Rapid growth in freight and air travel at Port Botany and Sydney Airport

A growing population, changing consumer demands and the increasing needs of business and industry will likely require a significant increase in capacity at Port Botany and Sydney Airport over the next 20 years.

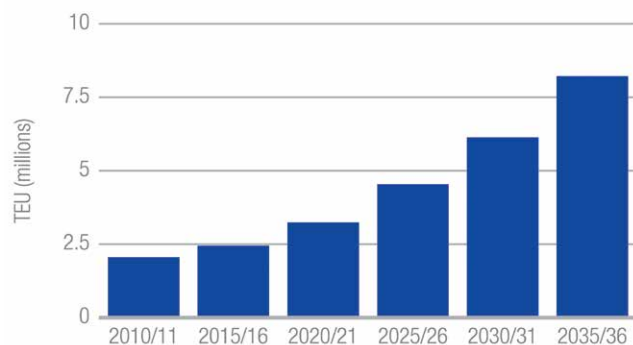
Sydney Airport moves more than 38 million passengers and 630,000 tonnes of airfreight annually and this is forecast to grow by 2031 to 70 million passengers and 965,000 tonnes of airfreight annually.⁶¹

NSW Ports, the lessee of Port Botany and Port Kembla, forecasts that annual container growth at Port Botany could be as high as 6 per cent, reaching 2.9 million TEUs by 2018.⁶²

These significant increases in container freight and airport passengers will require improvements to the road and rail network.

60. Transport for NSW 2014, Cargo Movement Coordination Centre Weekly Web Performance Report

61. Sydney Airport Corporation Ltd, 2014, Sydney Airport Master Plan 2033
62. NSW Ports, 2014, Five Year Port Development Plan

Figure 4.1 Projected growth in container movements at Port Botany

Source: NSW Bureau of Freight Statistics based on NSW Ports TEU growth forecasts

4.3.2 Physical and operational constraints at Sydney Airport

The capacity for Sydney Airport to continue to grow to meet demand is affected by a number of factors.

The site measures 907 hectares, small by comparison to other major airports in Australia and overseas.

Any further extension of the site is limited by urban development and by Botany Bay to the south, the Cooks River to the west and Port Botany to the south-east.

The particular configuration of the runways, taxiways, terminals and aprons arises from the staged development of the site over time and the constraints of the site. It does not reflect the optimal layout for terminals and runways at a major airport.

However, in the near term, there are simple regulatory changes that the Commonwealth Government can make to improve capacity at Sydney Airport. This includes increasing the flight cap from 80 to 85 movements per hour in peak periods and increasing flight movements in the curfew shoulder to the maximum allowed under Commonwealth legislation.

4.3.3 A congested road network is increasingly impacting delivery of containers

Growing congestion across the metropolitan road network is having an increasing impact on productivity in the Port Botany and Sydney Airport precinct.

Road freight is generally more cost effective and reliable for most short haul journeys. As such, most of the containerised freight moving between Port Botany and other parts of Sydney does so by road. Current estimates are that only 14 per cent of container freight at Port Botany is moved by rail.

Some 85 per cent of containers moving through Port Botany originate or are destined for locations within 40 kilometres of the port.⁶³ Western Sydney is the major destination for import containers and its importance as a destination is forecast to increase.

63. Transport for NSW

The metropolitan road network on which port containers currently travel is becoming increasingly congested and experiences variable travel times during peak periods. For example, Botany Road has an average speed of 25 kilometres per hour in the morning peak, while traffic on O'Riordan Street in the evening peak slows to 21 kilometres per hour.⁶⁴

Port freight traffic is a small component of this congestion, but attributes a high value to time relative to other traffic. Along the M5, all truck traffic represents 13 per cent of daily traffic and just 3 per cent of port container traffic.⁶⁵

The WestConnex scheme will cut traffic congestion, although there is still a need to ensure there are high capacity links from Port Botany and Sydney Airport direct to the motorway. Significant private sector beneficiaries should contribute to the development of such linking infrastructure.

64. Roads and Maritime Services 2013, Key Roads Performance Report

65. Bureau of Freight Statistics 2014, Sydney Commercial Vehicle Video Survey

4.3.4 The potential for a modal shift from road to rail freight at Port Botany

The NSW Government has set a goal in the NSW 2021 plan to double rail's mode share of container movements through the port from its 2010/11 level of 14 per cent.

The opening of new intermodal terminals at Enfield and Moorebank and the expanded use of existing terminals at Chullora, Minto and Yennora, together with more reliable rail services, may improve the economies of short haul rail freight. Currently, a shortage of intermodal terminal capacity limits options for the use of rail for metropolitan container movements. Recent market changes in operations and investment priorities may also have an impact on increasing rail modal share.

The majority of containers transported to and from Port Botany have their origin or destination in western Sydney. This pattern will intensify over time, as most new industrial land, including distribution centres and warehousing, will be located in south west Sydney (including the Western Sydney Employment Area) and, to a lesser extent, in the north west.

A number of capital projects and operational improvements could be implemented in partnership with the Commonwealth Government and the private sector, including the following:

- The Port Botany Line could be duplicated from Mascot to Port Botany and the signalling of the Cooks River Master Siding to Mascot could be extended. This would deliver increased rail capacity serving the terminals at Port Botany and improved ability to stage freight trains from the Enfield marshalling yard and adjacent Intermodal Terminal.

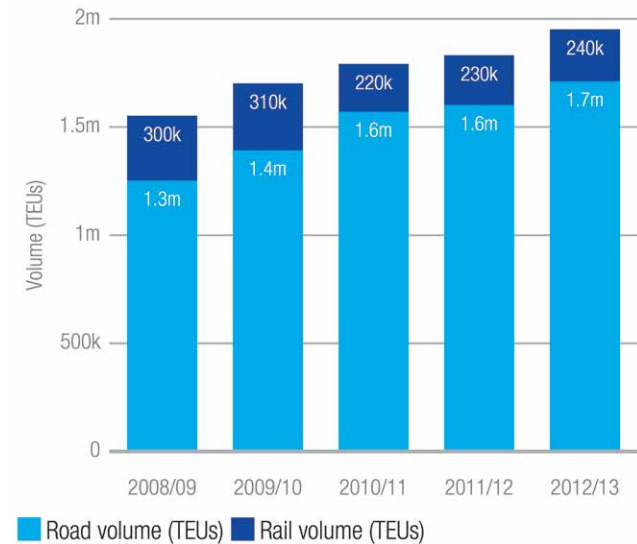
The estimated cost of the project is \$195 million.

- Amplification of the Southern Sydney Freight Line (SSFL) through a passing loop at Warwick Farm and the extension of an existing loop at Leightonfield could also deliver capacity benefits by enabling additional train paths to the Moorebank Intermodal Terminal.
- Removal of a key rail pinch point at Chullora Junction could improve the efficiency of Port Botany freight distribution by rail, in particular supporting the movement of containerised freight to the Moorebank Intermodal Terminal.
- Roads around the Moorebank Intermodal Terminal could be reconfigured to improve connectivity from the terminal to the major industrial and distribution centres between Eastern Creek and Campbelltown. Potential projects include the following:

- a solution to the M5 'weave' caused by vehicles entering the motorway at Moorebank Avenue and vehicles exiting onto the Hume Highway
- works to enhance the Cambridge Avenue corridor to create a new link between the site and the M7 motorway
- the upgrade of a number of intersections along the Hume Highway between the M5 and Orange Grove Road to the north.

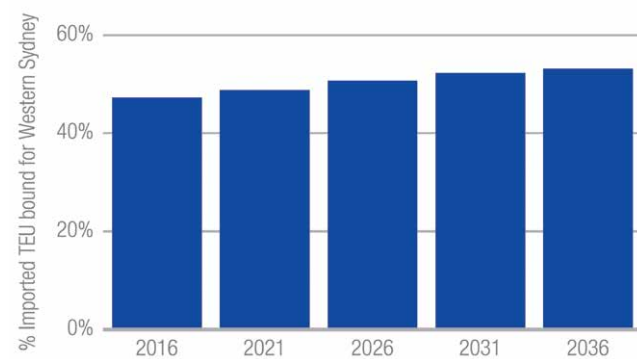
It should be noted that over the longer term some of these upgrades will also be required to support containerised rail freight bound for a potential future Eastern Creek Intermodal Terminal on a proposed Western Sydney Freight Line (WSFL).

Figure 4.2 Port Botany landside volume



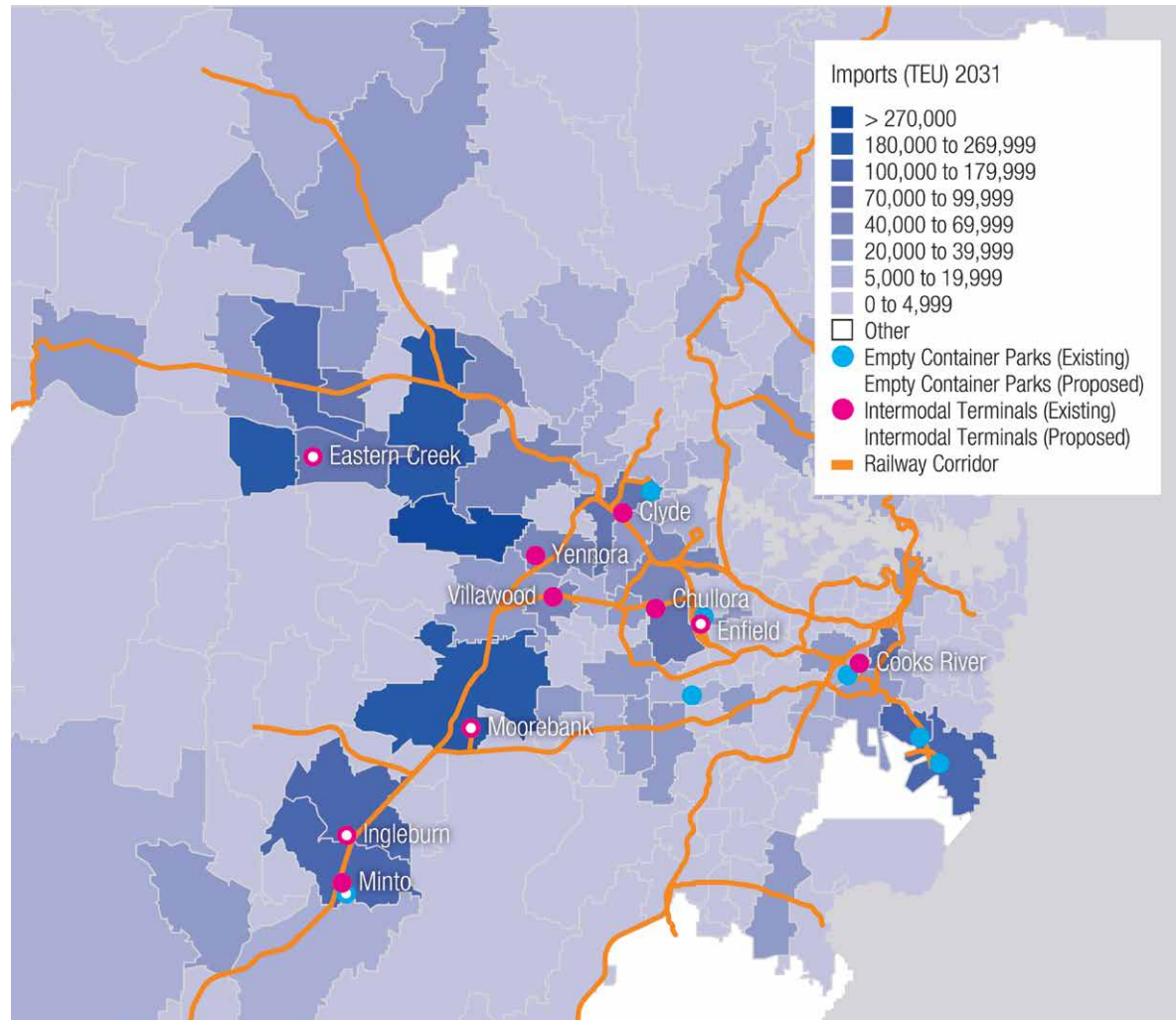
Source: NSW Bureau of Freight Statistics

Figure 4.3 Growth in Western Sydney container demand



Source: NSW Bureau of Freight Statistics

Figure 4.4 Import container demand 2031



Source: NSW Bureau of Freight Statistics

Recommendation

Infrastructure NSW recommends that the WestConnex Delivery Authority, in partnership with Sydney Airport and other strategic landholders, develop a detailed proposal for a Sydney Gateway linking the new WestConnex M5 to Sydney Airport and Port Botany.

Recommendation

Infrastructure NSW recommends that work commence to assess and prioritise projects that support freight movements from Port Botany to Moorebank Intermodal Terminal (including duplication of the Port Botany Line, upgrade of Chullora Junction and reconfiguration of roads around Moorebank).

Recommendation

Infrastructure NSW recommends that the Australian Rail Track Corporation (ARTC) be encouraged to increase the capacity of the SSFL to enable additional train paths to Moorebank, including a passing loop at Warwick Farm and the extension of an existing loop at Leightonfield.

4.3.5 Separating freight and passenger rail paths – the Western Sydney Freight Line

An additional challenge in the modal shift from road to rail is the regular disruption to freight trains running to and from Port Botany, as they currently operate on the shared Metropolitan Rail Network (MRN).

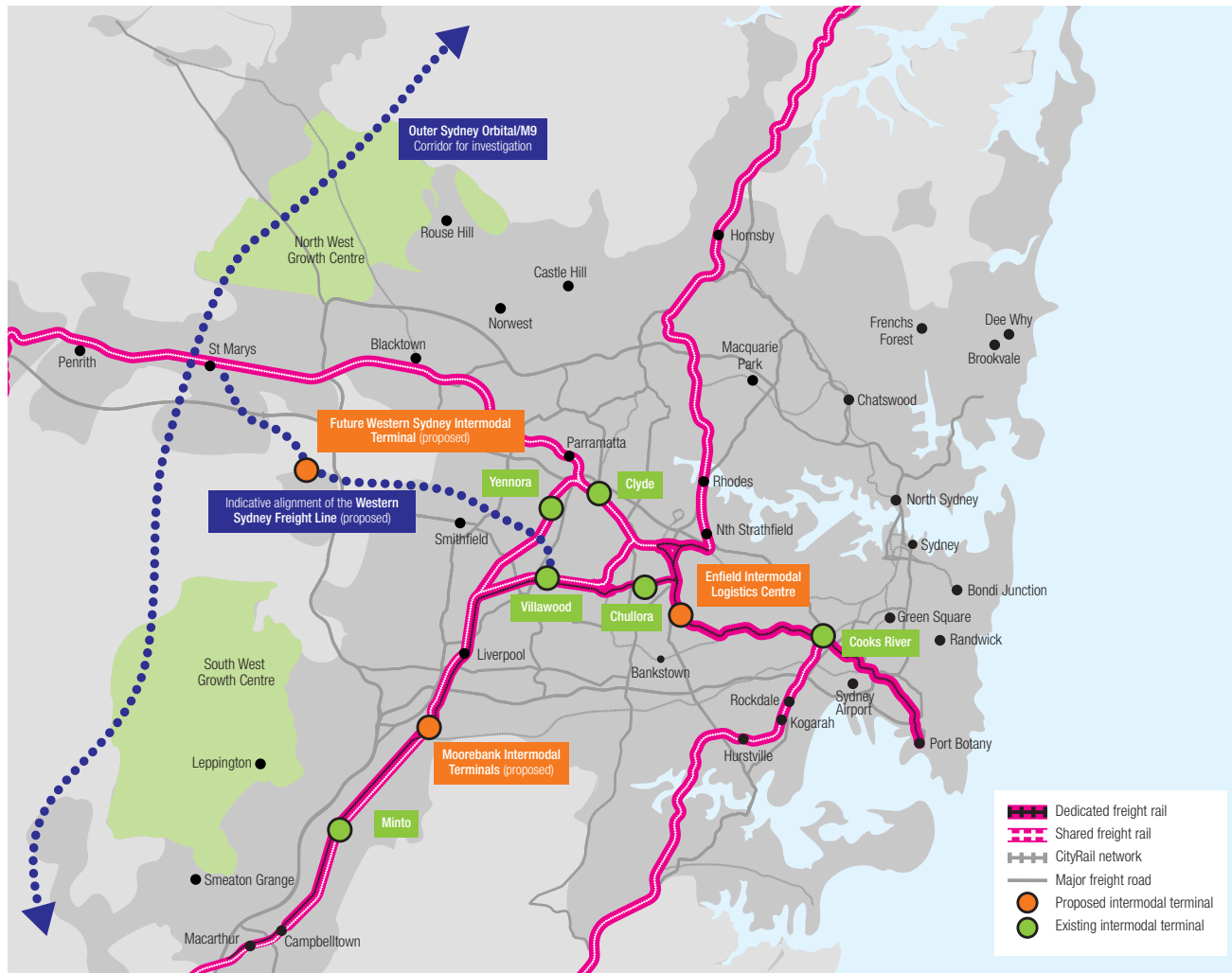
Passenger train services on the MRN are increasing and are given priority across the day, meaning the efficiency of freight trains will gradually decline. Improving the reliability of rail freight in the metropolitan area requires the ‘unwinding’ – or improved separation – of the passenger and freight rail use of the network.

The planned WSFL is a new dedicated freight line connecting the Main West Rail Line to the SSFL and new intermodal precinct at Eastern Creek. It will service the growth areas of Western Sydney that connect to Port Botany and regional producers that export from Port Kembla, as well as meeting demand from the businesses in the Western Sydney Employment Area (WSEA) for movement of containers by rail.

Currently, the WSEA is dependent for its freight needs on heavy vehicle transport. By 2036, 4.3 million truck kilometres a year could be saved through the WSFL and terminal precinct project.⁶⁶

66. Bureau of Freight Statistics

Figure 4.5 Proposed projects across the Sydney freight network



Source: Transport for NSW

Preservation of the corridor and site is required due to rapid urban development in the region, in particular in the WSEA. This will avoid the need for costly acquisition and retrofitting of urban areas to accommodate future freight rail access. It will also ensure that sufficient capacity is available for warehousing and empty container facilities close to the proposed intermodal terminal at Eastern Creek. The estimated project cost is \$2.2 billion.

Recommendation

Infrastructure NSW recommends reserving the corridor and site for the WSFL and Eastern Creek Intermodal Precinct.

Recommendation

Infrastructure NSW recommends that work commence to assess the full development of the WSFL and Eastern Creek Intermodal Precinct.

4.3.6 Maximising the economic potential of Badgerys Creek Airport

Over the next 10-20 years, the development of Badgerys Creek Airport will stimulate long-term economic activity in Western Sydney. Commonwealth Government projections indicate that Badgerys Creek Airport has the potential to create 35,000 jobs by 2035, increasing to 60,000 jobs in the longer term.⁶⁷

Investment and action will be needed across a number of areas to protect the future operating capacity of Badgerys Creek Airport, preserve land for complementary activities and ensure efficient, reliable access to the airport.

67. Media Release 2014, Prime Minister of Australia, 'Western Sydney Airport to deliver jobs and infrastructure'

Recommendation

Infrastructure NSW recommends the NSW Government take action to:

- Protect the future operating capacity of Badgerys Creek Airport by ensuring adequate buffers for areas affected by aircraft noise and sufficient airspace for future aviation needs
- Preserve land for complementary airport activities, including freight-related uses such as a new intermodal terminal and associated warehousing and distribution centres, and a jet fuel pipeline to service the airport
- Identify and preserve future transport and infrastructure corridors related to the airport site, including the extension of the South West Rail Link (currently undergoing public consultation)
- Develop new strategic employment corridors aligned with transport infrastructure investments that will service Badgerys Creek Airport

4.3.7 Connecting regional exporters to Port Kembla

Port Kembla supports bulk exporters, including grain and mining producers, and the import of motor vehicles and machinery. It is Australia's largest export grain terminal and the second largest coal export terminal in NSW.

The port plans to accommodate much of the State's future vehicle imports and serve as the major bulk export freight port for large parts of regional NSW. In the longer term, it will become NSW's second container port once Port Botany reaches capacity.

Currently, a significant proportion of freight travelling to and from Port Kembla is transported by rail on either the Illawarra Line or the Moss Vale to Unanderra Line. The rail network has around 60-65 per cent modal share by volume for bulk exports through Port Kembla.

A number of constraints exist on both of these lines. The Illawarra Line is shared between freight and passenger rail paths. This results in disruption to freight services and consequent problems in efficiency, reliability and cost. Plans for increased off-peak passenger services will further reduce capacity for freight movements on this line. Also, steep gradients and tight curves restrict freight movements on the rail lines.

A number of potential rail projects could secure freight paths connecting regional exporters to Port Kembla by reducing the impact of constraints on freight movements from Sydney's south west in the context of a growing passenger rail task. The following projects should be assessed and prioritised:

- Moss Vale – Unanderra capacity enhancements including the extension of four existing passing loops (with an estimated project cost of \$49 million)
- Dapto to Unanderra duplication (with an estimated project cost of \$150 million)
- Macarthur to Moss Vale capacity enhancements including the construction of two passing loops (with an estimated project cost of \$385 million)
- Duplication of the Southern Sydney Freight Line between Moorebank and Macarthur (\$772 million)
- Development of the Maldon Dombarton Railway – the NSW Government has recently released a Registration of Interest process to gauge private sector interest in the potential to construct, operate and maintain the railway (with an estimated project cost of \$650-700 million).

These projects would provide a dedicated freight line access from the Main West Rail Line, and possibly the WSFL, almost all of the way to Port Kembla, as well as providing better access from the south west via Moss Vale and catering for a growing demand for passenger services.

Figure 4.6 Road and Rail Network Supporting Port Kembla



Source: Roads and Maritime Services

Recommendation

Infrastructure NSW recommends that work commence to assess and prioritise projects that secure freight paths for regional exporters at Port Kembla (Moss Vale – Unanderra capacity enhancements, Dapto to Unanderra duplication and Macarthur to Moss Vale capacity enhancements).

Recommendation

Infrastructure NSW recommends that ARTC be encouraged to amplify the SSFL between Moorebank and Macarthur to enable regional exporters to secure freight paths to Port Kembla.

Recommendation

Infrastructure NSW recommends that work commence to gauge private sector interest in the potential to construct, operate and maintain the Maldon Dombarton rail link.

4.3.8 Regional road and rail connections to the Port of Newcastle

Port Newcastle is the world's largest coal export port. The NSW Government has entered into a 98-year lease with Port of Newcastle Investments to operate the port.

The related Hunter Valley coal chain consists of 35 coal mines owned by 11 coal producers.⁶⁸ The operator of Port Newcastle is required to work with coal producers and service providers through the Hunter Valley Coal Chain Co-ordinator (HVCCC) in relation to the transport of coal from mine to ship. The HVCCC is tasked with day-to-day planning and scheduling of the logistics chain to maximise throughput volumes, minimise costs and ensure long-term capacity alignment.

The ARTC operates the rail network and ensures that rail corridor capacity stays ahead of coal demand. Its recent forecast for mining-related freight has identified improvements to the rail network to accommodate prospective volumes of up to 277 mtpa. This would also require the proposed Terminal 4 on Kooragang Island or other terminal capacity expansion in the near term.

Although the private sector and ARTC are responsible for the efficient operation of Port Newcastle and the rail supply chain, there is scope for the NSW Government to improve the roads that enable movement of trucks from the port to deliver materials to the mines. This issue is addressed in Chapter 5.

68. Hunter Valley Coal Chain Coordinator, www.hvcc.com.au/AboutUs/Pages/History.aspx

The Lower Hunter Freight Rail Corridor (LHFC) project will provide a dedicated freight link that bypasses Newcastle, providing improved regional and interstate links. The LHFC is also critical in providing sufficient capacity to accommodate the expected growth in freight demand, which is forecast to double by 2031.

The existing rail network to and from Newcastle is subject to a number of operational constraints, including freight and passenger train interactions, and curvature and gradients that inhibit efficient transport options. Both regional and interstate freight rail movements are reduced in their efficiency as they travel through the Newcastle region.

The LHFC diverts freight services from sensitive suburban areas in the Newcastle region, delivering journey time and reliability improvements for existing and projected regional and interstate rail freight. It would also allow most freight trains to avoid the Adamstown and Islington level crossings. It therefore delivers consequential benefits to urban amenity and liveability by reducing noise and road congestion for the current and proposed residential areas in the Newcastle region.

Urgent action is required to reserve this corridor to protect it from any development which may impact on the future delivery of the project. This will require further investment in project definition, design, communication and business case development in order to progress the planning approval process.

Recommendation

Infrastructure NSW recommends that reservation of the Lower Hunter Freight Corridor be progressed as a priority.

5.0 Regional Transport

STRATEGIC OBJECTIVE

Improve regional producers' access to markets through investments supporting freight productivity

KEY CHALLENGES

- Manage a growing regional freight task efficiently
- Improve road freight productivity, particularly on major road freight corridors
- Tackle constraints and 'pinch points' on the local road network
- Improve the regional freight rail network and move more freight by rail where economically viable
- Make passenger transport investments that match the needs of a growing regional population

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATION

COSTS & FUNDING

Safer, more efficient road freight corridors

- Complete the Newell Highway Strategy and develop corridor strategies for the Golden Highway, New England Highway and Great Western Highway by mid-2016
- Establish a Regional Freight Road Corridor Fund, with investment priorities guided by freight productivity needs within the four proposed corridor strategies

Reservation of \$2 billion from the *Rebuilding NSW* initiative

Remove constraints on the local road network

- Expand the Bridges for the Bush program
- Deliver further rounds of the Fixing Country Roads program
- Investigate opportunities to leverage further private, council and/or Commonwealth contributions towards these programs

Reservations of \$200 million and \$500 million respectively from the *Rebuilding NSW* initiative

A viable, efficient regional rail freight network

- Establish a Fixing Country Rail program to tackle constraints on the rail network that reduce the efficiency of freight connections

Reservation of \$400 million from the *Rebuilding NSW* initiative

Keep pace with regional population growth

- Accelerate road network planning and investment to support the development of regional growth areas

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

Make passenger transport investments

- Develop a Mainline Acceleration Program to improve journey times between Sydney and the Central Coast and Illawarra (see Chapter 2)

Snapshot

- Regional freight supports production worth more than \$80 billion each year to the NSW economy. Agriculture, forestry and fishing, manufacturing and mining account for most of the freight from regional centres.
- NSW's most significant road freight corridors are the Hume and Pacific Highways connecting the east coast capital cities. Other major routes include the Great Western Highway, New England Highway and the Newell Highway.
- NSW's rail freight network includes the 3,270 kilometre interstate and Hunter Valley network leased to the Australian Rail Track Corporation and the 2,400 kilometre Country Regional Network managed by Transport for NSW.
- In 2013, the NSW rail network carried 157 million tonnes of freight (33 per cent of the total State freight task). Coal made up most of NSW's rail freight task, with significant grain and cotton movements drawn from across western NSW.
- The regional freight network in NSW plays a critical role in supporting the national freight task, with 75 per cent of interstate truck freight in Australia using the NSW road network for some part of its journey.
- Around 260 million tonnes of the NSW freight task originates in regional NSW. Together, the Hunter and Illawarra generate two thirds of all regional freight volumes in NSW.
- The cost of getting goods to port, including loading, accounts for around 15 per cent of the total cost of getting Australian coal to market.
- Over the next 20 years, the combined population of Newcastle and the Upper Hunter will increase by 120,000 people, while the Illawarra will grow by 65,000.
- The primary mode of transport for regional communities is private vehicle, with 90 per cent of the 7.5 million daily passenger trips in regional NSW occurring by car and only 1 per cent and 2 per cent respectively involving bus or train travel.

5.1 Summary

Safe, efficient and reliable transport connections are vital to regional communities and businesses. They are also essential to the productivity of industries that need to move freight around the State and to and from export gateways. While significant improvements have been made to regional road and rail networks in recent years, more needs to be done to service the increasing freight task and a growing regional population.

Strong growth is forecast over the next 20 years across NSW's major freight regions, including the Hunter and Illawarra. Coal production, generally moved by rail to port, is projected to drive growth, with new capacity requirements on the rail network largely met through Commonwealth and private investment.

Regional transport investments should aim to make producers' connections with domestic markets and international gateways more efficient and reliable – noting that investment in freight transport infrastructure often returns a 'double dividend', in that it can also improve safety and passenger transport outcomes.

While road freight productivity has more than doubled over the past 40 years, it has now slowed. Infrastructure improvements along major road freight corridors are needed to allow larger vehicles to move between regional centres, communities and gateways safely and efficiently. These improvements include bridge upgrades, overtaking lanes and driver rest areas. Infrastructure NSW endorses the corridor strategy model adopted by Transport for NSW for the Newell Highway corridor for identifying priorities and recommends the development of similar strategies for the Golden Highway, New England Highway and Great Western Highway.

Local road infrastructure can constrain freight network connections, imposing higher costs on business and communities. The NSW Government has established a number of programs that target local road improvement projects – notably Bridges for the Bush and Fixing Country Roads – and Infrastructure NSW recommends reserving further resources to complete or extend these programs.

A viable regional rail freight network – one with the capacity to carry a greater share of the total freight task – is critical to the productivity and competitiveness of regional businesses, as well as the broader NSW economy. Transport for NSW is developing an investment program, Fixing Country Rail, to address constraints on the network, such as steep gradients, inadequate passing loops, speed- and load-restricted bridges and delays due to passenger/freight train interactions. Infrastructure NSW recommends reserving \$400 million from the *Rebuilding NSW* initiative for this program, with detailed business cases to be developed by mid-2016.

With strong population growth predicted for a number of regional centres over the next two decades, transport investment should focus on serving this growth and ensuring that regional connections support the new economic and employment opportunities generated by an increasing population. Infrastructure NSW recommends a reservation of \$1 billion from the *Rebuilding NSW* initiative for investment in the regional road network, focusing on projects that will help to manage increasing travel demand in the fast-growing regions of the Central Coast, the Lower Hunter, the Southern Illawarra and the Far North Coast.

5.2 Progress since 2012

The past two years have seen improvements to key parts of the road network in regional NSW:

- The duplication of the Hume Highway was completed with the opening of the Holbrook bypass in 2013.
- A number of new sections of the Pacific Highway have been duplicated, with the length of dual carriageway increasing from 346 kilometres at the end of 2012 to 397 kilometres by the end of August 2014. About 60 per cent of the final length of the highway between Hexham and the Queensland border is now a four-lane divided highway.
- The 40 kilometre Hunter Expressway was opened in March 2014, connecting the Pacific Motorway with the New England Highway, carrying around 20,000 vehicles a day.
- Major widening works have been completed and progressed on the Great Western Highway across the Blue Mountains.
- Additional overtaking lanes were completed on the Newell Highway, increasing capacity. Key works, such as the Moree Bypass, have also been advanced or completed.
- Grain line upgrades have improved the reliability of the country regional network and heavy rail line locomotives can now operate from terminal to port on key corridors.

5.3 Ongoing challenges

NSW covers an area of almost 800,000 square kilometres.⁶⁹ The freight network transports more than 400 million tonnes each year across this extensive area by road and rail.⁷⁰

By 2031, the freight task in NSW will nearly double to 794 million tonnes, with significant growth in major regional exports, in particular mining production and meat and livestock.⁷¹

The primary transport challenge for regional NSW is to manage this growing freight task efficiently by improving road productivity, enhancing local freight connectivity across the regions and developing a sustainable and viable regional rail freight network.

In addition, investment in road infrastructure will be required to support population growth and economic development while avoiding potential network impacts.

5.3.1 Improving road freight productivity

Road freight productivity has more than doubled over the past 40 years, driven largely by the use of larger combinations of freight vehicles, increases in mass and dimension limits and targeted investments in road infrastructure.⁷²

However, road freight productivity growth has slowed over time,⁷³ underlining the need for additional investment to enable further gains to be made as effectively as possible.

69. Geoscience Australia, www.ga.gov.au/scientific-topics/geographic-information/dimensions/area-of-australia-states-and-territories

70. Transport for NSW 2012, NSW Freight and Ports Strategy,

71. Transport for NSW 2012, NSW Freight and Ports Strategy,

72. BITRE 2011, Truck Productivity: Sources, Trends and Future Prospects

73. BITRE 2011, Truck Productivity: Sources, Trends and Future Prospects

Improving productivity on key road freight corridors

Regulatory restrictions on heavy vehicle access arise from avoidable infrastructure constraints, as well as community concerns about road safety and other local impacts. Targeted infrastructure investment in bridge upgrades, overtaking lanes, intersection improvements, driver rest areas and pavement strengthening can enable greater access for Higher Productivity Vehicles (HPVs) in regional NSW.

The Newell Highway corridor

The Newell Highway connects regional centres and communities across western NSW. It also serves as a key economic link to domestic and export markets for agricultural products from the Central West and interstate road freight between Queensland and Victoria.

Heavy vehicle use along the Newell is high: 26 to 52 per cent of all daily traffic. Relative use of heavy vehicles is strongest on the Newell between Narrabri and Boggabilla, with up to 1,500 heavy vehicles per day near the Queensland border and rural sections around Narrandera. However, access to the Newell for Higher Productivity Vehicles and double road trains is limited from Tocumwal to Morundah, from Dubbo to Gilgandra and from Narrabri to Goondiwindi.

Extending HPV access would mean that the equivalent of 160 vehicles could be taken off the road, improving cost efficiency by 22 per cent.

The Newell Highway is the spine of regional NSW's road network, carrying the majority of interstate road freight between Queensland and Victoria along its 1,060 kilometre corridor.⁷⁴

The Newell also connects dozens of regional centres and communities, providing links to domestic and export markets for products from across western NSW.

The draft Newell Highway Corridor Strategy sets the objective of providing access along the entire length of the Highway for HPV vehicles of up to 36.5 metres in length, while progressively phasing out the use of double road trains.

Intersection upgrades will be essential in unlocking the productive potential of the Newell. The draft strategy identifies 28 intersections where turning is required to stay on the Highway, with seven intersections preventing HPV access altogether.

These constraints, along with other impediments to traffic flow, have informed a range of priorities for corridor investment, including:

- Intersection upgrades (for example, Oxley Highway, Grong Grong and Narrandera)
- Bypasses (at Coonabarabran and Parkes)
- Widening works (at Narrabri)
- Realignment works (at Trewilga, Bruxner Way, Dubbo and Parkes)
- Road / rail intersections (at Parkes and West Wyalong)

- Roundabout replacements (at Narrabri and Coonabarabran)
- Pavement strengthening works (at West Wyalong).

The business cases undertaken for some elements of this program suggest strong returns on investment, with indicative benefit cost ratios ranging from 1.3 to 5.7.

Infrastructure NSW considers that the corridor strategy model adopted for the Newell Highway has merit and should be selectively extended to NSW's other high priority road freight corridors. Structured corridor investment programs could also provide a stronger basis for contributions from the Commonwealth Government and industry.

Table 5.1
Forecast annual freight volumes on major road corridors in 2031

Corridor	2013 (Mt)	2031 (Mt)
Hume Highway	34	58
Pacific Motorway ⁷⁵	22	37
Pacific Highway ⁷⁶	17	28
Great Western Highway ⁷⁷	12	22
New England Highway	8	13
Princes Highway ⁷⁸	8	14
Newell Highway	5	9
Sturt Highway	5	8

⁷⁵. Near Gosford

⁷⁶. Near Queensland

⁷⁷. Near Penrith

⁷⁸. Near Sutherland

⁷⁴. Media Release 2014, Minister for Roads and Freight, 'Newell Highway Corridor Strategy to build on existing upgrade works'

The two corridors with the highest volumes, the Hume and Pacific Highways, have been the subject of major investment programs that are recently completed (in the case of the Hume) and well-established (the Pacific). However, growth on other freight corridors is expected to be substantial:

- By 2031, New England Highway volumes are projected to reach levels equivalent to 80 per cent of existing Pacific Highway volumes.
- Over the same period, Great Western Highway volumes are set to exceed existing Pacific Motorway volumes and reach levels equivalent to about 70 per cent of existing Hume Highway volumes.

Strong freight traffic growth on these corridors partly reflects a positive economic outlook for regional communities. Fewer, larger trucks can support growth in regional businesses and industries while decreasing the number of freight vehicles on the roads, reducing road wear and improving safety on regional roads.

In some instances, industry has choices as to the best routes to market – for example, between the New England and Pacific Highways in the north of the State. In these cases, assessments need to integrate costs, constraints and freight demands across the corridors appropriately so that investments secure the best economic returns available.

From the Central West, the Great Western Highway and Bells Line of Road offer connections to markets and gateways in the east. However, both of these routes travel through challenging topography over the Great Dividing Range, making further capacity enhancement

challenging and expensive. In addition, geographical constraints limit maximum vehicle sizes using the routes and both are regularly affected by adverse weather conditions (such as black ice).

The Golden Highway is an alternative east-west road connection linking the New England Highway in the Hunter Valley to the Newell Highway at Dubbo. It provides valuable access for the Central West region to the East Coast and Hunter Valley. At its eastern end, the highway carries significant coal mining related traffic; at the western end, it carries grain and supports commuter and other traffic. The route is also important for fuel transport serving the surrounding mining and agricultural hinterland.

Investment to improve HPV access along the Golden Highway could also maximise the use of the recently constructed Hunter Expressway (Branxton to the M1 Motorway), which opened to traffic in March 2014.

A package of works under development for the Golden Highway will target improvements to freight access, road safety, asset condition and traffic efficiency. These benefits could be delivered through upgrades including additional overtaking lanes, shoulder widening, road pavement and bridge strengthening, rest area improvements and flood immunity works. Preliminary analysis suggests good returns on investment, with a benefit cost ratio of 1.7.

The Golden Highway works under development should be developed into a corridor investment strategy, taking into account the highway's interrelationship with the Great Western Highway and Bells Line of Road.

Recommendation

Infrastructure NSW recommends Transport for NSW complete the Newell Highway Corridor Strategy and develop corridor strategies for the Golden Highway, New England Highway and Great Western Highway by mid-2016.

Recommendation

Infrastructure NSW recommends a reservation of \$2 billion from the *Rebuilding NSW* initiative for a Regional Road Freight Corridor Program.

Improving local road freight connections

Local road infrastructure can constrain freight network connections. Addressing these network ‘pinch points’ can enable more direct routes to market and allow the use of more efficient freight vehicle configurations.

Without investment, these pinch points will continue to require diversions of freight traffic and more freight vehicles will be needed to carry the same volume of freight, imposing higher costs on business and the community. It is estimated that diverted freight travel will cost NSW businesses almost \$1 billion over the next 20 years and require an additional 900,000 driver hours.⁷⁹

Through Restart NSW, the Government has invested in programs targeting local road projects designed to improve whole-of-network operations, including Bridges for the Bush, Resources for Regions (both initiated in response to *First Things First*) and Fixing Country Roads.

The **Bridges for the Bush** program prioritises upgrades of bridges that are both mass-constrained and on desired freight routes. Targeted investments in bridge strengthening or replacement can open up hundreds of kilometres of highway for HPVs.

Currently, more than 50 bridges across NSW have restricted access. Despite strong indicative economic benefits, Bridges for the Bush has not progressed as rapidly as planned due to a lack of matching Commonwealth funding. The program could be further extended over the timeframe of this infrastructure strategy, subject to demonstrating its economic advantages and receiving Commonwealth co-funding.

Priority projects for initial consideration include the replacement of the Tooleybuc Bridge over the Murray River and Cobb Highway, and construction of a new bridge over the Murray River between Echuca and Moama. Both bridges lie on important freight corridors but, due to their age and capacity, need to be replaced to meet current and future demand, particularly from heavy vehicles.

Recommendation

Infrastructure NSW recommends a reservation of \$200 million from the *Rebuilding NSW* initiative for the Bridges for the Bush Program.

The **Resources for Regions** program aims to improve local infrastructure in mining-affected communities. The program, which also invests in non-transport infrastructure, has committed to a number of road upgrades including:

- Bridge replacement in Broke
- New England Highway intersection upgrades in Singleton
- Roads supporting the Ulan mine near Mudgee
- An oversize vehicle bypass near Muswellbrook
- Redevelopment of Black Bridge near Lithgow
- Upgrade of Cordeaux road and bridge in Wollongong.

While coal production over the next 20 years will be mostly moved by rail, rather than road, increased coal production has implications for the State’s roads:

- Some mines do rely on trucks to move coal to market, particularly in the Southern Coalfield.
- Mining production inputs (such as fuel and explosives) comprise around 2.5 per cent of coal output⁸⁰ and tend to be moved by road.
- Increased coal train movements will create congestion where roads and rail lines intersect, requiring consideration of underpasses or overpasses to address impacts on communities and road freight movements.

79. Transport for NSW 2014, Fixing Country Roads: Expression of Interest Guidelines

80. Hyder Consulting 2013, Hunter Economic Infrastructure Plan

Removing a local road pinch point

Every year, 41,000 trucks carrying agricultural and paper products use Byrnes Road in Junee Shire to access the railway terminal at Harefield.

The location of the road and rail level crossing forces longer vehicles to make a left hand turn to leave the facility. This creates a detour of 10 kilometres for trucks travelling north, costing additional time and fuel with every trip.

The problem was identified as part of the pilot for the Fixing Country Roads program. Although the road realignment work was costed at \$1.2 million dollars, the time and fuel savings supported an indicative benefit cost ratio of 5.4.

Transport for NSW and Junee Council will fund the road realignment as a joint private-public partnership with Qube and Visy. Through collaboration with industry, the NSW Government has helped to secure fuel savings and cut input costs for regional businesses.

The **Fixing Country Roads** program seeks to remove constraints on local roads to support the use of HPVs, eliminate unnecessary diversions and improve 'last mile' access, including to the rail freight network.

Approximately 90 per cent of the NSW road network is local government roads,⁸¹ to which freight vehicles require access to reach their destinations. While the State network can provide access for freight vehicles, large parts of the local road network cannot – making a program of works to remove pinch points an important initiative. Removing these pinch points is relatively low cost, but delivers very high benefits due to the freight routes that targeted investments can open up.

Expressions of Interest are currently being evaluated for the first round of Fixing Country Roads, with recommendations to Government expected by the end of 2014.

The quality of submissions received from councils – and the economic benefits they demonstrate – suggest the program has considerable merit. However, in future rounds proposals for investment could be sought from industry as well as councils.

Infrastructure NSW recommends reserving \$500 million of *Rebuilding NSW* proceeds for further rounds of the Fixing Country Roads program, with a view to making allocations over a 10 year period.

81. Local Government NSW

Recommendation

Infrastructure NSW recommends a reservation of \$500 million should be made from the *Rebuilding NSW* initiative for the Fixing Country Roads Program.

Recommendation

Infrastructure NSW recommends that, in relation each of the Resources for Regions, Bridges for the Bush and Fixing Country Roads programs, the Government should actively encourage opportunities to leverage further private, council and/or Commonwealth contributions.

5.3.2 Viable regional rail freight

In 2013, the NSW rail network carried 157 million tonnes of freight (33 per cent of the total State freight task). Most of the freight moved by rail is coal, although grain and cotton movements are significant in western NSW.

Constraints on the rail network reduce the efficiency of freight connections between regional NSW and its key markets, driven by a number of factors:

- Delays due to passenger/freight train interactions on the shared network
- Steep gradients
- Inadequate passing loops
- Shallow ballast depths that reduce the load carrying capacity of the rail
- Speed and load restricted rail bridges.

Transport for NSW is developing an investment program, Fixing Country Rail, to target investment in:

- Grain siding extensions and railway line reconfiguration to enable faster loading rates
- Upgrades to branch and grain lines to remove constraints such as axle weight and speed restrictions – while consolidation of grain silos has increased potential loads, network restrictions remain an obstacle to larger tonnages and faster, more reliable speeds

Figure 5.1 Regional rail freight network



Source: *Transport for NSW, NSW Freight and Ports Strategy*

- Additional and extended passing loops to allow longer trains
- Signalling and recommissioning of duplicated sections on the Main West Line corridor between the Central West, Sydney and Port Kembla.

The program will also review investments in upgrades supporting the use of new, more efficient rail freight rolling stock technology. Technology upgrades could deliver additional capacity to meet the forecast growth in freight demand, while delivering consequential journey time improvements for passenger trains.

The Transport for NSW Main Western Rail Strategy analyses a list of 25 potential projects to be implemented west of Wallerawang. In general, these projects include the addition or extension of passing loops, track duplication and signalling upgrades. The highest priority upgrades identified include:

- **Orange to Dubbo** – extend Stuart Town loop to 1200-1500 metres at the country end
- **Bathurst to Newbridge** – provide a 1800 metre crossing loop near Georges Plains and investigate the installation of intermediate signals in the Bathurst – Georges Plains and Georges Plains – Newbridge sections
- **Wallerawang to Tarana** – new 1500 metre loop near Rydal/Sodwall with associated signals.

Upgrades on the Main West Corridor could help freight train operators meet their scheduled paths through the Sydney metropolitan network, reducing cycle times and lowering the total cost of the rail freight transport task.

Alongside works related to the Main West Corridor Program, additional funding would enable the consideration of projects identified in the NSW Grain Lines Upgrade Program, including points and level crossing upgrades, track enhancements and yard layout improvements across the following corridors:

- Burren to Walgett
- Burren Junction to Merrywinebone
- Bogan Gate to Tottenham
- Griffith to Hillston
- Ungarie to Lake Cargelligo
- The Rock to Boree Creek
- Camurra to Weemelah.

Further work is required to demonstrate the economic returns of these proposed investments. In addition, the case for industry contributions to help achieve productivity improvements in regional NSW's rail freight network should be tested as part of the program's development.

Recommendation

Infrastructure NSW recommends a reservation of \$400 million from the *Rebuilding NSW* initiative for a Fixing Country Rail Program.

5.3.3 Regional passenger transport

A reliable, accessible and efficient transport system is the foundation for sustainable regional communities and is critical to attracting essential workers to these communities.

Population growth projected over the next 20 years will create economic opportunities for regional NSW. Larger populations will mean expanded markets and more economic and social activity. However, investment will be required to support growing regional communities, including managing the anticipated increases in traffic on parts of the regional road network.

Among regional centres, the largest increases in population are expected in the Hunter, Central Coast and Illawarra. By 2031, the Department of Planning and Environment projects an additional 114,000 people in the Hunter, 57,000 in the Illawarra and 60,000 extra people on the Central Coast.⁸²

⁸² Deloitte Access Economics 2014, Economic Impact of the State Infrastructure Strategy including *Rebuilding NSW*, report to Infrastructure NSW, Department of Premier and Cabinet and NSW Treasury.

A safe and accessible road network is critical to people, households and businesses in regional NSW.

Table 5.2 shows the extent of travel and mode choice patterns across the major centres of regional NSW. Comparisons between Sydney and the major regional centres show that, relative to Sydney, private vehicle usage is 15 to 20 per cent higher in major regional centres. Likewise, in relation to public transport, train usage rates are two to nine times higher in Sydney.

Residents of regional centres are generally more car dependent than Sydneysiders. In addition, Newcastle and Illawarra residents make more trips per person than Sydney residents.⁸³

Typically, Newcastle and Illawarra residents travel greater distances, with shorter travel times, than Sydneysiders.⁸⁴ In part, this reflects the impacts of higher housing density and greater congestion in Sydney. Average vehicle kilometres travelled per person in Newcastle and the Illawarra is around 40 and 50 per cent higher respectively than the Sydney average.⁸⁵

Regional roads for growth

Transport for NSW is assessing measures to manage increasing passenger travel demands on regional roads. These measures take two forms:

- Improving network operation

While congestion is most significant in Sydney, there are

83. Bureau of Transport Statistics 2012, *Travel in Sydney, Newcastle and the Illawarra*.

84. Bureau of Transport Statistics 2012, *Travel in Sydney, Newcastle and the Illawarra*.

85. Bureau of Transport Statistics 2012, *Travel in Sydney, Newcastle and the Illawarra*.

Table 5.2 Daily trips comparison by mode, regional centres and Sydney, 2012/13

2012/13	Central Coast	Hunter	Illawarra	Sydney
Daily trips	1.2 million	2.1 million	1.6 million	17.6 million
Private vehicle	79.6%	83.1%	78.6%	69.0%
Trains	2.9%	0.6%	1.4%	5.4%
Buses	4.0%	3.0%	2.4%	6.0%
Walk only	11.9%	11.5%	15.5%	17.5%
Other	1.5%	1.9%	2.1%	2.2%

Source: Bureau of Transport Statistics

also opportunities to improve the performance of vehicle flows on regional road networks. For example, Transport for NSW is presently reviewing corridors in Newcastle and the Illawarra with a view to identifying and resolving 'pinch point' congestion hot spots, consistent with the approach outlined for Sydney's roads in Chapter 3.

- Upgrading and extending arterial networks

Detached housing is expected to accommodate most of the population growth in the major centres of regional NSW, suggesting the footprint of these centres will continue to grow over time. Road network improvements and extensions will be required to meet increasing travel demands in these centres cost effectively.

Areas projected to see strong growth include the Central Coast region, the Lower Hunter, the Far North Coast around Coffs Harbour and the southern Illawarra region.

Further rounds of roads investment in these regions over the short to medium term would seek to support projects such as:

- A Central Coast package of works to support access to and through the region, including augmenting a number of sections of the Pacific Highway
- Lower Hunter works to improve traffic efficiency in the region, including through the delivery of the last stage of the Newcastle Bypass – Rankin Park to Jesmond
- Completing duplication of the Pacific Highway as the first order priority on the Far North Coast
- Supporting population growth south of Wollongong in the Illawarra, including a realignment of the existing Princes Highway at Albion Park, as well as addressing other local pinch points.

Recommendation

Infrastructure NSW recommends a reservation of \$1 billion from the *Rebuilding NSW* initiative for a Regional Growth Roads Program to accelerate network optimisation and network planning for regional growth roads over the next two years.

Regional public transport service improvements

Over the last three years, a range of measures, including rail infrastructure improvements, have delivered notable journey time savings:

- The delivery of Oscar Trains, with revised stopping patterns and new timetables, has increased services and reduced journey times to Sydney on the Blue Mountains, South Coast, Newcastle and Central Coast lines. Weekly journey time savings are up to:
 - 155 minutes from Newcastle
 - 40 minutes from Wollongong
 - 45 minutes from Kiama
 - 40 minutes from Wyong.
- The Kingsgrove-Revesby quadruplication project (K2RQ) has delivered journey time savings on Canberra and Melbourne regional services.
- The Bathurst Bullet service, delivered through a refurbished Endeavour train, has introduced seven new daily return services from Bathurst to Sydney each week.

Transport for NSW is undertaking ongoing work to further improve travel times on the major regional rail corridors. Measures under review are combinations of infrastructure and operational initiatives that might achieve these travel time savings cost effectively.

Analysis to date suggests the combination of measures required to achieve the desired travel time savings would cost billions of dollars. Further detailed planning and engineering analysis will be required to determine project feasibility, particularly in sensitive areas such as the Illawarra escarpment and the crossing of the Hawkesbury River.

There is scope for travel time improvements to be made by allowing new Intercity and outer suburban rolling stock to operate at higher speeds (consistent with the long distance services) and through further timetable amendments that reduce dwell times or increase express services with fewer stops.

In particular, there is scope to achieve reductions in travel times between Sydney and the Central Coast and Illawarra through the combination of operational improvements, new stock and targeted Infrastructure upgrades. Infrastructure NSW's recommendation for a Mainline Acceleration Program to improve journey times between Sydney and these regions is discussed in Chapter 2.

6.0 Water

STRATEGIC OBJECTIVES

**Support the critical needs of regional industries and communities by ensuring water security and quality of supply
Provide flood mitigation and evacuation for the Hawkesbury-Nepean Valley in Greater Sydney**

KEY CHALLENGES

- Adapt to climate variability and a likely reduction in the availability of water
- Improve water management in 'hot spot' river catchments
- Provide greater water security in high priority regional towns
- Ensure that drinking water and waste water services in all regional NSW towns meet contemporary standards
- Plan for the future, including making the right infrastructure investments to achieve long-term water security and building resilience and redundancy into water infrastructure
- Identify how to recover the costs of investment through regulated pricing
- Improve flood mitigation and preparedness in the Hawkesbury-Nepean Valley

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Deliver critical water infrastructure projects in priority catchments

- Deliver critical water infrastructure projects in the priority inland catchments of the Gwydir, Macquarie and Lachlan Rivers, and in the coastal catchment of the Upper Hunter

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

Secure water supplies in high priority regional towns

- Identify and assess options for secure town water supplies for Broken Hill and Cobar

Funded from reservation above

Bring all regional towns up to water quality and environmental standards

- Finalise business cases for 71 backlog projects in regional towns to ensure drinking water supplies meet minimum guidelines and waste water services meet environmental standards

Funded from reservation above

Pricing and cost recovery for water security investment

- NSW Office of Water to maintain and further develop the Catchment Needs Assessment Framework developed for this report
- Water NSW to develop a best practice 20-year capital plan for bulk water supply to provide the evidence base for pricing applications going forward
- The NSW Government to request IPART to advise on how capital investment for water security over the next 20 years can be recovered, considering the Basin water charging objectives and principles (BWCOP)

Costs are not material

Hawkesbury-Nepean flood mitigation options

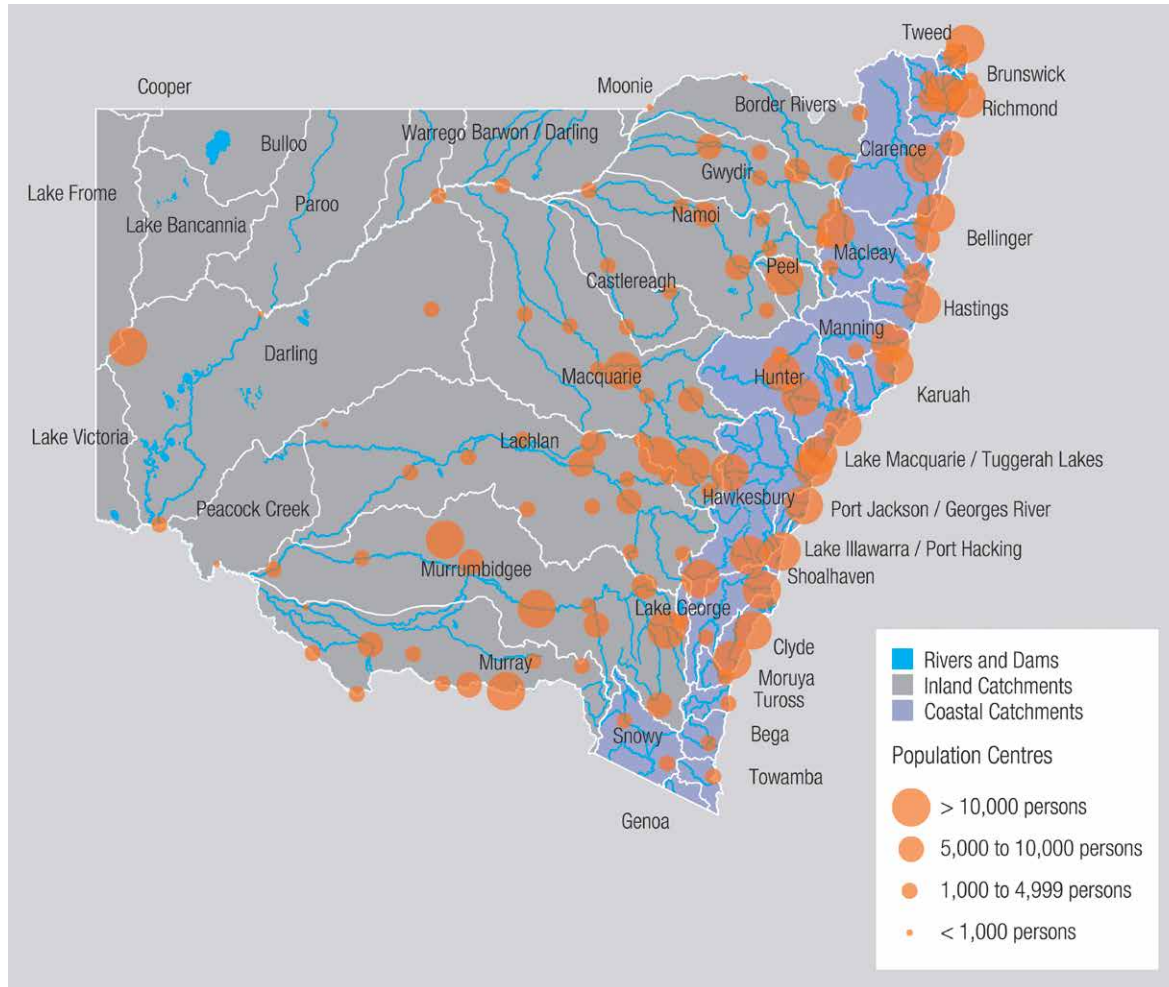
- Identify funding sources to deliver flood and evacuation works for the Hawkesbury-Nepean Valley in anticipation of the Taskforce report to the Government in mid-2015

Funding sources to be identified by mid-2015

Snapshot

- The water story in NSW is different west and east of the Great Dividing Range (see Figure 6.1):
 - West of the Divide represents 82.5 per cent of the area of NSW and 11.6 per cent of the population. The main demands for water are for commercial uses such as agriculture and mining, and to support the prosperity of regional towns. Long, slow-moving rivers flow south westward across flat, dry land to empty into the ocean at the mouth of the Murray River near Adelaide in South Australia. The regulation of this water resource is under the Murray Darling Basin Plan.
 - East of the Divide represents 17.5 per cent of the area of NSW and 88.4 per cent of the population. This coastal strip includes Sydney and the major cities of Newcastle and Wollongong, as well as regional towns. The terrain is steeper and the climate wetter with faster flowing rivers that run east into the ocean. The regulation and sharing of water is managed under NSW Government Water Sharing Plans, with additional strategic management plans in place for the Greater Metropolitan Region and the Lower Hunter.
- The water sector in NSW is heavily regulated and asset intensive. Long-term planning for new investment, as well as improving operations and asset management to maximise capital utilisation, are key challenges for the sector.
- Climate variability as well as population growth will influence investment decisions, but metropolitan and regional centres, smaller towns and regional industries, such as irrigation and mining, each face quite different challenges:
 - The metropolitan urban areas in Sydney, Illawarra, the Central Coast and Newcastle in the Lower Hunter are in reasonable shape due to a decade of intensive capital investment coupled with the success of demand management programs during recent prolonged drought. Long-term planning for these areas is on track and the metropolitan water utilities are self-funding and continue to comply with their operating licences.
 - The key infrastructure risk to be addressed for metropolitan Sydney is flood mitigation in the Hawkesbury- Nepean valley.
 - The operation of water infrastructure is considerably more complex in regional NSW than in metropolitan areas. The non-metropolitan water supply infrastructure west of the Great Dividing Range provides water to 1.9 million people and is managed by both the State government (with 6,300 licensed water users, 20 dams and over 250 weirs), as well as 105 local water utilities.
 - Regional towns have not seen the same levels of infrastructure spending as in metropolitan areas. A number of regional towns require investment to ensure that water services are secure and/or meet health and environmental standards.

Figure 6.1 NSW river catchments, with major rivers and towns



Source: Infrastructure NSW

6.1 Summary

Water is a limited and precious resource and must be managed both for immediate needs and for long-term economic and environmental sustainability.

Every NSW city, town and suburb needs water infrastructure that meets national health and environmental standards and guarantees a secure water supply. NSW also requires water security for economic growth in productive sectors such as agriculture (\$11 billion in 2011/12) and mining (\$22 billion in 2011/12), which jointly contribute over 7 per cent of GSP and provide about 100,000 jobs across the State.

In the next 20 years, the most important environmental change – and one with significant implications for infrastructure – is likely to be a reduction in the availability of water for use by productive industries and in the security of supply for some communities. Contributing factors to this reduction in water supply include changing rainfall patterns and increases in the allocation of water for important environmental uses.

The challenge is to take a long-term view about economic and social outcomes that rely on water security and supply, considering climate variability and population growth. Major capital investment should focus on high priority catchments, assets, towns and projects. Capital investment decisions also need to be considered within the framework of the National Water Initiative 2004 and the Commonwealth Government’s Murray Darling Basin Plan. The National Water Initiative sets out principles governing the sustainability of water resources, trade in water and a user pays approach to water use. The Basin Plan requires surface water extractions to be reduced by 2019.

To ensure future water security and supply, Infrastructure NSW recommends that \$1 billion be reserved from the *Rebuilding NSW* initiative for a program of well-targeted water infrastructure projects. Infrastructure NSW has identified ‘hot spot’ river catchments and high priority regional towns where effective action should be prioritised. However, it should be noted that no investment can result in increased surface water extractions without adjustment to the Basin Plan.

Investment decisions should be made within regulatory limits with the potential to revisit the Basin Plan in the decades ahead.

The inland catchments of the Gwydir, Macquarie and Lachlan Rivers, and the coastal catchment of the Upper Hunter River, are nominated as the highest priority river valleys for potential investment in the next decade.

The regional towns assessed as the highest priority for potential investment to address water security issues are Broken Hill and Cobar. Seventy one backlog projects have also been identified for assessment to bring regional towns across the State up to contemporary standards for drinking water and waste water disposal.

In the Sydney metropolitan area, the highest major infrastructure risk is flood mitigation in the Hawkesbury-Nepean valley. Allocations for infrastructure will be dependent on the Infrastructure NSW led review being undertaken by the Hawkesbury-Nepean Valley Flood Management Taskforce.

The issue of who should pay for water security should be part of any consideration of the best mix of water infrastructure investment for NSW. Infrastructure NSW is recommending a number of actions to review water pricing and cost recovery for capital investment in water security. In addition, the Commonwealth Government is an important partner on water security, and has allocated \$9 billion to fund water infrastructure and licence buybacks across the Murray Darling Basin.

6.2 Progress since 2012

Key activities in the water sector since 2012 include:

- Signing the Inter-governmental Agreement on implementing water reform in the Murray Darling Basin Plan (see box below)
- Planning for Greater Sydney and the Lower Hunter region to ensure that water supply, and projected water demands, are balanced in the metropolitan regions. The Lower Hunter Water Plan is complete and the latest revision to the Greater Sydney Water Plan is expected to be finalised in 2015.
- Initiatives to mitigate flooding in the Hawkesbury-Nepean Valley. Initial investigations into Hawkesbury-Nepean Valley flood management are complete and have been presented to the Government. Flood protection options identified for further investigation include investment to raise Warragamba Dam wall, upgrading evacuation routes (roads) and communication systems, and improving emergency

Murray Darling Basin Plan

The Murray Darling Basin Plan was signed into law by the Commonwealth Government and commenced on 24 November 2012. The NSW Government signed the Inter-Governmental Agreement in February 2014, agreeing to implement the provisions of the Basin Plan.

The Basin Plan includes enforceable limits on the quantities of surface water and groundwater that can be taken from the Murray Darling Basin. The sustainable diversion limits (SDLs) are set initially at 2,750 gigalitres (2750 billion litres), less than current diversions in the rivers. This reduction in water use is to be achieved by 2019 with the water being recovered by the Commonwealth to provide additional water for the environment.

Inland NSW makes up the largest proportion of the Murray Darling Basin. Most NSW river valleys have experienced significant buyback of water licences and removal of water from agricultural and other industrial production as the Commonwealth proceeds to obtain the volumes required to meet the SDLs.

As part of the Basin Plan implementation, the Commonwealth has allocated around \$9 billion to fund water infrastructure investment and water licence buybacks across the Basin. This includes around \$700 million for water savings projects and \$650 million for irrigators to improve their operations in NSW.

services coordination. A Taskforce set up by the NSW Government to undertake the second stage review will report in mid-2015.

- Continuing to support and invest in non-metropolitan urban water supply. The Independent Local Government Review Panel made a number of recommendations on the reform of local government-owned water utilities in regional NSW in late 2013 with a view to improving service quality and efficiency. In September 2014, the NSW Government announced a \$1 billion fund to support voluntary local government mergers and improve management systems.
- Maintaining and securing infrastructure for water storage and delivery. Since 2012, drought conditions have returned to large parts of NSW. Restart NSW is funding a regional water security program, of which \$37.5 million has been allocated in 2013/14 and \$325 million is reserved for 2014/15.
- Commencing a reform of the provision of bulk water in NSW: In March 2014, the NSW Government announced the administrative alignment of the Sydney Catchment Authority with the State Water Corporation to form Water NSW.

6.3 Ongoing challenges

6.3.1 Climate variability

The climate of NSW is changing (see Figure 6.2 below). Average temperatures have been steadily rising since the 1960s. The period from 2000-2009 was the State's hottest decade on record. NSW is expected to become hotter (1-3°C), with the greatest increases in maximum temperatures expected to occur in the north and west of the State. North eastern NSW is likely to experience a slight increase in summer rainfall (0-10%) while in the south-western regions there is likely to be a significant decline in winter rainfall (20-50%). Many parts of the State will experience a shift from winter-dominated to summer-dominated rainfall. The higher temperatures are likely to result in higher evaporation across much of the State, offsetting most of the expected increases in summer rainfall. In northern NSW, these changes to rainfall and evaporation appear to be within recorded levels of variability. However, the drying of the autumn, winter and spring seasons in the south is expected to fall outside the natural climate variability.⁸⁶

Studies predict that the Murray–Darling Basin climate is likely to become drier and more variable in the future.⁸⁷ Average surface water availability across the entire Basin is projected to fall by 10 per cent by 2050. The impact is expected to be greater in the southern area of the Basin, including southern NSW, with fewer storms meaning less rainfall, reducing water availability.

Climate variability is likely to mean more extreme

86. NSW Office of Environment and Heritage (www.environment.nsw.gov.au/climatechange/RegionallimpactsofClimateChange.htm), accessed 12 November 2014

87. See for example SEAC(2010)

droughts and more extreme floods. Weather events such as East Coast Lows, which caused significant flooding along the east coast of Australia, particularly in Queensland in 2010-11, may become less frequent but more intense when they do occur. The risk of such events is not confined to the loss of life and property; the GDP of Australia was reduced by an estimated \$30 billion due to the Queensland floods.⁸⁸ The priorities for long-term infrastructure investment are to ensure resilience and redundancy, to both provide water security in times of drought and to capitalise on and withstand flood waters.

6.3.2 Identifying 'hot spot' catchments and possible solutions

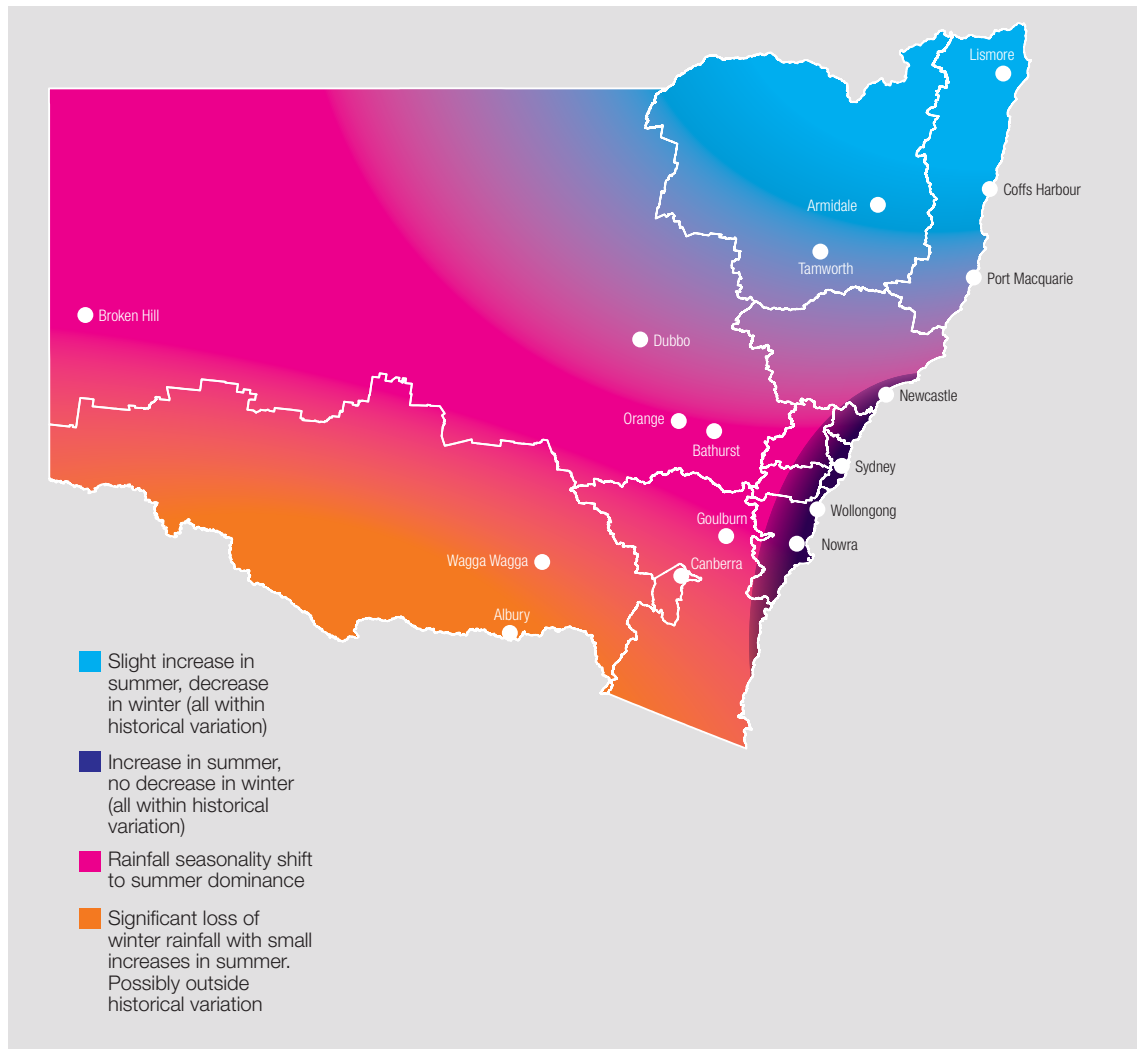
In preparing this report, Infrastructure NSW developed a needs identification framework to identify the regulated river valleys facing the most significant water management challenges, using four indices as described in Table 6.1.

These indices are quantitative and were calculated the same way for each of the regulated river valleys based on river modelling, using the last 100 years of climatic data, and current asset performance.

There is also some inter-relationship between the indices. For example, a catchment with low *Delivery Efficiency* is also likely to have lower *Drought Security*, given the higher water losses, particularly during drier periods. Conversely, a valley could improve its *Drought Security* without necessarily increasing *Flow Utilisation*, because additional storage enhances the ability to capture water in wetter periods and utilise it in drier

88. House of Representatives Standing Committee on Economics, June 2011

Figure 6.2 Predicted rainfall changes to 2050



Source: Department of Environment, Climate Change and Water (2010)

Table 6.1 Needs identification framework for regulated river valleys

Water Management Assessment Index	Description
Irrigation Drought Security Index	This measure describes the reliability of water available for use – primarily irrigation. It is an indicator of a river valley’s vulnerability to DRY conditions. The measure is based on the water allocation being exceeded 80% of the time, calculated using river basin modelling and climate data for the last 100 years. A low index suggests there is a high occurrence of DRY conditions in the catchment and years of low agricultural production.
Flow Utilisation Index	This measure describes how much of the available water is used for consumptive purposes, calculated using river basin modelling and climate data for the last 100 years. A low index suggests there is a relatively low proportion of the total flow that is extracted and therefore, there may be capacity to grow the AVERAGE water use.
Flood Management Index	The measure describes the capacity of major dams to provide flood mitigation of the events that occur. It is determined by calculating the total spare storage capacity (including flood surcharge) relative to the flood volume that is exceeded 5% of the time, calculated using river basin modelling and climate data for the last 100 years. A low index suggests there is a relatively low capacity for the current infrastructure to capture and mitigate the WET conditions river flows. The index does not reflect situations where there may be significant inflows downstream of the major dams.
Delivery Efficiency Index	This measure describes the efficiency of the water delivery system. It is calculated by comparing the total extractions to the amount of water released from the headwater storages to meet those extractions, calculated using river basin modelling and climate data for the last 100 years. A low index suggests the valley is relatively inefficient at delivering water to end-users. Inefficiency can be a major problem in DRY years, but also reduces a Valley’s productivity on AVERAGE.

periods, without necessarily increasing the long-term average usage. An improvement in *Flood Management* could also enable an improvement in Drought Security through additional or augmented storage capacity.

Each regulated river valley in NSW was assessed, using hydrological modelling, against each of the indices and scored to identify 'hot spots' as shown in Figure 6.3. In summary, this needs analysis identified the highest priority inland river catchments as the Gwydir, Macquarie and Lachlan. All three catchments have low *Irrigation Drought Security* due to low/variable rainfall, high evaporation and limited storages. This combination of climate, topography and existing asset performance indicates the potential need for augmentation of, or investment in, additional storage capacity to improve water security. In both the Gwydir and the Macquarie, *Delivery Efficiency* is also a priority; for the Lachlan, *Flood Management* is also a priority, given the lack of airspace in existing dams.

Recommendation

The Regional Water Security and Supply Fund can support the Regional Water Priority Catchments Program which includes the inland catchments of Gwydir, Macquarie and Lachlan and the coastal catchment of the Upper Hunter. A mix of works including dams and delivery efficiency schemes has been identified.

\$ Recommendation

Infrastructure NSW recommends a reservation of \$1 billion be made from the *Rebuilding NSW* initiative to establish the Regional Water Security and Supply Fund to support recommended programs and projects (as follows).

East of the Great Divide, the highest priority catchment identified is the Upper Hunter due to low *Flow Utilisation*, which indicates a capacity for growth, and low *Drought Security*. This finding is set against the Hunter Valley's transition from a predominantly agricultural base to include a strong and growing mining sector and corresponding growth in water demands. There are also some observed changes in water demand patterns, with high security water entitlements transferring to mining from agricultural holdings that, as a result, now rely on general security supply, leaving this sector very vulnerable to drought.

The *Hunter Economic Infrastructure Plan* recommended analysis of forecast industry water demand as a possible constraint to growth, particularly in drought conditions. For the purpose of this report, Infrastructure NSW commissioned hydrological and economic modelling. Foregone mining royalties were used as a proxy to evaluate the potential impacts on mining contributions to the State economy under different drought and commodity export price scenarios over the next 20 years. This work indicates that constraints in water supply may have a significant adverse impact on the economy.⁸⁹ More work is warranted, including for other significant water users such as agribusiness and power generation, to identify the best delivery efficiency enhancing options to manage water security and drought in the catchment, given there is opportunity for additional extractions, albeit no additional entitlement.

89. NSW Department of Primary Industries, Upper Hunter water security evaluation (Phase 2), October 2014, notes the range of value loss from mining royalties foregone could be \$150 million to \$360 million.

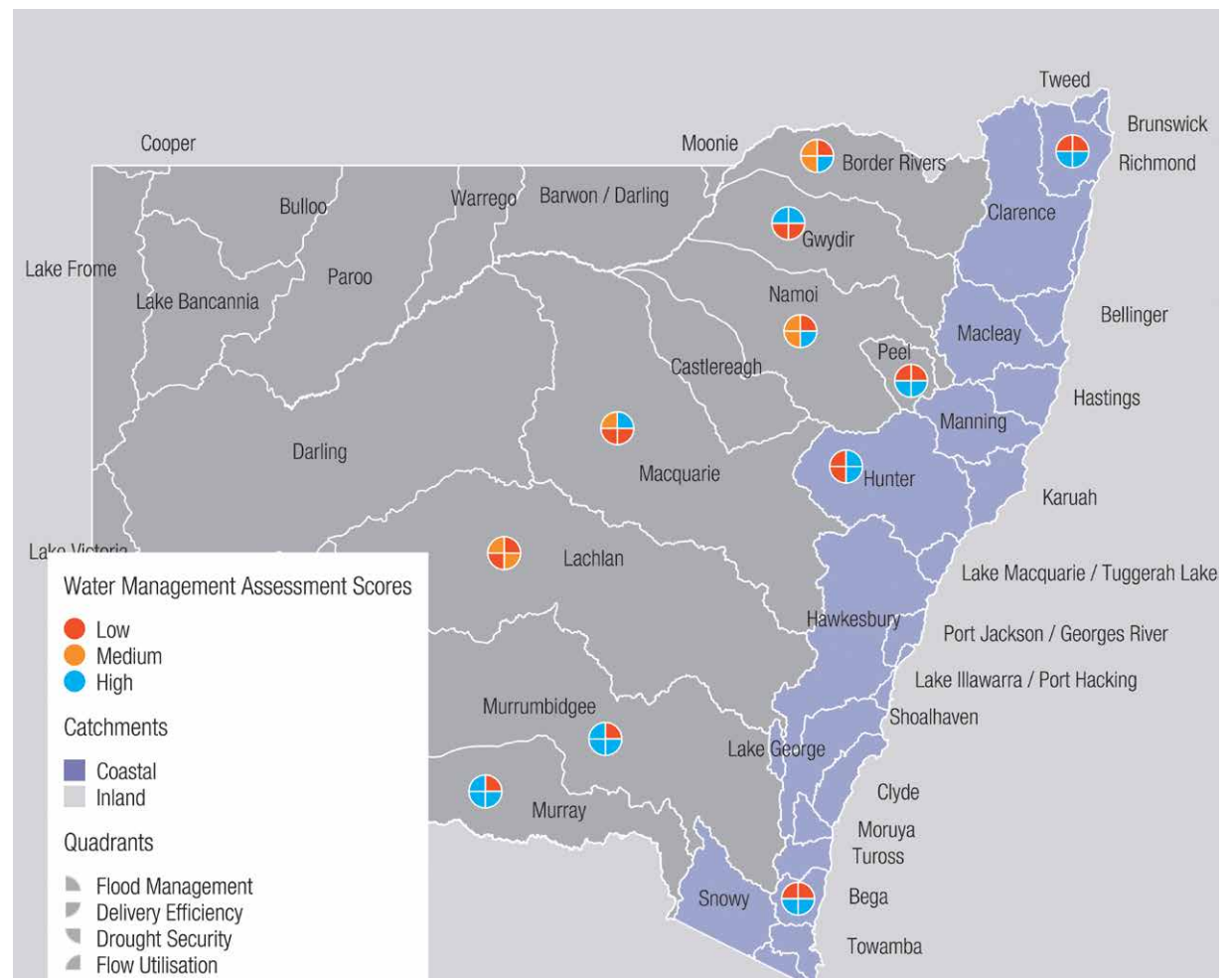
Recommendation

Infrastructure NSW recommends that further modelling, including all major licensed water users in the Upper Hunter, be completed in the next six months to identify the best mix of delivery efficiency investments to take advantage of unutilised flows and underutilised infrastructure, such as the Lostock Dam. Options include a pipeline linking the Lostock and Glennies Creek dams.

Figure 6.3 shows the result of the water management needs assessment using the indices described in Table 6.1 and highlights the priority catchments.

The full assessment of river catchments is set out in Table 6.2, which includes the potential infrastructure options. This analysis has helped to identify potential projects that are a good fit with the identified catchment needs; it also highlights gaps in current planning. The highest priority projects should improve the priority index scores in each valley. Projects in the highest priority valleys are considered the most important for further analysis.

Figure 6.3 Water management for regulated catchments



Source: Infrastructure NSW (2014)

Table 6.2 Catchment status for the regulated river catchments

River Catchment	Index Assessment				Area	Population	Major existing Infrastructure
	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency			
Macintyre/Border Rivers	M	M	L	H	24,212 sq. km	30,517 people	Glenlyon Dam: 254GL Pindari Dam: 312GL
Key Issues					Plan Limit: 188 GL (<1% towns, >99% industry)		
<ul style="list-style-type: none"> Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> New Mole River Dam 		
Gwydir	L	H	H	L	26,600 sq. km	24,343 people	Copeton Dam: 1,364GL
Key Issues					Plan Limit: 324 GL (1% towns, 99% industry)		
<ul style="list-style-type: none"> Low Drought Security Low Delivery Efficiency Copeton is a large dam but only regulates a small part of the valley as 90% of the catchment is below the dam. On-farm storages downstream of the dam are shallow with high evaporation losses. There are high distribution losses from long effluent streams. Moree is the largest town in the Gwydir and main commercial centre for surrounding agricultural areas. Major water users include local councils and water utilities, dryland agriculture, livestock grazing and irrigated agriculture predominantly cotton. 					Possible Solutions <ul style="list-style-type: none"> New re-regulating Dam at Gravesend or New Horton River Dam Delivery Efficiency projects The likely solution for the Gwydir would be a mix of deep storage, on-river re-regulation storages and reconfigured, efficient distribution networks. 		
Peel (with enlarged Chaffey)	H	L	L	H	4,669 sq. km	51,187 people	Chaffey Dam: 62GL (augmentation to 100GL under way)
Key Issues					Plan Limit: 16 GL (56% towns, 44% industry)		
<ul style="list-style-type: none"> Low Flow Utilisation Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> Recent augmentation of capacity at Chaffey Dam has improved drought security. 		

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River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
Namoi	M	M	L	H	37,372 sq. km	41,250 people	Split Rock Dam: 397GL Keepit Dam: 426GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> Low Flood Management 					<ul style="list-style-type: none"> Apsley River project could improve the Flow Utilisation and Drought Security Indices Projects to improve the Flood Management Index are yet to be identified 		
Macquarie	L	M	H	L	74,840 sq. km	179,364 people	Windamere Dam: 368GL Burrendong Dam: 1,190GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> Low Drought Security Low Delivery Efficiency Burrendong dam is the largest but small compared to environmental and irrigation demands resulting in low water reliability. High distribution losses due to long rivers and effluent creeks. Major cities and towns reliant on the rivers in this catchment include Bathurst, Orange and Oberon upstream of Burrendong dam and Dubbo, Wellington and Nyngan below the dam. Mudgee, Peak Hill, Narromine, Warren, Lithgow and Brewarrina also draw water from rivers in this catchment. Water users include local councils and water utilities, dryland agriculture, livestock grazing and irrigated agriculture including cotton. 					<ul style="list-style-type: none"> Augmentation of Burrendong Dam for Drought Security New re-regulating storage for Delivery Efficiency Delivery Efficiency projects may have favourable BCRs e.g. Cobar pipeline The likely solution for the Macquarie would be a mix of increased storage capacity (on-river and/or re-regulation) and works to address current inefficient water delivery. 		

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River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
Lachlan	L	M	L	M	86,290 sq. km	91,683 people	Wyangala Dam: 1,218GL Carcoar Dam: 36GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> • Low Drought Security • Low Flood Management • The Lachlan has low water security due to high distribution losses from long rivers, anabranches and effluent streams. Also high evaporation losses from large, shallow lakes (Brewster and Cargellio) and insufficient storage capacity for multi-year droughts. • Major towns drawing supply in this catchment include Cowra, Parkes, Forbes and Young. • Land use in the catchment is primarily agricultural including 15% for dryland cropping and 75% livestock grazing. Major water users include local councils and water utilities, mining and agriculture including dairy, wool, beef and lamb, as well as irrigated crops such as cereals, lucerne and cotton. 					<ul style="list-style-type: none"> • Additional storage for Drought Security and Flood Management, including The Needles and Cranky Rock sites, to be investigated • Delivery Efficiency projects, Booligal, Willandra and Wallamundry Creeks • The likely solution for the Lachlan would be a mix of increased storage capacity (on-river and/or re-regulation) and works to address current inefficient water delivery. 		
Murrumbidgee	H	H	L	H	71,144 sq. km	217,756 people	Burrinjuck Dam: 1,028GL Blowering Dam: 1,628GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> • Low Flood Management 					Irrigators have suggested the following projects: <ul style="list-style-type: none"> • Augment capacity of Burrinjuck Dam or • New Dam at Gundagai for flood mitigation • Projects to resolve the Tumut River Choke could be developed for delivery efficiency 		
					Plan Limit: 295 GL (6% towns, 94% industry)		
					Plan Limit: 1,769 GL (1% towns, 99% industry)		

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River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
NSW Murray	H	H	L	H	35,366 sq. km	101,598 people	Hume Dam: 3,038GL Dartmouth (Vic): 3,856GL Lake Victoria: 680GL
Key Issues <ul style="list-style-type: none"> • Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> • No projects proposed 		
Richmond	H	L	L	H	7,043 sq. km	121,121 people	Toonumbar Dam: 11GL
Key Issues <ul style="list-style-type: none"> • Low Flow Utilisation • Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> • Augmentation of Toonumbar Dam and linking with Local Water Utility Infrastructure (NOROC Project) 		

Index Assessment

River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
Hunter	L	L	H	H	21,460 sq. km	371,455 people	Glenbawn Dam: 750GL Glennies Ck Dam: 283GL Lostock Dam: 20GL
Plan Limit: 84 GL (8% towns, 92% industry)							
Key Issues <ul style="list-style-type: none"> • Forecast Low Drought Security with expected increased demand for water for mining and population growth • Low Flow Utilisation • The Upper Hunter has low water reliability because although Glenbawn and Glennies Creek dams are large they only regulate a small proportion of the valley. Also Lostock which has the potential yield is a small dam. The eastern catchment is high yielding but largely unregulated and disconnected from the demands for mining and power stations located in the central catchment. • Newcastle is the second largest city in NSW. Other major towns include Maitland, Singleton, Cessnock, Muswellbrook and Raymond Terrace. • The Hunter supports a large population and a diverse range of important water users including Hunter Water Corporation, local councils, power generators (providing most of the electricity used in NSW), major coal mines (Newcastle Port is one of the largest coal facilities in the world), other heavy industry, world renowned horse and cattle studs and wineries, as well as other agriculture and dairy farms. 					Possible Solutions <ul style="list-style-type: none"> • Augmentation of Lostock Dam and or a water transfer scheme linking Lostock and Glennies Creek Dams to improve flow utilisation and drought security. • The likely solution for the Upper Hunter would be a mix of increased storage capacity (Lostock augmentation) and works to take advantage of the low flow utilisation. 		
Bega/Brogo	H	L	L	H	2,834 sq. km	20,001 people	Brogo Dam: 9GL Cochrane Dam: 0.4GL
Plan Limit: 28 GL (43% towns, 57% industry)							
Key Issues <ul style="list-style-type: none"> • Low Flow Utilisation • Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> • No projects proposed 		

6.3.4 Pricing and cost recovery for water security investment

Infrastructure NSW has identified a number of new storages or storage augmentations as potential infrastructure priorities. The enforceable limits on the quantities of surface water and groundwater that can be extracted from the Murray Darling Basin establish a trading market for a commodity that is capped. While traded prices for water within this market will reflect the highest value use at a point in time, there is a disconnect between the prices in the traded water market and new major capital investment decisions for the NSW Government.

The case for recovering costs through pricing for capital investment in new storages by the NSW Government must pass regulatory tests, including how these tariffs will contribute to achieving Basin water charging objectives and principles (BWCOP).⁹⁰ In June 2014, the ACCC determined State Water's pricing application to 2016/17. The ACCC considered that State Water's proposed 80:20 fixed to variable tariff structure would not contribute to the BWCOP.⁹¹ The ACCC did not consider that transferring volume risk for water in dry times to customers contributed to the Basin pricing principles.

The issue of who should pay for water security over the next 20 years warrants review as part of considering the best mix of infrastructure investments to achieve water security for regional NSW. Capital investment by the NSW Government in new or augmented dams must be

efficient, with cost recovery achieved through regulated pricing. These regulated decisions will need to reflect the BWCOP and avoid perverse outcomes such as the potential to transfer value to water entitlement holders, at no cost to them, by making the availability of the water resource more secure.

Recommendation

Infrastructure NSW recommends that:

The catchment needs assessment framework developed for this report should be maintained and further improved by the NSW Office of Water.

The newly created agency for bulk water management, Water NSW, should develop a best practice 20 year capital plan to provide the evidence base required for pricing applications going forward.

The NSW Government should request IPART to review and advise on how the capital investment required for water security over the next 20 years can be recovered, considering the Basin water charging objectives and principles (BWCOP).

6.3.5 Priority regional towns

To identify the needs of regional towns, Infrastructure NSW assessed each of the 105 Local Water Utilities in relation to security of supply, quality of drinking water and effectiveness of sewerage services. The indices used were:

- Water Supply Deficiency Index – a measure of the projected 2036 water demand, relative to the available supply of water (Figure 6.4).
- Drinking Water Quality and Sewerage Index – as determined for the *Country Towns Water Supply and Sewerage Program* to prioritise the projects for this report (Figure 6.5).

The highest priority regional towns for water security are Broken Hill and Cobar. Both are in the Darling catchment and both are assessed as having high *Water Supply Deficiency* with inefficient delivery systems, high temperatures, high evaporation and low rainfall. Broken Hill relies predominantly on an ephemeral water source, the Menindee Lakes, and Cobar relies on the Macquarie River, over 200 kilometres to the east, in the neighbouring Macquarie catchment, which is also assessed as low for drought security (see Figure 6.4).

Broken Hill

The city of Broken Hill, with a population of 19,000, is heavily dependent on water pumped from Menindee Lakes through a 120 kilometre pipeline which is about 80 years old, unreliable and increasingly costly to maintain and repair. In dry times, the water quality in the Lakes declines, producing increasing levels of salinity with the result that the water eventually does not meet Australian

90. (Commonwealth) *Water Act 2007*, Schedule 2

91. ACCC Final Decision on State Water Pricing Application 2014/15 to 2016/17

Drinking Water Guidelines (ADWG). The current water treatment plant in Broken Hill cannot remove or reduce the salinity. During the Millennium Drought, Broken Hill purchased a modular desalination unit.

During times of drought, the demand on the Broken Hill town water supply remains high due to the high levels of lead, arsenic and other metals in the soil from mining activity in the past. Soil moisture needs to be maintained to preserve groundcover and avoid raised dust. For this reason, domestic water restrictions are rarely imposed in Broken Hill. The presence of lead dust also precludes the use of rainwater tanks. Cartage of any significant quantities of water for Broken Hill's town water supply is logistically impractical and extremely expensive. About every 10 years or so, in times of drought, significant costs are incurred in providing water to Broken Hill, a boom-bust cycle in the absence of a permanent secure town water supply.

The Commonwealth has identified \$180 million in funding available for structural works and operational changes at Menindee Lakes to provide water savings required under the Basin Plan. As part of the options analysis to achieve these water savings, NSW is investigating an option for Broken Hill to use groundwater as an emergency drought supply when needed. This is a potentially high cost option (in excess of \$40 million) requiring desalination of highly saline groundwater and remediation works to the existing Menindee Lakes pipeline.

Considering the condition and associated maintenance costs of the existing pipeline from Menindee Lakes to Broken Hill, and the water quality and security issues, a longer term option for a permanent, secure town water supply for Broken Hill should be identified. Infrastructure NSW commissioned a scoping study⁹² on the construction of a pipeline from the Murray River to Broken Hill, to be assessed together with the options for the Menindee Lakes system.

Recommendation

Infrastructure NSW recommends that the Regional Water Security and Supply Fund can support the preferred option for a secure/permanent town water supply for Broken Hill, which could include a pipeline from the Murray River.

Cobar

The Nyngan-Cobar Water Supply Scheme was built after the drought in the 1940s. Today it supplies water to more than 7,600 people in the towns of Cobar and Nyngan. The water supply is extracted from the Macquarie River near Warren and is delivered over 70 kilometres to the Nyngan weir pool through the unlined Albert Priest Channel. From the Nyngan weir pool, water is delivered the 130 kilometres to the town of Cobar (and to the

Cobar mines, irrigators and livestock producers) by pipeline. During prolonged dry periods, water losses from the channel due to evaporation, seepage and transpiration can result in 50 per cent of the annual allocation of 8 GL not arriving at the Nyngan weir pool.

In June 2014, the NSW Government accepted the recommendation of Infrastructure NSW that \$10 million be allocated from the Restart NSW Fund to construct an off-river storage at Nyngan as the first stage of a water security program for Cobar. This additional storage is expected to be completed in 2017. The Gross Regional Product of the Cobar silver and gold mines is estimated to be worth \$630 million per annum.⁹³ In addition to securing the town water supply in dry times, high security water is required for mining operations, agriculture and livestock.

Recommendation

Infrastructure NSW recommends the Regional Water Security and Supply Fund can support the preferred option for a pipeline to replace reliance on the Albert Priest Channel as a longer term solution to secure the Cobar water supply.

92. NSW Public Works, Murray River to Broken Hill Bulk Raw Water Transfer Pipeline and Associated Works – Initial Options Assessment, October 2014.

93. Nyngan and Cobar Raw Water Security: Business Case 2014, Bogan Shire Council January 2014, p. 21.

6.3.6 Backlog projects for regional towns

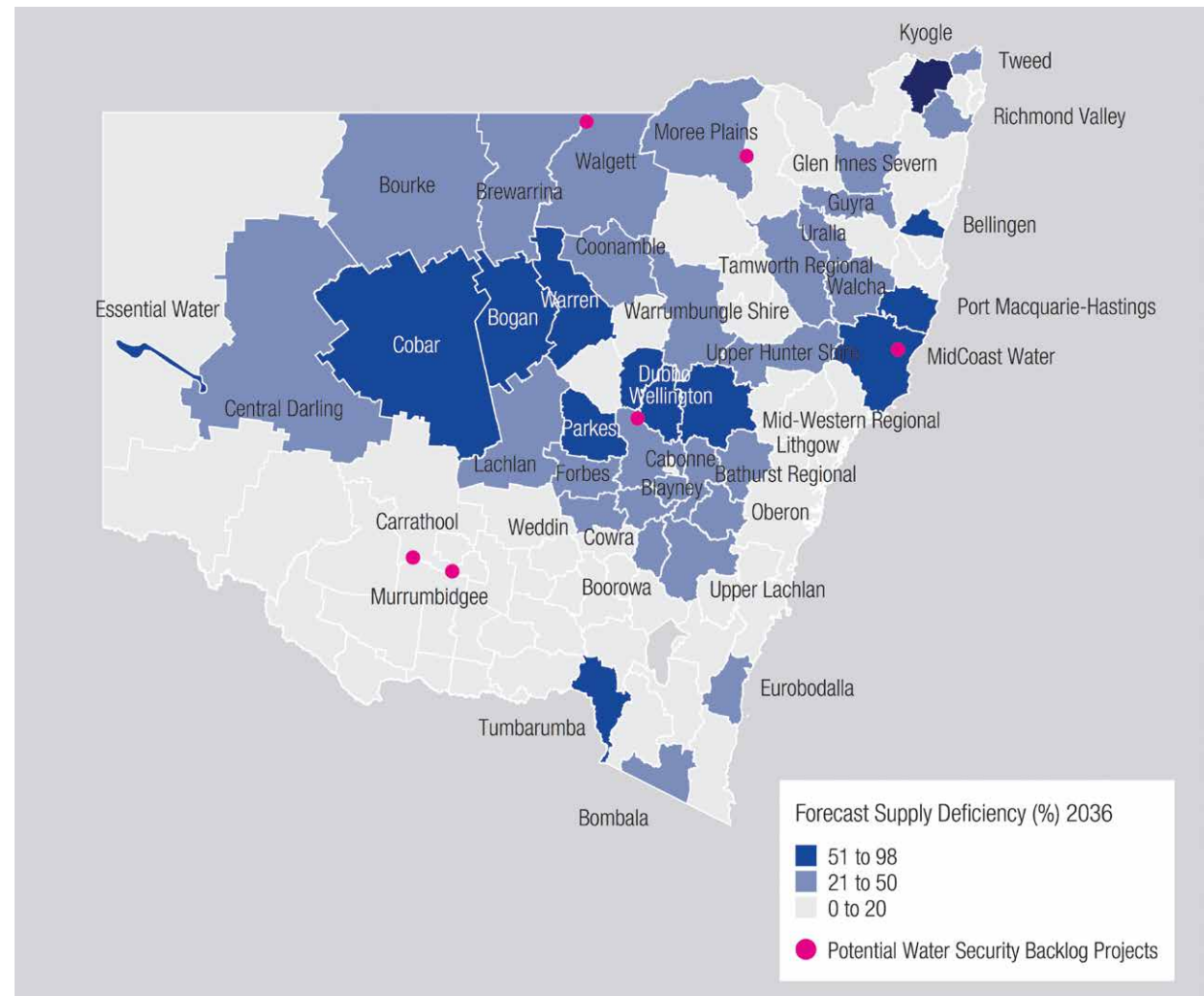
To ensure that all towns in regional NSW have drinking water and waste water services that meet standards, 71 projects have been identified.

A lack of or inadequate water supply and sewerage services are the single most important factors in protecting public health and reducing faecal pollution in receiving waters. Studies have shown that the risk of diarrhoeal disease is between 2.5 and 3.85 times higher, and there is an elevated risk of diseases such as respiratory illness, amongst communities in un-sewered, non-reticulated towns and villages.

Recognising the fundamental importance of improved sanitation, successive NSW State Governments over many years have invested in upgrading water and sewerage infrastructure in regional NSW. The 71 backlog projects assessed by Infrastructure NSW as potential priorities are all that remain of the original Country Town Water Supply and Sewerage (CTWSSP) Program that began in 1996. To date, this program has completed over 500 projects with a total asset value of approximately \$4 billion.

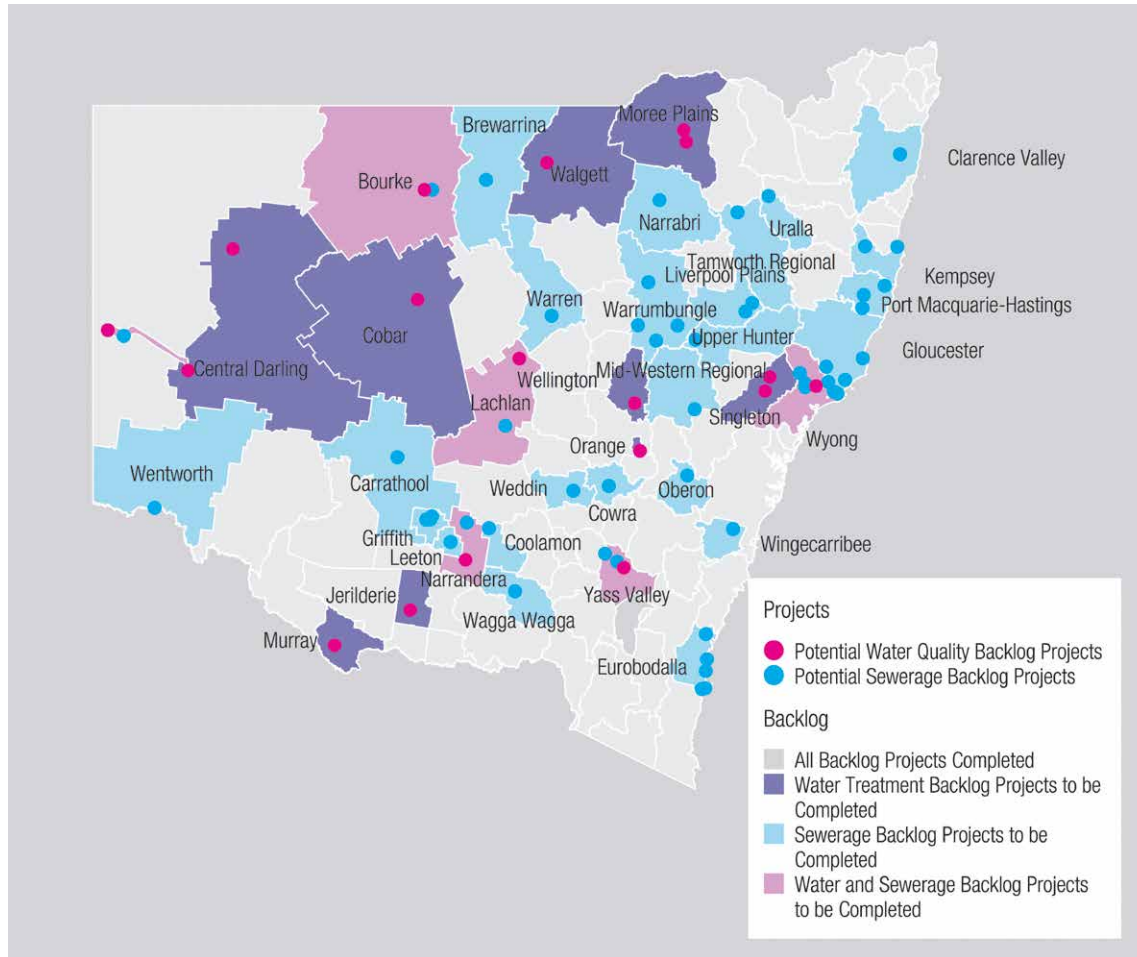
Providing water supplies that meet minimum drinking water quality guidelines, and waste water services that meet environmental standards, will improve the public health and wellbeing of residents in remote regional communities by reducing the incidences of gastroenteritis and water borne diseases, greatly adding to their quality of life.

Figure 6.4 Forecast water supply deficiency for local water utilities in 2036



Source: Infrastructure NSW

Figure 6.5 Regional backlog water quality and sewerage projects



Source: Infrastructure NSW

Recommendation

Infrastructure NSW recommends that the Regional Water Security and Supply Fund can support the preferred option for the 71 backlog projects identified in regional towns to ensure drinking water supplies meet minimum guidelines and waste water services meet environmental standards.

Figure 6.4 shows the projected Water Security Index for each Local Water Utility in regional NSW. The Index forecasts the potential shortfall in water supply compared to forecast water demand to 2036. Local Water Utility areas have been shaded based on the average of the projected security for each of the towns within their boundaries. This map identifies the highest priority Local Water Utilities in regional NSW and the projects to address water security.

Figure 6.5 shows the remaining high priority backlog of projects for consideration to bring regional towns up to drinking water and wastewater standards. The Local Water Utility areas are shaded to identify incomplete water and/or wastewater treatment services.

6.3.7 Flood mitigation in the Hawkesbury-Nepean Valley

The NSW Government accepted the advice of Infrastructure NSW in 2012 that, to significantly reduce the potential economic and social impact of flooding in the Valley, the Government should “*review the major flood mitigation options available in the Hawkesbury-Nepean Valley, including the options of raising the Warragamba Dam wall and road upgrades*”.⁹⁴

In 2012, it was estimated that a repeat of the 1867 flood, the largest on record, could be expected to cause direct damages of \$1.7 billion and \$3 billion in total tangible damages. Significant population growth – accompanied by the requisite housing, commercial and industrial development and provision of infrastructure – has occurred in the floodplain since the 1990s, making flooding a key planning issue.

In early 2014, the NSW Government endorsed the recommendations of the first stage of the Hawkesbury-Nepean Valley Flood Management Review. The Review found that flood management in the Hawkesbury-Nepean Valley will require an integrated and well-coordinated approach. There is no single option or solution that can address all of the flood risk in the valley. However, the Review has identified that infrastructure options can significantly reduce, but not eliminate, the flood risk in the valley.

A Taskforce was established in April 2014 to lead the next stage of the work to improve flood management and preparedness in the Hawkesbury-Nepean Valley. The Taskforce is developing a strategy which includes options to upgrade roads for evacuation, flood mitigation infrastructure (such as changes to Warragamba Dam), measures to increase flood awareness and preparedness in the community, improvements to emergency planning, response and recovery, and better consideration of flood risk in land use planning. The immediate priority of the Taskforce is to build the flood resilience and preparedness of communities and businesses in the Hawkesbury-Nepean Valley ahead of any major infrastructure upgrades.

The strategy will identify the priority areas for potential infrastructure investment required in the next 10 years, with final costs to be determined through the Taskforce process.

Recommendation

Infrastructure NSW recommends that funding sources be identified to deliver flood mitigation and evacuation works, when the Hawkesbury-Nepean Valley Flood Management Taskforce reports to Government in mid-2015.

94. Infrastructure NSW 2012, *First Things First*

7.0 Education

STRATEGIC OBJECTIVE

Equip growing urban and regional populations with the modern schools and training infrastructure required to deliver educational services for a competitive, innovative economy

KEY CHALLENGES

- Match education facilities to growing student populations to meet the legislative requirement that each child is entitled to be enrolled at the government school in his or her area
- Ensure that ageing assets keep up with standards for classroom conditions and support modern and technology-enabled teaching and learning
- Adopt a more coordinated and innovative planning response to develop partnerships for delivering education and training, and to identify and secure education sites and facilities ahead of time
- Ensure that NSW has a dynamic and innovative vocational training sector that is responsive to industry and client needs

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Service growing student populations and enrolments in the government sector

- Create a 10-year Schools Growth Program for education infrastructure projects to service growing student populations

Reservation of \$700 million from the *Rebuilding NSW* initiative

Upgrade classrooms and facilities in regional NSW

- Create a 10-year Regional Schools Renewal Program to upgrade classrooms and facilities to enable future-focused learning

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

Plan for the future

- Accelerate the finalisation of the School Asset Strategic Plan to manage the projected capital expenditure requirements for teaching space supply to 2031 and realign the Department of Education and Communities' asset portfolio to better match demand
- This asset plan should explore new approaches to providing high quality learning spaces, leveraging partnerships and optimising existing resources
- Ensure that policies in the NSW planning system are aligned with and enable the delivery of the School Asset Strategic Plan

Explore and develop new models of schooling

- Expedite demonstration projects in metropolitan and regional areas to test and showcase innovative ways of delivering functional performance requirements for new school facilities
- Explore partnership opportunities with non-government providers and innovative school models through PPP delivery

Match TAFE services with changing demand

- TAFE NSW should immediately start preparing a Strategic Asset Management Plan to ensure that the TAFE asset portfolio keeps pace with changes in training needs in an increasingly competitive environment and is realigned to better match demand

Snapshot

- The NSW Government provides education and training to over 1.3 million students through the public school system and TAFE NSW.
- There are currently 2,221 public schools in NSW and the average school building is 41 years old.
- The NSW Government's investment in schools has a current asset replacement value of \$25.1 billion.
- The current annual capital investment for schools is around \$400 million, with an annual maintenance program of \$347 million.
- TAFE NSW operates 168 sites across 130 campuses in metropolitan, regional and rural NSW. The TAFE NSW asset portfolio consists of land, buildings, mobile training units and extensive information communication technology (ICT) systems that support technology-based learning.

7.1 Summary

Having access to a good education enables people to achieve their full potential and become active, engaged members of society. The education and training sector also contributes to the State's productivity by providing students with the skills they need for future workforce participation.

In NSW, each child is entitled to be enrolled at the government school in his or her intake area. A growing population is placing this entitlement under increasing pressure.

Population projections for school aged children to 2031 show growth of 267,000, of which 65 per cent (or an expected 173,000 children) are expected to enter the public education system. An additional 6,250 classrooms will be needed to accommodate these extra students. Over 5,450 classrooms will be required in Sydney, including 4,050 in Western Sydney.⁹⁵

Meeting this growth in demand will be a challenging exercise. However it will also create opportunities to explore new ways to provide schools and develop new school models.

For example, as it is no longer affordable or cost-effective to acquire land in inner Sydney to build single storey schools, new options need to be considered – such as building larger multi-storey schools on smaller sites. Better engagement in the land use planning process by government and non-government education providers is needed to secure strategic sites for schools in greenfield areas, repurpose surplus government sites

for the provision of education facilities in established areas and partner with the private sector to deliver additional facilities in time to meet demand.

Increasingly, schools will need to use their assets more intensively or share resources with their local communities. Innovation in teaching methods will require learning spaces to be flexible and adaptable, supporting contemporary techniques and incorporating new technologies.

To meet changing demand, Infrastructure NSW is recommending a reservation of \$700 million from the *Rebuilding NSW* initiative to create a 10-year Schools Growth Program. This program will service the growing NSW student population, providing investment for much-needed education infrastructure projects while also investigating new models of school provision, including undertaking demonstration projects.

In addition, a \$300 million Regional Schools Renewal Program should be created to provide better facilities to more students and – in doing so – upgrade classrooms and facilities to support future-focused learning.

With TAFE NSW entering a contestable market from 2015, there is also a pressing need to ensure that the TAFE asset portfolio supports the mix of courses and service delivery methods it needs to offer to succeed in a competitive environment.

7.2 Progress since 2012

The NSW Department of Education and Communities (DEC) is implementing reforms designed to improve educational outcomes for all NSW students. These reforms include the following strategies: *Local Schools Local Decisions*, *Every Student Every School*, *Great Teaching Inspired Learning*, *Rural and Remote Education Blueprint* and *Connected Communities*.

The 2012 State Infrastructure Strategy focused on finding better ways to identify, deliver and manage assets. To this end, DEC has:

- Established web-based *Educational Facilities Standards and Guidelines* to provide a more flexible approach to school design which supports Future Focused Learning
- Commenced the development of a NSW Schools Asset Strategic Plan which supports the Government's reform agenda and aligns to the Department of Planning and Environment's regional and sub-regional land use planning frameworks.

From January 2015, there will be a move to a contestable market for government-funded training. TAFE NSW is changing the way it does business to prepare itself for this more competitive environment.

95. NSW Department of Education and Communities

7.3 Ongoing challenges

The quality of education and training in NSW depends on three main factors: the curriculum, our teachers and the infrastructure that supports service delivery.

Six key drivers impact on the planning and utilisation of education and training infrastructure:

- Responding to changes in demographics – the public school student population is projected to grow, requiring more classrooms and new ways to accommodate them
- Responding to training demand – having the agility to competitively offer training that responds to economic cycles, demographic change, technological enhancements and industry needs
- Future-focused learning spaces – designing classrooms to allow a variety of teaching and learning practices, with a focus on innovative uses of technology and space
- Efficiently managing assets to meet minimum service delivery standards and prolong asset life
- Better using schools and TAFEs as community assets – treating education and training assets as community assets that can be accessed outside of teaching hours
- Using partnerships to cost effectively procure assets – planning for education facilities on a sector-wide basis, including through partnerships with tertiary education providers, local government, the non-government sector and industry, to improve utilisation and obtain value for money.

These drivers underpin the recommendations in this report.

7.3.1 Matching facilities to demand and educational requirements

To meet the legislative requirement that each child is entitled to be enrolled at the government school in his or her local intake area, education infrastructure must be planned and delivered to service growing student populations.

Growth in demand

By 2031, it is projected that:

- 173,000 additional students will attend public schools across NSW. This is a 23 per cent increase which, after utilising existing capacity, equates to a demand for 6,250 more classrooms. This growth will be divided between primary and secondary students as follows:
 - an additional 110,000 primary school students will enter public primary schools, requiring additional capacity equivalent to 2,600 classrooms
 - an additional 63,000 secondary school students will enter public high schools, a demand equivalent to 3,650 classrooms.
- Approximately 80 per cent of the public school student growth will occur in metropolitan Sydney. West Central and South West Sydney are the regions that will require the most new classrooms to service population growth. Growth in these two regions alone will require an additional 3,900 classrooms. The Hunter is the fastest growing region outside Sydney, while the State's Central West, Orana and Murray-Murrumbidgee regions are expected to see a decline in overall student populations, as shown in Figure 7.1 overleaf.

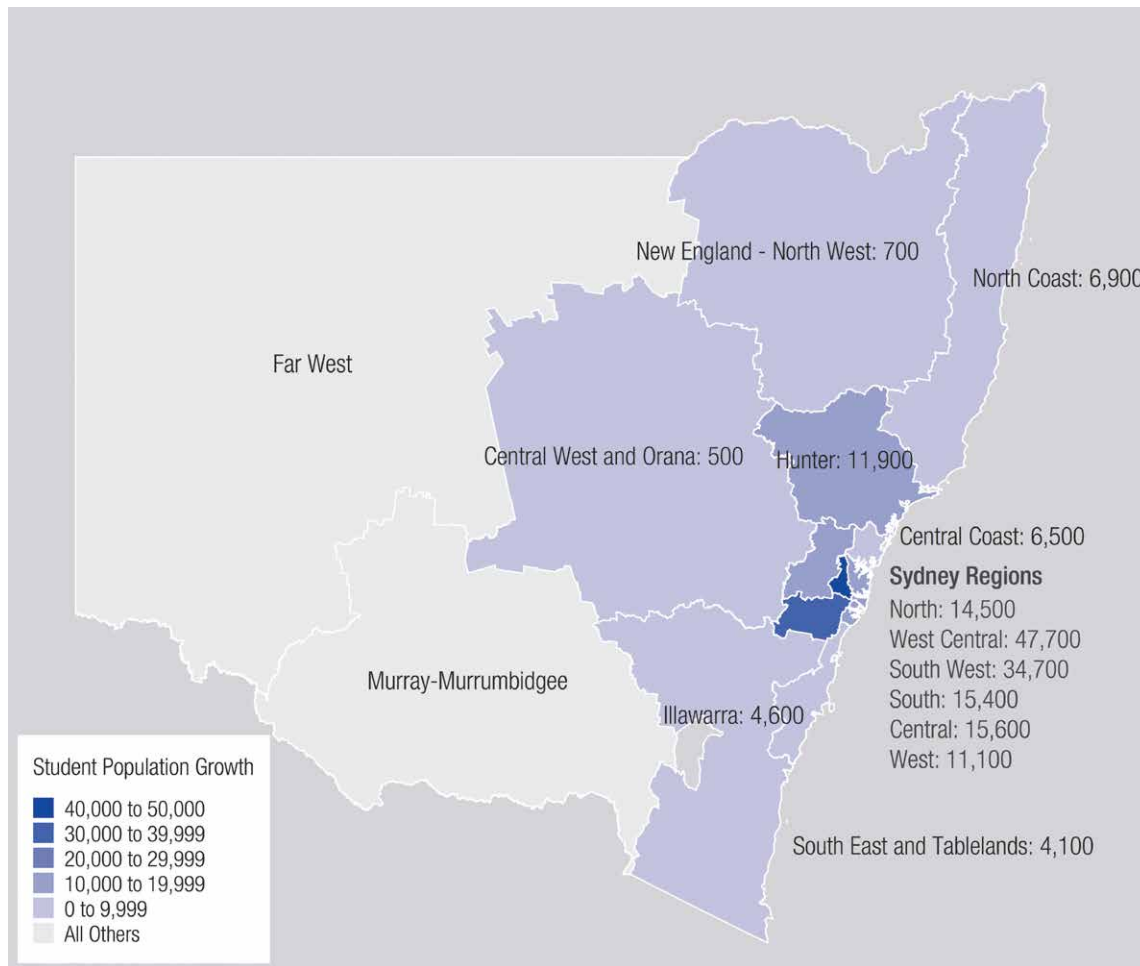
Meeting these demand increases will require a structured program to support the delivery of additional classrooms and related infrastructure in the greater metropolitan region.

Recommendation

Infrastructure NSW recommends that a reservation of \$700 million from the *Rebuilding NSW* initiative to create a 10-year Schools Growth Program for education infrastructure projects to service growing student populations.

The Department of Planning and Environment has projected that NSW's working age population will increase by 17 per cent to 5.6 million by 2031.

Figure 7.1 Student population growth to 2031



Source: NSW Department of Education and Communities

If current trends are maintained and 9 per cent of the working age population continues to undertake training with TAFE NSW or its competitors, there will be over half a million students enrolled in the vocational education and training sector in NSW in 2036.⁹⁶

Matching assets to demand

If recent trends continue, almost 80 per cent of Sydney’s additional population will be accommodated in established suburbs. Land acquisition and building costs have increased significantly, making it neither cost effective nor affordable to acquire land to deliver classrooms in single storey buildings in established areas.

The capital and land costs of providing the equivalent of 6,250 classrooms by 2031 is estimated at \$8.25 billion in 2014 dollars.⁹⁷ These cost projections are based on current models of school provision, using what are by international standards small schools on large sites. If NSW schools are to continue to keep pace with rising demand, new models of schooling need to be developed that entail building larger schools on smaller sites, with a heavy focus on the redevelopment of existing sites to minimise land acquisition costs.

The physical condition of school and TAFE assets also has an impact on student learning, including on the ability of students to concentrate and the instructional effectiveness of teachers.⁹⁸ An ageing asset portfolio is likely to bring with it an ever increasing need for maintenance. In addition to meeting standards for classroom conditions, targeted preventative maintenance to prolong asset life should be pursued. DEC should use opportunities to add to and renew its portfolio to cost effectively address the functionality of existing assets.

96. TAFE NSW

97. NSW Department of Education and Communities

98. KPMG 2007, Brownfield Schools Redevelopment Prioritisation and PPP Suitability Methodology

The current annual capital investment for schools is \$400 million, with an annual maintenance program of \$347 million. Over the next 20 years, the school asset portfolio will be even older, with increasing maintenance costs making a growing contribution to future funding needs.

The sustainability of multiple, underutilised primary and secondary schools in rural and regional areas of NSW needs to be carefully considered. In particular, further examination is needed to determine if education outcomes and teaching and learning experiences could be enhanced by making better use of existing assets.

Recommendation

Infrastructure NSW recommends that a reservation of \$300 million should be made from the *Rebuilding NSW* initiative to create a 10-year Regional Schools Renewal Program.

New approaches to the provision of learning spaces will need to find efficiencies, leverage partnerships, identify additional funding sources and optimise existing resources. To manage demand caused by population growth, DEC's School Asset Strategic Plan should promote:

- Larger schools in highly urbanised areas so that expensive land acquisition is minimised
- Optimisation of school sites and assets (where feasible) so that
 - growth in the demand for teaching space is accommodated on existing school land
 - the operating costs of schools are minimised
 - more students have access to facilities that support future-focused learning
- Removing land use planning policy barriers to increasing school densities and confirming that developer contributions will partially fund both land acquisition and the construction of the infrastructure needed to provide education services to new developments
- Better co-ordination between government land holders and non-government providers to
 - secure strategic sites ahead of time in greenfield areas to be on-sold to education providers when a school is required

- identify opportunities in areas of high demand to repurpose surplus government sites for the provision of education facilities
- identify opportunities for incorporating schools into compatible government developments
- Using existing school assets more intensively, with opportunities for staggered school starting times potentially increasing the number of classes taught per facility
- Partnering with the development industry to develop schools in multi-storey buildings to service dense population areas.

Recommendation

Infrastructure NSW recommends that DEC accelerate the finalisation of a funded School Asset Strategic Plan that will manage the projected capital expenditure requirements for teaching space supply to 2031 and realign DEC's asset portfolio to better match demand.

The asset plan should explore new approaches to the provision of learning spaces, leverage partnerships and optimise existing resources.

Strong collaboration between government agencies is also critical so that education planners know where and when residential developments will occur, including the types of housing, the rate of development and land acquisition opportunities.

By being better engaged in the land use planning process, government and non-government education providers can identify strategic locations to build schools in time to meet demand. State and local governments should simplify and standardise policies that regulate the development assessment of education infrastructure to facilitate the expected future investment in NSW schools.

It is unlikely that large scale urban housing developments in existing high density areas will be able to be serviced by an existing school if that school is already operating at capacity. In these circumstances, opportunities should be explored for partnering with the development sector to deliver new schools using high value, modest parcels of land that host multi-level teaching spaces as part of vertical mixed use developments.

Recommendation

Infrastructure NSW recommends that planners and regulators in State and local government must ensure that policies in the NSW planning system are aligned with and enable the delivery of the DEC School Asset Strategic Plan.

Different models of operation

A recently commissioned independent review of DEC's procurement methods observed that there are limitations to the effectiveness of Public Private Partnerships (PPP) as a vehicle for meeting enrolment growth, using existing school models on greenfield sites. However, Infrastructure NSW considers that PPPs may yet offer a value for money alternative to meet the significant projected need for facility investment and upgrades at established school sites.

Past and recent education PPPs across Australia have delivered value for money outcomes against their public sector comparators and demonstrated good outcomes in terms of shorter construction periods, innovation and service delivery. In one survey, 85 per cent of principals of NSW PPP schools reported that the model enabled them to devote more time to leading teaching and learning than in a non-public private partnership school.⁹⁹

In total, six education PPP projects have reached financial close in NSW, Queensland, South Australia and Victoria, with a further two PPPs under procurement. Of those education PPPs that have reached financial close in NSW, value for money was achieved with shorter construction timeframes than traditional design and construct contracts. On this basis, a report by the Auditor General found that *“risk transfer was well suited to the circumstances and to securing value for money”*.¹⁰⁰

99. Department of Education and Communities 2010, State Leadership Fellowship 2009–2010 Florence Ramstead Award Report

100. NSW Auditor General 2006, The New Schools Privately Financed Project

Any new model for managing and operating school facilities, must enable schools to:

- Be more connected, with learning spaces that strengthen student engagement, increase opportunities for group and individualised learning, and encourage greater collaboration among teachers
- Be inviting, safe and secure to foster positive learning experiences, enhance learning outcomes and support student and teacher wellbeing

New schools will also need to be designed to support future-focused learning, including the adoption of digital technologies and innovative teaching techniques. However, assets in the current DEC portfolio vary in condition and functionality, with many ill-suited to responding to advances in teaching and learning. The program for the refurbishment of existing assets can be accelerated and enhanced by optimising the impact of future investment in ways that will give more students and teachers access to high quality school environments and to facilities that support future-focused learning.

As the population of NSW grows, demand for community infrastructure will increase. The sharing of school and local infrastructure with communities will help to meet this demand. In addition to teaching and learning spaces, students need access to other spaces and facilities such as out of school hours care (OOSH), libraries, halls, meeting rooms, gymnasiums and playing fields.



Figure 7.2 Closing the gap

Factors that will close the potential education infrastructure funding gap over 20 years



Source: Infrastructure NSW

The design of new schools should anticipate the sharing of infrastructure with communities. This requires:

- Specialised design where the security and utility of the teaching and learning spaces is not compromised by use out of hours –the DEC School Asset Strategic Plan should address the policy and funding implications of this approach
- Better planning of new communities through close liaison between education asset planners, local government and the private sector
- Policy frameworks and flexible governance arrangements that encourage and support school/community resource sharing.

Demonstration projects are an important way for the Government to show leadership in testing and encouraging new ideas, and showcasing the benefits of new approaches to providing education and community infrastructure. Projects that explore the potential opportunities delivered by partnerships and innovative new school models, including design innovation, should be pursued.

Recommendation

Infrastructure NSW recommends that DEC expedite the development of demonstration projects in metropolitan and regional areas to test and showcase innovative ways of delivering functional requirements for new school facilities.

In developing project options DEC should also explore partnership opportunities with non-government providers and innovative school models through PPP delivery.

The introduction of competition to the vocational training sector will require TAFE to be dynamic in its course offerings responding to industry and client needs. TAFE business planning will identify the types, location and number of assets needed for service delivery. Courses that require access to sophisticated expensive equipment should be located in specialised campuses. Course and asset optimisation will assist in reducing operating costs and improve asset utilisation.

While on-campus face-to-face contact remains the primary method of training delivery, there is an increasing focus on the delivery of courses using technology. Over the last four years, electronically based course delivery has increased by over 85 per cent and now accounts for almost a quarter of all training.¹⁰¹ A greater use of off-campus learning models will change the mix of facilities needed to deliver training.

This kind of multimodal delivery is forecast to continue to grow, benefitting from ongoing innovation in mobile and remote learning, and a greater use of technology in a larger number of jobs.

Recommendation

Infrastructure NSW recommends that TAFE NSW immediately commences the preparation of a Strategic Asset Management Plan to ensure that the TAFE asset portfolio is managed efficiently to keep pace with changes in training needs in an increasingly competitive environment and is realigned to better match demand.

¹⁰¹. TAFE NSW

New school partnership with Canada Bay Council

A new primary school in Concord West will operate as a partnership with the local council, sharing facilities with the council and the surrounding community.

The school site is located on Victoria Avenue, Concord West, adjoining the Powell's Creek Reserve. The site is made up of land owned and managed by Canada Bay Council and leased by DEC for a peppercorn rent. The school will have capacity for 600 students and is expected to open in Term 1, 2015.

Canada Bay Council will operate an Early Childhood Centre and Child Care Centre from the site. The school playing field will permit community use after school hours and the school hall (purpose-built larger than standard school sizes) will be available for community purposes after school hours.

8.0 Health

STRATEGIC OBJECTIVE

Support the health, wellbeing and economic participation of our growing population and contribute to the attractiveness of NSW as a place to live and do business

KEY CHALLENGES

- Service a growing and ageing population and manage the cost impacts of increased service expectations
- Extract greater value and efficiency from existing health infrastructure and explore new models of delivering services such as out-of-hospital services, multipurpose services and greater involvement of the private sector in delivering health services
- Adopt and adapt new technologies to improve health service delivery
- Explore ways to make capital and operating cost savings without compromising care

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Partner with the private and non-for-profit sectors

- Pursue opportunities for a better mix of services from the not-for-profit and private sector for the delivery of infrastructure and public health services in NSW

Potential capital and operating cost savings

New service delivery models

- Prioritise configurations in health facilities that provide best practice clinical redesign and reduce operating costs
- Accelerate the modernisation of metropolitan, regional and rural health, delivering improvements progressively over the next 20 years
- Establish a *Care Co-location* program to accelerate the delivery of the NSW Primary and Integrated Care Strategy
- Establish a Regional Multipurpose Health Facilities Program

Expected efficiencies and reductions in recurrent spending growth for all initiatives

Reservation of \$100 million from the *Rebuilding NSW* initiative

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

Service fast-growing areas

- Reserve \$600 million from the *Rebuilding NSW* initiative to contribute towards funding new health facilities, including growth hospital investment such as the north-west (Rouse Hill) and south-west (Campbelltown) of Sydney and a south-west Sydney paediatric facility
- Finalise business cases for potential future investments in metropolitan and regional hospitals that are prioritised to meet acute activity demand in growth areas
- Implement reforms that will increase the private and not-for-profit market capacity to reduce the need for investment in new public facilities

Reservation of \$600 million from the *Rebuilding NSW* initiative

System-wide reforms

- Continue to pursue system-wide reforms, including an e-enabled system, contestability initiatives across the spectrum of services and better coordination of local and State-wide asset planning

Snapshot

- NSW Health is responsible for delivering health services to over 7 million people each year. On a typical day, 5,600 people are admitted to a public hospital, 6,500 people are being seen at Emergency Departments, 1,000 patients have surgery (emergency or planned) at a public hospital and 200 babies are born.
- The State's health infrastructure includes over 230 public hospitals, 280 community health centres, 226 ambulance stations and over 50 health centres across the criminal justice system. The health system employs over 100,000 staff.
- Health costs borne by the public purse in 2014/15 amounted to \$20 billion – 28 per cent of the total NSW budget – and included an infrastructure investment of about \$1.3 billion.
- Health facilities and precincts are anchors for employment. Twelve per cent of jobs in NSW are in the health industry. Employment in the sector is growing at 2 per cent a year. The health industry is the largest regional employer in NSW.
- NSW has a relatively smaller private hospital system and more public hospital beds per capita than other Australian States and territories.

8.1 Summary

Investing in health services supports economic growth by maximising workforce participation through improved health (particularly participation by older workers). A high quality, accessible and affordable health system also contributes to the attractiveness of NSW as a place to live and do business.

Across NSW, a number of factors are putting the health system under increasing pressure, including advances in the quality of services, the use of new technologies, increasing levels of chronic disease and a growing and ageing population.

While the NSW population is projected to grow by 28 per cent by 2031, Ministry of Health projections suggest demand for acute services will grow by 48 per cent over the same period – nearly double the rate of population growth. The number of people over 70 years of age is forecast to double by 2031; while this group represents only 15 per cent of the total population, it is expected to use 56 per cent of acute health services.¹⁰²

Substantial investment in health infrastructure will be required over the next 20 years to service this growth in demand, particularly in the growing regions of Western Sydney and South Western Sydney, which are expected to experience the greatest increases in acute health service activity.

Partnering with the not-for-profit and private sectors to deliver services will improve competitiveness and deliver a more productive and efficient health industry in NSW. Infrastructure NSW recommends the pursuit of new

opportunities to increase participation by the private and not-for-profit sectors in the delivery of public health infrastructure and services.

Infrastructure NSW recommends the Government proceed with the development of detailed proposals for major hospital investments in growing metropolitan and regional locations. These proposals should include consideration of partnership opportunities and innovative models for delivering services. Infrastructure NSW endorses growth hospital investments such as a new health facility at Rouse Hill, the expansion of Campbelltown Hospital and a new south-west Sydney paediatric facility. A reservation from the *Rebuilding NSW* initiative of \$600 million should be directed towards funding new health facilities to respond to growth in health service demand.

Accommodating the predicted growing demand for health services will require services to be delivered in new, more efficient ways. This will require the reconfiguration and re-design of health facilities and infrastructure, as well as new models of care.

Infrastructure NSW is recommending several priority initiatives to drive reform in service delivery and slow down the need for hospital expansions. Recommended priorities from the *Rebuilding NSW* initiative include reserving \$100 million to develop integrated primary care ‘one stop shops’ that provide a range of health-related services and reserving a further \$300 million to redevelop small rural health services into multipurpose facilities that offer integrated health, community and aged care services outside hospitals. Infrastructure NSW also recommends reconfiguring existing facilities to implement best practice clinical redesign and increase efficiency, including initiatives being delivered through

the Regional and Rural Modernisation Program and the Statewide Neonatal Intensive Care Units / Paediatric Intensive Care Units Program.

8.2 Progress since 2012

Since the 2012 State Infrastructure Strategy, the NSW Ministry of Health has:

- Released the NSW State Health Plan Towards 2021 (the Plan) in June 2014, setting out the Government’s directions and health service strategies, outcomes and targets, including a commitment to design future-focused infrastructure
- Continued to implement a number of organisational and funding reforms, including the decentralisation of decision-making to Local Health Districts and Specialty Health Networks; the introduction of Activity Based Funding and the development of the Ministry’s role as system manager and ‘purchaser’ of health services to drive efficiencies
- Sought to improve capital asset planning at the Local Health District, Specialty Health Network level and delivered improvements to the State-wide planning and prioritisation processes
- Actively sought to expand the provision of public hospital capacity by the private sector, with the Northern Beaches Hospital as the lead project
- Continued to develop demand management strategies to respond to growth, including clinical services redesign, integrated care models and out-of-hospital care.

¹⁰² NSW Ministry of Health, NSW Department of Planning and Environment 2014 population projections

8.3 Ongoing challenges

8.3.1 Servicing a growing, ageing population

NSW Ministry of Health projections suggest demand for acute services will grow by 48 per cent over 20 years – a faster rate than demand for health care in general and nearly double the rate of population growth.¹⁰³ Demand growth is driven by factors such as advances in the quality of services, new technologies and a growing, ageing population.

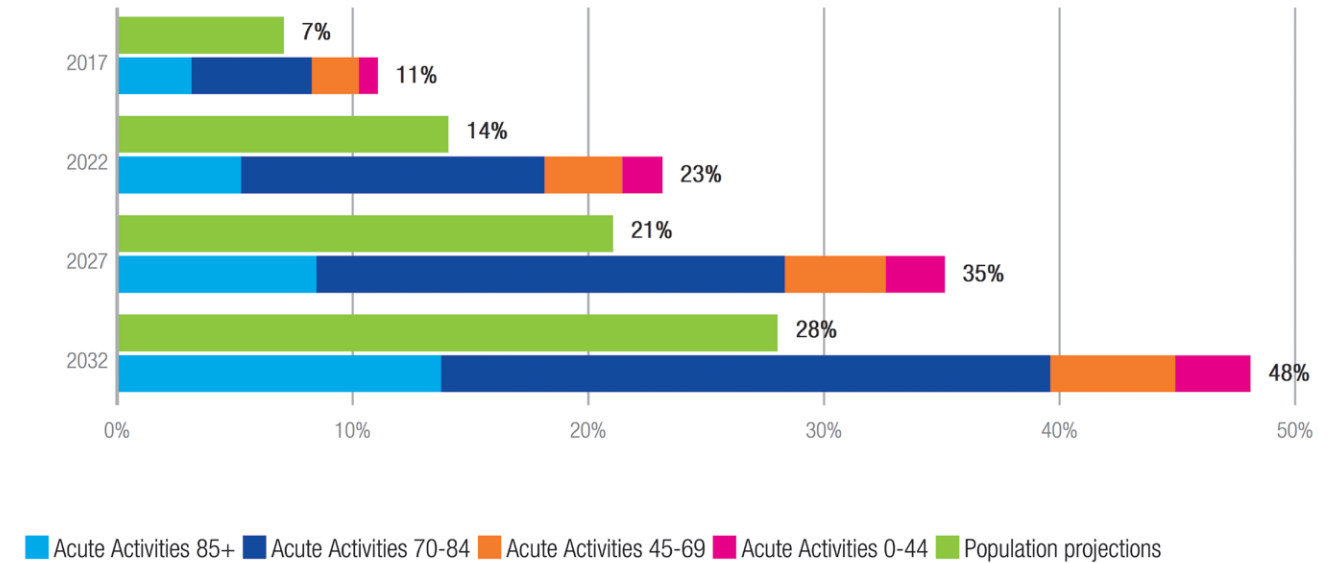
The NSW population is projected to grow by 2 million people to over 9 million by 2031, an increase from current levels of 28 per cent. The number of people over 70 years of age is expected to double by 2031. This cohort represents only 15 per cent of the total population, but is expected to use 56 per cent of acute health services.

8.3.2 Capital response – a prioritised investment program

Investment in existing hospitals in high demand areas will be required over the next 20 years to address the increase in demand for health services.

The heat-map (Figure 8.2 overleaf) shows that the Western Sydney and South Western Sydney Local Health Districts will experience the greatest increases in acute health service activity, with increases of 91 per cent and 80 per cent respectively by 2032, placing pressure on the region’s major hospitals at Liverpool and Westmead.

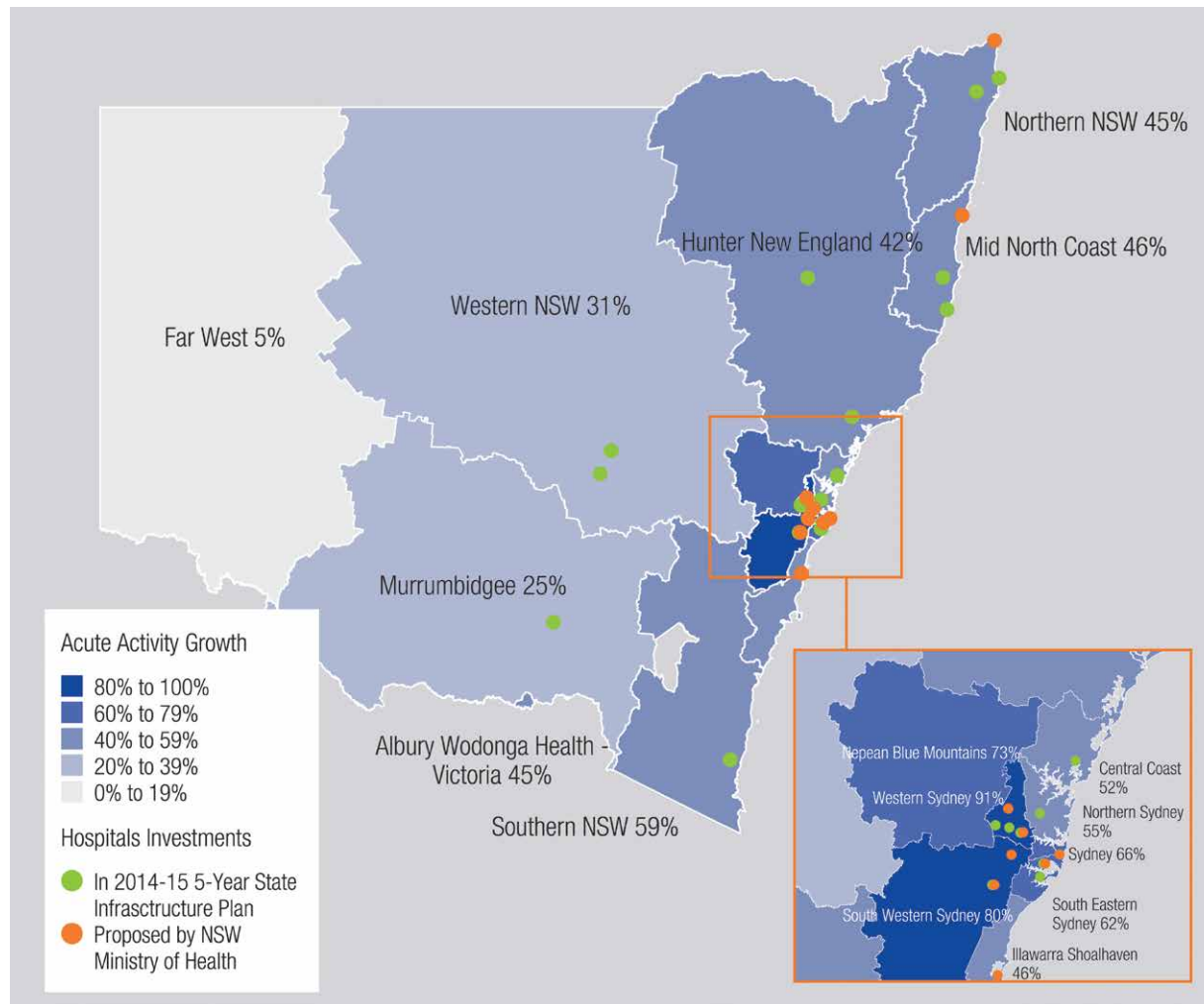
Figure 8.1 Population projections v acute activities projections (% growth from baseline, by age groups 2011)



Source: NSW Ministry of Health Acute Inpatient Modelling tool, Health System Planning Investment Branch, Department of Planning and Environment 2014 population projections

103. NSW Ministry of Health

Figure 8.2 Local Health Districts' percentage increase in acute activity to 2032 and proposed hospital investments' following 2032



Source: NSW Ministry of Health

As Principal Referral Tertiary hospitals, Liverpool and Westmead fulfil local and State-wide roles in the delivery of highly complex specialised services.

A new health facility at Rouse Hill and the planned expansion of the Campbelltown Hospital will ensure that future residents of Western and South Western Sydney have improved access to hospital and ambulatory care services closer to home. These new and expanded facilities will reduce local demand at Liverpool and Westmead Hospitals, allowing them to strengthen their State-wide roles.

Similarly, the growth in the number of children in Western Sydney forms a strong anchor for an expansion in the paediatric hospital network, with a new specialised children's hospital in south-west Sydney having the potential to improve access to services for residents in the Illawarra and South Coast regions, and the surrounds of the Australian Capital Territory.

Over the next 20 years, other metropolitan and regional hospitals will require expansion due to population growth. The Ministry of Health has identified priority projects in growth areas that are not included in the 5 Year State Infrastructure Plan. Infrastructure NSW is working with the Ministry of Health to update the tools used to appraise projects and develop infrastructure priorities. Figure 8.2 illustrates the projected increase in activity growth, confirmed government investment and possible future investment in facilities over the next two decades.

When developing options to service activity growth, non-build solutions should be considered, including reducing the use of public hospitals by private patients. Estimates show that, if 50 per cent of the private activity in public hospitals is moved to the private sector, the capacity freed-up would be the equivalent of five years of future demand growth.¹⁰⁴ To achieve this outcome, the private and not-for-profit market sector’s capacity needs to grow for patients to use their health insurance.

\$ Recommendation

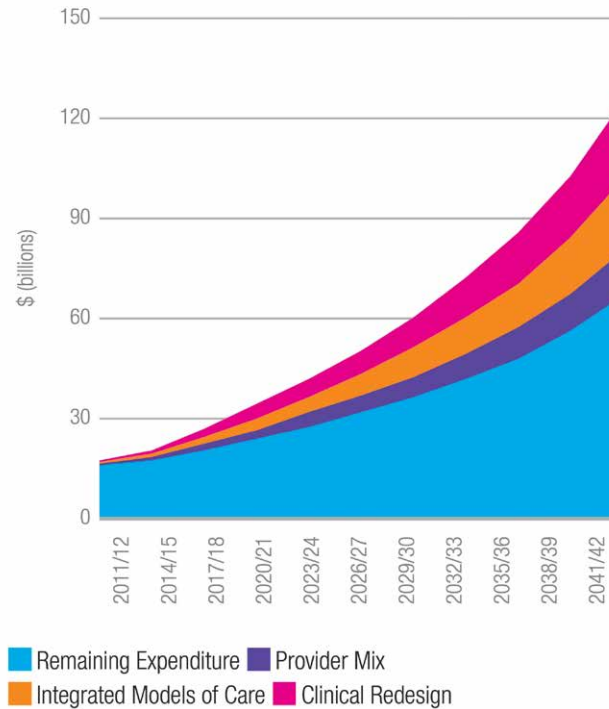
Infrastructure NSW recommends a reservation of \$600 million from the *Rebuilding NSW* initiative for a Hospitals Growth Program to contribute towards funding new health facilities.

Recommendation

Infrastructure NSW recommends the Ministry of Health pursue reforms that will increase the private and not-for-profit market capacity in order to reduce the need for investment in new public facilities.

104. PwC 2012, NSW Infrastructure Baseline: Health Baseline Report, to Infrastructure NSW

Figure 8.3 Reforms and their impact on expenditure growth



Source: NSW Ministry of Health Internal Projections, A combined approach to ‘bending the cost curve’, September 2014

8.3.3 Reforming service delivery models

The projected levels of activity growth cannot be accommodated without significant reforms to health service delivery models, which – in turn – will require changes to health network assets. The 2014-15 NSW Budget allocates \$20 billion to provide health services,

representing 28 per cent of total NSW Government expenditure. Without ongoing reform, a new hospital of the size and scale of Westmead Hospital would be required to be built every two years.

Consequently, a key objective for ongoing health infrastructure investment is the ability of assets and facilities to support more efficient service delivery models. Figure 8.3 shows the indicative contribution three key reforms can make in reducing the costs to government of meeting projected health demand.

Infrastructure NSW recommends the initiatives – clinical redesign, integrated models of care, and rebalancing the provider mix– be pursued as a priority and be included in *Rebuilding NSW* priorities to manage the long-term need for hospital expansions.

Clinical redesign

Clinical redesign refers to reform of work practices (based on feedback from staff) to ensure that patient care is managed efficiently to meet the needs of the patient, reduce delays (and costs) and improve the quality of care. Assets may need to be reconfigured to support these reforms to provide better access to technology and improve the functionality of working environments. For example, NSW Health has progressed implementation of the High Volume Short Stay model of care for suitable planned surgical cases. Preliminary analysis forecasts productivity gains in the order of \$100 million over 10 years based on reduced length of stay.

Recommendation

Infrastructure NSW recommends giving priority to facility reconfigurations that implement best practice clinical redesign, increase efficiencies and reduce growth in operating costs. A program to accelerate the modernisation of metropolitan, regional and rural facilities should be developed to deliver improvements progressively over the next 20 years.

Ministry for Health should prepare business cases for these programs and for the Regional and Rural Modernisation Program and the Statewide Neonatal Intensive Care Units / Paediatric Intensive Care Units Program.

Integrated models of care

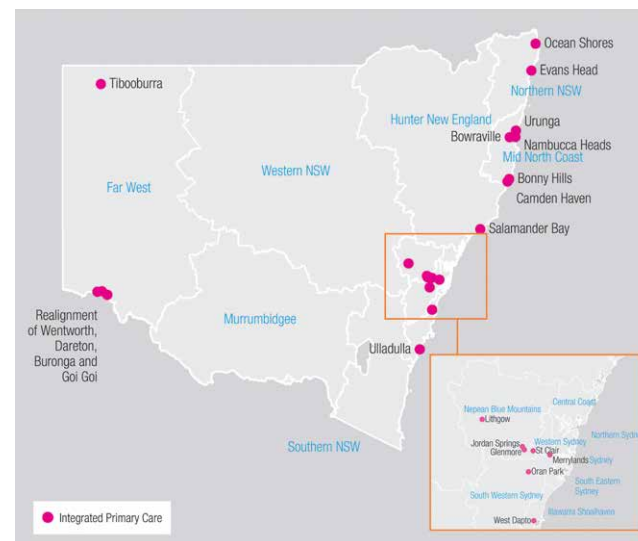
Primary and Integrated Care Strategy

Primary and integrated health care comprises universally accessible, generalist services delivered by a variety of providers that address the health needs of individuals, families and communities. A key aim of the initiative is to offer a 'one stop shop' for vulnerable members of the community to improve their health outcomes without the

need for hospital care. A typical site delivered under the Primary and Integrated Care Strategy could include core services such as allied health services (including oral health, physiotherapy and podiatry), early childhood and youth health services, nursing services, mental health services and aboriginal health services.

The Ministry of Health has nominated 19 sites for development, redevelopment or refurbishment.

Figure 8.4 Priority sites for Integrated Care Co-location program



Source: NSW Ministry of Health

\$ Recommendation

Infrastructure NSW recommends a reservation of \$100 million from the *Rebuilding NSW* initiative for the Care Co-location Program.

The sites have been prioritised to respond to areas experiencing an ageing population and an increased demand for integrated community health services, including mental health, drug and alcohol services. There are opportunities to develop partnerships with a range of service providers, including integration with not-for-profit facilities and services and co-location with GP clinics.

Multipurpose Services (MPS) Strategy

The MPS Strategy aims to improve access to health and aged care services in local communities through greater service coordination and more integrated, innovative and flexible services. The strategy also seeks to improve the economic viability and cost effectiveness of service delivery – leading ultimately to services that are easily accessible, locally targeted and sustainable.

The Ministry has nominated 11 small rural Health Services for redevelopment into MPS facilities to provide integrated health and aged care services outside hospitals.

Figure 8.5 Multipurpose Services Strategy next stage



Source: NSW Ministry of Health

The characteristics of communities and services that best support the implementation of the MPS model include:

- Insufficient catchment populations to sustain separate acute hospital, residential care, community health and home care services (generally from around 1,000 to 4,000 persons)
- Inability to access the mix of health and aged care services appropriate to the community’s needs due to isolation

- Complementary (rather than competing) services
- Support for the MPS from existing services, including local health professionals such as general practitioner(s).
- Capacity to achieve financial viability under MPS funding arrangements.

Where these characteristics are present, MPS facilities can offer a significant improvement in access to health services.

\$ Recommendation

Infrastructure NSW recommends a reservation of \$300 million from the *Rebuilding NSW* initiative for the Regional Multipurpose Health Facilities Program.

Rebalancing the provider mix

The NSW public sector delivers a higher share of health services, with less private sector participation and investment than in Victoria, Queensland or Western Australia. As the demand for new hospital capacity increases, partnerships with non-government providers will be needed to meet demand.

The Productivity Commission has produced estimates (albeit with significant caveats around the available data) that show the capital cost and operating costs per separation¹⁰⁵ are lower for private hospitals than for public hospitals, suggesting that greater private participation will deliver better value and productivity benefits.¹⁰⁶

In 2012, Infrastructure NSW concluded that partnering with the not-for-profit and private sectors to deliver services would improve competitiveness and deliver a more productive/efficient health industry in NSW.

NSW Health is actively exploring opportunities for non-government provision of health services. The Northern Beaches Hospital is the lead project of this kind, with the NSW Government funding public beds and shared infrastructure only, and paying for public health services on an activity basis for the life of the concession period. This model is expected to lead to both capital and recurrent savings.

Future projects will be developed using this model. If brought to market, these opportunities would contribute to rebalancing the provider mix. However, efforts should be made to enhance competition by increasing the number of market participants to ensure that any partnership delivers value for money.

¹⁰⁵. A separation is an event in which an episode of care for an admitted patient ceases.

¹⁰⁶. Productivity Commission 2009, Public and Private Hospitals, quoted in PwC 2012, NSW Infrastructure Baseline: Health Baseline Report, to Infrastructure NSW

Recommendation

Infrastructure NSW recommends pursuing opportunities for a better mix of services from the not-for-profit and private sector for the delivery of infrastructure and public health services in NSW. This should include all new major public hospital capacity projects fully considering opportunities for partnerships.

Infrastructure NSW also recommends that Health Infrastructure consider market capacity-building activities, such as the development of brownfield projects, multiple locations and measures to overcome the barriers to entry for international providers.

8.3.4 Planning, service procurement and system improvements

Infrastructure NSW notes that the NSW Ministry of Health has progressed reforms in the following system-wide improvements that will assist in the planning and procurement of health services:

- eHealth
- Contestability in the provision of clinical and non-clinical support services
- Better planning and asset management

While Infrastructure NSW has not proposed specific investment to prioritise these initiatives, they are vital to delivering value for money, as they offer both operating and capital savings. The design and implementation of these initiatives should be monitored by government to ensure the benefits are realised and savings achieved as soon as possible.

Recommendation

Infrastructure NSW recommends that NSW Ministry of Health continue to pursue an e-enabled system and contestability initiatives across the spectrum of services, while also uniting local and State-wide asset planning.

9.0 Culture, sport and the environment

STRATEGIC OBJECTIVE

Deliver targeted upgrades to the State's cultural, sporting and environmental infrastructure to drive growth in the visitor economy, realise the economic and social benefits of strong cultural and sporting sectors, and support local participation, creativity and liveability

KEY CHALLENGES

- Revitalise the NSW cultural, sports and tourism economies
- Maintain the Sydney CBD as a highly attractive, world renowned cultural destination and precinct
- Move away from ad hoc investment decisions to better target investment towards renewing ageing cultural and sporting infrastructure, strengthening defined precincts, and providing better facilities to more people, particularly in the fast-growing areas of Parramatta and Western Sydney
- Maintain competitiveness in the events market through investment in stadia
- Engage in meaningful partnerships with local councils in the cities of Newcastle and Wollongong and across regional NSW
- Support tourism and environmental initiatives in regional NSW

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Better investment planning and renewal of arts and cultural assets

- Standardise the investment framework for cultural infrastructure
- Develop a whole-of-sector cultural infrastructure strategy
- Invest in renewing ageing assets and further developing cultural precincts around the State

Cost of planning is not material

Reservation of \$600 million from the *Rebuilding NSW* initiative

Sydney CBD Cultural Precinct

- Define a Sydney CBD Cultural Precinct , in consultation with the City of Sydney, with priority investment directed to :
 - Sydney Opera House renewal
 - Walsh Bay Arts precinct
 - Art Gallery of NSW: Sydney Modern
 - State Library of NSW
- Prior to further public investment being made in the Australian Museum, investigate opportunities for reconfiguration and site optimisation and alignment with the whole-of-sector cultural infrastructure strategy

See reservation above

Greater access to indigenous art and culture

- Support plans for a purpose-built Indigenous Cultural Centre within the Sydney CBD Cultural Precinct at Barangaroo Head Land Park
- Promote greater collaboration between institutions housing indigenous collections to create a precinct-wide visitor experience and to enable sharing and consolidation of collections

A new Parramatta Cultural Precinct

- Plan for and prioritise investment in a new Parramatta Cultural Precinct, based around the Riverside Theatre Complex, the old David Jones site, Parramatta Stadium and the old Kings School
- Urgently consider relocation of the Powerhouse Museum to the Parramatta Cultural Precinct
- Promote sharing of collections from CBD-based institutions (such as the Australian Museum) with the Parramatta Cultural Precinct

Western Sydney cultural hubs

- Partner with local councils to develop opportunities for co-investment in new and repurposed cultural infrastructure in Western Sydney, with particular regard to the river cities of Liverpool, Penrith and Campbelltown

OPPORTUNITY	KEY Infrastructure NSW RECOMMENDATIONS	COSTS & FUNDING
Regional hubs and precincts	Newcastle and Wollongong <ul style="list-style-type: none"> • Work with the City of Newcastle to attract investment in the city's cultural precinct • Work with the City of Wollongong to enhance the cultural precinct around the Town Hall and Performing Arts Centre Regional NSW <ul style="list-style-type: none"> • Create regional creative hubs and cultural precincts across the State, including utilising digital infrastructure to drive local and tourist visitation and innovative use of existing community infrastructure 	See reservation above
Environmental infrastructure to support tourism	<ul style="list-style-type: none"> • Reserve \$300 million for the Regional Environment and Tourism Program for national parks and regional tourism 	Reservation of \$300 million from the regional allocation in the <i>Rebuilding NSW</i> initiative
Sporting infrastructure	<ul style="list-style-type: none"> • Complete upgrades to the Moore Park sporting precinct, focusing on the Sydney Football Stadium • Review major stadium alternatives in the Parramatta/Homebush area to address the need for a high profile rectangular sports stadium, before finalising stadia investment • Commence planning for an outer Western Sydney stadium, to be built in the longer term • Explore options for a multi-use indoor arena in a strategic Sydney location • Reserve \$600 million from the <i>Rebuilding NSW</i> initiative to support investments in sporting infrastructure during the timeframe covered by this report 	Reservation of \$600 million from the <i>Rebuilding NSW</i> initiative

Snapshot

- NSW has the largest arts and cultural sector in Australia, employing more than 176,000 people, about 5.6 per cent of total NSW employment and 36 per cent of the national arts workforce. Eleven of Australia's 28 Major Performing Arts Companies have a base in NSW.
- NSW leads the country for cultural tourism. In 2013, NSW attracted approximately 9.8 million international and domestic cultural visitors. State cultural institutions attracted 4.8 million paying visitors, who contributed an estimated \$8.3 billion to the NSW economy.
- The Sydney Opera House, Sydney's foremost tourist attraction, attracts over 8.2 million visitors each year.
- Cultural and heritage visitors spend almost twice as much as other international visitors – \$6,280 per trip compared to \$3,832 per trip.
- The major cultural institutions owned by the NSW Government comprise assets worth approximately \$7.4 billion, primarily located in central Sydney, of which \$2.8 billion is invested in property and \$4.6 billion in collections. Average expenditure over the last 10 years across sports and cultural sectors has been \$114 million a year: 55 per cent on sporting venues and 45 per cent on cultural venues.
- In addition to the NSW Government's cultural institutions, other key cultural organisations, such as the Museum of Contemporary Art Australia (MCA), Carriageworks and the Sydney Theatre Company, contribute significantly to the State's cultural economy. In 2013, the MCA attracted just under one million visitors to its base in The Rocks.
- Sydney's cultural institutions support regional NSW by lending and touring collections, off-site presentations, educational programs and online access to resources.
- National parks are a significant asset for regional tourism economies, receiving over 34 million domestic visits each year and generating thousands of regional jobs.
- The NSW Government has more than \$2 billion invested in 40 sporting stadia, ranging from Tier 1 international standard venues to Tier 3 local venues. Approximately \$21 million is spent every year on maintaining these venues.
- In 2013, 1.36 million patrons attended 61 major events at Allianz and the SCG, with an average attendance of 22,320.
- ANZ Stadium at Sydney Olympic Park attracted 1.9 million people to a mix of events, while Sydney Olympic Park overall attracted 2.46 million people to various sporting events.

9.1 Summary

According to the 2012 World Cities Culture Report,¹⁰⁷ cultural experiences and institutions are key drivers in attracting leisure visitors, business travellers and skilled workers to a city.

Sydney has a wealth of cultural attractions to offer visitors and residents – from the globally recognised Sydney Opera House and world-class collections in the city’s art galleries and museums to Australia’s leading music, theatre and dance companies. However, a number of significant cultural assets in the city are in need of renewal, including the Opera House, the Art Gallery of NSW, the Powerhouse Museum (part of the Museum of Applied Arts and Sciences), the Australian Museum and the State Library of NSW. Infrastructure NSW has estimated that at least \$2 billion is required to bring these assets up to national and international standards, an amount far exceeding likely available funds in the future. This means that rigorous demand and options analysis, together with identification of innovative ways to provide capital and ongoing funding, will be needed to renew and expand these important assets.

The NSW Government has commenced revitalising and expanding the city’s cluster of arts and cultural institutions around the CBD and Sydney Harbour, however, greater clarity on the drivers for that investment, and an agreed strategic outcome, is needed.

Infrastructure NSW recommends reserving \$600 million from the *Rebuilding NSW* initiative to improve cultural infrastructure across the State, with a strong focus on developing and investing in clearly defined cultural precincts.

In Sydney, Infrastructure NSW recommends two clearly defined cultural precincts: a CBD precinct (based around the Sydney Opera House, extending to Barangaroo in the west and the Australian Museum in the east) and a Parramatta precinct, established as part of the North Parramatta Urban Renewal project.

To anchor the new Parramatta cultural precinct, Infrastructure NSW recommends giving consideration to relocating the Powerhouse Museum. A relocated Powerhouse could be a core asset in the Parramatta precinct and a major addition to cultural infrastructure in the west. In addition, as part of the recommended whole-of-sector strategy, functions and collections from CBD-based institutions, such as the Australian Museum, could be shared with or at least exhibited in the Parramatta Cultural Precinct.

In Western Sydney, Infrastructure NSW recommends that the NSW Government should develop, in partnership with local councils, opportunities for co-investment in repurposed existing infrastructure and new cultural infrastructure as appropriate, with particular regard to the river cities of Liverpool, Penrith and Campbelltown.

Outside Sydney, cultural investment priorities in Newcastle and Wollongong should be delivered in partnership with local councils, with an initial focus on developing precincts based around the Newcastle Art Gallery and the Wollongong Town Hall and Performing Arts Centre.

In regional NSW, investment should be directed towards the creation of regional cultural hubs and precincts, with further investigation into the potential for digital infrastructure to drive local and tourist visitation.

Infrastructure NSW supports plans for a purpose-built Indigenous Cultural Centre within the CBD Cultural Precinct to facilitate greater access to Australian indigenous art and culture in general and to established indigenous collections located in Sydney and regional NSW.

There are a number of opportunities to grow the contribution which national parks make to the State’s economic and social wellbeing through transformative capital investment, as has taken place in New Zealand, Victoria and Tasmania.

Infrastructure NSW recommends reserving \$300 million from the regional allocation of the *Rebuilding NSW* initiative to create an Environment and Tourism Fund to develop environmental assets in national parks and support tourism in regional NSW.

107. Greater London Authority 2012, World Cities Culture Report

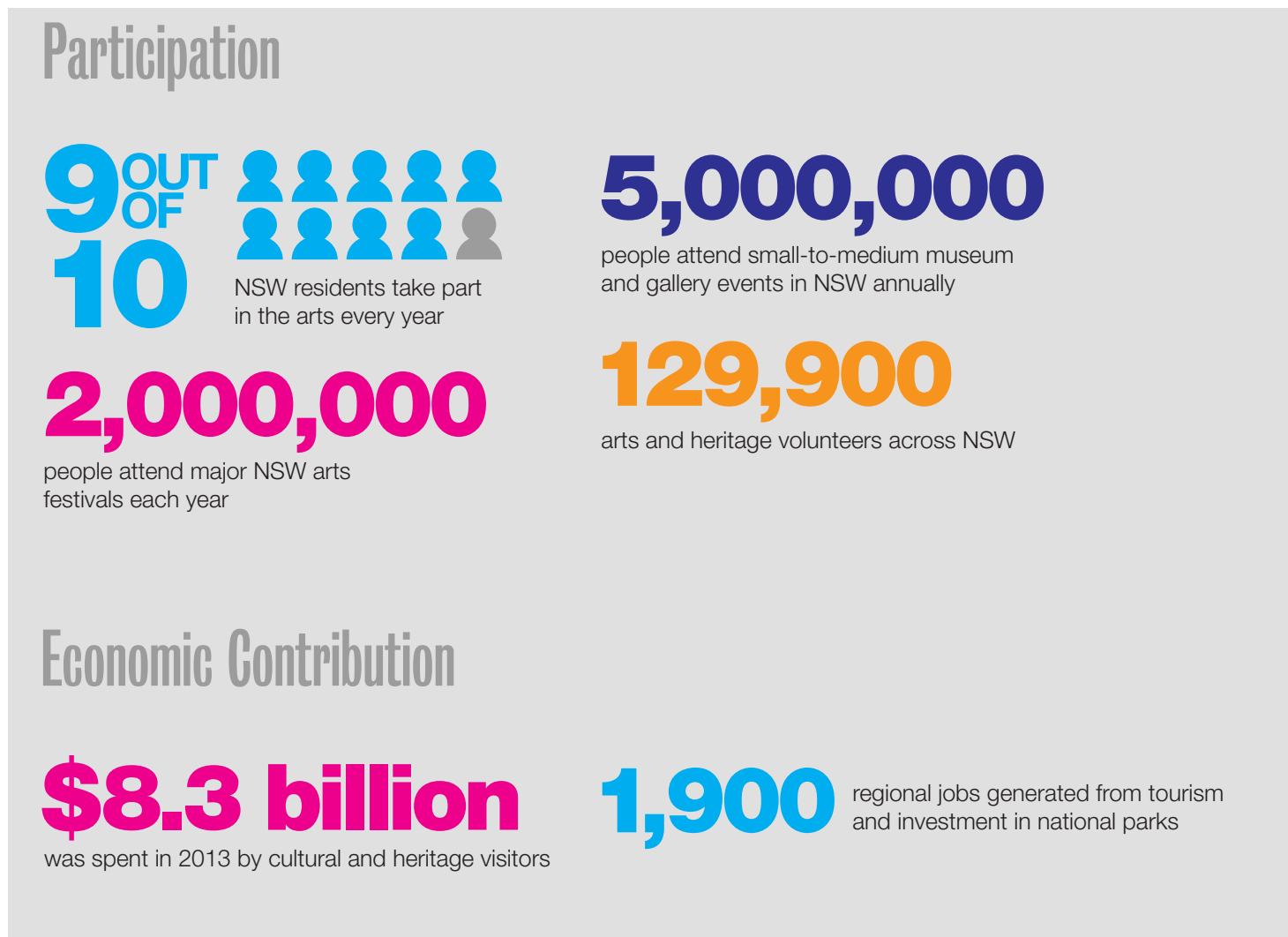
Infrastructure NSW also recommends that investment in sporting infrastructure focus on implementing the NSW Government's Stadia Strategy, which consolidates and directs investment into a limited number of world-class stadia and aims to create two international sporting hubs at Moore Park and the Olympic Park/Parramatta precinct.

Upgrades to the Moore Park sporting precinct – home to Rugby League Central, the Australian Cricket Team, NSW Blues, Sydney Sixers, Sydney Swans, Sydney Roosters, NSW Waratahs and the Sydney FC – should be completed. Infrastructure NSW also suggests that the Government carry out a full review of major stadia alternatives in the Parramatta/mid-western suburbs to identify the best means of providing a high quality rectangular sports stadium in the region, before finalising stadium investment plans.

Infrastructure NSW recommends that the Government commence long-term planning for building an outer Western Sydney stadium and examine options for a multi-use indoor arena in a strategic Sydney location to accommodate sports such as basketball, badminton, table tennis, tennis and martial arts.

Making these investments will ensure that Sydney and NSW continue to offer a diverse and expanding range of arts, cultural and sporting facilities that will help to attract visitors, new residents and investors to NSW.

Figure 9.1 Cultural and Sporting Overview



NSW is home to:

40%

of Australia's creative industries workforce

11

of Australia's 28 major performing arts companies



Australia's leading music companies: the Australian Brandenburg Orchestra, the Australian Chamber Orchestra, Musica Viva Australia, Opera Australia, the Sydney Symphony Orchestra

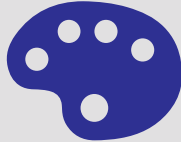


Australia's leading theatre and dance companies: Bangarra Dance Theatre, Belvoir St Theatre, Bell Shakespeare, Sydney Dance Company, Sydney Theatre Company

Visitation



Sydney Opera House
8.2 million visitors. 1.4 million attend 1,700 performances



Art Gallery of NSW
1.1 million visitors including Brett Whitely Studio and 6 touring exhibitions



State Library of NSW
5 million on-line visits



Australian Museum
10.6 million visits to the website



Museum of Applied Arts and Sciences (Powerhouse)
0.5 million visitors



Allianz Stadium and SCG
1.36 million visitors Moore Park is home to Rugby League Central, the Australian Cricket Team, NSW Blues, Sydney Swans, Sydney Sixers, Sydney Roosters, NSW Waratahs and the Sydney FC



Sydney Olympic Park
2.46 million visitors



ANZ Stadium
1.9 million visitors

9.2 Progress since 2012

9.2.1 Cultural infrastructure

The Government's priorities for cultural infrastructure, set out in the 2012 State Infrastructure Strategy were to revitalise and expand the State's existing cluster of world-class institutions and attractions through the development of an 'Arts and Cultural Ribbon' around Sydney Harbour and the CBD.

Key projects were identified as:

- Completion of the Walsh Bay Arts Precinct, (subject to a business case and available funding) within 10 years
- Investigation of options to expand the Art Gallery of NSW, renew the Sydney Opera House and expand the State Library of NSW, the Australian Museum and the Museum of Applied Arts and Sciences, all within 10 years.

Work is now under way to implement these priorities:

- The \$153 million Sydney Opera House Vehicle Access and Pedestrian Safety Project is nearing completion and \$13.7 million has been provided to develop the Sydney Opera House renewal framework, which will set out the vision, priorities and service needs for this iconic building over a 10 year timeframe.
- \$10.8 million has been provided to the Art Gallery of NSW for Stage 1 of the Sydney Modern master plan, which will double the size of the Gallery and increase gallery visitations from 1.2 million to 2 million a year.

- \$4.7 million has been provided to the Australian Museum to develop a master plan to better use the Museum site, particularly the eastern end of the College Street site.
- The State Library has received \$8 million for master planning and \$48.6 million for ongoing work to digitise its collections.
- A final business case has been completed for the Walsh Bay Arts Precinct to upgrade the existing facilities at Wharf 4/5 used by Sydney Theatre Company, Bangarra Dance Theatre, the Sydney Dance Company and the Sydney choirs, and to create new facilities on Pier 2/3 for the Australian Chamber Orchestra, the Australian Theatre for Young People and Bell Shakespeare Company
- The construction of a \$33 million storage facility at Castle Hill to enable the State-owned cultural institutions to share storage is also nearing completion.

9.2.2 Sporting infrastructure

Since 2012, the strategic priority for investment in sporting infrastructure has been in accordance with the Government's Stadia Strategy. Specific projects that have now been completed or are under way include:

- The Stage 2 redevelopment (\$197.5 million) of the Sydney Cricket Ground, with upgrades to the M.A. Noble, Don Bradman and Dally Messenger Stands
- Precinct improvements at Sydney Olympic Park, including construction of an AFL training and administration facility and Netball Central

- Better public transport and pedestrian access to the Moore Park precinct
- Improvements to the Hunter Stadium.

9.3 Ongoing challenges

9.3.1 Ad hoc planning, capacity constraints and ageing assets

Historically, cultural and sporting infrastructure investment in NSW has suffered from the lack of an agreed strategic economic and planning framework, including limited demand analysis. This has resulted in a lack of 'whole of government' planning.

The capital allocation process has meant that only NSW Government-initiated developments have access to capital development funds. Support for projects at the local government level, or for other non-government facilities, has been provided as grant funding, largely without detailed and robust business cases.

The challenge is to plan for better investment and make decisions based on an evidence-based needs assessment, forecasts of demand, analysis of potential revenue streams and an appraisal of net economic benefits and wider social goals. There is no reason why investments in cultural and sporting infrastructure, including investment in environmental infrastructure in national parks, should not demonstrate value for money, exploration of alternative funding sources and consideration of alternatives to major capital works.

Drivers for investment in key locations include:

- In central Sydney – the visitor economy and the role that cultural and sporting infrastructure can play in enhancing Sydney’s attractiveness as a place to work and invest
- In Western Sydney – changing demographics and a growing population west of Homebush, where investment continues to lag behind population growth
- In regional NSW – a segmented market, based on community demand, and the unique cultural and visitor profiles of key locations.

Recommendation

Infrastructure NSW recommends that all future investment decisions, including those foreshadowed in this report, be reviewed in accordance with a standardised investment framework.

9.3.2 Cultural infrastructure

Options to renew Sydney’s cultural infrastructure

A number of significant cultural assets in Sydney are in need of renewal, with capacity constraints and ageing assets reducing their competitiveness relative to other States.

The Sydney Opera House faces significant challenges, including ageing stage machinery, access, acoustics, capacity and technical support, while the Art Gallery of NSW is half the size of the major galleries in Melbourne and Brisbane.

The Australian Museum has 18 million objects, including the world’s best Australian indigenous and Pacific Islander collections, yet has only one fifth of the display space of the Melbourne Museum, resulting in these important collections being kept largely in storage.

The State Library of NSW, the home of some of the most important historical documents and artefacts in NSW and Australia, has inadequate and unsatisfactory storage and exhibition space. The Powerhouse Museum is site-constrained and located remotely from other key cultural institutions.

Infrastructure NSW has estimated that at least \$2 billion is required to bring these assets up to nationally and internationally competitive standards, an amount far exceeding the funds likely to be available in the future.

Rigorous demand and options analysis, together with identification of innovative ways to provide capital and ongoing funding, is therefore required to support investment proposals. To this end, Infrastructure NSW, in collaboration with NSW Treasury and NSW Trade & Investment (Arts NSW), is preparing a cultural infrastructure investment framework designed to improve the economic assessment of cultural infrastructure projects and identify alternative ways of funding and financing them.

The final report is due in early 2015.

Investing in cultural precincts and hubs across the State

Precincts form because they enable collaboration and promote higher rates of visitation. Close proximity lowers the cost of providing services and increases productivity and the exchange of ideas. These benefits are known as the ‘economies of agglomeration’.¹⁰⁸ Agglomeration benefits accrue at the local level, as well as the city level, and vary by industry. They are highest in the financial services, professional services and cultural and scientific sectors.¹⁰⁹

In the 2012 State Infrastructure Strategy, the Government recommended revitalising and expanding the State’s existing cluster of cultural institutions and attractions through the development of an ‘Arts and Cultural Ribbon’. Infrastructure NSW considers that the establishment of more defined cultural precincts along the Ribbon would enhance potential agglomeration benefits for these assets.

Infrastructure NSW considers that the primary focus for cultural investment should be the Sydney CBD, as the visitor economy is primarily focused on the city centre; it is highly accessible for residents and visitors, and existing facilities, especially around the Sydney Opera House, already form a loose precinct.

¹⁰⁸ Glaesser, E 2011, The Triumph of the City

¹⁰⁹ SGS Economics & Planning 2011, Agglomeration and Labour Productivity in Australian Cities

A **Sydney CBD Cultural Precinct** should be established and clearly defined by:

- Location
- Distance (no more than 1.5 km walking distance between cultural venues)
- Institutional offering (creating the best institutional mix within the precinct).

Based on these criteria, a cluster around the Sydney Opera House, the Museum of Contemporary Art Australia, Walsh Bay Arts precinct, the State Library of NSW, the Art Gallery of NSW and the Australian Museum is logical. Proposed cultural facilities at Barangaroo would also be accessible to this cluster, although the Powerhouse Museum is not.

Priority co-investment in this precinct should be given to:

- Progressive implementation of the Sydney Opera House renewal framework (asset renewal and lyric theatre), subject to the completion of a business case
- Walsh Bay Arts precinct (ready to proceed now)
- Art Gallery of NSW: Sydney Modern, subject to a business case
- State Library of NSW, subject to a business case
- Indigenous Cultural Centre, subject to a business case and the Barangaroo Development Authority's mandate to be 'self-funding'.

Figure 9.2 Sydney CBD Cultural Precinct



Source: Infrastructure NSW

Renewing the Sydney Opera House is expected to cost around \$600 million over 10 years (including \$150 million in the first three years). Infrastructure NSW notes that the Opera House is a significant national cultural asset and, as such, a funding contribution from the Commonwealth Government towards its renewal is appropriate.

Infrastructure NSW also considers that a purpose-built Indigenous Cultural Centre should be a component of this cultural precinct, as indigenous art and culture is a major attraction for visitors to Sydney and integral to Australia's cultural identity. This Centre will facilitate greater access to Australian indigenous art and culture in general and to established indigenous collections located in Sydney and regional NSW. The site nominated for the Centre at Barangaroo Head Land Park is supported as it meets the criteria listed above.

Greater collaboration between institutions housing indigenous collections is also recommended to create a precinct-wide visitor experience and to enable sharing and consolidation of collections as appropriate. In particular, the Indigenous and Pacific Island Collection housed in the Australian Museum should be more accessible to the general public.

The Australian Museum occupies a large CBD site that is currently under-utilised and poorly configured. Located at the eastern end of the proposed CBD cultural precinct, the Museum and site have considerable potential for reconfiguration. Infrastructure NSW notes the ongoing development of plans to upgrade the Museum and redevelop the site, with the potential for the Museum upgrade to be eventually self-funding.

Infrastructure NSW considers that redevelopment plans and further public investment in the Australian Museum should be subject to alignment with a whole-of-sector cultural infrastructure strategy. In particular, specific asset renewal plans should be subject to a full options analysis, including an assessment of the appropriateness of the asset as currently configured to meet long-term functional objectives.

NSW Cultural Institutions have remarkable collections. As part of a whole-of-sector strategy, the Government should find new and innovative ways of putting more of these collections on display. Opportunities to share and exhibit complementary collections between all institutions should be encouraged.

As noted above, the Powerhouse Museum is relatively remote from the proposed CBD cultural precinct. It occupies a constrained (but very valuable) site adjacent to Darling Harbour and will require significant reconfiguration to remain at its current location and comply with the exhibition and security standards of international and national lending institutions.

Given the growing deficit of cultural infrastructure in Sydney's western suburbs, there is a strong case for relocating the Museum to a new cultural precinct serving the west. The Museum's educational orientation makes it a good fit for the growing population of the area and its relocation could be partly funded by realising the commercial value of its existing site. The Museum would be a core asset – and potentially an iconic and popular one – in a cultural precinct in Sydney's west (see overleaf).

Recommendation

Infrastructure NSW recommends the establishment of a clearly defined Sydney CBD cultural precinct, with staged investment in the Sydney Opera House, the Walsh Bay Arts precinct, the Art Gallery of NSW and the State Library of NSW.

Recommendation

Infrastructure NSW considers that redevelopment plans and further public investment in the Australian Museum should be subject to alignment with a whole-of-sector cultural infrastructure strategy. In particular, an assessment is needed of whether the current site's configuration is appropriate to meet long-term functional objectives, alongside full options analysis of opportunities for site optimisation and reconfiguration.

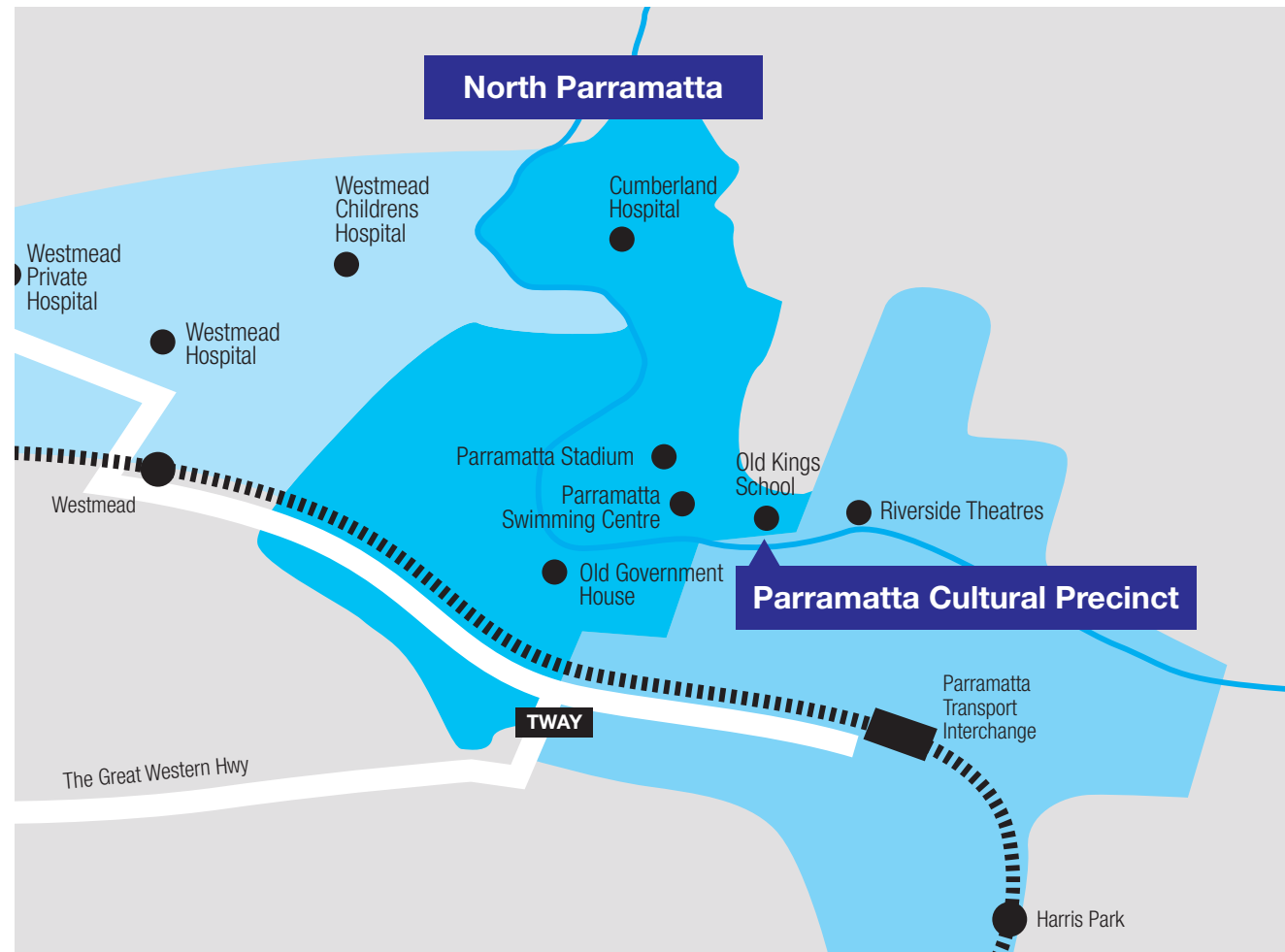
Recommendation

Infrastructure NSW supports plans for a purpose built Indigenous Cultural Centre within the Sydney CBD Cultural Precinct. The site nominated at Barangaroo Head Land Park is supported.

Recommendation

Infrastructure NSW recommends greater collaboration between institutions housing indigenous collections to maximise access to these collections, create a precinct-wide visitor experience and enable sharing and consolidation of collections as appropriate.

Figure 9.3 Parramatta Cultural Precinct



Source: Infrastructure NSW

A **Parramatta Cultural Precinct** should be established and clearly defined investment in this precinct based on the same principles as the Sydney CBD Cultural Precinct.

Within 25 years, Western Sydney will be home to more than half of Sydneysiders. Greater Parramatta will continue to grow in significance to Sydney and has the potential to reach 100,000 jobs over the next 20 years. The new University of Western Sydney campus, located just to the east of the Parramatta CBD, is forecast to cater to over 10,000 students by 2017. The 2011 Census revealed that Greater Parramatta is diversifying, experiencing growth in knowledge-based industries and attracting more highly qualified people to work in Parramatta. Employees with a bachelor or higher degree increased by almost 26 per cent between the 2006 census and the 2011 census.¹¹⁰ In 2012, Sydney Festival activities scheduled in Parramatta returned benefits of \$1.1 million to the City of Parramatta.¹¹¹

As part of the Government's plan to focus on Greater Parramatta as a centre of metropolitan significance, UrbanGrowth NSW has been directed to transform and revitalise the Parramatta North precinct to create a mixed-use urban renewal precinct.

This precinct is home to some of Australia's most important heritage buildings and is situated on the banks of the Parramatta River – within five minutes of the Parramatta CBD and close to existing major transport links. UrbanGrowth NSW will deliver around 6,000 new homes and 2,000 new jobs into the precinct as part of

this revitalisation. Existing heritage and parkland space will also be upgraded.

There are also plans to expand and improve the specialised health and education precincts at Westmead and Rydalmere, located to the north and east of the Parramatta North precinct.

These developments suggest that there are significant opportunities to expand cultural infrastructure in the region. Infrastructure NSW considers that as part of the Parramatta North Urban Renewal project, there is an opportunity to develop a Parramatta Cultural Precinct based around the Riverside Theatre complex, the old David Jones site, Parramatta Stadium and the Old King's School site.

Recommendation

Infrastructure NSW recommends that a Parramatta cultural precinct be developed as part of the Parramatta North Urban Renewal project based around the Riverside Theatre Complex, the old David Jones site, Parramatta Stadium and the old Kings School site.

Recommendation

Infrastructure NSW recommends that, before any further public investment is made in the Powerhouse Museum, urgent consideration be given to its potential relocation to the Parramatta Cultural Precinct.

Recommendation

As part of the recommended whole-of-sector cultural infrastructure strategy, opportunities to share and exhibit complementary collections between all institutions should be encouraged. Functions and collections from CBD-based institutions (such as the Australian Museum) could be shared with – or at least exhibited in – the Parramatta Cultural Precinct.

110. Department of Planning & Environment 2014, Draft: A Plan for Growing Sydney – The Metropolitan Strategy

111. Deloitte Access Economics 2012, Sydney Festival – Executive Summary

The potential for **Western Sydney cultural hubs** should also be explored. New pathways need to be established for local government to propose co-investment with the NSW Government for the development of these cultural hubs, with particular regard to the river cities of Liverpool, Penrith and Campbelltown.

Infrastructure NSW notes the preliminary work being undertaken by NSW Trade & Investment (Arts NSW) in conjunction with the Western Sydney Arts & Cultural Lobby to research cultural investment development needs.

Recommendation

Infrastructure NSW recommends that Arts NSW takes the lead to develop, in partnership with local councils, opportunities for co-investment in new cultural infrastructure and repurposed existing infrastructure, to meet the demands of the growing population in Western Sydney – starting with the river cities of Liverpool, Penrith and Campbelltown.

Newcastle and Wollongong

Cultural investment priorities in Newcastle and Wollongong should be delivered in partnership with the City of Newcastle and the City of Wollongong.

Opportunities exist to enhance the cultural precinct in Wollongong based around the Town Hall and the Performing Arts Centre. In Newcastle, consideration will need to be given to local priorities, but the focus should be on investment in the city's cultural precinct based around the Art Gallery.

Recommendation

Infrastructure NSW recommends cultural investment priorities in Newcastle and Wollongong be delivered in partnership with the City of Newcastle and the City of Wollongong.

In Newcastle, investment should focus on the cultural precinct which will develop around the city's Art Gallery.

In Wollongong, plans should focus on enhancing the cultural precinct around the Town Hall and Performing Arts.

Regional NSW

The NSW Government has established an Economic Development Strategy for Regional NSW which highlights the economic importance of overseas, interstate and domestic visitors to regional NSW. The strategy notes the role arts and culture investment can play in providing a platform for visitors to experience the attractions of NSW, while also helping to rebuild regional economies.

Infrastructure NSW recommends that investment in regional cultural infrastructure should be directed to the creation of creative hubs and cultural precincts, with appropriately scaled local infrastructure in smaller regional areas, as envisaged by Arts NSW. Community access to arts and cultural facilities can be achieved through greater investment in the use of digital infrastructure and innovative uses of existing community infrastructure.

Recommendation

Infrastructure NSW recommends the creation of regional creative hubs and cultural precincts with further investigation of the potential for digital infrastructure to drive local and tourist visitation and innovative uses of existing community infrastructure.

A whole-of-sector cultural infrastructure strategy

NSW Trade & Investment (Arts NSW) has recently developed a Cultural Infrastructure Strategy (CIS) in response to the renewal and demand challenges described above. The CIS outlines strategic policy directions for NSW Government cultural infrastructure over the next 10 years, focused on the three directions set out below.

Direction One	Expand, in partnership with local government, the arts and cultural facilities available to the people of Western Sydney. We will work on the Parramatta North Urban renewal project and plan for the optimal mix of community, cultural and commercial uses.
Direction Two	Investigate, in partnership with local government, opportunities for strengthening cultural facilities in regional NSW
Direction Three	Ensure NSW, through Sydney, is a cultural leader in the Asia Pacific. Sydney investment will focus on renewing the State Cultural Institutions along Sydney’s Cultural Ribbon. We will seek to maximise arts and cultural opportunities in major urban developments

The CIS is principally a plan for NSW Government-owned and-managed cultural assets, which include Sydney’s major cultural institutions and the properties administered by Arts NSW as part of the Arts Portfolio. It also seeks, through the directions set out above, to address the need for a cultural infrastructure strategy for the sector as a whole.

Infrastructure NSW and NSW Department of Trade & Investment will work together to develop a whole-of-sector cultural infrastructure strategy and will engage with all key cultural institutions including the Museum of Contemporary Art Australia (MCA), Carriageworks and the Sydney Theatre Company as well as the cultural initiatives at Barangaroo.

Development of this whole-of-sector strategy would incorporate initiatives from the public and private sectors, with input from local government (which has primary responsibility for cultural infrastructure in Western Sydney and regional NSW, statutory authorities (such as the Barangaroo Development Authority, the Sydney Harbour Foreshore Authority and UrbanGrowth NSW), as well as other key cultural organisations.

An example of a small but effective initiative reflecting a CBD whole-of-sector approach would be the development of an integrated ‘highlights walk’ and mobile app linking cultural facilities starting at the Sydney Observatory and progressing through Barangaroo, Walsh Bay, the Rocks, the Sydney Opera House, the Royal Botanic Gardens, Sydney Living Museum properties, the State Library and Macquarie Street, the Art Gallery of NSW and the Australian Museum.

 **Recommendation**

Infrastructure NSW recommends a reservation of \$600 million from the *Rebuilding NSW* initiative for the Cultural Infrastructure Program.

Recommendation

Infrastructure NSW and NSW Department of Trade & Investment will work together, to develop and implement a whole-of-sector cultural infrastructure strategy to make best use of public funds and existing infrastructure and sites.

9.3.3 Regional environmental and tourism infrastructure

One of the greatest assets of regional NSW is its natural beauty. Other jurisdictions, notably Victoria and Tasmania, have boosted their visitor economies through targeted investments that combine environmental protection – for instance, in national parks – with infrastructure that supports overseas, interstate and domestic visitation.

National parks are key assets for Sydney and regional NSW, contributing to quality of life in cities and towns, and anchoring the State's attractiveness as a destination for domestic and international visitors. The national parks system is an essential component of NSW's tourism and recreational infrastructure and a significant repository for some of the State's highest value natural capital. Across NSW, national parks receive over 34 million domestic visits each year.

National parks and reserves also play a critical role in local tourism economies and provide opportunities for regional and Aboriginal owned businesses across NSW. In the North East region, tourism and public investment in national parks generate more than 1900 regional jobs, and over \$120 million in regional value-added activity.¹¹²

There are a number of opportunities to grow the contribution national parks make to the State's regional economies through transformative capital investments, as has taken place in Victoria, Tasmania and New Zealand. Examples might include the provision of eco-tourism infrastructure such as walking tracks, re-purposed heritage buildings, and purpose designed visitor facilities.

Infrastructure NSW will work with the Office of Environment and Heritage to prioritise such investment and will assist in the development of business cases for environmental investment in under-utilised national park assets to support overseas, interstate and domestic visitation.

Recommendation

Infrastructure NSW recommends a reservation of \$300 million from the *Rebuilding NSW* initiative for the Regional Environment and Tourism Program to invest in improved national park and regional tourism infrastructure

9.3.4 Sporting infrastructure

Implementation of the Stadia Strategy

The 2012 Stadia Strategy is designed to deliver significant benefits to the NSW Government, sporting bodies and franchises, and the wider NSW community and economy by consolidating and directing investment into a limited number of stadia to deliver a world class stadia network.

The strategy was developed following significant research to develop a NSW Stadia Register and hierarchy of stadia in NSW, and was informed by extensive stakeholder consultation, scenario modelling and benchmarking with other Australian States.

The strategy prioritises increased utilisation for its most capital intensive assets and seeks to develop improved economies in stadia operations. It recommends the creation of two principal sporting hubs and the development of wider entertainment precincts leading to better game-day experiences for spectators.

However, notwithstanding the adoption by the NSW Government of the Stadia Strategy and the efforts of the former Office of Communities and the various sporting codes, real investment to implement the strategy has been slow to materialise.

112. DECCW. 2009, *Economic Benefits of National Parks and Other Reserves in NSW: Summary Report*.

Consolidate and invest

Stadia across NSW have been classified into tiers.

Table 9.1 Stadia classifications

Tier 1	<i>All located in Greater Sydney:</i> Stadium Australia (ANZ Stadium) Sydney Football Stadium Sydney Cricket Ground	Seating capacity greater than 40,000; regularly host international sporting events; offer extensive corporate facilities, including corporate suites, open-air corporate boxes, and other function/ dining facilities; maybe the home ground for sporting teams playing in national competitions
Tier 2	<i>In Greater Sydney:</i> Brookvale Oval Campbelltown Sports Stadium Endeavour Field, Woollooware Jubilee Oval, Kogarah Leichhardt Oval Penrith Stadium Parramatta Stadium Sydney Showground Stadium <i>In regional NSW:</i> Central Coast Stadium (Gosford) Hunter Stadium (Newcastle) Wollongong Stadium	Total seating capacity of between 20,000 and 40,000; some corporate facilities; home grounds for sporting teams playing in national competitions.

Source: KPMG 2012, Development of a NSW Stadia Strategy – Final Report

Unlike cultural infrastructure in Western Sydney, there is an oversupply of sporting infrastructure capacity, with competition between sporting venues in Sydney resulting in a ‘buyer’s market’.

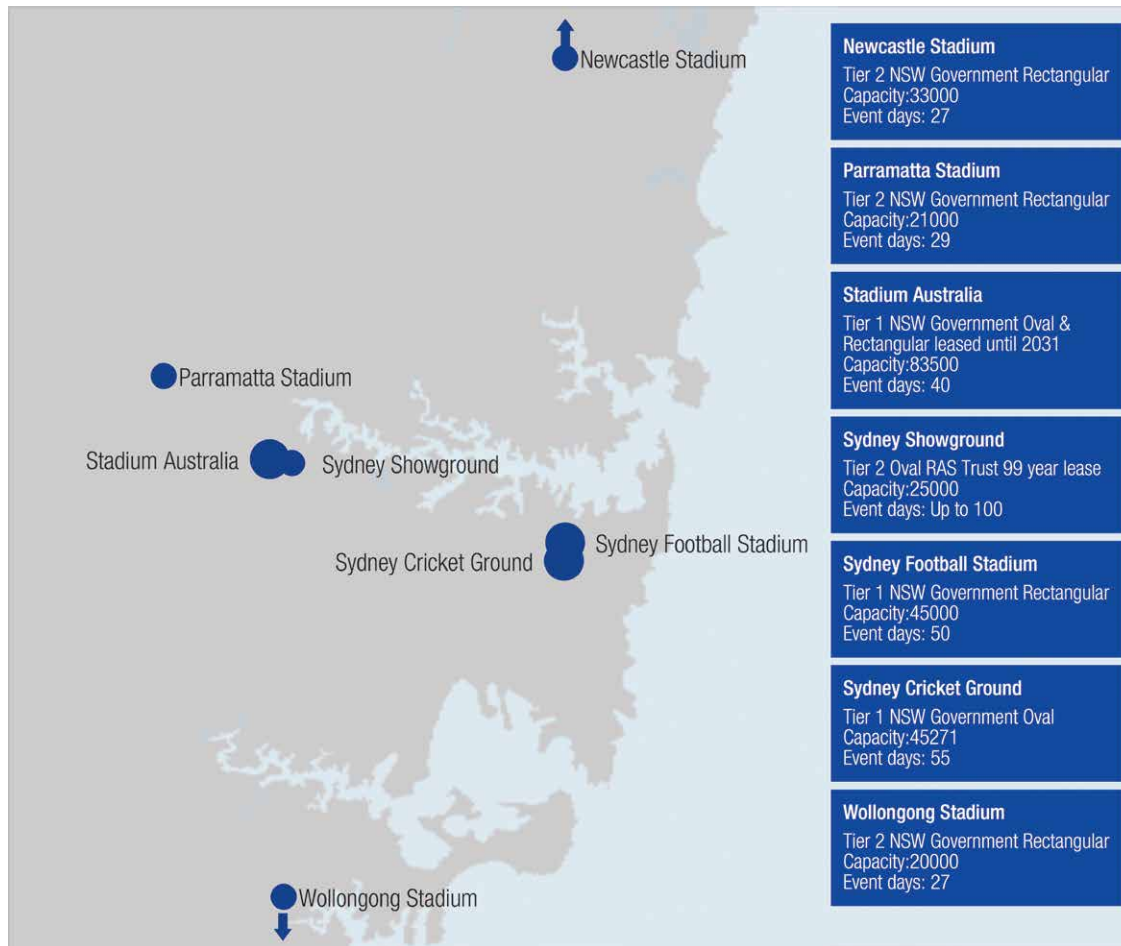
Many Tier 2 stadia operate at less than capacity and do not have a year-round program of national events. On the other hand, each of Greater Sydney’s Tier 1 Stadia, while not underutilised to the same extent, requires substantial investment not only in the stadium itself, but also in the surrounding food, entertainment and transport hubs to bring the stadium offering up to the standard of comparable venues interstate, particularly in Melbourne.

The Stadia Strategy is to ‘consolidate and invest’, with a focus on:

- Creating international sporting hubs at Moore Park and Sydney Olympic Park, as well as in the large population centres of Wollongong, Newcastle and Western Sydney
- Planning a 30,000 seat stadium in outer Western Sydney to accommodate future events and to reflect the rapid population growth in this area
- The conversion of other Tier 2 stadia to meet community needs, such as elite training facilities, playing fields for junior games and pre-season matches. Belmore Sports Ground and Redfern Oval provide examples of how venues can be redeveloped to maintain strong links between elite sport and the local community.¹¹³

113. KPMG 2012, Development of a NSW Stadia Strategy – Final Report

Figure 9.4 NSW Stadia Strategy: 'Consolidate and Invest'



Source: KPMG

Principles for further investment

Infrastructure NSW considers that the following principles should guide further investment in sporting infrastructure.

- Maximise the benefits of consolidation

The Stadia Strategy recommended as a priority the creation of two sporting hubs: Moore Park and Sydney Olympic Park. The upgrade of the Moore Park precinct is critical, given ageing assets and the location of two Tier 1 Facilities in the precinct (the Sydney Football Stadium, which is the premier rectangular stadium in Sydney, and the Sydney Cricket Ground, which currently hosts the majority of international cricket matches), a combined seating capacity of approximately 100,000 and the precinct's location next to the leisure and retail facilities of the Entertainment Quarter.

The Moore Park facilities are home to Rugby League Central, the Australian Cricket Team, NSW Blues, Sydney Sixers, Sydney Swans, Sydney Roosters, NSW Waratahs and the Sydney FC and, once the Sydney Light Rail is completed, will be well connected to the CBD.

Infrastructure NSW considers that further investment is needed in the Moore Park precinct, in both the Sydney Football Stadium and the Sydney Cricket Ground, to bring the stadia experience up to comparable interstate venues. The proposed upgrades to the Sydney Cricket Ground stadium should be completed to maximise the benefits of this sporting hub.

Recommendation

Infrastructure NSW recommends the completion of upgrades to the Moore Park sporting precinct focusing on the Sydney Football Stadium.

- Optimisation of the Sydney Olympic Park precinct and Parramatta Stadium

Parramatta Stadium will reach the end of its useful economic life in 2025-26, while ownership of Stadium Australia (ANZ Stadium) will return to the NSW Government in 2031. Both stadia are in need of significant upgrades to improve their amenity and to develop the surrounding retail, commercial and entertainment precincts. Stakeholders have indicated that ANZ Stadium in particular suffers from not being a purpose-built rectangular stadium and provides less than optimal conditions for its principal user, the NRL.

Current suggestions for upgrading Stadium Australia include a retractable roof to provide weatherproofing and the construction of retractable seats at each end of the ground to bring fans closer to the field. Parramatta Stadium will also need substantial re-configuration if it is to be useable after 2025-26.

Recommendation

Infrastructure NSW recommends that a full review of major stadia alternatives in the Parramatta/Homebush area is carried out to address the need for a high profile rectangular sports stadium in these suburbs, before finalising stadia investment plans.

- Outer Western Sydney Stadium

The Stadia Strategy commits the NSW Government to providing a 30,000 seat stadium in outer Western Sydney to accommodate future demand. Infrastructure NSW recommends the commencement of long-term planning for an outer Western Sydney stadium, to be built in the longer term.

Recommendation

Infrastructure NSW recommends the commencement of long-term planning for an outer Western Sydney stadium, to be built in the longer term.

- Indoor arena

NSW is well placed to be a regional leader in some of the sports gaining popularity in Asia, where rapid economic growth is driving new markets for sport, leisure and sports related tourism. As many of these sports, including basketball, tennis, badminton and martial arts, use indoor facilities, an indoor arena in Sydney is likely to enjoy good patronage and deliver significant benefits.

Recommendation

Infrastructure NSW recommends that options be explored for a multi-use indoor arena in a strategic Sydney location.

Further investment

As noted at the beginning of this section, the 2012 Stadia Strategy released by the NSW Government remains a sound basis for planning the State's high level sporting infrastructure. While more work needs to be done to support the detailed investment program flowing from the Strategy – not least in relation to future stadia investments in Sydney Olympic Park and/or Parramatta and the potential indoor arena – it would be prudent to reserve an appropriate level of funding from the *Rebuilding NSW* initiative to ensure that investment decisions can proceed quickly to implementation once they have been taken.

Recommendation

Infrastructure NSW recommends a reservation of \$600 million from the *Rebuilding NSW* initiative for the Sports Stadia Infrastructure Program covered by this Report.

10.0 Energy

STRATEGIC OBJECTIVE **Ensure reliable and affordable supply for the State's businesses and households**

- KEY CHALLENGES**
- Improving energy affordability for businesses and households
 - Ensuring a diversity of supply and a sustainable energy mix for NSW into the future
 - Resolving regulatory uncertainty around the future of the energy sector
 - Bringing new gas projects on-stream

OPPORTUNITY **KEY Infrastructure NSW RECOMMENDATIONS** **COSTS & FUNDING**

Gas projects	<ul style="list-style-type: none">• Develop an appropriate regulatory regime to support investment by the private sector in gas infrastructure and supply projects	Cost is not material
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Snapshot

- In the five years to 2013–14, annual electricity usage in NSW declined on average by 2.8 per cent a year to 66,233 gigawatts per hour (Australian Energy Market Operator 2014). The drivers of this reduction were declining industrial use, increased solar (PV) installation and improved energy efficiency. These factors counteracted upward pressures on demand, such as increasing population and incomes, and economic growth. AEMO forecasts that between now and 2023/24, NSW will see minimal growth in demand due to the continued impact of these factors.
- Based on the latest forecasts from AEMO, there is currently between 2800 megawatts and 3100 megawatts of surplus capacity in the NSW electricity system. By 2023/24, that there will still be between 1500 megawatts and 3450 megawatts of surplus capacity in NSW. Any new generation required over the next 20 years will be provided by the private sector, with the NSW Government no longer directly owning/controlling any electricity generation assets by the end of this year – other than 58 per cent of Snowy Hydro.
- Over the last decade, the average NSW residential electricity bill has more than doubled. These price increases contributed to structural adjustments in NSW's industrial and manufacturing base. The cost of providing gas to residential and business customers is forecast to increase significantly in the next few years as long-term gas supply contracts to NSW gradually expire from 2014 to 2018 and prices within Australia rise to be in parity with global export markets for Australian producers.
- The cost structure of NSW's electricity networks is less competitive than that in other jurisdictions. Investment in NSW electricity networks is significantly higher than in other States where the private sector owns the network. Each electricity business has borrowed heavily to fund its capital program and this increase in debt has contributed significantly to the increase in the Government's overall net debt. The electricity sector accounted for 23 per cent of Government capital in the four years to 2012/13 and represents 21 per cent of the future capital program (the four years to 2016/17), causing constraints on borrowing in other government sectors.

Australian Energy Market Operator 2014

10.1 Summary

While reforms in the NSW energy sector are successfully delivering competition in the wholesale and retail gas and electricity markets, challenges remain in ensuring that households and businesses have access to a secure, reliable, affordable and clean energy supply.

In particular, the cost of providing electricity to residential and business customers in NSW has increased significantly in recent years, primarily driven by increases in network (transmission and distribution) prices – with some contribution from 'climate change' schemes.

There is clear evidence that private sector ownership and management of network and transmission businesses in other States is delivering lower costs to customers with the same levels of service. Infrastructure NSW considers that further reform of the energy sector – in particular, increasing private sector ownership and operation of the State's electricity networks – will deliver benefits for NSW energy customers.

In 2012, the NSW Government established Networks NSW, a framework under which Ausgrid, Essential Energy and Endeavour Energy collaborate to pursue a range of cost saving initiatives that are already delivering substantial savings.

NSW also needs to manage and adjust to changes in its fuel mix over the next 20 years. This means coming to terms with a range of challenges, including the impacts of expected significant increases in wholesale gas prices within the next 5 to 10 years. Bringing new gas projects

on-stream will require the development of an appropriate regulatory regime to support investment by the private sector in gas infrastructure and supply projects.

Snowy Hydro Limited is now one of the last remaining government-owned retailer/generation business in the National Electricity Market. Infrastructure NSW recommends that work commences on a scoping study of the options for leasing Snowy Hydro Limited, with a view to recycling NSW’s share into new investments in public infrastructure.

10.2 Progress since 2012

The energy sector in NSW is moving towards greater private sector involvement. Over recent years, the Government has moved out of ownership of retail energy businesses and electricity generators – recycling billions of dollars in sales proceeds into infrastructure projects across NSW.

There is strong evidence that government ownership of electricity networks does not provide the best customer outcomes and growing recognition that public ownership is not necessary, providing that good regulation being in place. Customers of private network operators in Victoria and South Australia have benefited in terms of both network prices and service levels, as shown in the figure below.

The NSW Government removed retail electricity price regulation in NSW from 1 July 2014, based on a review by the Australian Energy Market Commission (AEMC) in October 2013, which found that competition in NSW retail energy markets is delivering discounts and other

Table 10.1 Long-term change in average annual electricity prices (%)

	Government-owned		Privately-owned	
	NSW 1996 – 97 to 2012 – 13	Queensland 1996 – 97 to 2012 – 13	Victoria 1996 – 97 to 2012 – 13	South Australia 1998 – 99 to 2010 – 11
Retail electricity prices	+83%	+57%	+28%	+23%
Network prices	+122%	+140%	-18%	-17%
Non-network costs plus other costs*	+51%	+11%	+72%	+86%

Source: EY

benefits to small consumers and that price regulation could be removed.¹¹⁴ This means that IPART no longer determines regulated electricity retail prices and retailers are free to set their own prices.

10.3 Ongoing challenges

10.3.1 A reliable and affordable energy supply

The Government’s primary objective for energy is to make sure that residential and business customers across NSW have access to a secure, reliable, affordable and clean energy supply. This is best achieved by ensuring a diversity of supply and a sustainable energy mix that incorporates renewable energy sources.

The cost of providing electricity to residential and business customers in NSW has increased significantly in recent years, primarily driven by increases in network prices. However, other parts of the supply chain have

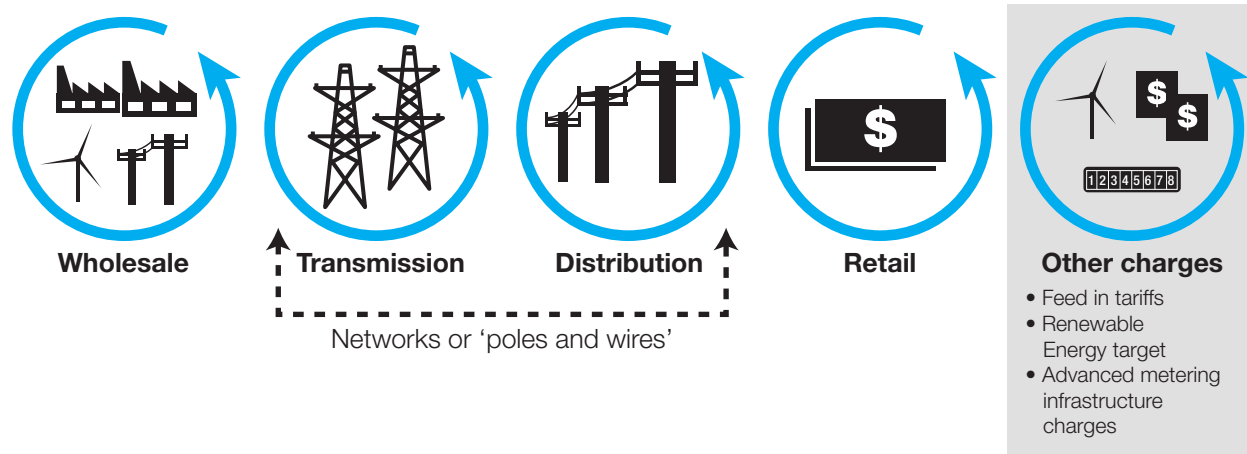
also driven the increase in prices, most notably ‘climate change’ schemes such as the carbon tax, renewable energy programs and the NSW Energy Savings Scheme.

IPART estimates that the annual electricity bill of a typical residential customer in NSW on regulated retail prices increased from \$1,013 in 2007/08 to \$2,073 in 2013/14 (in nominal terms). This increase was driven by:

- a \$580 increase in network costs
- a \$259 increase due to the carbon price and other green schemes
- a \$166 increase in retail costs (such as retail cost-to-serve and retailers’ margins)
- a \$55 increase in energy costs (for example, generation costs).¹¹⁵

114. Australian Energy Market Commission 2013, *Review of Competition in the Retail Electricity and Natural Gas Markets in NSW – Final Report*

115. IPART, *Review of Regulated Retail Prices and Charges for Electricity from 1 July 2013 to 30 June 2016: Electricity – Final Report*

Figure 10.2 Components of the typical electricity bill

Source: EY

10.3.2 Impact of network prices

High network price increases have contributed to structural adjustments in NSW's industrial and manufacturing base. In *First Things First*, Infrastructure NSW concluded that customers were getting marginal service benefits from the significant price increases they have faced in recent years. Much of the growth in the industry's capital expenditure was based on forecast increases in demand, which did not materialise.

In 2012, the NSW Government established Networks NSW, a framework under which the three State electricity distribution organisations – Ausgrid, Essential Energy and Endeavour Energy – collaborate to pursue a range of initiatives that apply greater financial discipline to capital and operating programs. This framework is projected to deliver total business savings of \$4.3 billion

over a five-year period, commencing in July 2011. By November 2013, the businesses had achieved over \$1.4 billion in savings across 2011/12 and 2012/13.¹¹⁶

10.3.3 Impact of electricity wholesale and retail prices

In recent years, wholesale electricity prices have been flat or falling, as declining demand growth put downward pressure on electricity prices for consumers. In the five years to 2013/14, annual electricity usage in NSW declined on average by 2.8 per cent a year to 66,233 gigawatts per hour.¹¹⁷

AEMO forecasts that between now and 2023/24, there

116. Media Release 2013, NSW Treasury, 'Network savings now 10 times above target'

117. Australian Energy Market Operator, *2014 National Electricity Forecasting Report*

will be minimal growth in demand due to the continued impact of lower manufacturing activity, consumers' responses to higher prices (demand management), the impact of energy efficiency improvements and distributed generation. These decreases may offset any increases that might otherwise have been driven by population, income or economic growth.

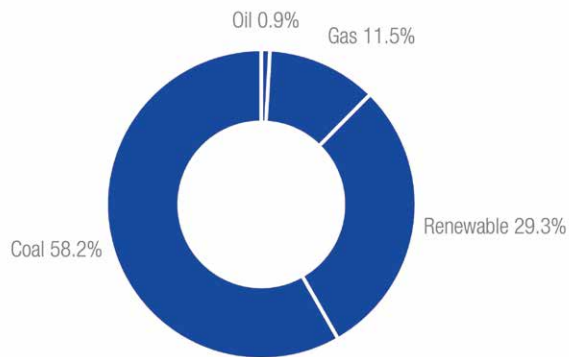
Based on the latest forecasts from AEMO, there is no need to provide any new generation capacity in NSW between now and 2023/24. There is currently between 2800 megawatts and 3100 megawatts of surplus capacity in NSW. By 2023/24, there will still be an estimated 1500 to 3450 megawatts of surplus capacity. Furthermore, any new generation required in NSW over the next 20 years will be provided by the private sector, with the NSW Government no longer directly owning/controlling any electricity generation assets by the end of 2014, other than 58 per cent of Snowy Hydro.

10.3.4 A changing fuel mix

Despite AEMO forecasts for generation capacity, a significant issue for NSW is how the State's fuel mix will change over the next 20 years. This means coming to terms with a range of challenges: the impacts of expected wholesale gas prices; the future of coal (which makes up a significant share of NSW generation, as shown in the figures below); the retiring of NSW generation assets and the increasing role of renewables.

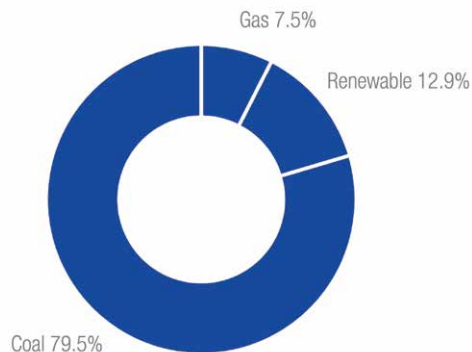
The considerable uncertainty associated with renewable energy schemes has implications for investor confidence in the renewable and non-renewable generation sectors. At present, NSW has over 17,000 megawatts of electricity generation projects in the planning system,

Figure 10.3 Installed capacity by fuel type in NSW in 2013



Source: Trade and Investment 2014, *State of the Renewable Energy Industry in NSW*

Figure 10.4 Generation by fuel type in NSW in 2013



Source: Trade and Investment 2014, *State of the Renewable Energy Industry in NSW*

many of which are unlikely to proceed. Almost 50 per cent of these schemes, worth an estimated \$13 billion,¹¹⁸ are for renewables.

Ideally, future investment in generation should align with the retiring of NSW generation assets (primarily coal) and should reflect regulatory certainty on renewable schemes. This will provide greater investor certainty, ensure security and affordability of supply and facilitate an orderly transition of retiring assets out of the market.

10.3.5 Role of gas in NSW fuel mix

The NSW Government does not own any gas distribution or transmission network assets, but gas infrastructure plays a critical role in the State’s energy mix.

NSW currently imports the vast majority of its gas from other States under long-term supply contracts. A large number of wholesale gas supply contracts are due to expire between 2014 and 2018. According to the Bureau of Resources and Energy Economics, by 2018 less than 15 per cent of NSW’s demand will be met by existing contracts.¹¹⁹

The growth in exports of Liquid Natural Gas (LNG) to Asian markets is driving significant changes in eastern Australia’s wholesale gas market.

NSW’s major gas network provider, Jemena, has proposed lowering gas network charges by up to 20 per cent for residential users over a five year period (excluding inflation) to ensure gas remains a competitive fuel

option in the longer term.¹²⁰ Nonetheless, NSW retailers increasingly will have to compete with offshore demand and move towards paying gas suppliers the same high price they can fetch on the global market.¹²¹ As a result, the cost of providing gas to residential and business customers is likely to increase significantly in the next five to 10 years as prices rise to parity with global export markets for Australian producers. This price increase is putting pressure on a number of industries, particularly manufacturing.

The NSW Government will need to consider bringing new gas projects on-stream. There are at least two key coal seam gas projects in NSW: Santos’s Narrabri Gas Project and AGL’s Gloucester Gas Project. Combined, these projects could supply a critical proportion of NSW’s demand for gas. In addition, putting in place longer term policy instruments such as trading hubs and gas trading bulletin boards will be important for market transparency on availability, demand and pricing.

Industrial gas users, related industry associations and other affected stakeholders have supported the idea of a domestic gas reservation policy, which would retain a portion of domestic gas for domestic use at lower prices. However, the Grattan Institute puts forward an alternate view, observing in its ‘Gas at the Crossroads’ report that “government intervention to artificially suppress prices or reserve supplies for domestic use will reduce the incentive to develop new supplies”.¹²²

118. Trade and Investment 2014, *State of the Renewable Energy Industry in NSW*

119. Bureau of Resources and Energy Economics 2013, Gas Market Report

120. Media Release 2014, Jemena, ‘Jemena seeks to lower NSW gas network prices’

121. IPART, *Changes in regulated retail gas prices from 1 July 2014*

122. Grattan Institute 2014, *Gas at the Crossroad: Australia’s hard choice*

Recommendation

Infrastructure NSW recommends placing greater emphasis on developing an appropriate regulatory regime to support investment by the private sector in gas infrastructure and supply projects.

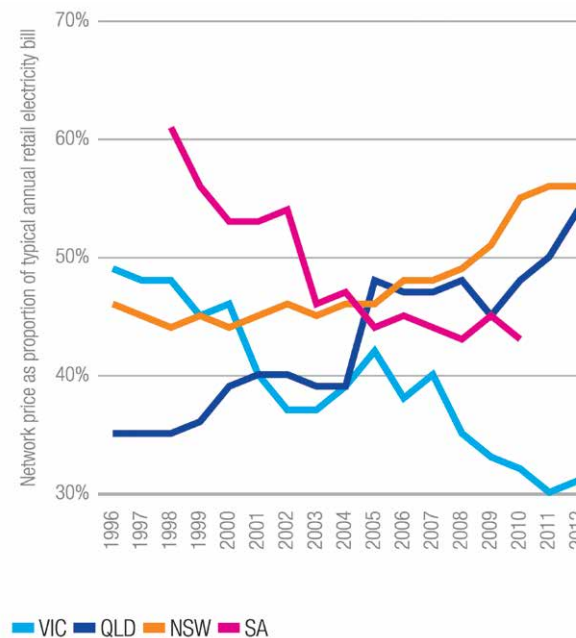
10.3.6 Investor confidence and reform in the energy sector

Improving energy affordability and security will require timely investment by the private sector to respond to market changes, as well as efforts by the NSW Government to continue the reform of the energy sector and to provide certainty for the sector.

The regulatory environment has recently been changed in an effort to encourage more efficient investment and provide a greater focus on the long-term interests of consumers. However, it is yet to be seen how the Australian Energy Regulator¹²³ will apply these new rules when considering submissions from the three NSW distribution businesses and TransGrid on prices for the period 2014 to 2019. A draft determination is due -in November 2014 for public consultation.

The evidence strongly indicates that the privatisation reform of electricity networks can serve the public interest in relation to energy security. While network prices in NSW increased in real terms by well over 100 per cent

Figure 10.5 Network prices as a proportion of typical annual retail electricity bill (%)



Source: EY

in the period from 1996/97 to 2013/14, network prices in Victoria and South Australia have decreased significantly in real terms since privatisation. These results appear to be underpinned by substantial efficiency improvements in South Australia and Victoria since privatisation, suggesting the private sector has managed the networks more efficiently than government.¹²⁴ Since network privatisation, residential electricity customers in Victoria and South Australia have benefited in terms of both network prices and service levels.

In *First Things First*, Infrastructure NSW recommended that the NSW Government undertake a study to assess the scope and implementation strategy for the privatisation of distribution networks. It also recommended the investigation of options for the lease of Snowy Hydro Limited – one of the last remaining government-owned retailer/generation business in the National Electricity Market.

With stable and transparent policy and governance frameworks in place, there is no longer any sound public policy reason why governments should continue to own electricity network assets or, in the case of Snowy Hydro, retail and generation assets. Specifically:

- Reforms in the energy sector are successfully delivering competition in the wholesale and retail gas and electricity markets.
- Recent changes to the regulatory framework will protect the long-term interests of consumers. These changes include competition reforms and national regulation by the independent Australian Energy Regulator (which is part of the ACCC).
- There is clear evidence that private sector ownership and management of network and transmission businesses in other States is delivering lower costs to customers with the same levels of service.

123. The AER determines capital spends and pricing/revenue levels for the monopoly transmission and distribution sectors in both gas and electricity.

124. Ernst and Young 2014, *Electricity Network Services – Long Term Price Trends*, Report to NSW Treasury

11.0 Key themes and opportunities

11.1 The infrastructure imperative: value for money investment in productive infrastructure

The purpose of this Report is to advise the NSW Government on the State's highest priorities for infrastructure investment and to ensure that investment achieves the best value for money outcomes and highest economic returns for the people of NSW.

Where limited public funds are spent on the wrong projects, or wasted on the inefficient delivery of otherwise good projects, this crowds out investment for more beneficial projects and is a drain on the economy.

In *First Things First*, Infrastructure NSW argued that identifying the best projects and delivering them efficiently is imperative because governments are constrained in their ability to fund and finance public infrastructure.

The most significant constraint is that Government infrastructure funding is generally limited to the gap between the total revenue it receives (from taxation and grants) and the recurrent expenditure it makes on services and delivery. By this definition, the infrastructure budget can only grow where:

- Efficiencies are found from existing spending
- Revenues increase via natural (economic) growth or new taxation measures

- Additional funding sources, such as Australian Government grants and user charges, become available
- Public assets are sold to unlock capital for new infrastructure.

Importantly, private capital does not necessarily increase the funding available for infrastructure. It can finance infrastructure where it can be repaid at a commercial return by user charges (fares and tolls) or availability payments (Government payments). However, private sector involvement can improve value for money outcomes where the private sector delivers projects more efficiently, harnesses innovation more effectively or better manages project and delivery risks.

Maximising the funding available for critical infrastructure also relies on deciding not to invest in new projects where more efficient use of existing assets can be achieved through demand management, retrofits, refurbishments or targeted enhancements.

Most importantly, extracting maximum value for public infrastructure is about getting the basics right across the whole lifecycle – from strategic planning and prioritisation, to procurement and delivery, and on to the ongoing use and maintenance of infrastructure networks.

This chapter sets out cross-sectoral findings on infrastructure planning and delivery in NSW and makes recommendations to the Government on further improvements that could lift the quality of infrastructure investments and decisions in NSW.

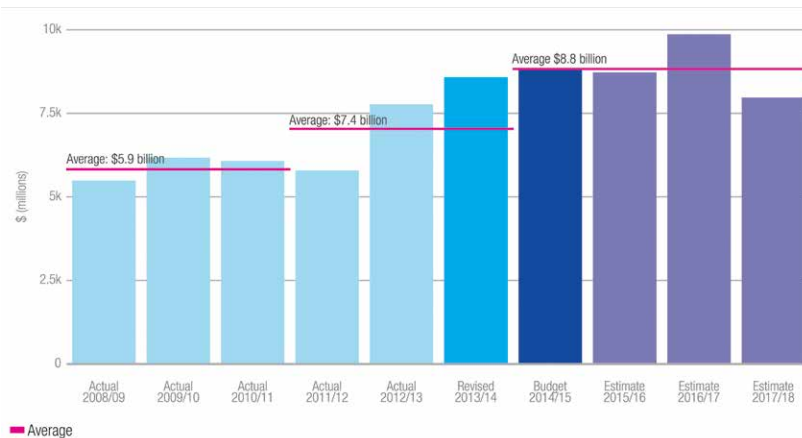
11.2 Good progress, but fiscal discipline more important than ever

Much debate has occurred in NSW in recent years about whether underinvestment has created an 'infrastructure gap' and the size of this gap.

The 2012 Commission of Audit report concluded that the perceived 'infrastructure gap' was less a result of underinvestment and more a result of poor quality decision-making and sub-optimal infrastructure investments. The report identified a history of poor project planning and governance in NSW, finding that NSW needed a more rigorous framework to evaluate expenditure outcomes, with greater transparency around what agencies achieved with their expenditure. Likewise, the 2014 Productivity Commission Report on Public Infrastructure identified opportunities to lower infrastructure project costs through improvements to project governance and management by public sector agencies.

Signs of real progress since 2012 are now evident, with the development of long-term infrastructure plans, including the State Infrastructure Strategy and the Long-Term Transport Master Plan. The preparation of business cases for major investment proposals is now common practice across NSW Government agencies, as is the use of Gateway reviews of major projects at key points in their lifecycles. Infrastructure NSW plays a key role in supporting and coordinating these activities.

Figure 11.1 State funded infrastructure program



Source: NSW Budget Paper 4 2014/2015

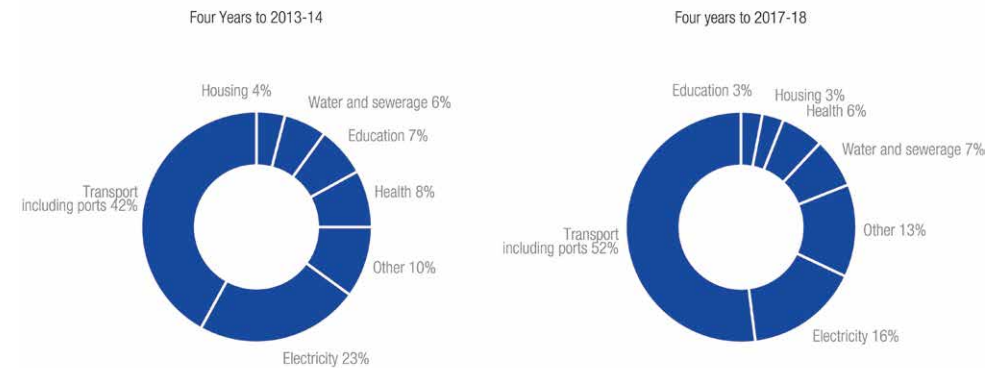
However, while the quality of planning processes and project governance in NSW is increasing, so too has the amount of funding being committed to infrastructure, making fiscal discipline and quality decision-making more important than ever.

With \$15 billion allocated in 2014–15, State infrastructure expenditure will total \$61.5 billion over the four years to 2017–18.¹²⁵ This is a step change in the level of investment in infrastructure – an average 19 per cent higher each year over the next four years than for the three years to 2013–14, and 49 per cent higher than the three years prior to that.¹²⁶

125. NSW Budget Paper 4 2014/15. Figure does not include *Rebuilding NSW* initiative funding.

126. NSW Budget Paper 4 2014/15

Figure 11.2 Capital investment by major sector



Source: NSW Budget Paper 4 2014/2015

Infrastructure spending is concentrated among a few key agencies. The infrastructure budgets of the State’s transport and health agencies alone account for 58 per cent of the general government’s total infrastructure investment.

Spending has grown most significantly in transport, with more than half the State’s infrastructure program dedicated to transport projects in the four years to 2017–18.

Currently, the pace of planning and delivery across Government is significant, with more than 50 projects of more than \$100 million in value being delivered. Ambitious timetables have been set for major and complex projects.

The Government’s proposal to unlock \$20 billion of additional capital through the ‘poles and wires’ transaction means that worthwhile capital investment

in productive infrastructure can be accelerated. Chapters 2 to 10 of this document highlight the areas Infrastructure NSW considers to be the most economically productive ones for investment.

Yet this acceleration of investment must not come at the expense of robust planning and assurance. Hence the emphasis, throughout this Report, is on the need for thorough, independently assured business cases to be brought before Government ahead of any substantive decisions to invest in particular projects.

Business cases enable government to be confident of the costs, benefits and risks associated with projects before they lock in investment decisions. They do not preclude governments from giving ‘in principle’ support to particular projects, provided that appropriate flexibility is preserved before the final investment commitment is made.

Business cases also test whether the rationale for public financing is sound. In its report on Public Infrastructure, the Productivity Commission noted that:

The threshold step for any assessment on the merits of direct government provision of finance should focus on the underlying rationale for government involvement. Both government capital contributions and lending involve a transfer of financial costs and/or risks of a component of the financing to the taxpayer, and the first order question is whether this is warranted on public benefit grounds. To some degree, appropriate project selection and design as well as the decision on the extent of government involvement are more important than the form in which finance is provided by the government.¹²⁷

Transparency in infrastructure decision-making is rarely a bad thing. A number of recent reports – including the Productivity Commission’s report – have recommended that business cases for major infrastructure investments should be published, not least in order to discipline governments to undertake rigorous upfront analysis before taking major investment decisions.

In the past, and in response, some governments have argued that by their nature project business cases are likely to contain sensitive information (particularly pricing information) which, if disclosed, would put the State at a commercial disadvantage.

Infrastructure NSW considers that, for the purposes of transparency and public confidence in capital decision-making, the NSW Government should commit to the publication of its business cases for major projects whenever a decision has been made to invest. Any redactions to business cases made prior to publication should be based upon the criteria established in Government Information (Public Access) legislation.

A robust, independent assurance framework and transparency across government of major investment decisions are the hallmarks of a fiscally rigorous public infrastructure program.

11.3 Opportunities to improve the planning, delivery and use of infrastructure

11.3.1 The importance of long-term planning

High quality infrastructure projects emerge from high quality long-term plans.

Projects that do not have a strategic underpinning, and emerge on an ad hoc basis without context or strategic rationale, generally make for poor investment choices for government.

As noted above, a key feature of the NSW Government’s approach to infrastructure over the past three years has been its willingness to invest time and resources upfront to identify emerging long-term trends, undertake gap analyses and plan ahead on a properly prioritised and sequenced basis.

In the transport portfolio, for instance, the overarching Long-Term Transport Master Plan is supported by a large and developing suite of modal or place-based planning documents.

Infrastructure NSW welcomes this more strategic approach and notes the importance of the Government ensuring that State agencies’ strategic planning and asset management functions are appropriately skilled and resourced.

Beyond the production of long-term plans, there are steps governments can take in the near term, short of expending major capital, which will ensure future infrastructure investment is made cost effectively. A good example is the identification, reservation and (where necessary) acquisition of sites or corridors to reduce the long-term cost to government of worthwhile infrastructure provision.

Long-term network expansions involve inherent uncertainties such as potential changes to policy, technology, demand and availability of funding. Nonetheless, astute corridor planning and investment can ensure that longer term extensions to the network are not ‘built out’ by urban development or made prohibitively expensive as a result of long-term increases in land prices or a requirement to build underground.

¹²⁷. Productivity Commission 2014, Draft Report on Public Infrastructure

Infrastructure NSW is currently working with the Department of Planning and Environment and Infrastructure Australia to review and develop a more structured policy basis for government decisions on corridor preservation and management. The review has identified 70 existing major corridors across the transport, electricity, water and wastewater portfolios in NSW at various stages of identification and reservation.

The next step is to establish a pathway for major corridor projects through existing planning and capital investment processes, including:

- Progressing a study jointly with Infrastructure Australia, to demonstrate the economic benefits in the longer term of corridor preservation
- Developing a consistent and streamlined approach to corridors under the planning system to provide a clear pathway for delivery agencies, greater transparency for the public, and facilitate better land use planning outcomes
- Establishing, maintaining and reviewing a common, up-to-date dataset and map of long-term corridors to inform more coordinated future strategic planning.

Recommendation

Infrastructure NSW recommends a reservation of \$100 million from the *Rebuilding NSW* initiative for a corridor reservation program for identified strategic projects.

11.3.2 Optimising asset utilisation

Infrastructure funding can be used to support relatively low cost interventions that maximise the value obtained from existing economic assets. Examples proposed for investment in this Report include projects that relieve congestion at pinch points on key arterial road and rail links, unlocking the full potential of economically critical assets such as coalfields, intermodal terminals, ports or airports.

Too often, governments place excessive emphasis on ‘big ticket’ infrastructure projects to the exclusion of lower cost alternatives, even when the evidence points to many lower cost interventions delivering greater value, higher returns and being quicker to implement.

The 2006 UK Eddington Transport Study¹²⁸ first articulated a ‘Small Can be Beautiful’ principle, demonstrating that smaller scale projects and better utilisation strategies often offered higher economic returns relative to larger schemes.

An initial mapping of the project proposals submitted to Infrastructure NSW for consideration in the 2014 State Infrastructure Strategy shows a similar trend, whereby ‘better use’ and asset optimisation strategies such as pinch point relief, managed motorways technologies or small-scale upgrades to traffic control systems often demonstrate higher benefit-cost ratios than large projects.

A simple representation of these is depicted on page 144.

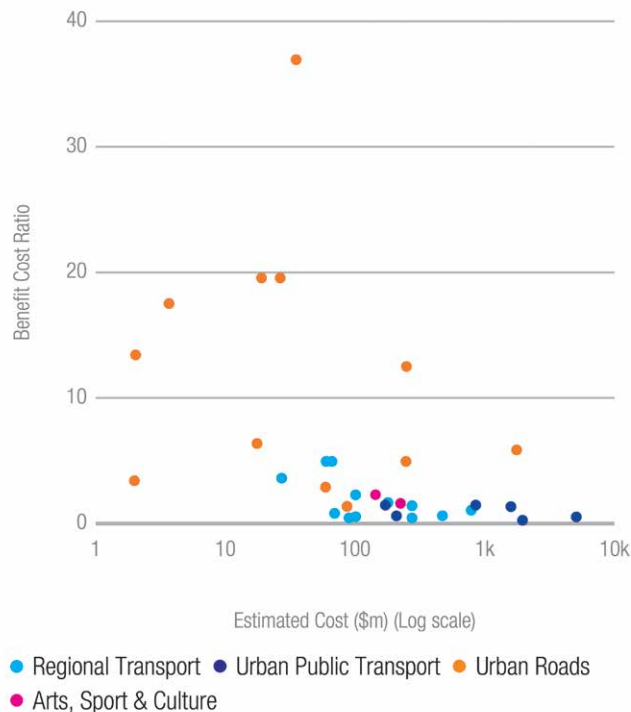
11.3.3 Harnessing technology across the infrastructure lifecycle

Infrastructure is not simply about pouring concrete. Recent advances in information and communications technologies (‘Smart ICT’) have brought about a fundamental shift in how infrastructure can be designed, constructed and operated.

Smart ICT includes data analytics, optimisation, advanced modelling and software systems. As computational power and algorithmic complexity grow, these tools are becoming more powerful drivers of improved productivity.

128. Eddington. R, 2006, The Eddington Transport Study

Figure 11.3 BCR mapping of project proposals



Source: Infrastructure NSW

Smart technology can improve infrastructure outcomes across the asset lifecycle:

- Smart ICT in planning, options analysis and design:** Smart ICT enables more precise and insightful decision-making at the planning stage by collecting data from current infrastructure systems (such as transport and water networks) and building evidence-based, data-driven models that provide an understanding of network effects. For example, data analytics can demonstrate how major planned infrastructure such as airports will affect demand for other infrastructure such as road and rail links.
- Smart ICT in construction:** Data analytics and optimisation can unlock significant value during the construction phase of major infrastructure projects. Project management – prioritising, scheduling and managing the delivery of multiple components, trades and essential services – is an already complex optimisation task. Rarely does a project proceed without some major component being rethought, replanned and redesigned, with knock-on effects across the balance of the project.
- Smart ICT in operations:** Smart ICT can ensure that infrastructure networks are operated efficiently, reducing the need for costly new investment. The financial, telecommunications, water and gas sectors are now routinely integrating data analytics into their operations.

Remote reading technology in Goldenfields Water County Council

The Goldenfields Water County Council has implemented a Data Acquisition Network, for a total cost of \$1.2 million.

As part of this program, the council has put in place a meter replacement program that installs remote metering via wifi connection to households and properties. The remote meters record water flow data and enable early identification of leaks.

Within three months of use, the technology was found to have reduced leaks by more than 100ML, led to capital works savings of \$10 million, and yearly meter reading savings of \$200,000.

The network also provides a platform for ancillary services such as soil moisture testing, livestock tracking, monitoring trough and tank levels and rainfall trend analysis.

Goldenfields Water County Council, 2013/14 Overview

- **Smart ICT in maintenance:** A key attribute of major infrastructure projects is their long life cycles and the value that can be derived from being able to model future states and predict the impact of changing demand profiles on existing infrastructure and maintenance and re-investment decisions. In many cases, preventative maintenance costs are around one-tenth the cost of reactive repairs and maintenance.¹²⁹ Predictive tools can help prioritise maintenance spend to those elements most likely to fail, thus avoiding or delaying major capital outlays.
- **Smart ICT in pricing:** New technologies provide a platform for infrastructure pricing that responds to the needs of users or the network. For example, new in-vehicle technologies support enhanced heavy vehicle access to the network, enable a charging framework for freight vehicles, and mitigate risks to safety or road infrastructure from HPV use. In the electricity sector, advanced metering and time-of-use pricing can give households the ability and incentive to use electricity more efficiently, which can spread peak demand and enable more responsive service provision to customers.

- **Smart ICT in service delivery:** Service models that utilise ICT have different infrastructure requirements, and can realise significant efficiencies. For example, eHealth can connect patients to service providers across vast distances, providing instant and responsive services for regional communities or for home-based care. In the training sector, ICT-enabled connectivity can reduce the need for multiple sites, supporting specialisation by select TAFE campuses and enabling regional and remote access to courses. For example, the development of the Lindfield Learning Village will include Skype hubs that put students in daily contact with their peers around the world.

Staying abreast of ICT developments and their potential to be harnessed on NSW networks and infrastructure increasingly needs to be part of a 'business as usual' approach to planning investments.

NSW is home to NICTA (Australia's centre of excellence for research on Smart ICT applications). NICTA's remit is to develop technologies that generate economic benefit for Australia and that can be applied to transport, water, and other infrastructure across Australia.

Infrastructure NSW considers that Smart ICT can add significant value to the planning, construction and operation of infrastructure across a range of sectors. It proposes to enter into a long-term non-exclusive partnership with NICTA to ensure that NICTA's expertise, and the benefits of Smart ICT, are available to agencies across the NSW Government sector.

11.3.4 Reforming contingency management and project governance

Recent trends in Australia point to an increase in the average size of public infrastructure projects, with cost over-runs averaging 6.5 per cent, and nearly twice that level for larger projects of over \$1 billion.¹³⁰

Against this backdrop, Infrastructure NSW undertook a review of contingency management across major NSW capital projects, considering approaches to the overall risk assessment, budget setting process and project management outcomes across the project lifecycle.

The main findings of this review were that contingency management practices vary across agencies with a tendency towards overly conservative allowances that could be reduced through better planning, control and governance.

As a result of the review, best practice guidelines for contingency and governance were recently adopted by NSW Treasury as policy for NSW agencies.

129. NICTA 2014, as above

130. Deloitte Access Economics 2014, Major infrastructure projects: costs and productivity issues, submission prepared for Australian Constructors Association

11.3.5 Identifying new approaches to funding and procurement

With governments facing a ‘perfect storm’ of fiscal constraint, high project costs (particularly in urban areas) and high community expectations, a meaningful discussion on alternative funding approaches is needed.

A number of funding and procurement options can be tested to help bridge the funding gap for new infrastructure, to make better use of the government’s balance sheet and to improve equity across users, beneficiaries and taxpayers.

- **Value capture mechanisms for major urban transport projects:** Where new transport or other infrastructure facilitates significant urban renewal and increases surrounding property or land values, value capture levies can assist with funding that infrastructure project. For example in Queensland, as part of the Gold Coast Rapid Transit project, the local council implemented a city-wide transport improvement levy as part of all property owners’ annual council rates notices.
- **Commercial revenue streams:** Private infrastructure owners routinely diversify their sources of commercial revenue. For example, airport operators develop revenue sources from terminal retailing, car parking, advertising to property development. Public transport investments such as interchanges and rolling stock represent opportunities for on-site commercial revenues – from retailing, property development, development of air rights and entertainment.

- **Asset recycling:** Selling mature public assets unlocks significant value for one-off, generational investments in economic and social infrastructure. Provided the right regulatory environment is established upfront, asset recycling can lead to reduced regulatory conflicts, improved efficiency and customer prices, and more responsive service delivery. The Commonwealth Government’s incentive payments for asset recycling will also deliver additional funding for State infrastructure priorities.
- **Commissioning services:** Commissioning services may enable more outcomes-focused service provision, improve value for money and better utilise system capacity across the government and non-government sectors, avoiding the need for costly new capital investment. The Northern Beaches Hospital is the first of its kind in NSW, being a long-term operator-led PPP where Healthscope will enter into a long-term contract with the NSW Government for the design, construction, commissioning, operation and maintenance of all aspects of the hospital and for the provision of the full suite of clinical and other services.
- **Road pricing:** Tolling is an important way to finance new motorway links in urban areas, and can also assist with maintaining the productivity benefits of new road infrastructure. In relation to heavy vehicle road pricing, the Long-Term Transport Master Plan undertook to assess the potential for a pricing trial on the Hume Highway which would hypothecate revenue for freight infrastructure improvements to the corridor to support HPV use. Consultation with industry indicated that firms would only make the

requisite fleet investments where they had certainty around policy settings governing HPV access on identified corridors. Reinvigorating the road pricing reform agenda is critical to meeting the long-term costs of efficient road provision and arresting the slowdown in national road freight productivity growth.

11.3.6 Delivering ‘whole of government’ outcomes

While this report has adopted a sector-by-sector structure, Infrastructure NSW considers that integrated, cross-agency planning is of the highest importance.

Two major priorities identified in this report for whole of government cooperation are planning for population growth and housing acceleration in urban areas, and integrated planning for Greater Parramatta as Sydney’s second CBD. Both these priorities will require a focus on deep integration of place-based infrastructure, investment and service planning.

Housing acceleration in metropolitan Sydney

Housing supply acceleration is critical to the economic fortunes of the State and should be a key objective in determining investment priorities.

Urban renewal and the acceleration of housing in metropolitan Sydney require significant coordination of delivery agencies across Government. Delivered well, transit-oriented development has the potential to achieve wider economic benefits, such as improved land use productivity, and to improve the returns on major transport investments. There may also be the potential for government-led projects to achieve other housing objectives in relatively low cost ways, including social housing renewal, the delivery of affordable housing, and universal (lifelong) housing options.

The major obstacle to the delivery of urban renewal is the need to address community concerns around impacts of densification on existing infrastructure, and to plan and fund improvements in a coordinated manner to match growth.

One option for investigation is for Restart NSW funding to support the integrated planning and infrastructure requirements of urban densification programs. This could include supporting transport and community infrastructure and the provision of social housing, with repayment or co-contribution mechanisms established over time through developer contributions.

Greater Parramatta – Sydney’s second CBD

Greater Parramatta is unique in the Australian context, being a suburban CBD that serves a metropolitan-wide catchment. Its precincts have a traditional ‘CBD-type’ offering that includes a mix of professional and administrative services, health and education, retail, government offices and civic functions, and provide public spaces and infrastructure for arts and culture. It already operates as a CBD for Sydney’s west.

Efforts to grow Parramatta as Sydney’s second CBD provide a genuinely ‘city shaping’ opportunity and a test of place based approaches to planning. Coordination should take place across all levels of government, working closely with the private sector.

Within this context, Infrastructure NSW is of the view it is better to invest *Rebuilding NSW* proceeds in economic infrastructure which improves the lives of social housing tenants by providing them with improved quality of life and access to opportunities.

Infrastructure to enable housing choice – private and social housing

Housing diversity promotes choice, providing opportunities for people to select the housing that matches their current situation. The state’s housing stock should have adequate levels of private and social housing, with the latter allowing workers on lower incomes to enter the housing market with a view to a later transition into private rental and private ownership.

The NSW Department of Planning and Environment’s population projections describes the changing nature of Sydney’s households. In 2011 only 36.6 per cent of households in Sydney were couples with children, while detached dwellings represented 57.3 per cent of Sydney’s housing stock. Pressure to reconfigure existing stock will grow over the next twenty years, with lone person households projected to grow on average by 2.1 per cent each year, faster than any other household type.

Similarly, the portfolio of social housing assets should be optimised to meet tenant needs in terms of size and location. The reconfiguration of the state’s public housing portfolio to meet current and projected client needs could be expedited with the assistance of the private and not-for-profit sectors. Infrastructure NSW is supportive of reform and innovation in the social housing sector and notes the Premier’s call for innovative ideas to provide for an increase in social housing stock.

Social housing optimisation should leverage transport investment to improve access to jobs and services. Recommended investments like Sydney Rapid Transit and urban road pinch points will provide better connections to more people in more locations.

11.3.7 Working with the Commonwealth Government

One of the benefits of a federal system of government is the ability to harness cooperation between governments on infrastructure projects of national significance – and for that cooperation to improve the quality of project planning and delivery, and the affordability of national-scale projects.

There are sound policy reasons why the Commonwealth is a critical partner in delivering infrastructure in NSW. The Australian system is characterised by vertical fiscal imbalance, whereby State governments are responsible for funding and delivering the larger share of public services, while having fewer broad-based taxes than the Commonwealth Government. In addition, productivity-boosting infrastructure yields economic returns that are captured more easily by Commonwealth revenues.

Some recent examples of constructive cooperation between the Commonwealth and NSW Governments include:

- The Moorebank Intermodal Terminal Project – where the Commonwealth is running the tender for its construction and working with NSW Government on landside access
- The Western Sydney Roads Package – which will be jointly funded by the Commonwealth and NSW Governments, and will support landside access to the Western Sydney Airport (being delivered by the Commonwealth Government)

- The WestConnex project – where the Commonwealth will provide \$2 billion of capital made available through a Federal Subordinated Loan
- The NorthConnex project connecting the M1 and M2 – with the NSW and Commonwealth Governments each contributing \$405 million towards the \$3 billion project.

Business and the community often decry the complexity of multiple levels of government planning, funding, delivering and maintaining infrastructure, with overlapping approvals for individual projects.

Duplication and unclear roles and responsibilities can impact national productivity, through longer project lead times, increased uncertainty around planned projects, overlapping approval processes, ‘gaming’ of the system and reduced accountability and a focus on large new projects rather than systematic investment in improving existing networks.

An example is regional road infrastructure. Heavy vehicle road charges are collected by two levels of government while investment, maintenance and renewal is spread across three levels of government. The Commonwealth Government assists the State Government with maintaining the interstate freight routes defined on the National Land Transport Network. The NSW Government has primary responsibility for the State Road Network and local governments maintain the regional and local road network and govern heavy vehicle access on this network. In addition, the Commonwealth provides grants to Councils for local

roads, and invests through discrete road programs including Black Spots, Bridges Renewal Programme and Roads to Recovery.

Poor alignment between State and federal planning and priorities can be a factor behind variable levels of Commonwealth investment in State infrastructure projects.

Commonwealth funding to NSW peaked in 2009/10, when NSW received \$5.3 billion, including stimulus payments for Education, Housing and Nation Building One. NSW funding fell by 75% to \$1.4 billion in 2012/13. Recent cooperation on key projects will return Commonwealth contributions to \$8.8 billion over the next four years (see Figure 11-4 opposite).

The establishment of Infrastructure Australia marked a shift in the Commonwealth’s approach to investment towards a framework based on support for nationally significant, productive infrastructure projects that demonstrate individual merit.

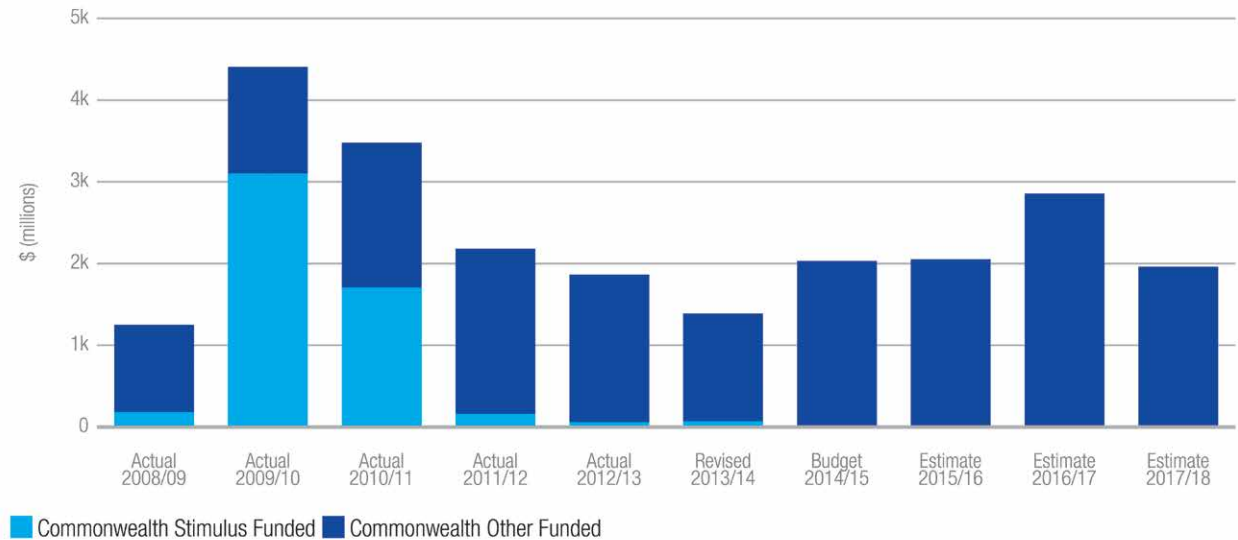
Infrastructure NSW welcomes the Commonwealth’s renewal of Infrastructure Australia’s mandate and strengthening of its independence and looks forward to ongoing collaboration and partnership with its sister body in the future.

Infrastructure NSW also welcomes the Reform of the Federation White Paper process (due to report in 2016), which aims to clarify roles and responsibilities across health, education and transport based on guiding principles that include subsidiarity (where the lower level of government has responsibility for ensuring responses reflect the community’s needs), equity and efficiency, national interest considerations and fiscal sustainability.

Infrastructure NSW urges the Commonwealth to continue its focus on projects that demonstrate economic merit and deliver benefits to national productivity. This big-picture approach should be modally ‘agnostic’ and recognise that good infrastructure investment has positive spillovers to other jurisdictions and to the national economy.

Throughout this report, opportunities are identified for Commonwealth co-funding of infrastructure investments. The NSW Government should work with Infrastructure Australia and other Commonwealth agencies to ensure that these opportunities are realised.

Figure 11.4 Commonwealth Government contribution to State Infrastructure Program



Source: NSW Budget Papers 2014/15

11.4 Recommended actions

OPPORTUNITY	KEY Infrastructure NSW RECOMMENDATIONS	COSTS & FUNDING
Reserve corridors for future development	<ul style="list-style-type: none"> • Reserve \$100 million from the <i>Rebuilding NSW</i> initiative for a corridor reservation funding program for identified strategic projects • This program should be supported by: <ul style="list-style-type: none"> – A study jointly undertaken with Infrastructure Australia to demonstrate the long-term economic benefits of corridor preservation – A consistent and streamlined approach to corridors under the planning – The establishment of a common, up-to-date dataset and map of long-term corridors to inform more coordinated future strategic planning 	Reservation of \$100 million from the <i>Rebuilding NSW</i> initiative over 10 years
Harness technology	<ul style="list-style-type: none"> • Infrastructure NSW should enter into a long-term non-exclusive partnership with NICTA to develop ICT and innovation options to be applied across the government infrastructure program 	Cost is not material
Alternate funding sources for projects	<ul style="list-style-type: none"> • The NSW Government should assess the potential for alternative funding options for the following projects recommended in this report: <ul style="list-style-type: none"> – Diversification of revenue for major transport projects, including development of commercial revenue streams at new interchanges and value capture mechanisms being rolled out as part of urban renewal efforts – Developer contributions as a way to offset potential Restart NSW reservations for housing acceleration and support infrastructure development for housing densification projects – Recycling of public assets to support generational improvements to infrastructure stock, for example, in health, education or social housing 	Should lead to savings on total profit costs

12.0 Funding recommendations

12.1 Summary

This Chapter draws together the funding recommendations made in the 2014 State Infrastructure Strategy Update.

The recommendations are supported by the analysis undertaken by Infrastructure NSW to develop the initial advice to Government in October 2012. Infrastructure NSW has also drawn on its assurance work for major projects in making recommendations to Government for expenditure from the Restart NSW Fund.

The funding recommendations in this Strategy are in addition to the forecast State infrastructure expenditure of \$61.5 billion over the four years to 2017-18 set out in the 2014 State Budget Papers.¹³¹

The new projects and programs recommended by Infrastructure NSW are estimated to cost over \$25 billion in additional capital expenditure over 10 years from 2016. The indicative funding mix comprises:

- An estimated \$18.9 billion for recommended funding reservations from the \$20 billion *Rebuilding NSW* initiative.
- An estimated \$6.3 billion recommended for motorway enhancements that will be largely self-funding if delivered as tollways.

Infrastructure NSW also recommends that funding sources should be identified to deliver flood mitigation and evacuation works for the Hawkesbury Nepean Valley in anticipation of the Task Force report to Government in mid-2015.

¹³¹. See Infrastructure Statement 2014-15 NSW Budget Paper No. 4

In all cases, the funding reservations recommended by Infrastructure NSW demonstrate strategic merit. They should be supported by final business cases before the NSW Government gives approval for projects to proceed. It is assumed that the funds from the Rebuilding NSW initiative would be available from 2016, and that final business cases can be prepared in the meantime.

It should be understood that accelerating the delivery of major infrastructure projects takes significant effort and time. The Productivity Commission Inquiry into Public Infrastructure states,¹³² *best practice project selection can greatly reduce, but not eliminate the number of projects that prove to be poor investments. This is because perfect foresight is unachievable and so decisions must be made on imperfect information about how the future will play out.*

The Productivity Commission highlighted that selecting the right project is the most important step in achieving good outcomes for the community, irrespective of the funding and financing mechanisms used. The further development of all projects recommended in this Strategy is essential to ensure the intended outcomes are achieved efficiently, to support productivity and economic growth. For this reason, Chapter 11 in this report outlines the key themes and opportunities for successful funding and delivery of what would be an unprecedented level of investment in major infrastructure in the decade ahead.

¹³². Australian Government Productivity Commission Inquiry Public Infrastructure Report Volume 1 No. 71, 27 May 2014, page 76.

12.2 The brief

The recommendations contained in this Report are for those projects and other actions that will best deal with identified infrastructure deficiencies, as required by the Infrastructure NSW Act 2011.

In providing this advice, Infrastructure NSW has taken into account the following State strategic priorities, as directed by the Premier in accordance with section 17(3) of the Act:

- Allocation of \$20 billion to Restart NSW for investment in infrastructure over the term of the SIS.
- **Sydney Rapid Transit**, comprising the extension of rapid transit services between Bankstown and the North West Rail Link, via the CBD and a second harbour crossing.
- **Sydney Roads Renewal** – major projects to address congestion on key arterial routes across Sydney, including in Southern Sydney, the West and Northern Beaches, and the augmentation of WestConnex with greater north/south connectivity.
- **A Regional Roads Fund** with an expected contribution of at least \$1 billion in funding to invest in upgrades to the regional road network.
- **A Regional Water Fund** with an expected contribution of at least \$1 billion in funding to improve water quality and security in regional NSW.
- **A Schools and Hospitals Building Fund** with an expected contribution of at least \$2 billion to provide health and education infrastructure to improve

services and support population growth in Sydney and across NSW.

- **A Sporting and Cultural Infrastructure Fund** with an expected contribution of at least \$500 million to build and improve sporting and cultural infrastructure that will increase the economic capacity of the State and have both strategic and social value.

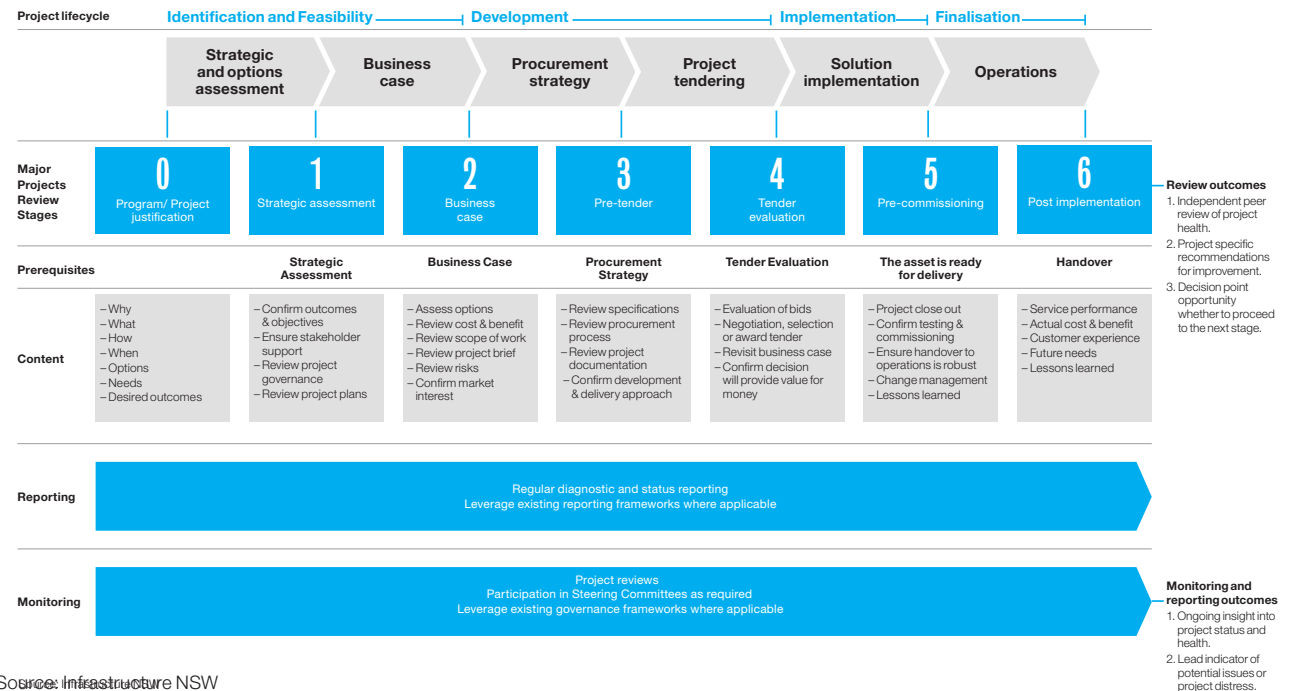
12.3 Recommendations

The recommendations for funding made by Infrastructure NSW in Chapters 2 to 11 are listed in Table 12.1. In all cases, these recommendations should be supported by further planning work and assessment of final business cases reviewed by Infrastructure NSW before final investment decisions are taken.

At the project level, Infrastructure NSW applies an independent three part test:

- **Strategic fit** – alignment with the principal State planning instruments such as the 2012 State Infrastructure Strategy (SIS), the State Plan and the Long-Term Transport Master Plan (LTTMP).
- **Economic merit** – as demonstrated through a cost benefit analysis and reflected in the benefit-cost ratio or net present value of net benefits.
- **Completed assurance processes** – including a compliant business case, completed Gateway review process and appropriately implemented risk mitigation and management strategies.

Figure 12.1 Infrastructure NSW major project assurance framework



Source: Infrastructure NSW

Figure 12.1 above illustrates the assurance process for major projects. Each of the stages in this framework can be used to test project scoping and delivery plans, assess project delivery and benefit risks, and encourage new approaches maximise value for money.

Infrastructure NSW's recommendations for funding are set out in Table 12.1. The table also indicates project dependencies and next steps. Many of the cost estimates cited in this Report have been reviewed by EIG (Everything Infrastructure Group).

Table 12.1 Project Assessment Summary of Recommendations for funding from the Rebuilding NSW initiative

	Project/Program	Strategic Fit	Recommendation	Rebuilding NSW reservation \$million	Dependencies/Next steps
1	Western Sydney Rail Upgrade Program (Sydney's Rail Future 2)	Demonstrated. 2012 SIS	A reservation of up to \$1 billion from the Rebuilding NSW initiative should be made for the Western Sydney Rail Upgrade Program (SRF2).	1,000	Transport for NSW should complete final business cases from 2015 for the Western Sydney Rail Upgrade Program (SRF2).
2	Sydney Rapid Transit	Demonstrated. 2012 SIS	A reservation of \$7 billion from the Rebuilding NSW initiative to fund the delivery of Sydney Rapid Transit.	7,000	Transport for NSW should complete the final business case by early 2016 for Sydney Rapid Transit.
3	Bus Rapid Transit and Bus Priority Program	Demonstrated. 2012 SIS	A reservation of \$300 million from the Rebuilding NSW initiative for investment in Bus Rapid Transit and Bus Priority Infrastructure programs.	300	Transport for NSW should prepare a final business case by the end of 2015 for Northern Beaches BRT and Victoria Road to Parramatta to enable detailed investment decisions to be taken.
4	Parramatta CBD public transport improvements Program	Demonstrated. 2012 SIS	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 and residential areas.	600	Transport for NSW should report to the Government by the end of 2015 on a long-term transport improvement program for Parramatta.
	Urban Public Transport subtotal			8,900	
5	Urban Roads Pinch Points Program	Demonstrated. 2012 SIS	A reservation of \$300 million should be made from the Rebuilding NSW initiative for the Urban Roads Pinch Points Program.	300	Transport for NSW should prepare final business cases by the end of 2015 for the Urban Roads Pinch Points Program.
6	Expanded Clearways Program	Demonstrated. LTTMP	A reservation of \$100 million from the Rebuilding NSW initiative for the Expanded Clearways Program.	100	Transport for NSW should complete a final business case by mid-2015 of for the Expanded Clearways Program.
7	Smart Motorways	Demonstrated. 2012 SIS	A reservation of \$400 million should be made from the Rebuilding NSW initiative for Smart Motorways investments on the M4, the Warringah Freeway and Southern Cross Drive-General Holmes Drive.	400	Noting the significant work already done, Transport for NSW should finalise business cases by mid-2015 for Smart Motorways investments on the M4, the Warringah Freeway and Southern Cross Drive-General Holmes Drive.

	Project/Program	Strategic Fit	Recommendation	Rebuilding NSW reservation \$million	Dependencies/Next steps
8	SCATS and Transport Management Centre	Demonstrated LTTMP	A reservation of \$200 million from the Rebuilding NSW initiative to upgrade the Sydney Coordinated Adaptive Traffic System (SCATS) and the Transport Management Centre (TMC).	200	Transport for NSW should complete final business cases by the end of 2015 to upgrade the Sydney Coordinated Adaptive Traffic System (SCATS) and the Transport Management Centre (TMC).
9	WestConnex Northern and Southern extensions	Demonstrated. 2012 SIS	The WestConnex Delivery Authority develops final business cases for the Northern and Southern Extensions to WestConnex by the end of 2015, with a view to their procurement and delivery as toll roads within the next decade	Toll roads	Development of final business cases by the end of 2015 for the Northern and Southern extensions. Decision to procure as tollways. WestConnex Stages 1 and 2 project delivery.
10	Western Harbour Tunnel	Demonstrated. 2012 SIS	Transport for NSW should develop a final business case for the Western Harbour Tunnel by the end of 2015 to enable the project's procurement and delivery as a tollway with, or immediately after, the delivery of WestConnex Stage 3.	Toll road	Development of final business case by early 2016 for the Western Harbour Tunnel project. Decision to procure as a tollway. WestConnex Stage 3 project delivery.
11	Sydney-Illawarra Pinch Points Program	Demonstrated. LTTMP	A reservation of \$300 million from the Rebuilding NSW initiative for a Sydney-Illawarra Pinch Points program to improve access to Sydney from the Illawarra by unblocking critical constraints on Sydney's southern road corridors.	300	Transport for NSW should complete a final business case by the end of 2015 for the Sydney-Illawarra Pinch Points Program. Transport for NSW should also continue to undertake detailed assessment of larger scale investment options on the F6, A1, A3 and A6 corridors.
	Urban Roads subtotal			7,600	
12	Regional Road Freight Corridor Program	Demonstrated. 2012 SIS	A reservation of \$2 billion from the Rebuilding NSW initiative for a Regional Road Freight Corridor Program.	2,000	Transport for NSW should complete corridor strategies as soon as possible for the Golden Highway, New England Highway and Great Western Highway. Transport for NSW should prepare final business cases for projects to be funded from this reservation, with investment priorities guided by freight productivity needs identified within the four proposed corridor strategies.

	Project/Program	Strategic Fit	Recommendation	Rebuilding NSW reservation \$million	Dependencies/Next steps
13	Bridges for the Bush Program	Demonstrated. 2012 SIS	A reservation of \$200 million from the Rebuilding NSW initiative for the Bridges for the Bush Program.	200	Transport for NSW should prepare final business cases by the end of 2015 for projects to be funded from this reservation.
14	Fixing Country Roads program	Demonstrated. 2012 SIS	A reservation of \$500 million should be made from the Rebuilding NSW initiative for the Fixing Country Roads Program.	500	Transport for NSW should prepare a final business case by the end of 2015 for the Fixing Country Roads Program.
15	Fixing Country Rail Program	Demonstrated. 2012 SIS	A reservation of \$400 million from the Rebuilding NSW initiative for a Fixing Country Rail Program.	400	Transport for NSW should complete a final business case for the Fixing Country Rail Program by mid-2016, including an assessment of the capacity of industry to contribute towards the costs of investment.
16	Regional Growth Roads Program	Demonstrated. LTTMP	A reservation of \$1 billion from the Rebuilding NSW initiative for a Regional Growth Roads Program to accelerate network optimisation and network planning for regional growth roads over the next two years.	1,000	Transport for NSW should prepare final business cases by the end of 2015 for projects to be funded from the Regional Growth Roads Program.
Regional Transport subtotal				4,100	
17	Regional Water Security and Supply Fund	Demonstrated. 2012 SIS State strategic priority	A reservation of \$1 billion should be made from the Rebuilding NSW initiative to establish the Regional Water Security and Supply Fund to support recommended programs and projects.	1,000	Investment decisions for expenditure from the \$1,000 million Regional Water Security and Supply Fund may be subject to any requirements to adjust the Basin Plan Sustainable Diversion Limits (SDLs) for increased water extraction, and/or regulated pricing determinations for cost recovery.
18	Regional Water Priority Catchments Program	Demonstrated. 2012 SIS	The Regional Water Security and Supply Fund can support the Regional Water Priority Catchments Program which includes the inland catchments of Gwydir, Macquarie and Lachlan and the coastal catchment of the Upper Hunter. A mix of works including dams and delivery efficiency schemes has been identified.	As above	The NSW Office of Water should develop final business cases by the end of 2015 for projects to be funded in the Regional Water Priority Catchments Program for the Gwydir, Macquarie, Lachlan and the Upper Hunter.
19	Water security for Broken Hill.	Demonstrated. 2012 SIS	The Regional Water Security and Supply Fund can support the preferred option for a secure/permanent town water supply for Broken Hill, which could include a pipeline from the Murray River.	As above	The NSW Office of Water should prepare a final business case by the end of 2015 for the preferred option for Water Security for Broken Hill.

	Project/Program	Strategic Fit	Recommendation	Rebuilding NSW reservation \$million	Dependencies/Next steps
20	Water security for Cobar.	Demonstrated. 2012 SIS	The Regional Water Security and Supply Fund can support the preferred option for a pipeline to replace reliance on the Albert Priest Channel as a longer term solution to secure the Cobar water supply.	As above	The NSW Office of Water should prepare a final business case by the end of 2015 for the preferred option for Water Security for Cobar.
21	Regional Towns backlog water and wastewater Program	Demonstrated. 2012 SIS	The Regional Water Security and Supply Fund can support the preferred option for the 71 backlog projects identified in regional towns to ensure drinking water supplies meet minimum guidelines and waste water services meet environmental standards.	As above	The NSW Office of Water should finalise the business case by the end of 2015 for the preferred option for 71 Regional Towns backlog projects. These projects will have Co-contributions to capital costs from Local Water Utilities.
Regional Water subtotal				1,000	
22	Schools Growth Program	Demonstrated 2012 SIS	A reservation of \$700 million from the Rebuilding NSW initiative to create a 10-year Schools Growth Program for education infrastructure projects to service growing student populations.	700	The Department of Education and Communities should finalise the business case by the end of 2015 to prioritise projects to be funded in the Schools Growth Program.
23	Regional Schools Renewal Program	Demonstrated 2012 SIS	A reservation of \$300 million should be made from the Rebuilding NSW initiative to create a 10-year Regional Schools Renewal Program.	300	The Department of Education and Communities should prepare a strategic business case by the end of 2015 to prioritise projects to be funded in the Regional Schools Renewal Program.
24	Hospitals Growth Program	Demonstrated 2012 SIS	A reservation of \$600 million from the Rebuilding NSW initiative for a Hospitals Growth Program to contribute towards funding new health facilities.	600	The Ministry of Health should finalise business cases by the end of 2015 for hospital investments such as (Rouse Hill) and south-west (Campbelltown) of Sydney. The Ministry of Health should also complete business cases for possible future investments in metropolitan and regional hospitals to be funded from this reservation.

	Project/Program	Strategic Fit	Recommendation	Rebuilding NSW reservation \$million	Dependencies/Next steps
25	Care Co-location Program.	Demonstrated. 2012 SIS	A reservation of \$100 million from the Rebuilding NSW initiative for the Care Co-location Program.	100	The Ministry for Health should prepare a final business case by mid-2015 for the Care Co-location Program.
26	Regional Multipurpose Health Facilities Program	Demonstrated. 2012 SIS	A reservation of \$300 million from the Rebuilding NSW initiative for the Regional Multipurpose Health Facilities Program.	300	The Ministry for Health should prepare a final business case by mid-2015 for the Regional Multipurpose Health Facilities Program.
	Education and Health subtotal			2,000	
27	Cultural Infrastructure Program	Demonstrated 2012 SIS	A reservation of \$600 million from the Rebuilding NSW initiative for the Cultural Infrastructure Program.	600	Infrastructure NSW and the NSW Department of Trade and Investment will work together to develop a sector-wide cultural infrastructure strategy by mid-2015 to guide investment in the sector and prioritise projects to be funded from the Cultural Infrastructure Program.
28	Regional Environment and Tourism Program	Demonstrated State strategic priority	A reservation of \$300 million from the Rebuilding NSW initiative for the Regional Environment and Tourism Program to invest in improved national park and regional tourism infrastructure.	300	Department of Trade & Investment should develop a strategic business case by mid-2015 to prioritise projects to be funded from the Regional Environment and Tourism Program.
29	Sports Stadia Infrastructure Program	Demonstrated 2012 SIS	A reservation of \$600 million from the Rebuilding NSW initiative for the Sports Stadia Infrastructure Program.	600	Venues NSW should progressively develop business cases (with relevant stakeholders) to support the delivery of the Sports Stadia Program.
	Sports and Culture subtotal			1,500	
30	Corridor Reservation Program	Demonstrated. 2012 SIS	A reservation of \$100 million from the Rebuilding NSW initiative for Transport for NSW to establish a corridor reservation funding program for identified strategic projects.	100	Transport for NSW should develop a strategic business case by mid-2015 for corridor reservations under the Corridor Reservation Program.
	Corridor reservation			100	

The investments and reforms that Infrastructure NSW recommends are anchored to three critical priorities:

- a competitive global Sydney
- supporting population and economic growth in Greater Sydney, particularly in Parramatta, and
- ensuring a competitive and connected regional economy.

The total value of recommendations made for funding from the Rebuilding NSW initiative is \$18.9 billion, \$6 billion of which is recommended for use in regional NSW. Table 12.2 sets out the indicative funding mix for the recommendations against each of the critical priorities.

Table 12.2 Indicative Funding Mix – 3 Critical Priorities

Recommendation by Critical Priority

Recommendation by Critical Priority	Indicative Funding Mix		
	Total (\$ Million)	Rebuilding NSW	User Funded
Critical Priority 1: A competitive Global City			
Western Sydney Rail Upgrade Program (SRF2)	1,000.00	1,000.00	
Sydney Rapid Transit	7,000.00	7,000.00	
Upgrade Sydney's passenger rail network sub total		8,000.00	
WestConnex Nthn & Sthn extensions	1,800.00		1,800.00
Western Harbour Tunnel	4,500.00		4,500.00
Expanded Motorway program sub total			6,300.00
Pinchpoint program	300.00	300.00	
Expanded clearways program	100.00	100.00	
Smart Motorways: M4 West	400.00	400.00	
SCATS & Transport Management Centre	200.00	200.00	
Congestion mitigations optimise existing roads sub total		1,000.00	
Critical Priority 2: Supporting population and economic growth in Greater Sydney, including Parramatta			
Parramatta CBD public transport improvements	600.00	600.00	
Sydney-Illawarra Pinch Points Program	300.00	300.00	
Corridor Reservation Program	100.00	100.00	
Bus Rapid Transit Program	300.00	300.00	
A major cultural precinct in Parramatta	see note below		
Education and health infrastructure supporting growth:			
Schools Growth Program	700.00	700.00	
Hospitals Growth Program	600.00	600.00	
Care Co-location Program	100.00	100.00	
Greater Sydney Education and health sub total		1,400.00	

Table 12.2 Indicative Funding Mix – 3 Critical Priorities

Recommendation by Critical Priority	Indicative Funding Mix		
	Total (\$ Million)	Rebuilding NSW	User Funded
A major review of sporting infrastructure	see note below		
<i>Note the following cultural and sporting funds benefit both Global and Greater Sydney</i>			
Cultural Infrastructure Program	600.00	600.00	
Sports Stadia Infrastructure Program	600.00	600.00	
Critical Priority 3: Ensuring a competitive and connected regional economy			
Freight Road Corridor Program	2,000.00	2,000.00	
Bridges for the Bush	200.00	200.00	
Fixing Country Roads Program	500.00	500.00	
Fixing Country Rail Program	400.00	400.00	
Efficient freight transport to ports and markets sub total		3,100.00	
Regional Growth Roads Program increase connectivity	1,000.00	1,000.00	
Regional Water Security and Supply Fund	1,000.00	1,000.00	
Regional Schools renewal Program	300.00	300.00	
Regional Multi-purpose health facilities Program	300.00	300.00	
Equip regions with modern schools and health sub total	600.00	600.00	
Regional Environment and Tourism Program	300.00	300.00	
Total funding recommendations from the Rebuilding NSW initiative		18,900.00	

13.0 Expert Reports

Infrastructure NSW's advice to the NSW Government has been informed by the following external reports and NSW Government reports:

External Reports *commissioned by Infrastructure NSW*

Deloitte Access Economics (November 2014) "Economic impact of the State Infrastructure Strategy – Rebuilding NSW"

EIG, (November 2014), "Assessment of Project Cost Estimates"

Hyder Consulting (2013), Hunter Economic Infrastructure Plan

NSW Department of Primary Industries, Office of Water, (October 2014), "Upper Hunter Water Security Evaluation Phase 2"

NSW Public Works (October 2014) "Murray River to Broken Hill Bulk Raw Water Transfer Pipeline & Associated Works Initial Option Assessment", prepared for NSW Office of Water and Infrastructure NSW

PwC (June 2012) "NSW Infrastructure Baseline: Health Baseline Report"

NSW Government Reports

NSW Department of Planning and Environment, (November 2014), "A Plan for Growing Sydney"

NSW Department of Planning and Environment, 2014, Final NSW Population Projections

NSW Department of Planning and Environment, 2014, Final NSW Household and Dwelling Projections

NSW Trade & Investment, Arts NSW, 2013, "Discussion paper, Framing the Future: Developing an Arts and Cultural Policy for NSW"

Transport for NSW, (November 2013), "NSW Freight and Ports Strategy"

Transport for NSW, (December 2013), "Sydney's Bus Future"

Transport for NSW, (June 2012), "Northern Beaches BRT Pre-Feasibility Study"

Transport for NSW, (December 2012), "Long-term Transport Master Plan"

