

# WESTCONNEX UPDATED STRATEGIC BUSINESS CASE

November 2015



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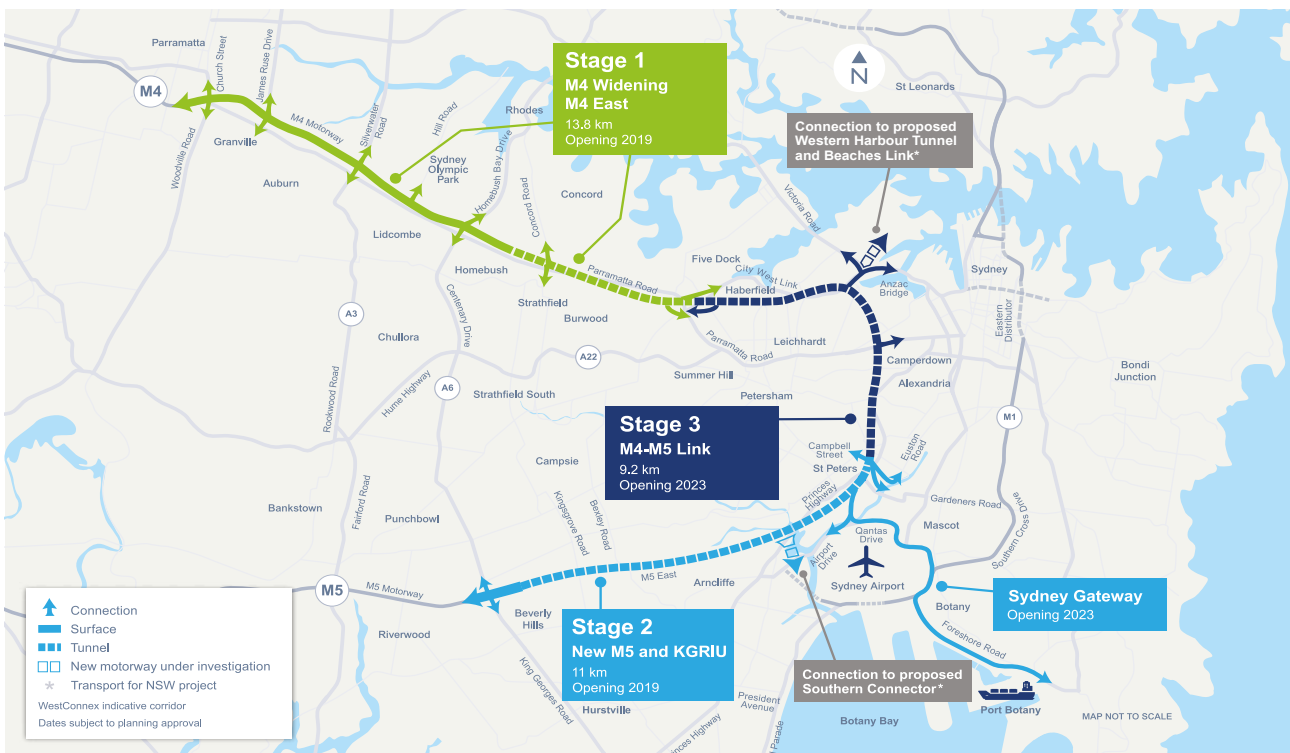


# EXECUTIVE SUMMARY

# The WestConnex project

WestConnex is part of the Government’s long-term, integrated transport and landuse planning solution. It is a central part of the broader plan for Sydney, which links demographic trends, aligns land use and infrastructure planning, achieves integrated network level improvements and enables long-term investments to be planned and scoped ahead of time.

Figure E.1 WestConnex





WestConnex is a cornerstone of the Government's vision and will enable significant improvements in travel times, productivity, reliability and accessibility, providing a significant contribution to both the State and National economies.

WestConnex will provide high quality, motorway standard connections from western Sydney to Sydney Airport and Port Botany. WestConnex will transform urban travel, providing better connectivity between key employment hubs and local communities. By removing traffic from surface roads and local streets, WestConnex will provide a catalyst for urban transformation.

The NSW Government is using a limited-recourse financing model for the project. Private sector debt finance and a loan from the Federal Government, will be raised against future toll revenue to fund a significant portion of the construction costs.

Under this model, it is also possible to implement private sector financing during or after construction. The State will then sell down the equity it has invested into the project and recycle the proceeds into Stage 3. This approach helps to maintain flexibility and helps to protect the State's AAA-credit-rating.

The State has established a special-purpose vehicle, Sydney Motorway Corporation, to deliver the project on behalf of the client, Roads and Maritime Services.

## The purpose of this Updated Strategic Business Case

WestConnex was a recommendation of Infrastructure NSW in October 2012, with Government adopting the concept in the *2012 State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*.

This was followed by the development of a business case, which was approved by Government in August 2013. An Executive Summary of that business case was publicly released.

This Updated Strategic Business Case consolidates the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

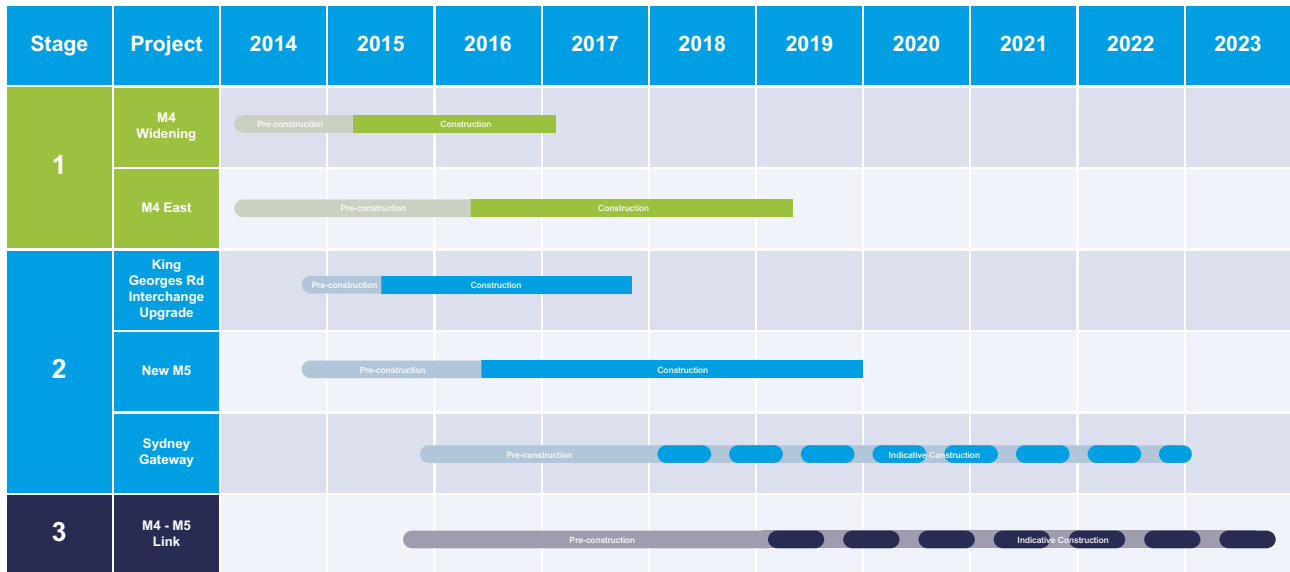
## About WestConnex

WestConnex consists of three stages split into six sub-projects as shown in **Table E.1**. **Figure E.2** shows the delivery schedule for WestConnex.

Table E.1 WestConnex stages

Stage	Sub-project	Description
Stage 1	Stage 1A - M4 Widening (Parramatta to Homebush)	Widening the existing M4 Motorway from Parramatta to Homebush.
	Stage 1B - M4 East (Homebush to Haberfield)	Extending the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for the future connection to M4 – M5 Link.
Stage 2	New M5 (Beverly Hills to St Peters)	Duplicating the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters Interchange allows for connections to the Sydney Gateway. The New M5 tunnels include provision for a future connection to the proposed Southern Connector (part of Gateway to the South) and the M4 – M5 Link.
	King Georges Road Interchange Upgrade (Beverly Hills)	Upgrade of the King Georges Road Interchange between the newly widened M5 West and the M5 East at Beverly Hills, in preparation for the New M5.
	Sydney Gateway (St Peters to Sydney Airport and Port Botany)	A high-quality, high-capacity connection between the new St Peters Interchange and the Sydney Airport and Port Botany precinct.
Stage 3	M4 – M5 Link (Haberfield to St Peters)	Tunnels connecting to the M4 East and New M5 via Rozelle and Camperdown. Includes ramps connecting to the St Peters Interchange and an interchange at Rozelle with provision for a future connection to the Western Harbour Tunnel and Beaches Link.

Figure E.2 WestConnex delivery schedule



'Pre-construction' period commences after Government approval of project. It includes design refinement, tendering, and environmental approvals processes

Sydney Gateway delivery timeframe is marked 'Indicative Construction'. It is dependent on further development work, so timeframes may change. At the latest, it will open by 2023.

# Stage 1A

## M4 Widening

Figure E.3 Stage 1A – M4 Widening



# Stage 1B

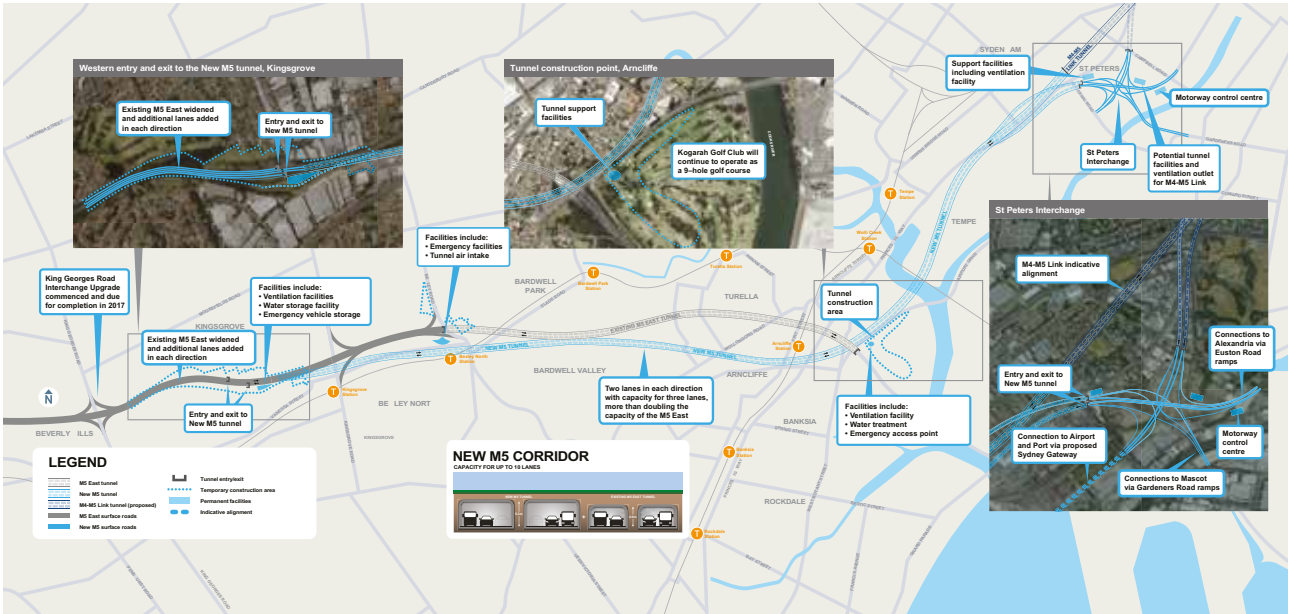
## M4 East

Figure E.4 Stage 1B – M4 East



# Stage 2 New M5

Figure E.5 Stage 2 – New M5



# Stage 2 King Georges Road Interchange Upgrade

Figure E.6 Stage 2 – King Georges Road Interchange Upgrade



# Stage 2

## Sydney Gateway

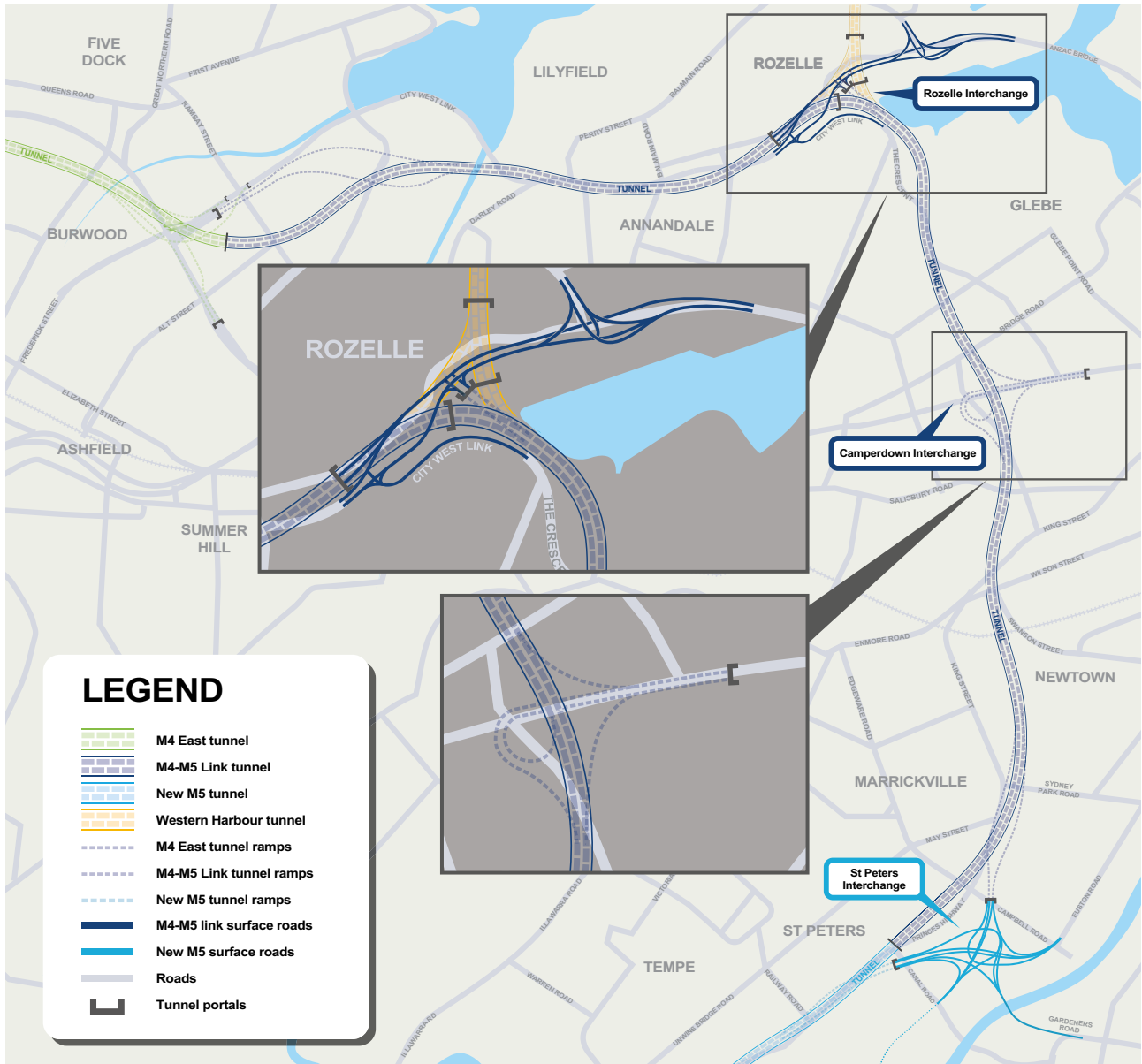
Sydney Gateway will connect St Peters Interchange with the Domestic and International Airport terminals, providing a high-quality, high-capacity link.

The NSW Government has been working to optimise and finalise the design of Sydney Gateway in consultation with stakeholders. The Updated Strategic Business Case includes the costings for the Infrastructure NSW 'Enhanced Gateway' solution.

# Stage 3

## M4 – M5

Figure E.7 Stage 3 – M4 – M5 Link (indicative only)



## Project objectives

In the context of the issues facing Sydney, the goals set down for the State, and the strategic planning undertaken by the NSW Government, the following objectives have been identified for WestConnex:

- Support Sydney's long-term economic growth through improved motorway access and connections linking Sydney's international gateways, western Sydney and key places of business across the city
- Relieve road congestion to improve the speed, reliability and safety of travel in the M4, M5 and Central Business District (CBD)/airport/port corridors, including parallel arterial roads
- Cater for the diverse travel demands along these corridors that are best met by road infrastructure
- Create opportunities for urban renewal, improved liveability and public and active transport improvements along and around Parramatta Road
- Enhance the productivity of commercial and freight-generating land uses strategically located along the corridor
- Fit within the financial capacity of the State and Federal governments, in partnership with the private sector
- Optimise user-pays contributions to support funding in a way that is affordable, equitable and fair.
- Provide the ability to deliver an additional harbour road crossing and northern beaches motorway, the Western Harbour Tunnel and Beaches Link, which should be able to connect into the WestConnex motorway
- Support improved connectivity between Sydney, the Sutherland Shire, and the Illawarra; with the ability for the 'Gateway to the South' project to connect into the WestConnex motorway.

## Progress since 2013

While the objectives of the project remain unchanged since 2013, there have been a number of enhancements made since the initial reference design was first developed.

These include:

- The acceleration of Stage 2 (the New M5) from a 2020 completion to a 2019 completion date, and the confirmation of its alignment
- The realignment of Stage 3 (M4 – M5 Link), with a 'northern extension' being incorporated. WestConnex originally followed Parramatta Road to Camperdown, but will now duplicate the City West Link to Rozelle providing connectivity to the Anzac Bridge and Victoria Road
- Works to enable connectivity with the proposed Western Harbour Tunnel and Beaches Link and Southern Connector (part of Gateway to the South)
- Improved connections to the Airport and port precinct.

Since 2013, a significant amount of detailed planning, modelling and design work has been undertaken by leading experts from around the world. This work takes into account recent commitments by the NSW and Australian governments to delivering significant infrastructure investment across Greater Sydney.

## Revised capital value

The key movements since 2013, expressed in nominal terms, are shown in **Table E.2**.

Table E.2 WestConnex capital value

Original WestConnex	(\$m)	Original WestConnex + Additions	(\$m)
Stage 1	4,197	Enhanced Sydney Gateway connection	402
Stage 2	4,737		
Stage 3	5,947	Extension of Stage 3 to Anzac Bridge, Victoria Road and the future Western Harbour Tunnel and Beaches Link	1,207
Original Business Case Total	14,881	Acceleration costs and associated delivery costs for scope enhancements	322
		<b>Enhanced WestConnex Total</b>	<b>16,812</b>



# The case for change

## Serving Sydney's growth

Over the 20-year period from 2011 to 2031, Sydney's population will grow by 1.6 million people. Over half of this increase will be in western Sydney. As Sydney's population grows, so too does the demand for travel on the road network. Sydney's roads directly support around 75 per cent of the 17.6 million trips made every weekday.<sup>1</sup>

Given this, the number of car trips is expected to increase substantially – even in the context of significant public transport investment being undertaken by the NSW Government.<sup>2</sup> This is illustrated in **Figure E.8**.

Throughout this period there will be significant growth in both employment and the workforce across the Sydney Metropolitan area. However, while population and jobs will grow strongly in the western parts of Sydney, overall jobs will remain skewed towards the east.<sup>3</sup>

Employment growth will remain strong in the Global Economic Corridor, an area of concentrated employment, economic activity, transport gateways and industrial land.

The corridor takes in Port Botany and Sydney Airport, the Sydney CBD, Macquarie Park, Parramatta, Norwest, and Sydney Olympic Park.<sup>4</sup> Over a quarter of all jobs in Sydney are based in the Global Economic Corridor.<sup>5</sup>

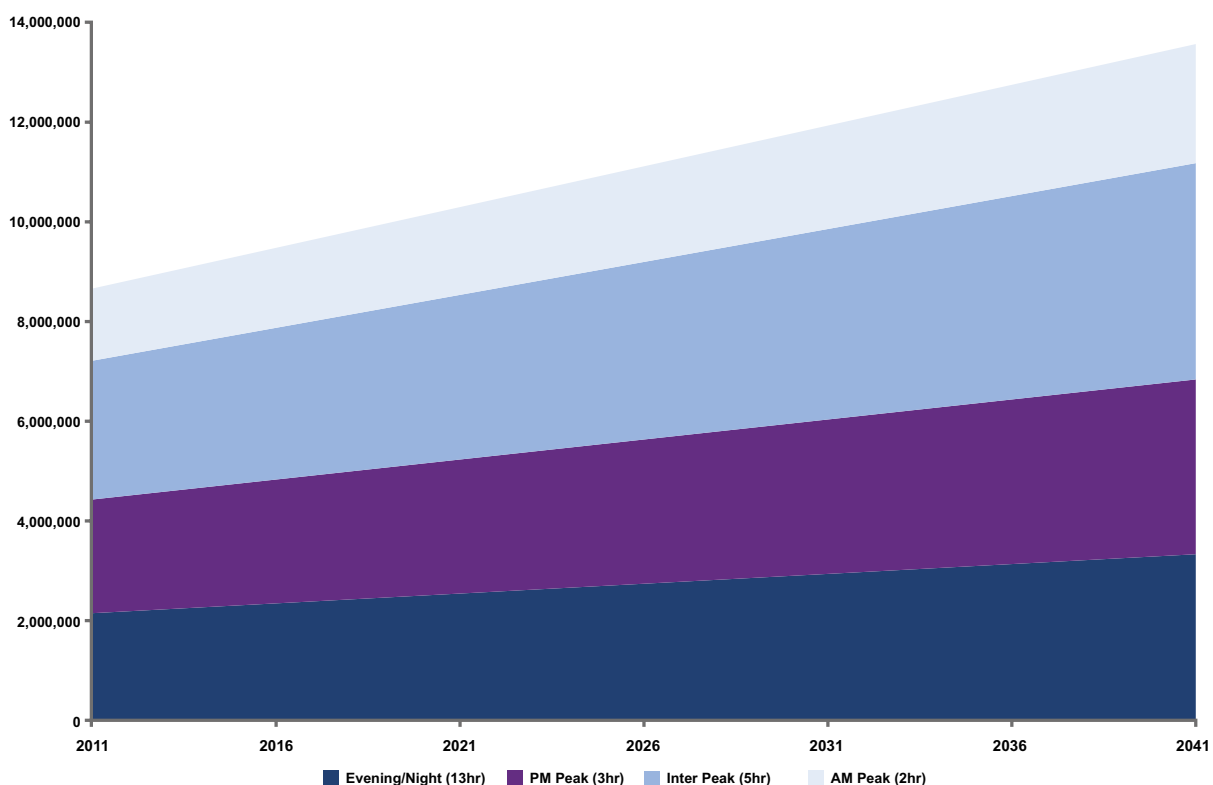
Importantly, the Sydney CBD is not the sole focus for employment growth.

As **Figure E.9** illustrates, key areas of employment growth will include:

- Sydney Airport and Port Botany, extending towards the inner west through St Peters and Marrickville; north between the airport and the CBD in areas such as Alexandria, Mascot, Eastlakes and Randwick; and south towards Arncliffe and Kogarah
- Areas surrounding the Parramatta Road corridor, particularly in the Homebush/Olympic Park/Lidcombe area, extending west to Parramatta and east to Burwood
- In the inner west, through Pymont-Ultimo and westwards to Leichhardt and Dulwich Hill.

High quality transport connections between homes and jobs; between a growing western Sydney and the job opportunities in eastern Sydney, are critical to the successful development and growth of Greater Sydney.

Figure E.8 Forecast growth in car trips.  
Source: Analysis of Sydney Strategic Travel Model data



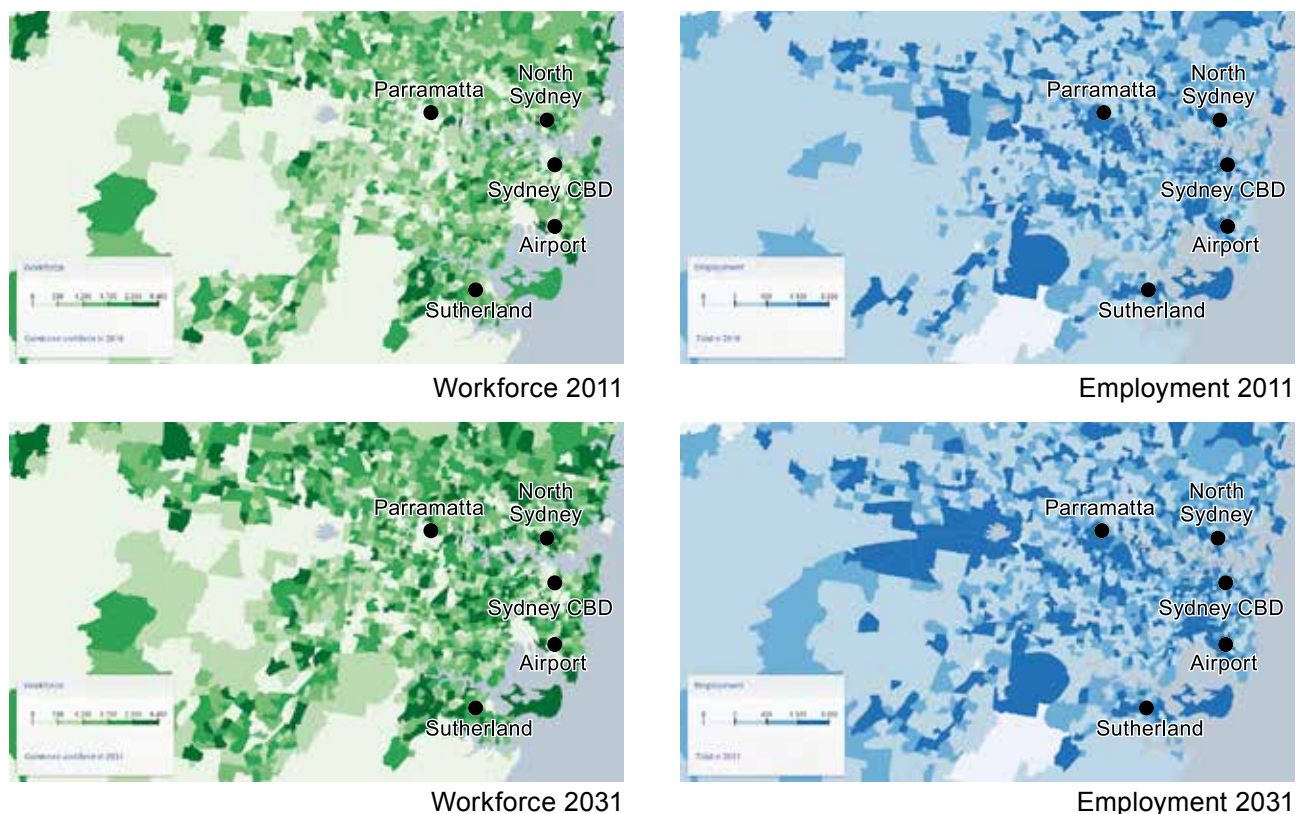
To succeed in connecting housing to jobs, investment will need to address the demands on the road network, much of which cannot be facilitated by public transport alone. Catering for this growth is necessary to ensure a competitive city that is attractive for investment, supports job creation and therefore delivers a higher standard of living for residents.

## Fixing the missing links

While Sydney's motorways provide the backbone of the road network, there are a number of missing links in the network. The central spine of the network – the M4 Motorway – provides the primary road connection from Penrith and the Western Sydney Employment Lands, through Parramatta, before ending at Strathfield. This is well short of the Sydney CBD, Sydney Airport and Port Botany.

Figure E.9 Workforce and employment mapping 2011 and 2031

Source: Bureau of Transport Statistics 2014, Population, Employment and Workforce Forecasts, December 2014 Release – Landuse Planner.



1. Infrastructure NSW (INSW) 2014, *State Infrastructure Strategy Update 2014*, INSW, Sydney
2. Analysis of Sydney Strategic Travel Model data
3. Bureau of Transport Statistics (BTS) 2014, September 2014, *Release Employment Forecasts*, TfNSW, Sydney
4. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney
5. Bureau of Transport Statistics (BTS) 2014, September 2014, *Release Employment Forecasts*, TfNSW, Sydney

## How roads fit into our transport network

While the public transport system supports a significant number of commuters travelling to and from Sydney's major centres, around 70 per cent of all commuters across metropolitan Sydney travel by car.

This is unsurprising, as over 60 per cent of jobs are outside Sydney's major centres.<sup>6</sup> Public transport is simply unable to provide a convenient alternative for a large proportion of travellers given the diffuse nature of employment and the diverse purposes of many trips. In addition, public transport options such as buses, rely on the road network.

Given Sydney's urban structure, and despite significant planning effort and continuing government investment in expanding public transport, the road network will need to continue to support a significant and growing number of cars.

While 70 per cent of commuters travel by car, commuters only make up around 20 per cent of trips across an average working day.<sup>7</sup> While the road network is important in supporting commuting to work, it serves a diverse range of other purposes, many of which are not ideally served by public transport:

- Commercial and freight road users – large articulated trucks move over 25 billion tonne kilometres per annum, and rigid trucks around 10 billion tonne kilometres per annum across the State<sup>8</sup>

- Light commercial vehicles – smaller commercial vehicles like vans support people performing services or making deliveries. They make four times as many trips as larger trucks, with over 1.1 million trips in an average weekday.<sup>9</sup>

In addition, 8.1 per cent of the population use buses as a form of transport and buses also rely on the road network.<sup>10</sup>

## Congestion

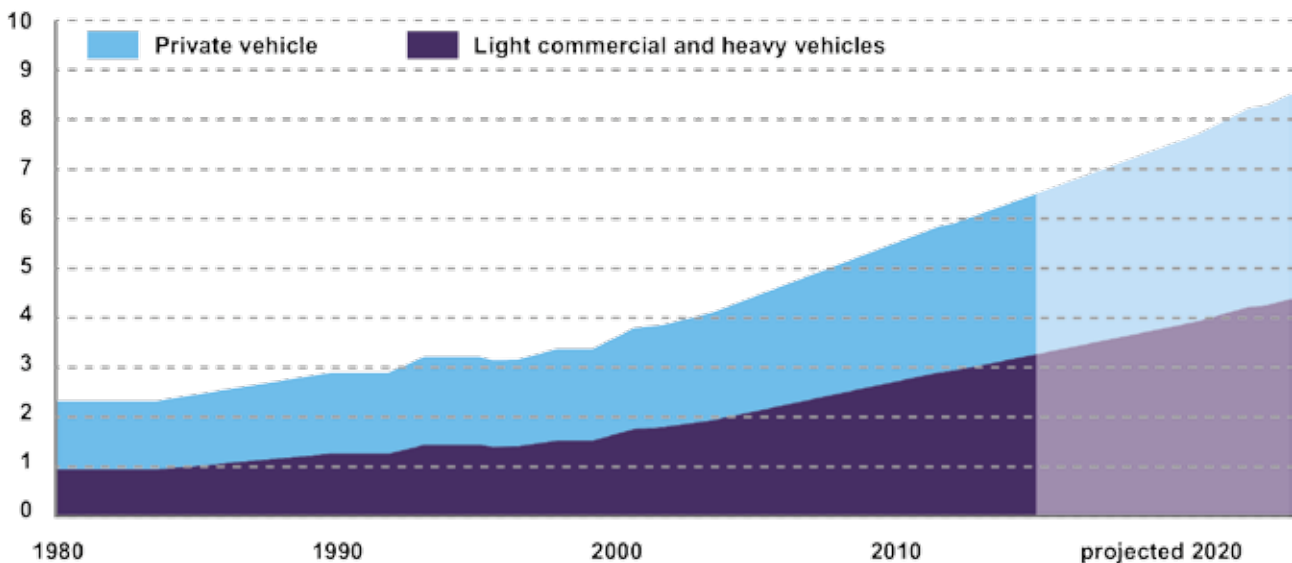
Congestion across Sydney costs around \$5 billion per year – equivalent to an annual cost of \$1,100 per Sydneysider. Without action, these costs are forecast to rise to \$8.8 billion per year by 2020, as shown in **Figure E.10**.<sup>11</sup>

These results are broadly in line with the recent Infrastructure Australia audit of national infrastructure. This identified a cost of congestion for the Greater Sydney region (including Newcastle and Wollongong) of almost \$5.6 billion per annum (in 2011). Infrastructure Australia forecasts these costs will rise to \$14.7 billion by 2031.<sup>12</sup>

Congested roads are slower and less efficient, with travel times often becoming less predictable. With users taking longer to reach their destination, the overall productivity of the transport task is reduced and results in a significant economic impact.

Figure E.10 Growing cost of congestion.

Source: Transport for NSW 2012, *NSW Long Term Transport Master Plan*



6. Bureau of Transport Statistics 2014, *September 2014 Release Employment Forecasts*, TfNSW, Sydney

7. Bureau of Transport Statistics 2014, *Household Travel Survey Report: Sydney 2012/13*, TfNSW, Sydney

8. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

9. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

10. Bureau of Transport Statistics 2013, *Transfigures*

The NSW Long Term Transport Master Plan identified 46 strategic transport corridors throughout metropolitan Sydney. Six of these corridors were identified as facing ‘high constraints’,<sup>13</sup> including:

- Parramatta to the Sydney CBD via Strathfield
- Sydney CBD to Sydney Airport
- Liverpool to Sydney Airport.

In terms of major roads, these corridors correspond to:

- M4/Parramatta Road
- Eastern Distributor/Southern Cross Drive
- M5 Motorway.

Updated traffic modelling on these and other significant corridors has been undertaken. The results show substantial congestion during the peak periods on the major roads that connect western Sydney, south western Sydney and eastern Sydney. This leads to a significant impact on travel speed and reliability across large portions of the road network.

As shown in **Figure E.11**, some journeys are almost half an hour longer in the morning peak compared to the non-peak period (in 2012).

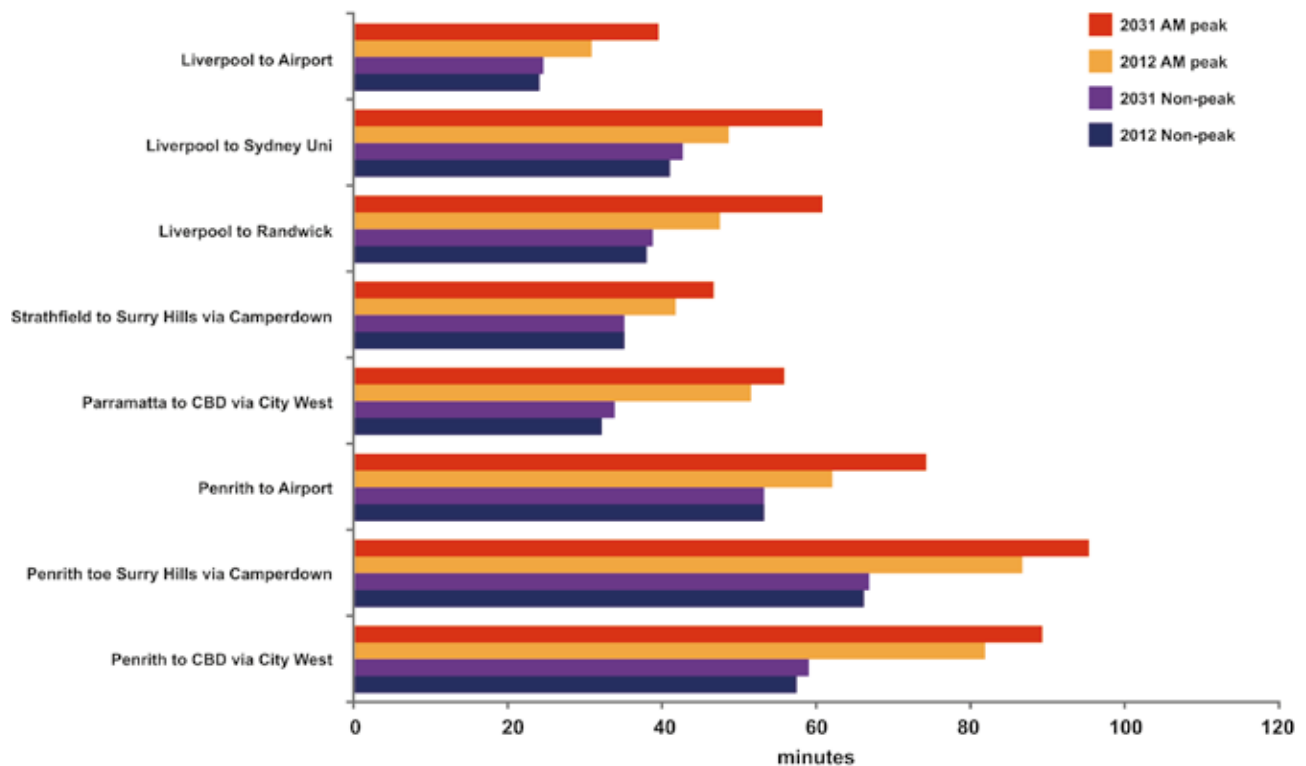
Without intervention, by 2031 congestion would reduce the average peak hour speeds on most roads in these corridors by up to 70 per cent.

## Parramatta Road

Today, sections of Parramatta Road carry over 90,000 vehicles per day, with the most heavily utilised points between the end of the M4 and the CBD being on the portion west of the City West Link. By 2031, this figure is expected to exceed 100,000 vehicles per day.<sup>14</sup> Included in these vehicle numbers are up to 8,000 heavy vehicles per day in 2012. If no alternative is provided, this will rise to over 10,000 by 2031.<sup>15</sup>

With these high traffic volumes, Parramatta Road suffers slowdowns at multiple points – including at the existing connection point between the M4 and Parramatta Road, around the Burwood Road intersection, between the Great North Road and City West Link (Wattle Street) intersections, around Hawthorne Canal, and around the Balmain Road and Pyrmont Bridge Road intersections.

Figure E.11 Modelled results for travel times – peak vs non-peak 2012 and 2013 (without WestConnex)



11. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

12. Infrastructure Australia (IA) 2015, *Australian Infrastructure Audit: Our Infrastructure Challenges*, IA

13. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

14. WestConnex 2015, *WestConnex Road Traffic Model 2.1*, WestConnex

15. WestConnex 2015, *WestConnex Road Traffic Model 2.1*, WestConnex

# Serving freight and international gateways

A large proportion of Australia’s goods are imported and exported via Port Botany, NSW’s primary container port.<sup>16</sup> Port Botany is located in the same precinct as Sydney Airport, Australia’s primary international airport.<sup>17</sup>

By 2031, the freight task in NSW is projected to nearly double to 794 million tonnes compared to 2011. Road freight is also increasingly subject to capacity constraints and peak hour congestion throughout Sydney. The M4 and M5 motorways in particular have limited available capacity in peak periods.<sup>18</sup>

The 2013 *NSW Freight and Ports Strategy* examined whether the shift from road to rail freight would address this issue for the motorway network.

Given the predicted population growth and increase in total freight volumes, even if a significant percentage mode shift from road to rail was achieved, there would still be increases in road freight volumes. Specifically, it found that: *“even with the targeted increase in rail mode share, early modelling results indicate the M4 and M5 will not be able to accommodate the additional container traffic when combined with background growth from employment and population by 2031.”*<sup>19</sup>

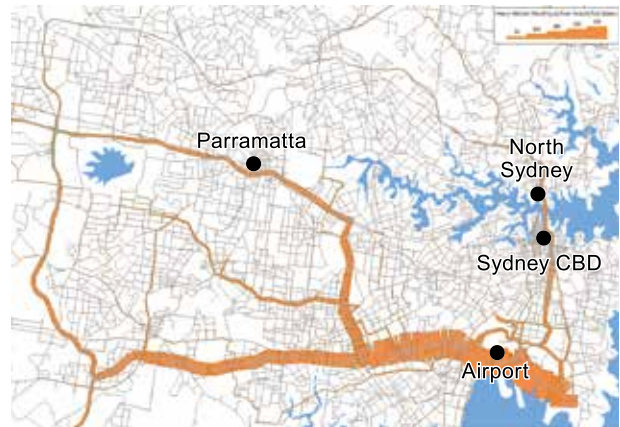
Figure E.12 Heavy Vehicle movements from the port and airport in the morning peak period under a ‘do minimum’ scenario

Source: WestConnex Road Traffic Model v2.1

2012



2031



16. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney  
 17. NSW Trade and Investment (NSWTI), *NSW NOW Accessible to the World*, NSWTI, Sydney  
 18. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney  
 19. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

## Freight precincts and Port Botany

Significant freight trip generators, include:

- Port Botany and Sydney Airport
- Established intermodal terminals such as at Chullora and Macarthur
- Enfield Intermodal Terminal
- Future Moorebank Intermodal Terminal(s)
- Western Sydney Employment Lands.

These precincts are largely located on the city's major roads – particularly along the M4, M5 and M7 motorways – and rail lines, as well as at Port Botany and Sydney Airport.

Port Botany is a significant origin and destination for container freight, being the State's primary container port. Even with new intermodal terminals boosting freight rail capacity substantially – truck movements from Port Botany are still forecast to almost triple.<sup>20</sup>

Traffic modelling (**Figure E.12**) indicates this port traffic makes significant use of the M5 East, the M5 South West, the A3 Corridor (King Georges Road, Roberts Road, and Centenary Drive).

In 2012, the M5 East and M4 both had significant volumes of freight impacted by road congestion. Other roads including the Eastern Distributor, Harbour Bridge and Tunnel, and City West Link also face congestion, although they carry a comparatively lower volume of trucks during the morning peak.

By 2031, without intervention, there would be a significant worsening of congestion impacting heavy vehicles on the M5 East and M4. There is also forecast congestion in the airport and port precinct and along the A3 and M7 corridors.

## Sydney Airport

Sydney Airport is the busiest airport in Australia for scheduled passenger services.<sup>21</sup> Given this, it is both a substantial 'trip generator' for the city's transport network and produces a significant economic value add. Despite being serviced by a rail line and planned public transport improvements, vehicle numbers for the airport (encompassing passengers, workers and other visitors) are anticipated to rise from 92,000 per average weekday in 2012 to 163,000 in 2031.<sup>22</sup>

The airport also serves a growing freight market. Sydney Airport Corporation states "*total freight is forecast to grow from 615,378 tonnes in 2012 to 1,011,312 tonnes in 2033*".<sup>23</sup>

Air freight by its very nature is time sensitive and generally unsuitable for rail haulage – it is therefore carried on the road network.

## Supporting job creation

Proximity to suppliers, customers and partners helps businesses to work efficiently, identify new market opportunities, develop partnerships and collaborations, and come up with innovations and new ways of working.<sup>24</sup>

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. In order to facilitate and grow these centres, high-quality transport links are needed.<sup>25</sup>

20. Bureau of Transport Statistics 2015, *Sydney Airport – Port Botany Freight Movement Model*, TfNSW, Sydney

21. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

22. WestConnex 2015, *WestConnex Road Traffic Model 2.1*, WestConnex

23. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

24. Infrastructure NSW (INSW) 2014, *2014 State Infrastructure Strategy Update*, INSW, Sydney

25. Infrastructure NSW (INSW) 2014, *2014 State Infrastructure Strategy Update*, INSW, Sydney

## Urban transformation and housing – Parramatta Road

Parramatta Road is the primary road connecting Sydney's two most significant business districts – Sydney CBD and Parramatta. It acts as a transport thoroughfare, a business corridor, and a connector between the many places and communities along its length. Traffic volumes along the road have continued to increase with the growth of the city, and with through-traffic continuing to take priority, other activities in the corridor have declined.

Pedestrian activities have been pushed to the edges and a once-thriving business community has eroded to the point where many parts of Parramatta Road are devoid of activation and are the subject of graffiti and dilapidation, leading to an unattractive and anti-social environment.

Sydney is expected to need around 664,000 additional homes over the next 20-years.<sup>26</sup>

*A Plan for Growing Sydney* identifies the Parramatta Road corridor as a focus for increased housing, economic activity and social infrastructure given its strategic location.<sup>27</sup> Without a significant catalyst however, it is likely that existing trends in relation to land use and development in the Parramatta Road corridor will continue.

## Solution in a strategic context

The NSW State Priorities, released in 2015, provide key targets for NSW. These State Priorities are supported by a series of strategic documents targeting infrastructure investment and urban planning for Sydney. These documents frame the strategic issues from different perspectives, but provide a consistent and coordinated direction for Sydney. WestConnex was first identified as a key element of the infrastructure solution for Sydney in the *2012 State Infrastructure Strategy*.

## NSW State Priorities

In 2015, the NSW Premier announced a new set of State Priorities targeting growth and economic development.

These include priorities of:

- Creating jobs
- Building infrastructure
- Encouraging business investment
- Boosting apprenticeships
- Improving road travel reliability
- Increasing housing supply
- Ensuring on-time running of public transport.

## NSW 2021

*NSW 2021* outlines a number of goals for the State, including:<sup>28</sup>

- Reducing travel time
- Improving road safety
- Investing in critical infrastructure.

These and other goals outlined in *NSW 2021* have driven the planning in the subsequent strategy documents produced by the Government.

## 2012 State Infrastructure Strategy

The *2012 State Infrastructure Strategy* adopted by Government, is based on advice received from Infrastructure NSW.

The strategy covered urban roads, bus and light rail, passenger trains and international gateways. It recommended operational improvements to make better use of existing assets, targeted upgrades, as well as major new infrastructure.

One of the principal recommendations was:

*“Government progress the development of WestConnex, an integrated toll-road scheme designed to innovatively and affordably deliver the M4 extension and M5 East expansion projects within the next 10 years.”<sup>29</sup>*

This introduced the concept of WestConnex into the State's strategic planning.

26. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

27. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

28. Department of Premier and Cabinet (DPC) 2011, *NSW 2021*, DPC, Sydney

29. Infrastructure NSW (INSW) 2012, *First Things First: The State Infrastructure Strategy 2012 – 2032*, INSW, Sydney

# NSW Long Term Transport Master Plan

The *NSW Long Term Transport Master Plan* presents a whole of NSW, multi-modal transport plan for the State. It outlines the Government's strategic priorities for rail, road, freight, bus, light rail, ferry, cycling and walking.

Specifically, it identifies that WestConnex will:<sup>30</sup>

- Support Sydney's long-term economic growth through improved motorway access and connections, linking Sydney's international gateways, western Sydney and places of business across the city
- Relieve road congestion and improve the speed, reliability and safety of travel in the M4 and M5 corridors, including parallel arterial roads
- Cater for the diverse travel demands along these corridors that are best met by road infrastructure
- Create opportunities for urban renewal, improved liveability, and public and active transport improvements along and around Parramatta Road
- Enhance the productivity of commercial and freight generating land uses strategically located near transport infrastructure
- Optimise user-pays contributions to support funding in a way that is affordable and equitable.

## 2014 State Infrastructure Strategy

Infrastructure NSW updated its *NSW State Infrastructure Strategy* advice to Government in 2014 and recommended further development on a new Western Harbour Tunnel and Beaches Link. This would extend from WestConnex across Sydney Harbour to North Sydney, creating another bypass of Sydney's CBD and improving traffic flows on the Sydney Harbour Bridge, Eastern Distributor and other approaches to the CBD.

Infrastructure NSW also endorsed a series of road upgrades between Sydney and the Illawarra known as the 'Gateway to the South', which would reduce journey times from the city's south.

In relation to WestConnex, Infrastructure NSW recommended two potential enhancements to the scope of the project – northern and southern extensions:

- The proposed northern extension, to connect WestConnex to the proposed Western Harbour Tunnel and Beaches Link. Stage 3 of WestConnex has been enhanced to incorporate the northern extension.
- The proposed southern extension, now the 'Southern Connector'. This would provide a connection from WestConnex to the Gateway to the South project and now forms part of this project, being led by Transport for NSW.

## NSW Freight and Ports Strategy

The *NSW Freight and Ports Strategy* states that WestConnex: "*will reduce freight costs through increased travel speeds and reliability and reduce the distances travelled by freight vehicles ... WestConnex has the potential to deliver time savings on the M4/M5 corridors in the order of 15 minutes to 35 minutes by 2031.*"<sup>31</sup>

In reducing travel times, WestConnex will improve the productivity of the freight fleet by enabling more freight movements and deliveries to be conducted each day.

30.Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

31.Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney



# A Plan for Growing Sydney

*A Plan for Growing Sydney* is the NSW Government's urban planning strategy for Greater Sydney. WestConnex is a key component of the plan, which outlines benefits of the project as follows:

- Providing improvements in connectivity between western and south western Sydney and the Sydney CBD
- Enhancing the freight networks that serve Sydney's global gateways at Port Botany and Sydney Airport, making the export of goods more cost effective
- Facilitating a stronger economy, by providing better connections to Global Sydney.

It also identifies that: "...*WestConnex will allow for significant improvements to local amenity [on Parramatta Road] by reducing through-traffic on surface roads, and allowing for enhanced north-south local connectivity.*"<sup>32</sup>

## Meeting national infrastructure priorities

### National Infrastructure Plan

The *National Infrastructure Plan* recognises that congestion in the transport corridors relevant to WestConnex is considered to be a nationally significant problem, stating:

*"The primary objectives of this project are to improve accessibility, speed, congestion, reliability and connectivity of the roads linking Sydney's international gateways and western Sydney and places of business across the city. This is to address existing demand as well as the expected increase in demand for transport services provided by roads."*<sup>33</sup>

### Australian Infrastructure Audit

The *Australian Infrastructure Audit* released in 2015 covered a broad range of infrastructure sectors and challenges, including transport.

Some of the key findings from the Audit relevant to WestConnex include:

- *"Population growth will drive a significant rise in demand for infrastructure services ... [with] almost three-quarters of this growth ... projected to be in the four largest capitals – Sydney, Melbourne, Brisbane and Perth ... this growth will impose additional demands on urban infrastructure already subject to high levels of demand"*<sup>34</sup>
- *"Demand for many key urban road and rail corridors is projected to significantly exceed current capacity by 2031."*<sup>35</sup>

## Customers

The key user groups for WestConnex are those that are reliant on road-based travel, and as such are likely to benefit most from the motorway. These groups are broadly identified as:

- International Gateway users – to and from Sydney Airport and Port Botany
- Heavy and light freight industries
- Dispersed and long distance travellers
- Commercial services and business users.

## Evolution of WestConnex motorway

### Original concept

WestConnex was originally recommended as a strategic concept by Infrastructure NSW in its advice for the *2012 State Infrastructure Strategy*. In preparing its advice, Infrastructure NSW examined a broad range of infrastructure related solutions for Sydney and NSW. In terms of transport and roads, it made recommendations relating to the rail system, optimising the use of existing road and transport assets through targeted investment, and new bus and other public transport infrastructure.<sup>36</sup>

32. Department of Planning & Environment (DPE) 2014, *A Plan for Growing Sydney*, DPE, Sydney

33. Infrastructure Australia 2013, *National Infrastructure Plan*, IA, Canberra

34. Infrastructure Australia (IA) 2015, *Australian Infrastructure Audit: Our Infrastructure Challenges*, IA, Canberra

35. Infrastructure Australia (IA) 2015, *Australian Infrastructure Audit: Our Infrastructure Challenges*, IA, Canberra

36. Infrastructure NSW (INSW) 2012, *First Things First: The State Infrastructure Strategy 2012-2032*, INSW, Sydney

## Refining the design

In undertaking business case development in 2012 and 2013, a thorough options development process was followed with consideration given to:

- Option alignment
- Engineering structure (tunnel, slot, viaduct, surface road, or a combination of these)
- Interchange locations
- Tunnel portal locations.

A total of five different options in the M4/Parramatta Road corridor, and six different options in the M5/airport corridor were examined. A multi-criteria analysis was undertaken, with criteria summarised as follows:

- Provides improved connectivity between western Sydney and the Global Economic Corridor
- Reduces travel duration, improves road safety and increases consistency of travel times
- Enables ease of delivery
- Maximises urban amenity (liveability) and provides opportunities for urban renewal
- Enables the longer-term development of the road network
- Enable efficient management, maintenance and operations
- Capital and whole-of-life costs
- Toll revenue.

Following the completion of this options analysis, a reference design was selected for the 2013 Business Case, noting that further detailed planning was required.

Further detailed design development undertaken since the 2013 Business Case, found that in relation to Stage 2:

- Remaining in a deep tunnel until surfacing in the vicinity of St Peters avoids the constraints posed by existing land uses, utilities and ground conditions
- Ground conditions present better opportunities for construction of the eastern portal close to St Peters
- An alignment directly to St Peters provides a more direct and shorter route to the Stage 3 interchange site. It also avoids viaduct and at-grade construction issues.

As a result of this further design development, a revised alignment for Stage 2 was identified, consisting of twin tunnels running from Kingsgrove towards the Airport along the existing M5 corridor, to St Peters.

## Can public transport replace the need for new roads?

In assessing the need for new road infrastructure, the *2012 State Infrastructure Strategy* stated:

*"As in other major cities, public transport is the best option for journeys to dense employment centres – such as the Sydney CBD and Parramatta. In these areas, public transport is already the preferred choice for many employees and that will continue to be the case in the future.*

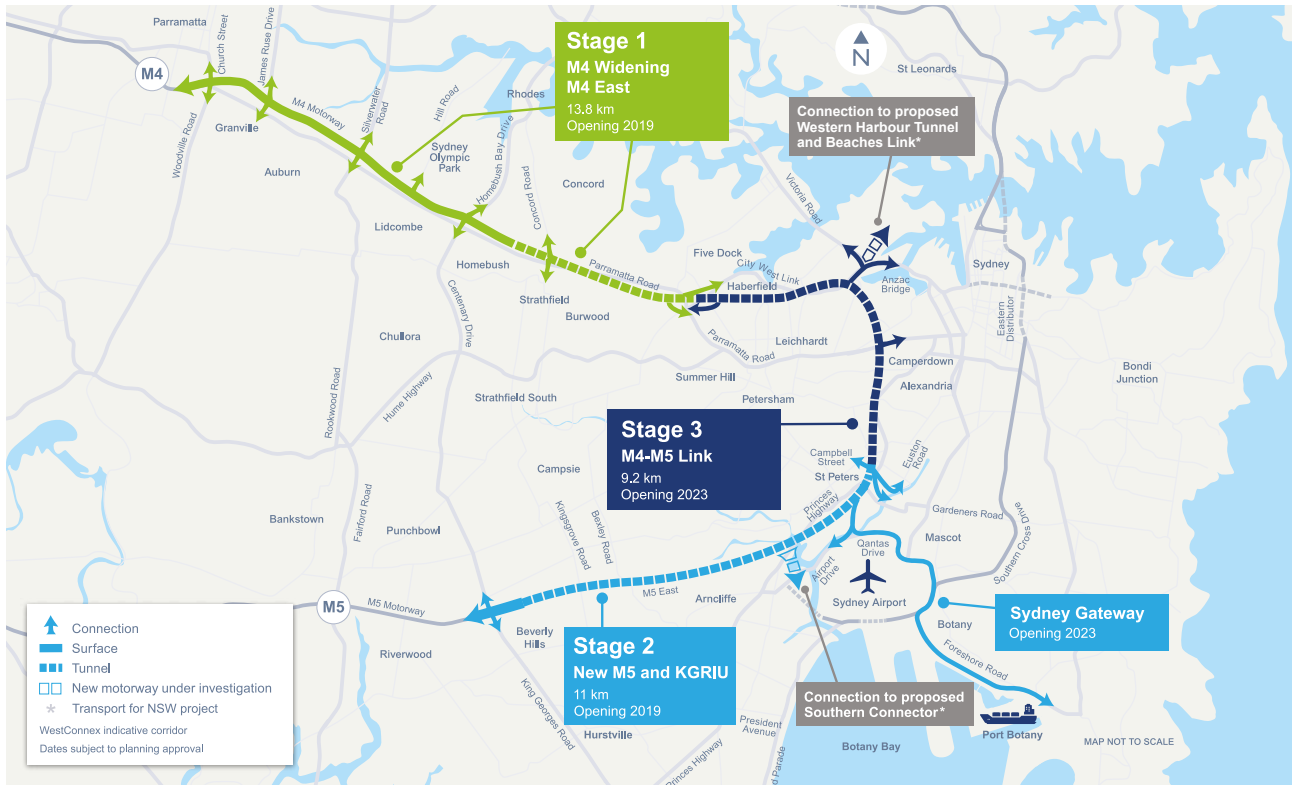
*However, the overwhelming majority of Sydney's journeys are dispersed in nature. For such trips the flexibility of the private car makes it the dominant choice. This pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand will change in the future."*

*"It is unfortunate that roads and public transport have often been positioned as opposing alternatives competing for scarce public funding. In reality, these modes are complementary to each other, each having a valuable, but different role.*

*The evidence is clear that private road transport is – and will remain – the only viable option for most journeys in Sydney most of the time, even with the targeted growth in public transport and rail freight sought by Government, and the expected increase in the population density of the city."*

In this context, the Government is making significant investment in both roads and public transport, including Sydney Metro, Sydney Light Rail and enhancements to the suburban rail network.

Figure E.13 WestConnex incorporating revised Stage 3 alignment



### Northern and southern extensions

In 2014, Infrastructure NSW recommended a northern and southern extension to WestConnex, along with the Western Harbour Tunnel and Beaches Link, be incorporated into the Government’s strategic planning.<sup>37</sup>

Sixteen options for the northern extension were investigated, plus a number of sub-options with differing connectivity. The recommended option incorporated the extension directly into the alignment of Stage 3 (the M4 – M5 Link). The M4 – M5 Link was diverted from the previous Parramatta Road alignment, to follow the City West Link alignment to Rozelle, before turning south to Camperdown and St Peters. Further detailed investigations by Infrastructure NSW regarding the southern extension (known as the Southern Connector) resulted in a Government decision for this motorway to be included in the ongoing planning for the Gateway to the South project, led by Transport for NSW.

### Procurement approach

Following the example of NorthConnex, and to maximise industry innovation, procurement is based on an ‘output specification approach’. A detailed design is not dictated for tenderers. Instead, tenderers compete on final design, allowing optimisation of tunnel route, depth, intersection design, construction approach and property impacts.

One of the key features of this approach is that the environmental impact assessment for each stage is undertaken after, rather than prior to, awarding of the contract. This is necessary given the final design is not confirmed until the tender process is completed.

37. Infrastructure NSW (INSW) 2014, *2014 State Infrastructure Strategy Update* INSW, Sydney

# Urban renewal and transport projects enabled by WestConnex

WestConnex will enable the improvement of Sydney's urban fabric, particularly along Parramatta Road. WestConnex has also been designed with other urban renewal priority precincts in consideration, such as The Bays Precinct at Rozelle.

## Transforming the Parramatta Road corridor

When WestConnex was originally put forward by Infrastructure NSW in 2012, one of its central features was to enable urban renewal and regeneration along Parramatta Road. This remains one of the main objectives of the project.

This urban transformation is reliant on shifting traffic off surface roads and into tunnels.

New land use, design and transport improvements will then be put in place to take advantage of the new road environment. This will include enhancing public and active transport opportunities along and adjacent to Parramatta Road.

These improvements will be delivered by UrbanGrowth NSW and Transport for NSW, but rely on the successful delivery of WestConnex to first manage and minimise growth of traffic on surface roads.

## The Bays Precinct

The former Rozelle Rail Yard in The Bays Precinct, adjoins major road and proposed light rail infrastructure, which will be transformed by the Stage 3 Rozelle Interchange.

In addition to the transport infrastructure planned, future uses of the Rozelle Rail Yard could also include a mix of housing, including affordable housing, as well as public spaces and employment uses. Design of the Rozelle Interchange will continue to be taken in collaboration with UrbanGrowth NSW to achieve:

- Providing greater housing choice
- Creating new open space and nature reserves to link to the Harbour
- Integrating and reconnecting Communities
- Providing new pedestrian and cycle links between Lilyfield and Rozelle
- Raising awareness of and interpreting heritage of rail transport.

Figure E.14 Draft urban transformation precincts along Parramatta Road

Source: UrbanGrowth NSW 2015, *New Parramatta Road – Draft Parramatta Road Urban Transformation Strategy*



## Tolling regime

In developing the original business case for WestConnex, a tolling regime was developed to allow traffic, financial and economic modelling to be undertaken. This became the 'Reference Tolling Regime', and was based generally on the tolls applied to the M7 Motorway.

The Reference Tolling Regime, as detailed in **Table E.3**, has been endorsed by the Government for use as the basis of WestConnex analysis. It has been applied in the traffic demand modelling and revenue figures, and therefore the economic and financial analysis within this business case.

## Traffic demand modelling results

Strategic traffic modelling provides a forecast of the expected changes to traffic numbers on the broader road network due to WestConnex, as well as the performance of the motorway itself. The WestConnex Road Traffic Model is used to model the network, using information from the Transport for NSW Strategic Travel Model and incorporating estimates of induced traffic demand.

This model is best-practice and was subject to peer review.

Table E.3 Reference tolling regime

Once operational, toll indexation will be consistent for all three stages with a maximum of four percent or CPI, whichever is greater for the first 20-years, reverting to CPI thereafter.

Element	2013	2015
Flagfall	\$1.04	\$1.12
Toll per km	\$0.38	\$0.42
Toll cap	\$7.35	\$7.95
Truck multiplier	3x	
Escalation	Max of 4% or CPI whichever is greater	
Concession term	To 2060	

## Traffic volumes

The forecast volumes on WestConnex in 2031 are shown in **Table E.4**. The New M5 motorway will carry around 37,000 vehicles per day and the widened M4 Motorway will carry the highest volumes on WestConnex, at around 164,000 vehicles on an average weekday.

### Addressing congestion on the network

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 everyday on the network. When completed, WestConnex will help to disperse traffic in a more efficient way across the broader network.

By 2031, some of the key improvements delivered by WestConnex will be:

- A reduction in average weekday and peak hour volumes on Parramatta Road, Queens Road and Lyons Road in the Five Dock area, around the M4 East
- Reductions in traffic on City West Link (Dobroyd Parade) and Marion Street in Leichhardt
- A reduction in traffic on Southern Cross Drive of approximately 24,000 vehicles on an average weekday
- A reduction of 60,000 vehicles in the M5 East tunnel on an average weekday
- A reduction, on General Holmes Drive of around 15,000 vehicles on an average weekday.

With the forecast increase in traffic on the broader network in 2031, traffic dispersion will not be fully contained to WestConnex, with other major thoroughfares sharing the capacity.

- Traffic on the surface network along Victoria Road at Rydalmere and Parramatta Road at Auburn is predicted to increase due to traffic growth generally and the introduction of a toll on the widened M4
- Anzac Bridge is predicted to experience an increase of around 20,000 vehicles on an average weekday. This will change when the Western Harbour Tunnel and Beaches Link is in operation
- Concord Road shows an increase in volume of 8,500 vehicles on an average weekday
- Euston Road is being upgraded as part of the local road upgrades to support the integration of the St Peters Interchange. Following the upgrade, the road is predicted to carry an extra 50,000 vehicles
- An increase of traffic on Stoney Creek Road of around 5,000 vehicles on an average weekday is expected
- Beyond the eastern end of WestConnex on Parramatta Road (that is, beyond the tunnel portal east of Camperdown towards Sydney CBD) there is an increase in traffic volumes of around 20,000 vehicles in an average weekday.

Table E.4 Forecast average weekday volumes on WestConnex in 2031

Location	Average weekday volumes in 2031 (vehicles)	Number of lanes (two way)
Widened M4 Motorway, East of James Ruse Drive	163,800	8
M4 East, East of Concord Road	132,400	6
M4 – M5 Link (between Haberfield and Rozelle)	105,000	6
M4 – M5 Link (between Camperdown and Rozelle)	99,800	6
M4 – M5 Link (between Camperdown and St Peters)	111,200	6
Existing M5 East Motorway	49,300	4
New M5	37,200	4
Sydney Gateway	89,400	4

## Traffic forecasts: Parramatta Road

Traffic volumes on Parramatta Road between Wentworth Road and Wattle Street show significant reductions due to the relief provided by the M4 East tunnel. East of Wattle Street the 2031 traffic volumes with WestConnex are similar to the current 2012 volumes, in essence, containing 20-years of forecast growth that would occur if no action was taken.

## Network productivity

Network productivity changes can be understood through two sets of key metrics:

- The change in 'vehicle kilometres travelled' on the road network
- The change in 'vehicle hours travelled' on the network.

In 2031, WestConnex is forecast to result in:

- An increase in vehicle kilometres travelled of around 600,000
- A reduction in vehicle hours travelled of around 110,000.

This indicates that while vehicles will travel more, they are spending less time getting to their destinations, that is, travel is more productive.



# Operational modelling

Micro-simulation and micro-analytical traffic models have been used to assess intersection operations adjacent to WestConnex and traffic operations at portals.

The operational modelling undertaken for this business case is at a strategic level. More detailed modelling results have been presented in each of the environmental impact statements produced for the project to date.

## Economic results

The assessment of the economic viability of WestConnex has been undertaken by KPMG, an independent professional services firm using Cost Benefit Analysis and wider economic impacts analysis.

Analysis of the results considers the Benefit Cost Ratio, Net Present Value and Internal Rate of Return metrics using the conventional Cost Benefit Analysis (without wider economic impacts) as the primary measures of economic viability. A wider economic impacts analysis was undertaken as a secondary measure of viability.

The results are presented in **Table E.5**.

Table E.5 Economic evaluation results

	Result
<b>Results (without wider economic impacts)</b>	
Benefit Cost Ratio	Ratio of 1.71
<b>Results (with wider economic impacts)</b>	
Benefit Cost Ratio	Ratio of 1.88

The economic analysis undertaken demonstrates that WestConnex is economically viable and will return \$1.71 for every dollar invested. The project has a Benefit Cost Ratio of 1.71 without wider economic benefits and 1.88 with wider economic benefits.

The full cost of the Stage 3 realignment is included in this business case. However, the full benefits are unlocked when the Western Harbour Tunnel is delivered. This business case has adopted a more conservative approach by not capturing benefits that are delivered as a result of Western Harbour Tunnel.

## Financial results

A discounted cashflow financial model has been developed that captures the construction and operating period cost and revenue assumptions for the individual stages of WestConnex, and presents the net cash flows to the end of the analysis period (31 December 2060).

The economic analysis undertaken, demonstrates WestConnex is economically viable, with a Cost Benefit Ratio of 1.71 without wider economic benefits.

## Financing and delivery approach

WestConnex is financed using 'limited-recourse project financing' and a 'sale of business' model. The key elements of this include:

- A State entity holding equity in the special purpose vehicles created to deliver the project
- The State acting as a 'contract aggregator' and taking the lead role on structuring and procurement
- Limited-recourse private sector debt finance against future toll revenue to fund a significant portion of construction costs
- Retaining flexibility for the State to progressively sell-down equity in the project at appropriate points in time to optimise value.

To implement the limited recourse project finance, a 'fixed price and time' design and construction approach is being used for procurement. To facilitate this:

- Sydney Motorway Corporation Pty Limited, has been established to deliver the project and the NSW Treasurer and the Minister for Roads, Maritime and Freight are the shareholders on behalf of the State
- Separate project entities are being established for the delivery of each stage of WestConnex. These are wholly-owned subsidiaries of Sydney Motorway Corporation. These entities are responsible for:
  - Holding the long-term toll concession for their respective stage
  - Entering into requisite contract packages to deliver the functional components of the project
  - Raising private sector limited-recourse debt to supplement equity investment to fund construction.

These entities do not represent the State and are expressly not guaranteed by the State. Any debt raised will be self-supporting and without recourse to the State, that is, there is no Government guarantee.

This structure supports future sell-down to the private sector.

## Financing strategy execution

### Stage 1

Senior private sector capital is expected to be raised following the completion of the M4 Widening (early 2017) to be used as a source of funds for the M4 East. Following completion of the M4 East (early 2019) Sydney Motorway Corporation's equity in WCX M4 Pty Limited is expected to be sold at a point in time that aligns with Sydney Motorway Corporation's commercial and delivery objectives.

### Stage 2

Sydney Motorway Corporation is in the process of establishing new subsidiaries to deliver Stage 2 to facilitate financial close in late 2015. In addition to Sydney Motorway Corporation's residual seed capital, the NSW Government, subject to final approval, will also inject up to an additional \$1 billion of equity into the Stage 2 entities to maintain full ownership through to completion. The investment in Stage 2 will be recycled toward the cost of Stage 3. Maintaining full ownership during construction is expected to maximise the return to the State on eventual sale.

### Stage 3

The findings of the delivery model options analysis for stages 1 and 2 also apply to Stage 3. As a result, a similar delivery model is envisaged for this stage. The current delivery timing for Stage 3 would see capital costs incurred prior to the construction completion dates of stages 1 and 2.

The financing strategy for the M4 – M5 Link does not rely on the sale proceeds from stages 1 and 2 alone and additional sources of funding are being investigated. Therefore, the tradeoff between delivery timing and optimising sale proceeds is a key consideration.

## Environmental sustainability

The issues of environmental sustainability and planning are central to a major project such as WestConnex.

The economic assessment found that WestConnex will produce a greenhouse gas emission saving of \$3.58 billion (undiscounted). This means that in 2021, WestConnex will contribute to a reduction in CO<sup>2</sup> emissions of 610,719 tonnes. By 2031 this rises to 1,417,420 tonnes.

In 2015, the WestConnex Sustainability Strategy was released, which details measurable objectives in relation to energy and resource use, sustainability leadership and training and employment opportunities.

As part of the development of WestConnex, a strategic environmental review was undertaken to consider environmental factors and constraints (see **Technical Paper 3**).

The review found: *“There are unlikely to be any significant issues that cannot be effectively avoided, managed, minimised and/or mitigated to an acceptable level provided appropriate attention is given to defining clear and transparent performance outcomes at the project planning, design and delivery stages.”*

Each stage will fully assess environmental considerations as part of the planning approval process.

## Communications and stakeholder strategy

Engagement activities for WestConnex have been extensive; from articulating the local and broader regional and state-wide benefits of the project to identifying the key issues and concerns of our stakeholders and working with them to develop solutions and mitigate impacts at a local level.

Communications and stakeholder engagement plans for each stage have been developed to detail how Sydney Motorway Corporation engages with stakeholders and the community on a range of planning and construction activities through a variety of channels.

## Risk identification and management

Risks and opportunities identified are managed in accordance with Australian Standards. A Risk Management Policy has been implemented with the general principle of identifying risks early, and removing and mitigating them through design or management.

## Risk allocation and culture

Project risks are allocated to the party that is best placed to manage the risk. The procurement method used will determine the risk allocation for each stage of WestConnex, to deliver the best value-for-money outcome.

Operationally, project teams and their risk managers are responsible for the risk data contained within the project risk registers ensuring that risks are monitored, communicated and reported in compliance with the Risk Management Framework.

A good risk management culture supports the way risk management is applied by people working within the organisation. It supports team members to recognise and respond to risk and how risk is considered in decision-making. The awareness and process of risk management is integrated into the culture of the organisation and includes leadership and commitment from the Board, the Audit and Risk Committee, the Chief Executive, Project Directors, the Executive Leadership Team and their staff.

## Risk registers

Risk registers are in place for each stage and key activity, program and corporate area. The risk register is used to document all risk events, analyses, evaluations and treatment actions.

## Delivery and governance

WestConnex is being delivered by a dedicated entity, Sydney Motorway Corporation, ensuring a well-resourced and highly experienced delivery team focused specifically on the project.

The breakdown of responsibility recommended by Infrastructure NSW and adopted by the Government between Sydney Motorway Corporation and Roads and Maritime Services is explained in **Table E.6**.

The project delivery structure for WestConnex, bringing together the Sydney Motorway Corporation and Roads and Maritime Services is illustrated in **Figure E.15** and **E.16**.

A 'Project Control Group' has been established, to facilitate internal project and officer level discussions across all stages of WestConnex and with other significant delivery agencies.

Table E.6 Split of responsibilities between deliverer and client

Sydney Motorway Corporation	Roads and Maritime Services
<b>Deliverer</b>	<b>Client</b>
<ul style="list-style-type: none"> <li>Project management of the delivery of WestConnex.</li> <li>Contract engagement and management.</li> <li>Funding and financing of WestConnex.</li> <li>Management of day-to-day communication and customer inquiries, under the direction of the Government.</li> </ul>	<ul style="list-style-type: none"> <li>Acts on behalf of the Government, as the client.</li> <li>Commissioning agency for the motorway.</li> <li>Property acquisition on behalf of the Government.</li> <li>Management of concession arrangement from Government side of contract.</li> <li>Proponent for Environmental Impact Statement/planning approvals.</li> </ul>

Figure E.15 Project delivery structure

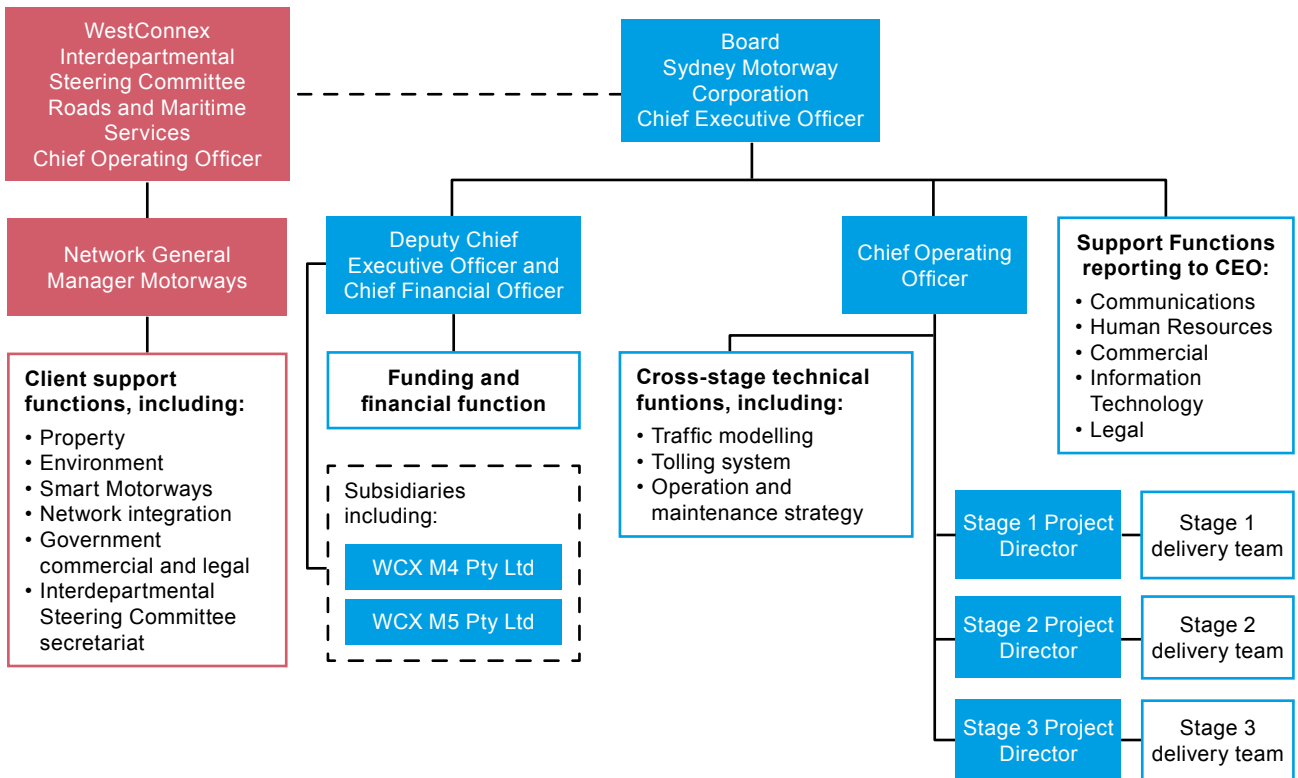
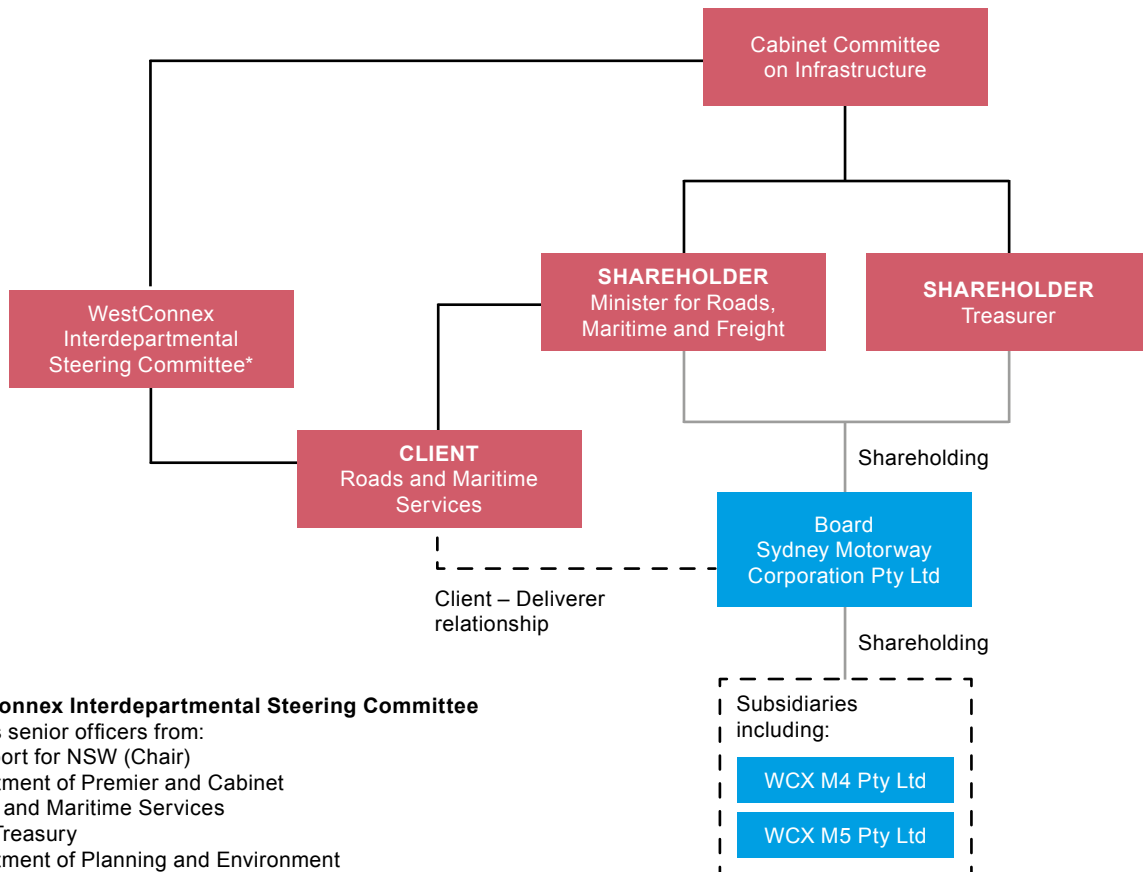


Figure E.16 External governance



**\*WestConnex Interdepartmental Steering Committee** includes senior officers from:

- Transport for NSW (Chair)
- Department of Premier and Cabinet
- Roads and Maritime Services
- NSW Treasury
- Department of Planning and Environment
- Sydney Motorway Corporation (as observer)
- Federal Government representative.

## Oversight and assurance

All major decisions regarding WestConnex are subject to a Cabinet approval process. These decision points are aligned to the Infrastructure NSW *Infrastructure Investor Assurance Framework*.

As components of WestConnex move through the project lifecycle, they are subject to an independent review organised by Infrastructure NSW. Approval to proceed requires the approval of the Cabinet or the appropriate Cabinet Committee.

A Project Review is undertaken as each part of the project lifecycle is completed. The review is organised by Infrastructure NSW, and consists of a panel of independent experts that reviews the relevant project documentation, and interviews the project team. The review occurs before approval to progress to the next project stage is permitted.

Government oversight is facilitated by a WestConnex Interdepartmental Steering Committee (including Federal Government representation), regular project monitoring by Infrastructure NSW, and quarterly project reporting to the NSW Cabinet Committee on Infrastructure.

## Benefits realisation

A clear benefits realisation approach with appropriate baseline information is important to allow the government to measure whether WestConnex has achieved its objectives as originally intended, and whether the economic benefits that formed the basis of this business case have been achieved.

Benefits identified for later evaluation include:

- Ensuring project objectives are met, including:
  - Travel time savings and congestion relief
  - Delivering on other priorities, such as skill creation and reduced traffic incidents.

### WestConnex will:

- Deliver the travel time savings necessary to help manage Sydney's growth
- Connect Sydney with new motorway capacity to the benefit of east, south western and western Sydney, with a focus on our major international gateways at Sydney Airport and Port Botany
- Reduce traffic numbers on key roads across the city – and in particular along a large section of Parramatta Road
- Provide the traffic improvements needed to deliver on the urban renewal and public transport uplift the Government has planned for the Parramatta Road corridor
- Create job opportunities and deliver cost savings for business and other road users.







# INTRODUCTION

This Chapter outlines the purpose of this Updated Strategic Business Case, provides an overview of the status of WestConnex and highlights the State's strategic goals relevant to WestConnex.

In particular, it addresses the comments made by the NSW Auditor General and Infrastructure Australia in 2014, which have helped shape this document. It also provides contextual information for some of the key terms and documents referred to throughout the Updated Strategic Business Case.

# 1.1 What is WestConnex?

WestConnex is a major investment in Sydney’s road infrastructure by the NSW and Australian governments. It is the largest urban road project currently underway in Australia and comprises a series of interconnected motorways and road upgrades, enhancing and extending the M4 Motorway from Parramatta to Sydney Airport, and duplicating the M5 East corridor.

Figure 1.1: WestConnex



NSW is the nation's largest state economy, contributing more than 20 per cent of Gross Domestic Product. It is the most densely populated of our major cities with more than 20 per cent of the Australian population living in Sydney.

A key objective of WestConnex is to improve access to and connectivity with NSW's international gateways, Port Botany and Sydney Airport, which 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 global competitiveness of Sydney and NSW.

As the freight task grows and the pressure for better and more landside infrastructure increases, road and rail become increasingly important for distribution of goods from metropolitan Sydney to the regional and rural areas of the State.

The *2014 State Infrastructure Strategy* targets three areas: Global Sydney's competitiveness; supporting population and economic growth in Greater Sydney, including Parramatta and western Sydney; and ensuring productive regional industries and connected regional communities.

WestConnex is part of the Government's long-term, integrated transport and landuse planning that links demographic trends, aligns land use and infrastructure planning, achieves integrated network improvements and enables long-term investments to be planned and scoped ahead of time.

With more than two-thirds of WestConnex being built in underground tunnels, the project will ease congestion on surface roads and improve productivity and efficiencies for all road users, including buses, freight and light commercial vehicles.

Table 1.1 WestConnex stages

Stage	Sub-project	Description
Stage 1	Stage 1A - M4 Widening (Parramatta to Homebush)	Widening the existing M4 Motorway from Parramatta to Homebush.
	Stage 1B - M4 East (Homebush to Haberfield)	Extending the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for the future connection to M4 – M5 Link.
Stage 2	New M5 (Beverly Hills to St Peters)	Duplicating the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters Interchange allows for connections to the Sydney Gateway. The New M5 tunnels include provision for a future connection to the proposed Southern Connector (part of Gateway to the South) and the M4 – M5 Link.
	King Georges Road Interchange Upgrade (Beverly Hills)	Upgrade of the King Georges Road Interchange between the newly widened M5 West and the M5 East at Beverly Hills, in preparation for the New M5.
	Sydney Gateway (St Peters to Sydney Airport and Port Botany)	A high-quality, high-capacity connection between the new St Peters Interchange and the Sydney Airport and Port Botany precinct.
Stage 3	M4 – M5 Link (Haberfield to St Peters)	Tunnels connecting to the M4 East and New M5 via Rozelle and Camperdown. Includes ramps connecting to the St Peters Interchange and an interchange at Rozelle with provision for a future connection to the Western Harbour Tunnel and Beaches Link.

## 1.2 Summary of the enhancements to WestConnex

WestConnex was a recommendation by Infrastructure NSW to the NSW Government in October 2012. The concept was adopted by the Government in the December 2012 *State Infrastructure Strategy*<sup>1</sup> and *NSW Long Term Transport Master Plan*,<sup>2</sup> and preparation then began on a business case, which was completed in July 2013. An executive summary was publicly released in September 2013.<sup>3</sup>

In that business case, WestConnex was envisaged as generally travelling under the Parramatta Road corridor to Camperdown, and was above ground between St Peters and Tempe. Each stage was to be delivered sequentially.

This Updated Strategic Business Case includes enhancements to the scope and alignment.

The key modifications to WestConnex since the 2013 business case are:

- **Acceleration of Stage 2 (the New M5) and confirmation of its alignment.** The selected design is now fully in-tunnel from Kingsgrove to St Peters. Construction on the New M5 was to be completed by 2020, but has been accelerated so that it can be completed in 2019. This has been enabled by an Australian Government concessional loan of up to \$2 billion
- **Realignment of Stage 3 (M4 – M5 Link).** A northern extension was identified in mid-2014 and subsequently incorporated as a realignment of Stage 3.

The M4 – M5 Link originally followed Parramatta Road to Camperdown, but will now duplicate the City West Link to Rozelle before heading south. This provides better connectivity to the Anzac Bridge and Victoria Road, while still providing an alternative to Parramatta Road.

Importantly, the new Stage 3 alignment also enables connection to the future Western Harbour Tunnel and Beaches Link (see **Section 7.4**).

1. NSW Department of Premier and Cabinet (DPC) 2012, *State Infrastructure Strategy*, DPC, Sydney

2. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

3. Sydney Motorways Project Office 2013, *WestConnex Business Case Executive Summary*, Roads and Maritime Services, Sydney.

Since 2013, progress has been made on more detailed design, cost and risk analysis as components of the motorway move towards procurement and delivery. The business case has been updated to reflect the information that is now available as a result of this further development.

**Chapter 5** provides further detail on the evolution of the project.

## 1.3 Purpose of this Updated Strategic Business Case

This Updated Strategic Business Case consolidates the analysis to date, and confirms for the Government that WestConnex remains fit for purpose, economically viable, and financially deliverable. It brings together the work progressed since the 2013 Business Case into a single cohesive document. It has been written to meet the requirements of the NSW Treasury Guidelines for Capital Business Cases (*NSW Treasury Policy Paper 08-5*), as well as Infrastructure NSW and Infrastructure Australia requirements (see **Sections 1.3.1** and **1.3.2**).

### 1.3.1 Auditor-General and Infrastructure Australia recommendations

Both the NSW Auditor-General and Infrastructure Australia have released reports on various aspects of WestConnex. The recommendations from these reports have been considered and incorporated into this business case.

#### **NSW Auditor-General**

This business case recognises and responds to recommendations from the NSW Auditor-General. In particular, the Auditor-General recommended that: “... *the business case ... be formally and thoroughly revisited for stages 2 and 3 of the project as well as any other major changes to the scope*”.<sup>4</sup>

In relation to this recommendation, formal reports have already been submitted to government addressing the business case for stages 2 and 3. This Updated Strategic Business Case consolidates that work and includes the revised Cost Benefit Analysis for the entire WestConnex project.

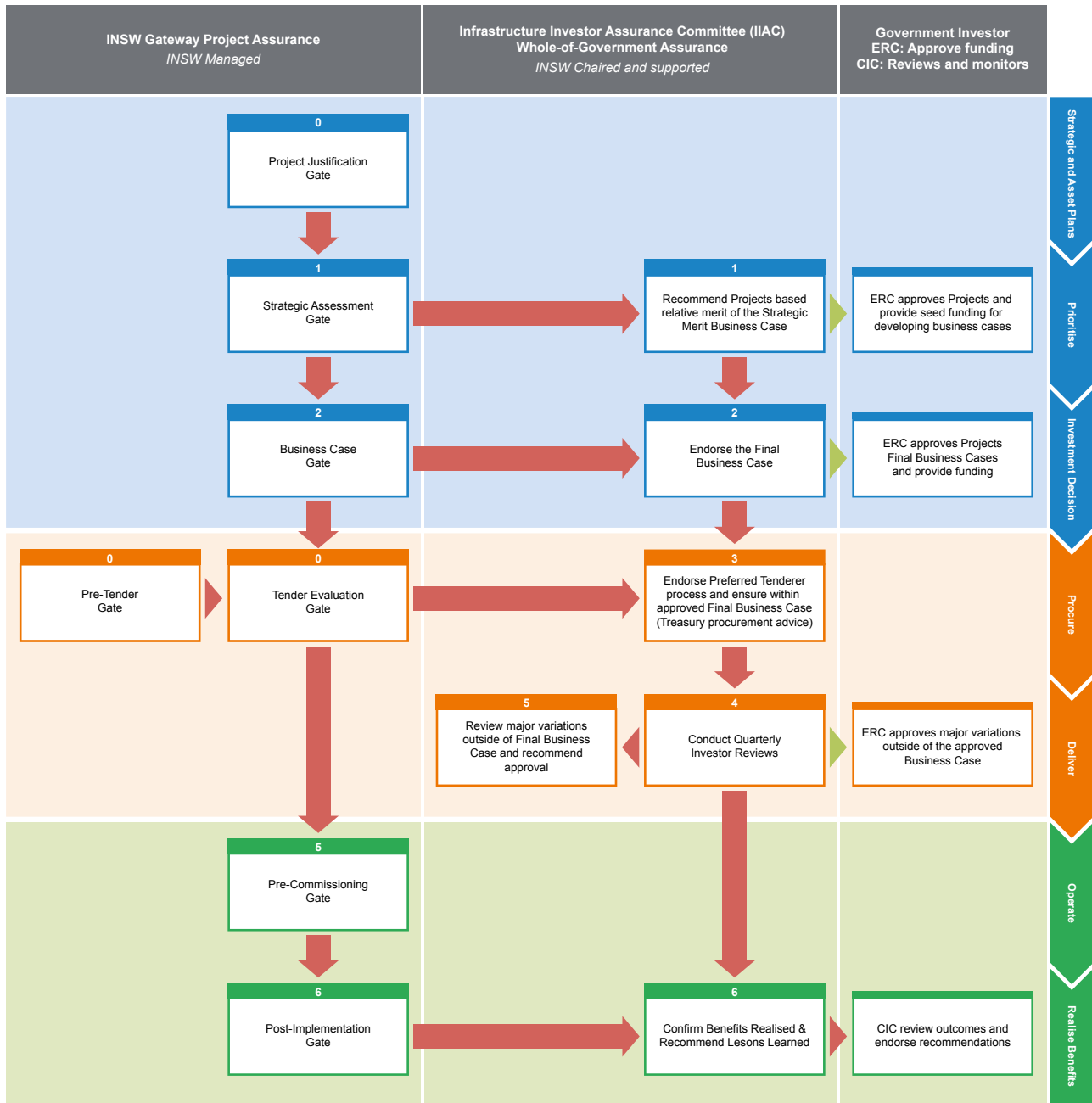
Details of WestConnex’s updated assurance processes, which were also subject to Auditor-General recommendations, are covered in **Chapter 18**.

4. Hehir, G 2014, *New South Wales Auditor-General’s Report Performance Audit – WestConnex: Assurance to the Government*, Audit Office of New South Wales, Sydney.

## NSW Auditor-General's report

In December 2014, the NSW Auditor-General released a performance audit that examined the assurance processes around WestConnex. The Auditor-General found that while there were a number of good practices already in place, the project should be subject to the Infrastructure Investor Assurance Framework, designed by Infrastructure NSW (see **Figure 1.2**). In particular, the Auditor-General highlighted the need for externally managed reviews of major projects and key documents – such as the business case. Sydney Motorway Corporation acknowledges and supports the recommendations made by the Auditor-General. This business case has been subject to an externally managed Business Case Gateway Review, under the Infrastructure Investor Assurance Framework (see **Section 18.6**).

Figure 1.2: Infrastructure NSW Infrastructure Investor Assurance Framework  
 Source: Infrastructure NSW, 2014 State Infrastructure Strategy Update



## Infrastructure Australia

Infrastructure Australia released an assessment of the previous WestConnex business case and subsequent project documents in early 2015.

Infrastructure Australia recommended the project be moved forward to the 'Threshold' stage on the Priority List and further assessment was needed before declaring the project 'Ready to Proceed'.

Together with analysis already provided to Government over the past three years, this economic assessment is intended to address the requirements necessary to receive a 'Ready to Proceed' assessment from Infrastructure Australia<sup>5</sup>, including:

- Proposals identify a nationally significant problem
- Problem assessment and analysis is well developed
- A comprehensive list of reform and investment options is identified
- Considerable work has been undertaken to develop and analyse potential options
- Selection of the preferred option is justified, with analysis demonstrating that the solution will best address the identified nationally significant problem
- A robust cost benefit analysis has been undertaken to confirm benefits exceed costs
- Risk-based cost estimates have been used in cost benefit analysis and in the funding request
- A financial model has been developed demonstrating the viability gap and exploring options for, and impact of, different funding solutions
- A robust delivery plan is in place, including adequate cost and risk assessments to provide assurance that the initiative will be delivered within budget
- Where Government funding is likely to be sought, analysis of scope for private funding is completed
- The risk-based cost estimate, risk assessment, demand models and economic appraisal have been independently reviewed.

As recommended by Infrastructure Australia, this business case includes an updated economic assessment using:

- Fully updated demand modelling incorporating induced demand and redistributed trips
- Updated cost estimates for the project, informed by tenderer information received and a risk-based estimating approach.

## 1.3.2 Related WestConnex project documents

Detailed planning and assessment of the financial, optionality and deliverability aspects has been undertaken for each stage of WestConnex.

For Stage 1, this detail is provided in the implementation plan considered by the Government with the 2013 Business Case. Stages 2 and 3 have separate 'Definition and Delivery Reports', which have been approved by the Government.

The relationship between each of the key WestConnex project documents is outlined in **Figure 1.3**.

In addition to these documents, over the next 12 months Infrastructure NSW, Roads and Maritime and Sydney Motorway Corporation will undertake further development work on Sydney Gateway.

5. Infrastructure Australia (IA) 2014, *Better Infrastructure Decision-Making: Guidelines for making submissions to Infrastructure Australia's infrastructure planning process, through Infrastructure Australia's Reform and Investment Framework*, IA, Canberra



## 1.4 NSW State Priorities and NSW 2021 goals

In September 2015, the NSW Premier announced new priorities for the State. This refocused the State goals to improve economic and social outcomes for the people of NSW.

Key priorities related to WestConnex include:

- Creating jobs
- Building infrastructure
- Encouraging business investment
- Protecting our credit rating
- Ensuring on-time running for public transport
- Reducing road fatalities
- Improving road travel reliability.

Prior to this, and at the time of the 2013 Business Case, *NSW 2021* identified 32 goals, which set the direction for the public sector.

A number of *NSW 2021* goals are central to the ultimate objectives and purpose of WestConnex:

- **Goal 7 – Reduce travel times:** delivering an efficient and effective transport system that reduces the time it takes to travel around Sydney
- **Goal 10 – Improve road safety:** making NSW's roads the safest in the country, reducing road fatalities per head of population
- **Goal 19 – Invest in critical infrastructure:** investing in strategic and coordinated infrastructure to boost business confidence and help NSW reach its full potential, create more job opportunities and choice, and a better quality of life for NSW citizens.<sup>6</sup>

There are a range of other goals that are more broadly related to WestConnex:

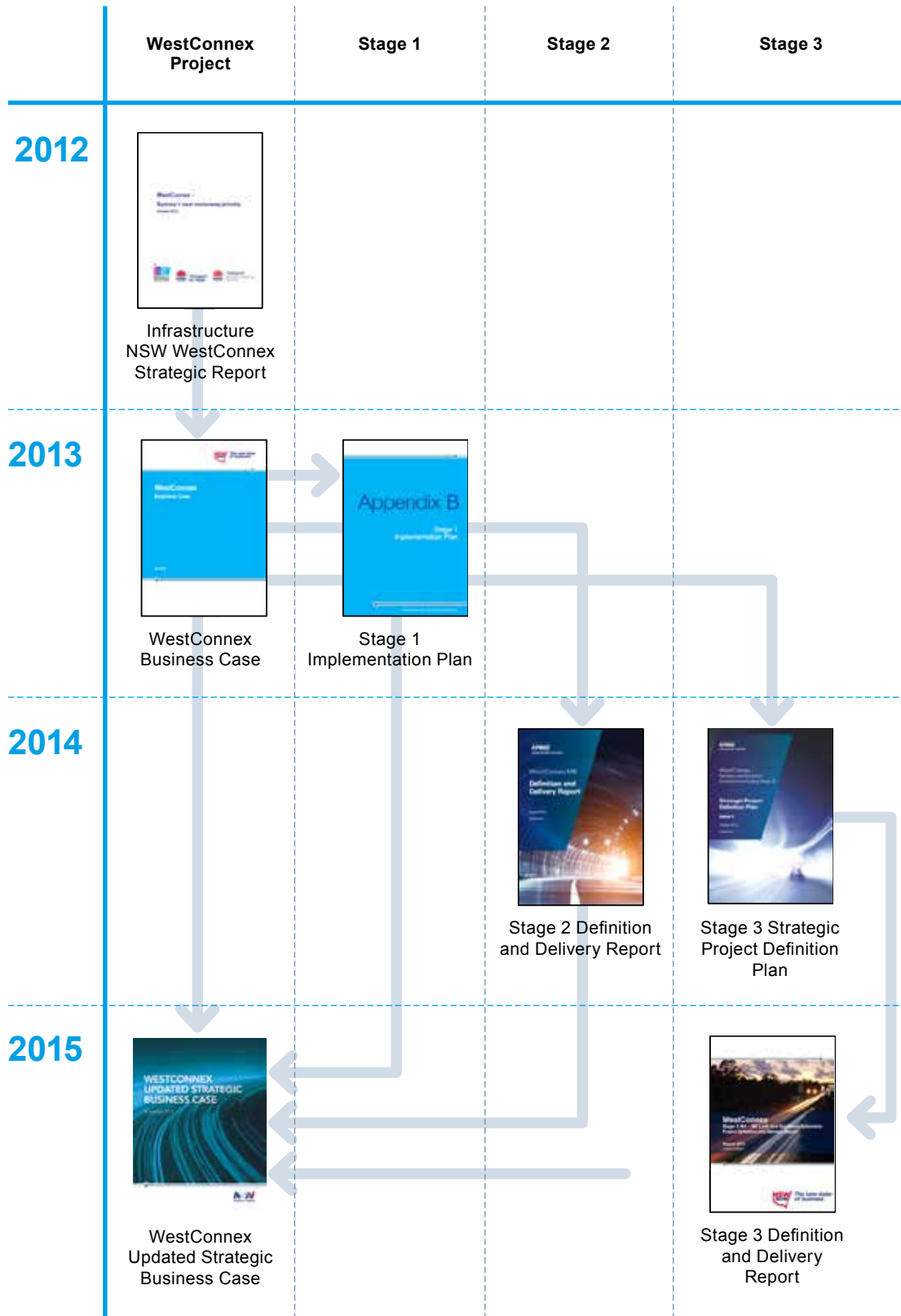
- **Goal 1 – Improve the performance of the NSW economy:** NSW to lead Australia in sustainable economic growth through the increasing of business investment, growth in Gross State Product per capita, and growth in employment
- **Goal 2 – Rebuild the State's finances:** deliver disciplined and effective management of public finances, ensuring the State's AAA credit rating is maintained
- **Goal 4 – Increase the competitiveness of doing business in NSW:** ensure that the State is a compelling choice as a location for investment and employment growth
- **Goal 8 – Grow public transport patronage:** increased uptake in public transport usage is intended to reduce traffic congestion, improve travel times, and provides environmental benefits
- **Goal 20 – Build liveable centres:** deliver great places to live and work, making it easier to travel between work and home through good strategic planning.<sup>7</sup>

These goals form the basis for the business case. The full relationship between the Government's *NSW 2021* goals and WestConnex is drawn out in subsequent chapters including as part of the strategic context in **Chapter 3**.

6. NSW Department of Premier and Cabinet (DPC) 2011, *NSW 2021*, DPC, Sydney

7. NSW Department of Premier and Cabinet (DPC) 2011, *NSW 2021*, DPC, Sydney

Figure 1.3: Relationship between key WestConnex project documents



## 1.5 WestConnex – part of an integrated planning approach for Sydney and NSW

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs.

It is fully integrated into the State's infrastructure, transport and planning strategies. These include:

- **State Infrastructure Strategy** (2012, updated 2014) – the whole-of-NSW strategy for infrastructure delivery and use, based on the advice of Infrastructure NSW. This includes public transport, roads, international gateways, regional transport, water, education, health, culture and energy infrastructure. WestConnex was first adopted as a strategic priority in the *2012 State Infrastructure Strategy*.<sup>8</sup> The *2014 State Infrastructure Strategy Update* re-confirmed this and identified extensions to the original project<sup>9</sup>
- **NSW Long Term Transport Master Plan** (2012) – the overarching transport plan for the State. It addresses rail, road, bus, light rail, ferry, freight, walking and cycling. WestConnex is a major infrastructure priority in the *NSW Long Term Transport Master Plan*.<sup>10</sup> Alongside the *NSW Long Term Transport Master Plan*, with work enabled or supported by WestConnex, also sits:
  - *NSW Freight and Ports Strategy* (2013)
  - Other mode specific plans, including *Sydney's Bus Future* (2013), *Sydney's Light Rail Future* (2012), *Sydney's Cycling Future* (2013), and *Sydney's Walking Future* (2013), *Sydney's Rail Future*, *Sydney's Ferry Future* and *City Centre Access Strategy*
  - *Sydney CBD to Parramatta - Strategic Transport Plan* (2015)

- *NSW State Priorities* – announced by the Premier in 2015, these provide a targeted approach to delivering results in the areas of infrastructure, health, education and other services across NSW. The priorities highlight WestConnex as an infrastructure priority
- *A Plan for Growing Sydney* (2014) – the urban planning strategy for the Sydney metropolitan area. The delivery of WestConnex is a central element to support the urban planning goals articulated in *A Plan for Growing Sydney*<sup>13</sup>
- *Draft Parramatta Road Urban Transformation Strategy* (2015) – the urban renewal strategy for the 20 kilometre Parramatta Road Corridor, including plans for eight growth precincts
- *Transformation Plan: The Bays Precinct, Sydney* (2015) – the strategy for how The Bays Precinct can build on its heritage and transform to maximise uses and support the growth of Sydney.

These plans are referred to throughout this business case.

## 1.6 Structure of this business case

This business case has been developed with three specific sets of guidance in mind. It is intended to meet:

- NSW Treasury requirements for Capital Business Cases, as outlined in *NSW Treasury Policy Paper 08-5*
- Infrastructure NSW content expectations set out in the *Infrastructure Investor Assurance Framework*
- The requirements and expectations set out in Infrastructure Australia's '*Better Infrastructure Decision Making*' guidelines.

8. NSW Department of Premier and Cabinet (DPC) 2012, *State Infrastructure Strategy*, DPC, Sydney

9. NSW Department of Premier and Cabinet (DPC) 2014, *Rebuilding NSW State Infrastructure Strategy 2014*, DPC, Sydney

10. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

Table 1.2 WestConnex project status

WestConnex Stage	Current Status
<p><b>Stage 1A: M4 Widening</b> Under construction</p>	<ul style="list-style-type: none"> <li>• Business Case approved for project delivery in August 2013 (as part of the July 2013 WestConnex Business Case).</li> <li>• Tender awarded December 2014.</li> <li>• Planning approval received December 2014.</li> <li>• Construction commenced March 2015.</li> </ul>
<p><b>Stage 1B: M4 East</b> Planning assessment</p>	<ul style="list-style-type: none"> <li>• Business Case approved for project delivery in August 2013 (as part of the July 2013 WestConnex Business Case).</li> <li>• Tender awarded first half of 2015.</li> <li>• Environmental Impact Statement lodged in second half of 2015.</li> <li>• Construction expected to commence in first half of 2016 (subject to planning approval).</li> </ul>
<p><b>Stage 2: King Georges Road Interchange Upgrade</b> Under construction</p>	<ul style="list-style-type: none"> <li>• Stage 2 Definition and Delivery Report approved August 2014.</li> <li>• Planning approval received February 2015.</li> <li>• Tender awarded May 2015.</li> <li>• Construction commenced July 2015.</li> </ul>
<p><b>Stage 2: New M5</b> Tender underway</p>	<ul style="list-style-type: none"> <li>• Stage 2 Definition and Delivery Report approved August 2014.</li> <li>• Tender award anticipated second half of 2015.</li> <li>• Environmental Impact Statement to be lodged late 2015.</li> <li>• Construction expected to commence in mid-2016 (subject to planning approval).</li> </ul>
<p><b>Stage 2: Sydney Gateway</b> Options assessment</p>	<ul style="list-style-type: none"> <li>• Further project definition and delivery planning underway.</li> </ul>
<p><b>Stage 3: M4 – M5 Link</b> Pre-procurement</p>	<ul style="list-style-type: none"> <li>• Project Definition and Delivery Report approved October 2015.</li> <li>• Tender award planned for 2018.</li> <li>• Environmental Impact Statement planned for 2018.</li> <li>• Construction planned to commence in 2019 (subject to planning approval).</li> </ul>

## 1.7 Current status of the project

Following approval of the 2013 Business Case, the Government established WestConnex Delivery Authority and Sydney Motorway Corporation. In October 2015 all WestConnex Delivery Authority's functions were transferred to Sydney Motorway Corporation and Roads and Maritime Services. Sydney Motorway Corporation is continuing with the design and construction of WestConnex.

See **Chapter 18** for details of project's governance arrangements.

**Table 1.2** outlines the current status of each stage of the project, as at Q4 2015 and provides indicative dates for future major activities.

## 1.8 Key assumptions underpinning the Updated Strategic Business Case

There are a number of key assumptions that underly the analysis contained in this document. In particular, these drive the traffic, economic and financial modelling.

In order to ensure the assumptions made are both reasonable and consistent, a cross agency working group has been established. This ensures that the assumptions made for WestConnex are broadly endorsed and used consistently for other interrelated projects such as the Western Harbour Tunnel and Beaches Link and the urban transformation work being developed in parallel to WestConnex. The working group includes Sydney Motorway Corporation, Transport for NSW, Roads and Maritime Services, and UrbanGrowth NSW.

Some of the key assumptions include:

- Population and employment forecasts (based on NSW Department of Planning and Environment projections) as updated in September 2014
- Tolling principles as applied across Sydney's road network
- Other road and transport projects assumed in modelling – ensuring that traffic modelling factors in other relevant, committed projects. This includes:
  - Sydney Metro (both Northwest and City & Southwest projects) and related rail network upgrades, NorthConnex, CBD and South East Light Rail, and bus network improvements
  - Assumptions for major traffic generators or traffic altering projects such as Sydney Airport, Western Sydney Airport (Badgerys Creek), Port Botany, freight rail intermodal terminals at/planned for Enfield, Moorebank, and Eastern Creek, and The Bays Precinct transformation project.

# 2

# PROBLEM ANALYSIS – THE CASE FOR CHANGE

In 2012, Infrastructure NSW identified a series of strategic challenges faced by Sydney and NSW. This included missing road network links, congestion, increasing travel times, the need to improve urban amenity, growing demand, population and employment growth, and growth in the use of our international gateways and freight network.<sup>1</sup>

This Chapter articulates the scale of those challenges as they relate to WestConnex.

## 2.1 Key challenges for NSW

**Table 2.1** outlines the key challenges and associated *NSW 2021* goals related to WestConnex.

Table 2.1 Challenges and *NSW 2021* goals

Key Challenge	Related <i>NSW 2021</i> goal
Serving Sydney's growth – the need for the transport network to meet the demands of a growing city, support improved productivity, and connect key housing and employment areas.	Goal 1 – Improve the performance of the NSW economy Goal 4 – Increase the competitiveness of doing business in NSW Goal 7 – Reduce travel times Goal 19 – Invest in critical infrastructure Goal 20 – Build liveable centres
Congestion – the issue of traffic congestion, impacting travel times and reliability of Sydney's road network.	Goal 1 – Improve the performance of the NSW economy Goal 4 – Increase the competitiveness of doing business in NSW Goal 7 – Reduce travel times Goal 8 – Grow public transport patronage Goal 10 – Improve road safety
Serving freight and international gateway traffic – significant enablers of our economy, there is a need to support forecast growth.	Goal 1 – Improve the performance of the NSW economy Goal 4 – Increase the competitiveness of doing business in NSW Goal 7 – Reduce travel times Goal 19 – Invest in critical infrastructure
Supporting job creation – the need to facilitate job growth in Sydney.	Goal 1 – Improve the performance of the NSW economy
Urban renewal and housing supply – addressing areas of urban decay and meeting needs of a growing population.	Goal 20 – Build liveable centres
Affordability and fundability constraints – minimising the impact on the State's finances.	Goal 2 – Rebuild the State's finances



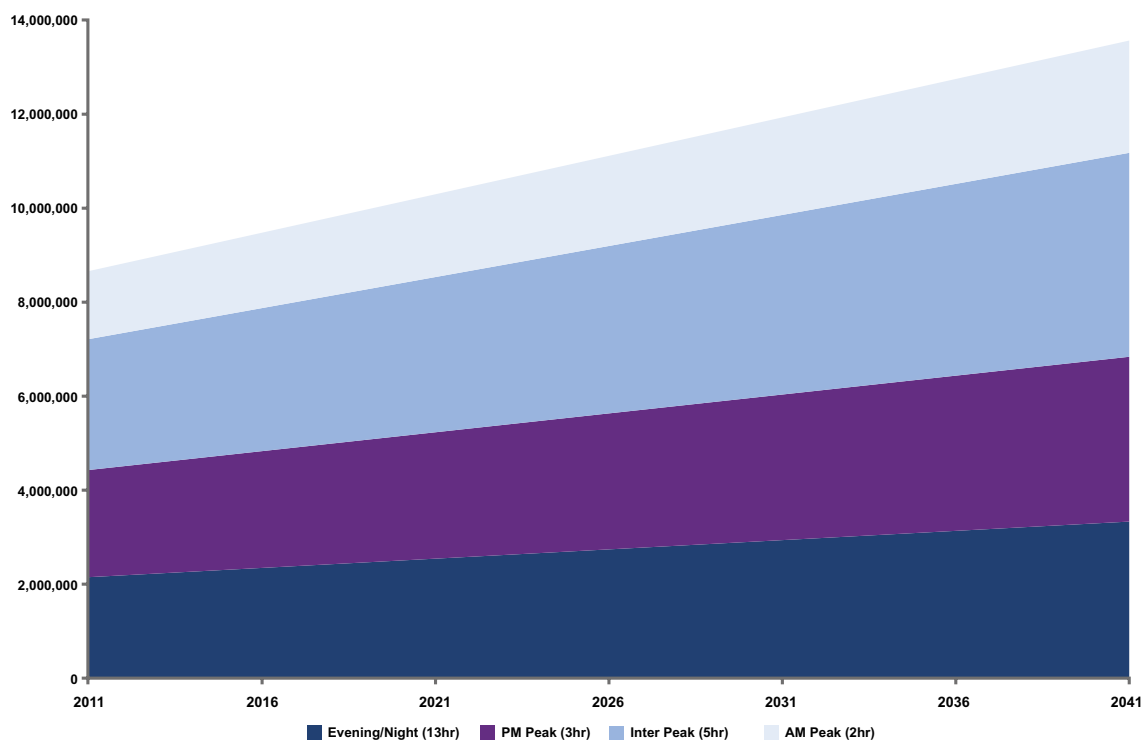
## 2.2 Serving Sydney's growth

Sydney is Australia's largest city, a growing, vibrant, multi-centred metropolis that is home to over 4.5 million people.<sup>1</sup> Over the 20-year period between 2011 and 2031, Sydney's population will grow by 1.6 million people. Of this, more than half, or 900,000 additional people, will call western Sydney home. This means western Sydney's population is growing much faster than other parts of the city.<sup>2</sup>

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.<sup>3</sup>

As Sydney's population grows, so too does the demand for travel on the road network by bus, car, or motorbike. The number of car trips is expected to increase substantially given the growing population of Sydney overall (**Figure 2.1**<sup>4</sup>) – even in the context of significant public transport investment, with projects like Sydney Metro and CBD and South East Light Rail underway. As such, the road network will continue to accommodate the vast majority of journeys in Sydney for the foreseeable future.<sup>5</sup>

Figure 2.1 Forecast growth in car trips  
Source: Analysis of Sydney Strategic Travel Model data



1. NSW Department of Planning & Environment (DP&E) 2015, Population NSW, Issue 4, April 2015, DP&E, Sydney
2. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney
3. Bureau of Transport Statistics: Household Travel Survey Report Sydney 2012/13.
4. *Analysis of Sydney Strategic Travel Model data*
5. Infrastructure NSW (INSW) 2014, *State Infrastructure Strategy Update 2014*, INSW, Sydney
6. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney
7. Bureau of Transport Statistics (BTS) 2014, September 2014 Release Employment Forecasts, Transport for NSW, Sydney
8. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney
9. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

## 2.2.1 Jobs and the Global Economic Corridor

*A Plan for Growing Sydney* defines a Global Economic Corridor, which takes in Port Botany and Sydney Airport, the Sydney CBD, Macquarie Park, Parramatta, Norwest and Sydney Olympic Park. The corridor is an area of concentrated employment, economic activity, transport gateways and industrial land (**Figure 2.2**).<sup>6</sup>

Over a quarter of all jobs in Sydney are based in the Global Economic Corridor.<sup>7</sup> Sydney's 'knowledge sectors' – finance, education, business services, communications, high-tech manufacturing, and other emerging industries – are heavily concentrated within the Corridor.<sup>8</sup>

It generates over 41 per cent of Gross State Product.<sup>9</sup>

Given the economic significance of the Global Economic Corridor to the State, and its role across a number of highly skilled employment industries, high quality transport connections both to and across the corridor are strategically important for Sydney and NSW.

The population in Sydney's west is forecast to surpass that of the east of the city in the coming decades. Although jobs growth in western Sydney continues to be strong, it is not anticipated to match the job numbers of the city's east (see **Figure 2.3**). This can be seen in the workforce and employment projections in **Figure 2.4**.

Figure 2.2 The Global Economic Corridor

Source: *A Plan For Growing Sydney*, NSW Department of Planning and Environment, 2014

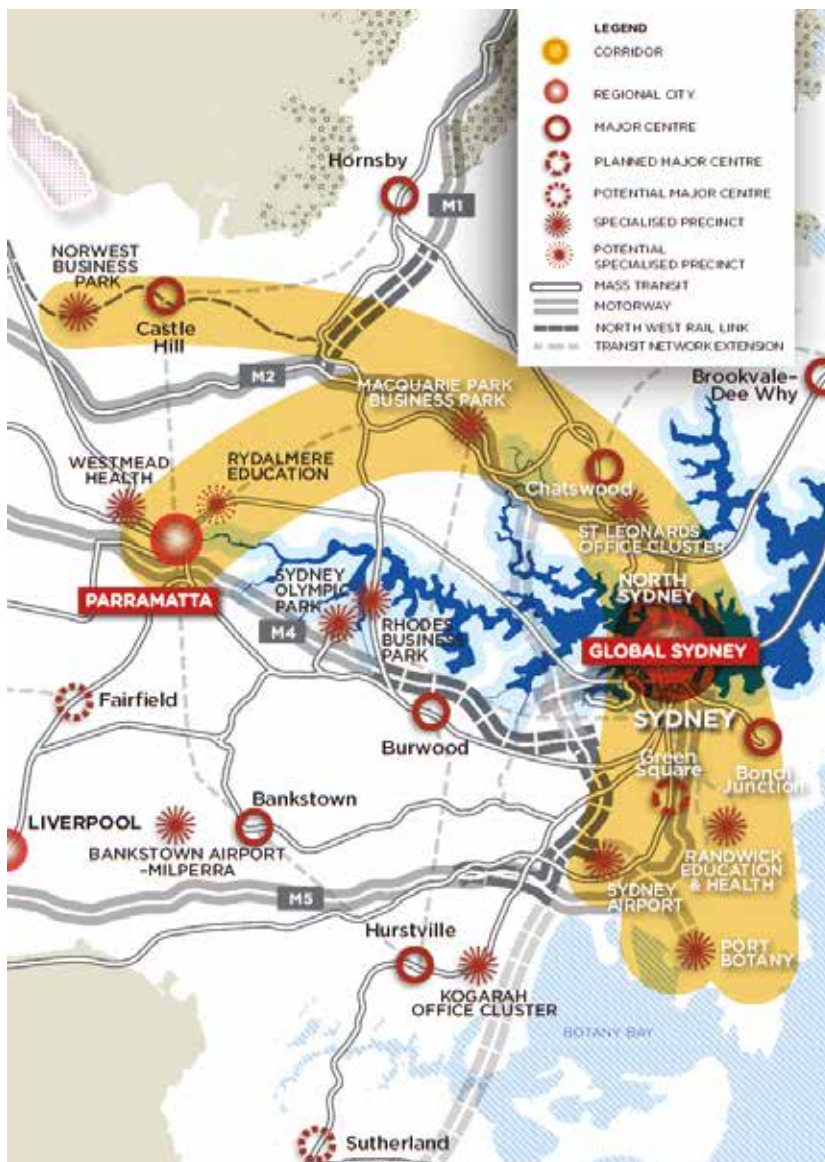
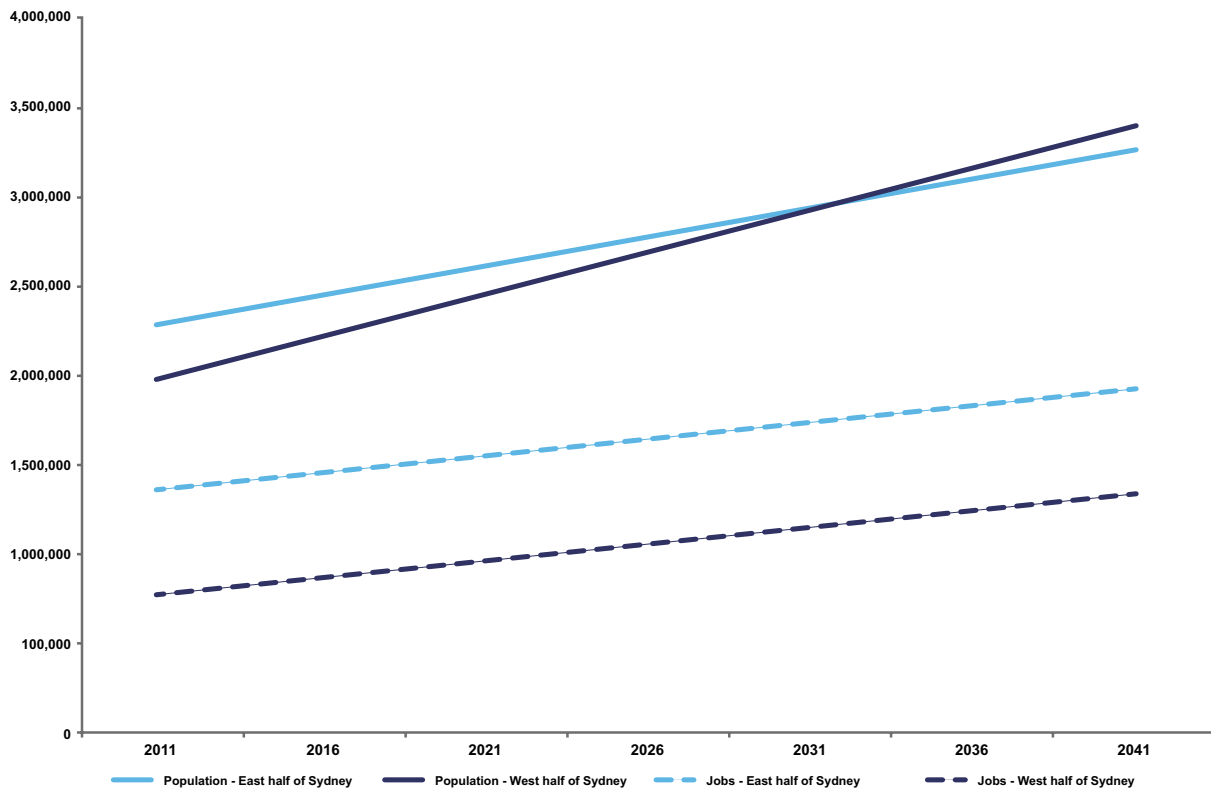


Figure 2.3 East – west population and job forecasts for Sydney

Source: Bureau of Transport Statistics 2014, September 2014 Release Employment Forecasts and Bureau of Transport Statistics (BTS) 2014, September 2014 Release Population Forecasts



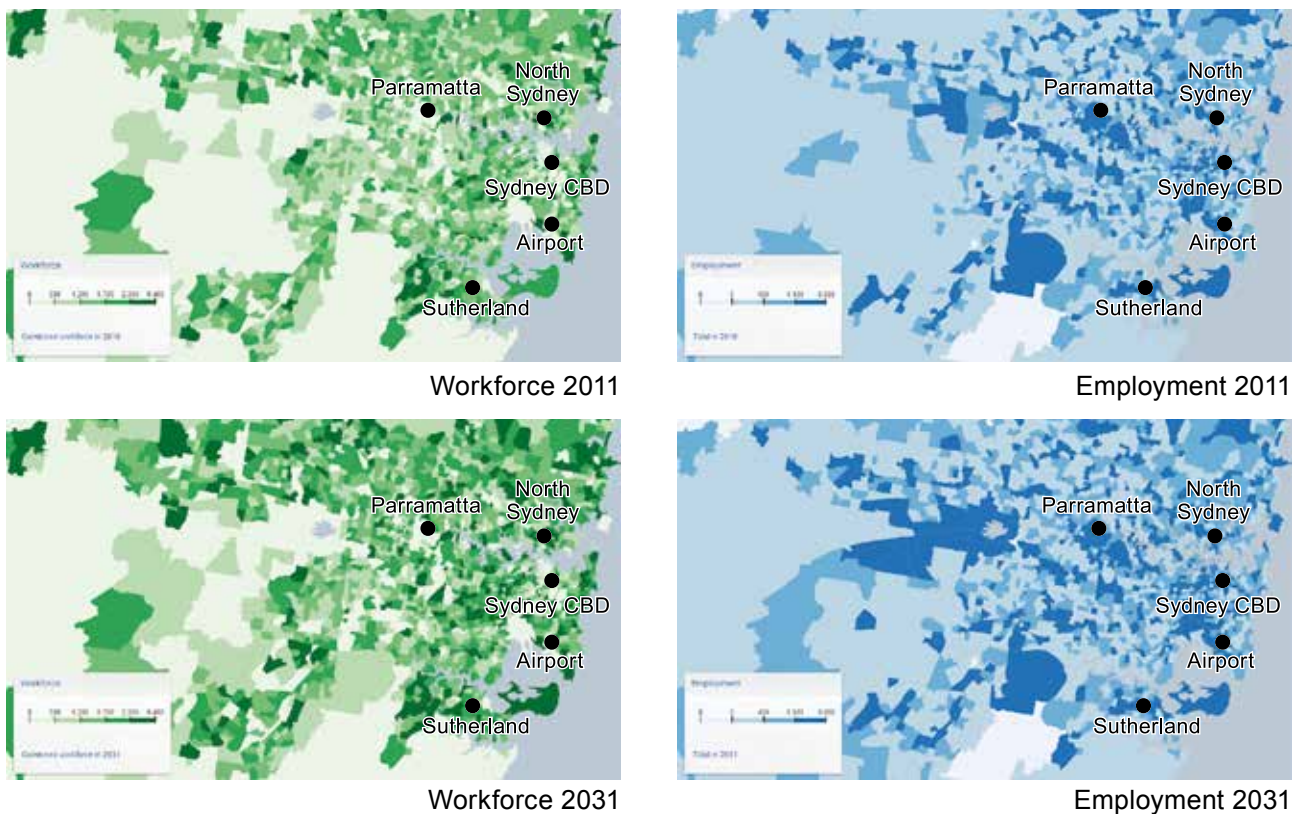
Future employment growth will not only be centred around the Sydney CBD. As **Figure 2.4** illustrates, major employment areas outside of the CBD, but east of Parramatta are already substantial. The key corridor between Sydney CBD, through Randwick, to the international gateways of Sydney Airport and Port Botany (inclusive) currently accounts for more than half a million jobs, or around 20 per cent of the city's total employment.<sup>10</sup> Forecast growth in the east includes:

- Sydney Airport/Port Botany, extending towards the inner west through St Peters and Marrickville; north between the airport and the CBD in areas such as Alexandria, Mascot, Eastlakes and Randwick; and south towards Arncliffe and Kogarah

- Areas surrounding the Parramatta Road corridor particularly in the Homebush/Olympic Park/Lidcombe area, extending west to Parramatta and east to Burwood
- The inner west, through Pyrmont-Ultimo, and west to Leichhardt and Dulwich Hill.

To succeed in connecting homes to jobs, investment will need to address the demands on the road network and provide high-quality transport connections. Catering for this growth is necessary to ensure a competitive city that is attractive for investment, supports job creation, and delivers a higher standard of living for residents.

Figure 2.4 Workforce and employment mapping 2011 and 2031



Source: Bureau of Transport Statistics 2014, Population, Employment and Workforce Forecasts, December 2014 Release – Landuse Planner

10. Bureau of Transport Statistics (BTS) 2014, September 2014 Release Employment Forecasts, TfNSW, Sydney

## Public transport investment

Investment in public transport plays a central part in connecting people with jobs. There are a number of major NSW Government public transport projects in development, in delivery, or recently completed.

These include:

- The Sydney Metro Northwest, which will connect the North West Growth Centre with Global Economic Corridor centres at Norwest, Castle Hill, Macquarie Park and Chatswood
- Sydney Metro Southwest and City to extend the Sydney Metro Northwest via St Leonards and North Sydney, across the Harbour into the Sydney CBD. From Sydney CBD, the Metro will connect to an upgraded Bankstown Rail Line
- Upgrades on the Western Line, to facilitate extra passenger capacity across the rail network, including for commuters into and across the Global Economic Corridor
- The recently opened South West Rail Link through the South West Growth Centre, which allows heavy rail access via interchange to Sydney Airport and Sydney CBD, as well as Parramatta
- Extension of the existing light rail line from Lilyfield through to Dulwich Hill, and construction of a new CBD and South East Light Rail Line along the corridor between Sydney CBD and Randwick/Kingsford
- Investigation and funding of light rail from Parramatta, with one of the routes for investigation including Parramatta to Sydney Olympic Park and Strathfield.

Despite this investment, given Sydney's growing population, the road network will still need to handle sustained growth as **Figure 2.1** shows. Upgrades to the road network are important to support investment, improved bus infrastructure and the growing freight task.

## 2.2.2 Missing motorway link – the M4 at Strathfield

Sydney's motorways provide the backbone of the road network (**Figure 2.5**). They are the high quality, high capacity, road connections around Sydney. The main motorway connections between the Global Economic Corridor and the growing suburbs of western Sydney are the M2 in the north, the M5 in the south, and the M4 through the centre of Sydney.

The central spine – the M4 Motorway – starts at the base of the Blue Mountains, and provides the primary road connection from Penrith and the Western Sydney Employment Lands to the Global Economic Corridor at Parramatta. It then travels further east.

As it currently stands however, the M4 Motorway ends at Strathfield, on Parramatta Road. This is well short of other key Global Economic Corridor centres including Sydney CBD, Sydney Airport and Port Botany; and represents a substantial gap in the motorway network. The result is significant traffic congestion on the arterial road network forced to handle this traffic from Strathfield onward (see **Section 2.3.3** for traffic modelling results).

## 2.2.3 How roads fit into our transport network

### Household road users

Sydney has an extensive and growing public transport system, consisting of buses, heavy and light rail and ferry services. The public transport system supports a significant number of commuters travelling to and from Sydney's major centres. For example, around 75 per cent of peak hour commuters to Sydney CBD and around 45 per cent to Parramatta CBD travel by public transport.<sup>11</sup> Around 70 per cent of all commuters across metropolitan Sydney, however, travel by car.<sup>12</sup> This is unsurprising, as over 60 per cent of jobs are outside Sydney's major centres.<sup>13</sup> Public transport is simply unable to provide a convenient alternative for a large proportion of travellers given the diffuse nature of this employment and the diverse purposes of many trips.

This is borne out by the Household Travel Survey Results, which confirm that convenience, the indirectness and speed of services, and the inability to get to a destination by public transport are the top reasons for car travel.<sup>14</sup>

Given Sydney's urban structure, and despite significant planning effort and continuing government investment in expanding public transport, the road network will need to continue to support a significant and growing number of cars.

The Household Travel Survey also provides data on the purpose of road trips undertaken from the driver's perspective. As can be seen from **Figure 2.6**, commuters make up around 20 per cent of trips across an average working day. Even in the morning peak, this percentage only increases to around 29 per cent of trips.<sup>15</sup> This highlights that while the road network is important in supporting commuting to work, it serves a diverse range of other purposes, many of which are not ideally served by public transport.

### Commercial and freight road users

The road network will also need to continue to carry a large number of commercial trips. Freight is a significant part of this. Large articulated trucks move over 25 billion tonne kilometres per annum, and rigid trucks around 10 billion tonne kilometres per annum across the State.<sup>16</sup>

Given its significance, freight is discussed in further detail later in this Chapter.

While articulated and rigid trucks carry the vast bulk of freight on a tonne-kilometre basis, light commercial vehicles supporting people performing services or making deliveries are far more prevalent on the road network. They make four times as many trips as larger trucks, and travel a substantial number of extra kilometres, as shown in **Figure 2.7**.

The nature of these trips – for example, delivering goods locally, or transporting a tradesperson and their tools to a job – mean that they are reliant on the road network. Delays to these vehicles impact businesses, their costs, and the productivity of those workers.

11. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, (TfNSW), Sydney

12. NSW Department of Premier and Cabinet (DPC) 2014, *NSW 2021 Performance Report 2014-15*, DPC, Sydney

13. Bureau of Transport Statistics 2014, *Household Travel Survey Report: Sydney 2012-2013*, TfNSW, Sydney

14. Bureau of Transport Statistics 2014, *September 2014 Release Employment Forecasts*, TfNSW, Sydney

Figure 2.5 Sydney's motorway network - the missing links

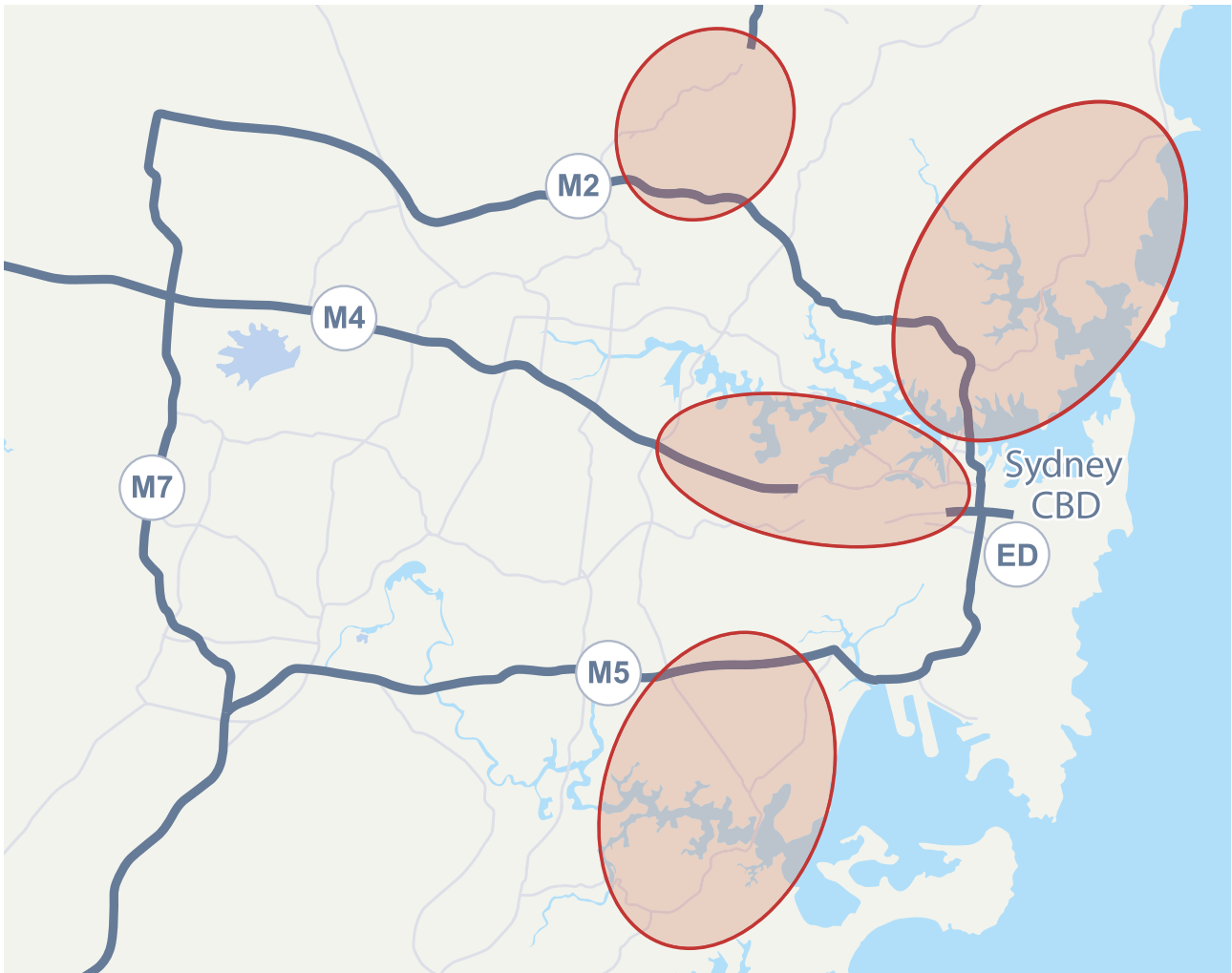
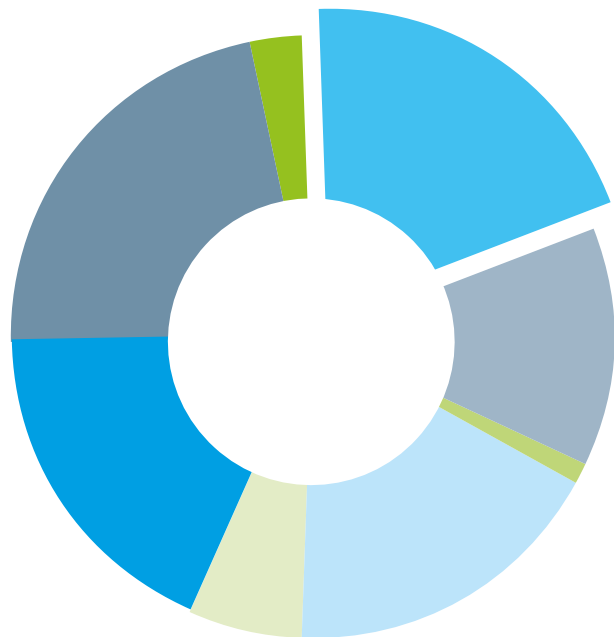


Figure 2.6 Vehicle driver trips by purpose

Source: Bureau of Transport Statistics 2014, Household Travel Survey Report: Sydney 2012/13

- Commute 19.7%
- Work related business 12.9%
- Education/childcare 1.1%
- Shopping 17.4%
- Personal business 6%
- Social/recreation 18.1%
- Serve passenger 22.0%
- Other 2.6%

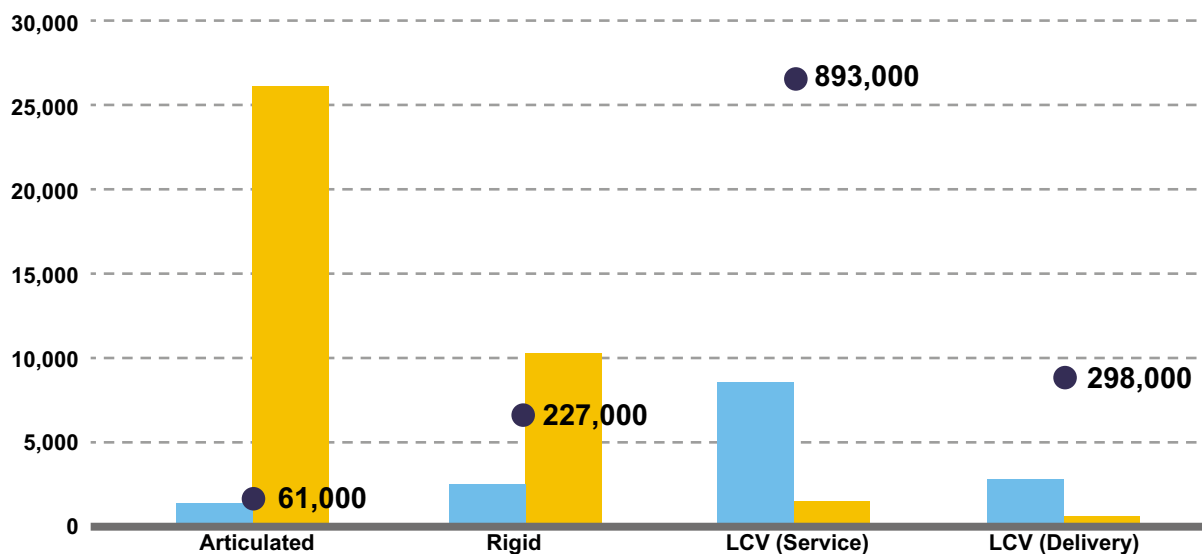


15. Bureau of Transport Statistics 2014, *Household Travel Survey Report: Sydney 2012-2013*, TfNSW, Sydney

16. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

Figure 2.7 Truck and commercial vehicle activity in NSW

Source: Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*



■ Vehicle km (million per annum)

■ Tonne km (million per annum)

● Trips average weekday (Sydney GMA)

Source: ABS 9208.0. Survey of Motor Vehicle Use, 2010 and BTS, Freight forecasts, 2010. NB: LCVs are assumed to be broken into 25% deliveries only and 75% service related, based on the Melbourne Commercial Vehicle Video Study, 29 November 2011. Equivalent data for Sydney was not available at the time of writing.

## 2.3 Congestion

Congestion is a significant issue for Sydney. In recent independent Global Positioning System (GPS) based benchmarking undertaken by TomTom, Sydney ranked worst out of nine major cities in Australia and New Zealand for congestion, which included Auckland, Melbourne, Perth, Adelaide and Brisbane.<sup>17</sup> Out of the 100 most congested large cities across the world, Sydney ranks 21<sup>st</sup> (marked in red in **Figure 2.8**). In comparative terms, Sydney's congestion is only slightly better than that of Los Angeles,<sup>18</sup> and at a similar level to London and Shanghai,<sup>19</sup> despite those cities housing significantly larger populations.

In the *State Infrastructure Strategy* released in 2014, Infrastructure NSW highlighted the real costs that congestion imposes on the economic productivity and competitiveness of NSW. This is particularly true in the time sensitive commuter and freight markets. In simple terms, it takes longer to travel to work or home, longer to move

goods around Sydney and longer for workers to travel between jobs. This time has a real, material cost. Given projected population increases, without corrective action, congestion will continue to worsen, resulting in:

- A less reliable transport network, with more redundant, contingency time built into logistical tasks
- Greater delays for businesses, motorists and bus commuters
- Higher costs to operate a vehicle
- Reduction in air quality and amenity.<sup>20</sup>

The *NSW Long Term Transport Master Plan* estimates Sydney's congestion costs around \$5 billion per year – equivalent to an annual cost of \$1,100 per Sydneysider. Without action, these costs are forecast to rise to \$8.8 billion per year by 2020. The anticipated rate of growth of these costs is 6.9 per cent per year over the next decade – double the growth rate of congestion costs experienced in the previous decade.<sup>21</sup>

17. TomTom 2014, *TomTom Australia & New Zealand Traffic Index*, TomTom

18. TomTom 2014, *TomTom Americas Traffic Index*, TomTom

19. TomTom 2014, *TomTom European Traffic Index*, TomTom

20. Infrastructure NSW (INSW) 2014, *2014 State Infrastructure Strategy Update*, Sydney

21. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney



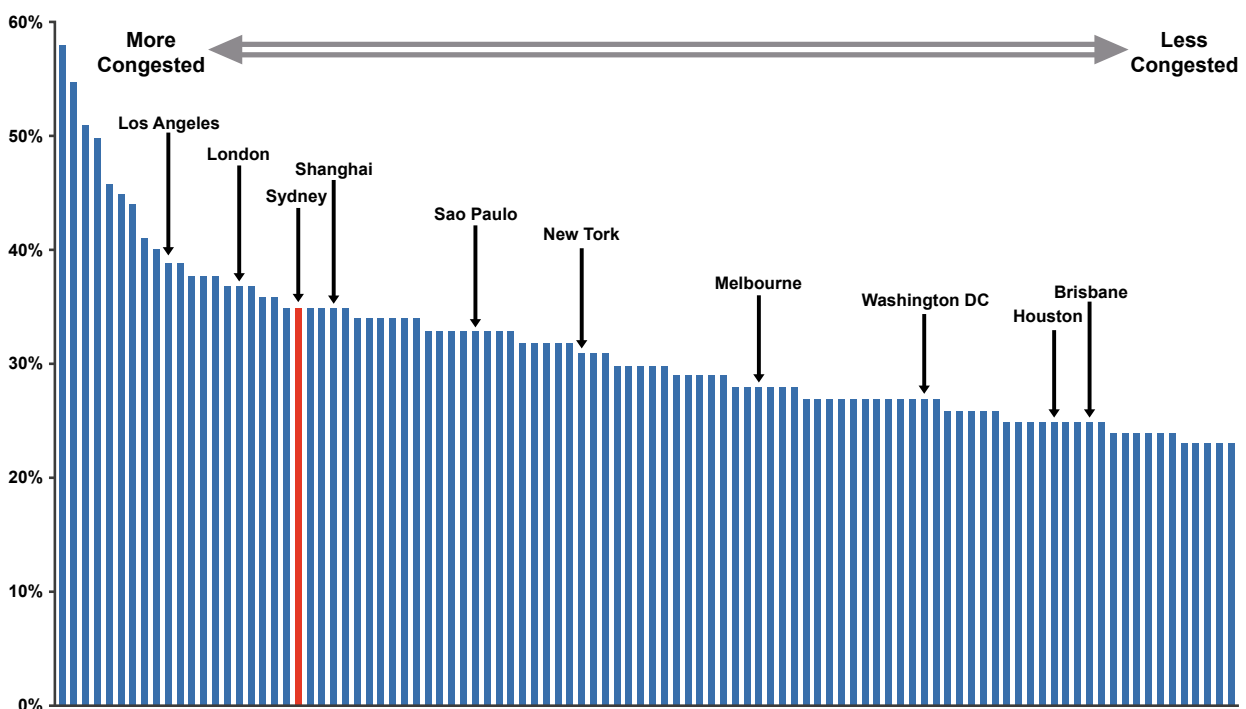
This information is supported by statistics released in 2015, which show that the avoidable costs of congestion in Sydney in 2015 are \$6.1 billion. By 2030, this is predicted to rise to up to \$12.6 billion.<sup>22</sup>

The graph at **Figure 2.9** highlights this growing impost on the economy, and its impact on both commuters and freight.

These results are broadly in line with the recent Infrastructure Australia audit of national infrastructure. This identified a cost of congestion for the Greater Sydney region (including Newcastle and Wollongong) of almost \$5.6 billion per annum (in 2011). Infrastructure Australia forecasts these costs will rise to \$14.7 billion by 2031.<sup>23</sup>

The rate of growth in congestion predicted by Infrastructure Australia is below that forecast in the *NSW Long Term Transport Master Plan*. Unlike the *NSW Long Term Transport Master Plan*, the Infrastructure Australia analysis assumes the delivery of transport and road projects already funded (including a subset of the projects in the *NSW Long Term Transport Master Plan* and some of the elements of this business case). This demonstrates the need for additional investment in both road and public transport to manage and contain this economic cost.

Figure 2.8 World's 100 most congested large cities (Sydney shown in red)  
Source: TomTom 2014, TomTom Traffic Index

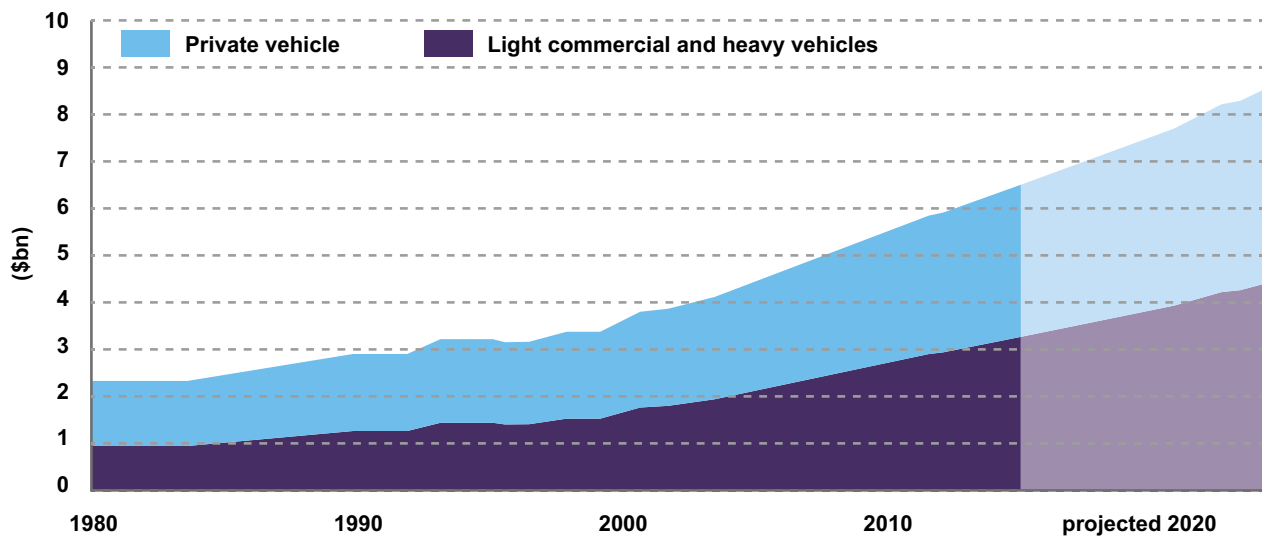


22 Department of Infrastructure and Regional Development, *Traffic and Congestion Cost Trends for Australian Capital Cities 2015*

23. Infrastructure Australia (IA) 2015, *Australian Infrastructure Audit: Our Infrastructure Challenges*, IA, Canberra

Figure 2.9 Growing cost of congestion

Source: Transport for NSW 2012, *NSW Long Term Transport Master Plan*



### 2.3.1 Constrained strategic transport corridors

Transport for NSW has identified 46 strategic transport corridors across metropolitan Sydney, where there are high concentrations of travel demand during peak periods on all travel modes.

Of the 46 corridors, six have been identified as facing ‘high constraints’. As shown in **Figure 2.10**, these highly constrained corridors include:

- Parramatta to Sydney CBD via Strathfield
- Sydney CBD to Sydney Airport
- Liverpool to Sydney Airport.

In terms of major roads, these corridors correspond to:

- M4/Parramatta Road
- Eastern Distributor/Southern Cross Drive
- M5/M5 East.

The peak travel times for these three corridors are shown at **Figure 2.11**. In 2031, with no additional infrastructure, the travel times for these corridors would deteriorate further – with motorists experiencing travel time increases of between nine to 29 per cent, depending on the corridor.

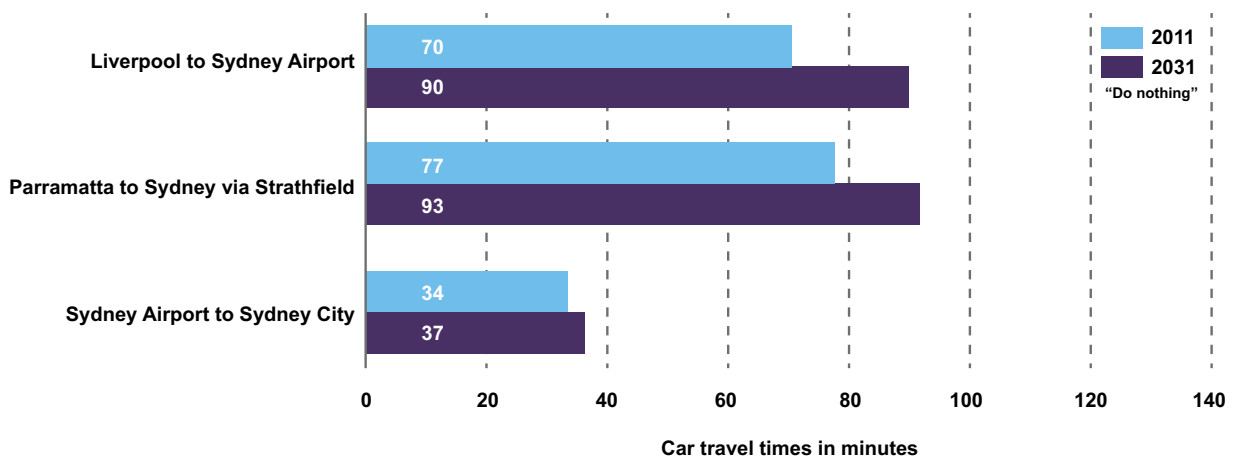
Figure 2.10 Strategic transport corridors with medium or high constraints

Source: Transport for NSW 2012, *NSW Long Term Transport Master Plan*



Figure 2.11 Peak travel times on selected strategic transport corridors

Source: Transport for NSW 2012, *NSW Long Term Transport Master Plan*



## 2.3.2 Road level impacts

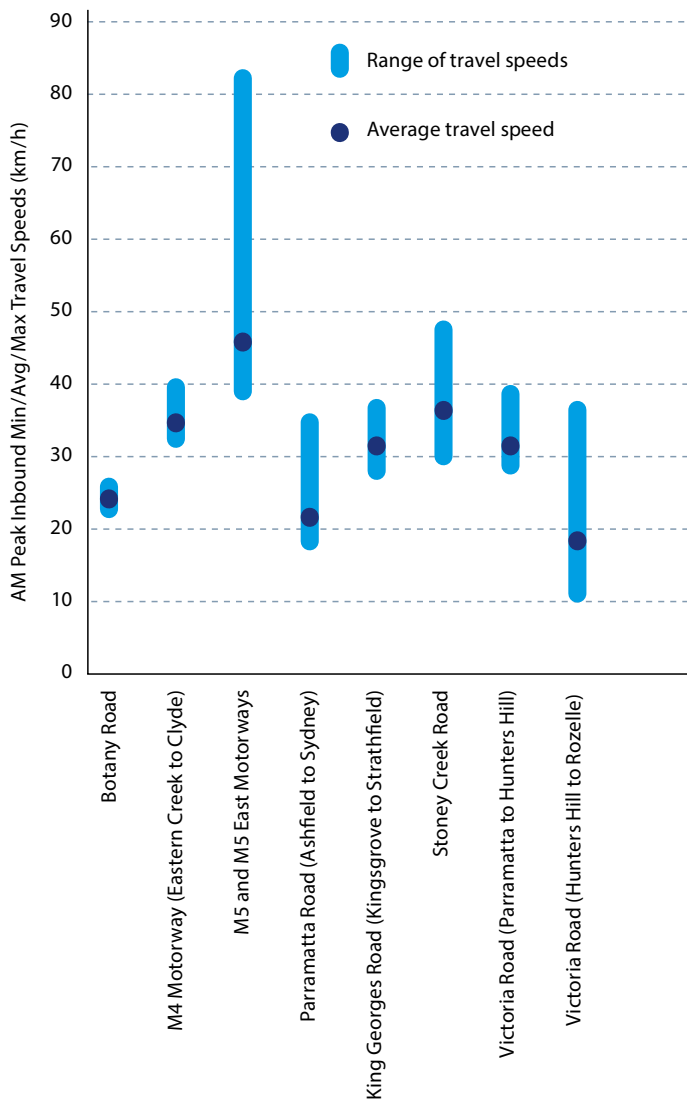
Congestion manifests as travel time and reliability impacts for road users. Congested roads become slower and less efficient, with travel times often becoming less predictable.

Figure 2.1234 illustrates the highly variable range and average morning peak travel speeds measured on a number of key roads that are particularly relevant to this business case.

With users taking longer to reach their destination, the overall productivity of the transport task is reduced. Slowed traffic on a road corridor makes it difficult to predict the ultimate travel time, forcing users to build contingency time into their journey to meet deadlines. This is unproductive time that costs the road user, and has a real economic impact.

Figure 2.12 Average travel speeds

Source: Transport for NSW, 2012  
NSW Long Term Transport Master Plan



The NSW Long Term Transport Master Plan also provides a comparison of traffic volume against road capacity on a selection of key roads along the constrained corridors. The Master Plan looked at volumes in 2011, and those forecast in 2031, assuming a 'do nothing' scenario (where no new infrastructure is built). This data is illustrated in Figure 2.13. Where the ratio exceeds one, it indicates that road volumes are exceeding the designed capacity, of the road; leading to congestion and delays.

Figure 2.13 illustrates that, for all these roads, volumes are forecast to increase. In a 'do nothing' scenario, this leads to the volumes exceeding road capacity.

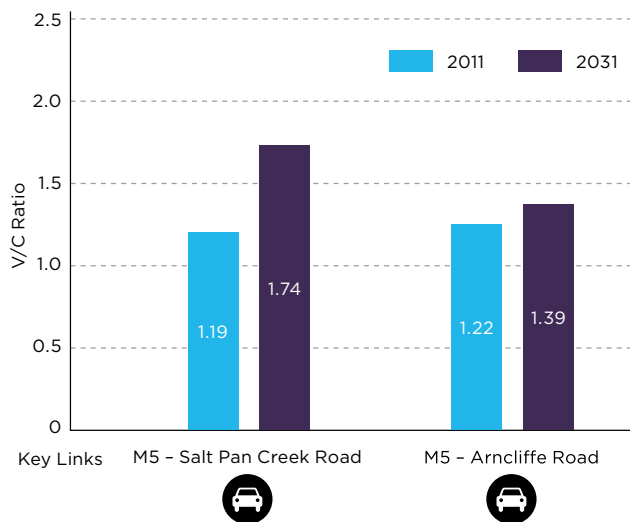
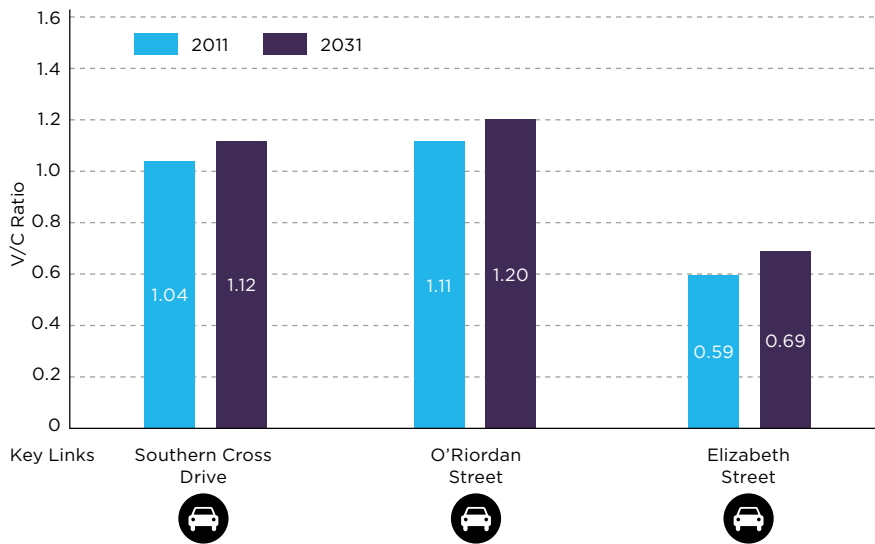
Virtually all of the key roads along the Parramatta to Sydney CBD, Sydney CBD to airport, and airport to Liverpool corridors already exceed capacity in the morning peak. As time progresses, congestion on these corridors is forecast to worsen.

The NSW Long Term Transport Master Plan provides the following analysis:

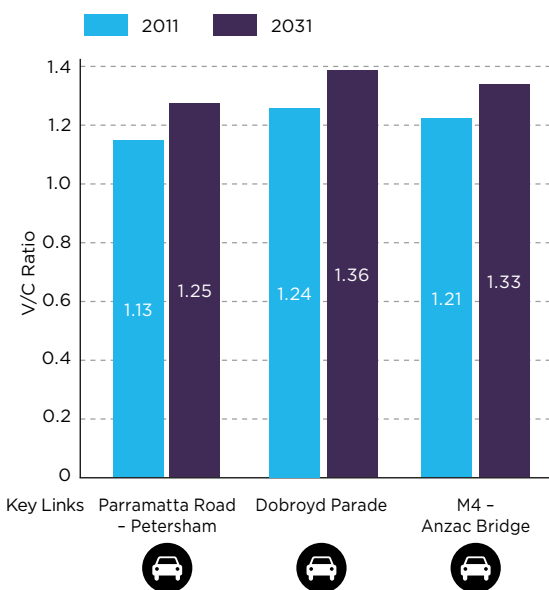
- "Southern Cross Drive currently operates at capacity during the morning peak period, slowing to an average speed of 35 km/h. Due to congestion on the Eastern Distributor, traffic diverts onto the adjacent arterial road network including O'Riordan and Bourke streets, which are also congested. Increasing activity at Sydney Airport, population and employment growth in the south Sydney and airport areas (including Green Square), and higher traffic volumes along strategic connections to the South West Growth Centre, including the M5, will place increasing pressure on this corridor"<sup>24</sup>

24. Transport for NSW (TfNSW) 2012, Long Term Transport Master Plan, TfNSW, Sydney

Figure 2.13 Volume Comparison on Key Roads – NSW Long Term Transport Master Plan ‘Do Nothing’ scenario  
 Source: Transport for NSW 2012, NSW Long Term Transport Master Plan



- “For drivers travelling between Parramatta and the CBD, both the M4 and Parramatta Road are congested and at capacity during peak periods. Most bus services on Parramatta Road are full during peak periods and experience variable travel times, with an average variance of up to eight minutes in the morning and evening peak periods due to congestion at the CBD-end of the journey. Growth in demand on this corridor under a ‘do nothing’ scenario is forecast to result in car travel times increasing by 16 minutes between the CBD and Parramatta. Rail demand is also forecast to exceed existing capacity”<sup>25</sup>
- “The M5 is very congested during peak periods, [with volumes exceeding capacity] and average speeds reducing to below 40 km/h. The high population growth forecast in south west Sydney will place increasing pressure on this corridor, further reducing speeds on the M5 by 2031.”<sup>26</sup>



25. Transport for NSW (TfNSW) 2012, Long Term Transport Master Plan, TfNSW, Sydney

26. Transport for NSW (TfNSW) 2012, Long Term Transport Master Plan, TfNSW, Sydney

## 2.3.3 Modelling our road network

A strategic traffic model has been used to forecast traffic patronage in Sydney. The model is discussed in **Chapter 10**. It includes an assessment of 'base demand', which replicates traffic flow data for the present and future, without the improvements to the network contained in this business case.

### Modelled network speed

Modelling results for Sydney's current road network show that at a large range of locations, vehicles are already travelling well below the sign-posted speed limit.

Most locations examined along the arterial road network show travel speeds up to 40 to 50 per cent slower than the posted speed during peak periods. Without intervention this trend will continue to worsen.

**Table 2.2** gives a selection of major arterial roads across Sydney on the M4/City West Link, M5, and Eastern Distributor or parallel corridors; comparing speeds with the posted limit.

- 'Green' represents a 25 per cent or lower difference in actual versus posted speed
- 'Yellow' is 25 per cent to 50 per cent lower
- 'Orange' is 50 per cent to 75 per cent lower
- 'Red' represents travel speeds that are more than 75 per cent lower than the posted speed.

Table 2.2 – Model travel speed results (2012).

\*Modelled as 70 km/h to account for slowing traffic in this location

Source: WestConnex Road Traffic Model v2.1

Locations	Posted Speed (km/h)	AM Peak East Bound Speed (km/h)	PM Peak West Bound Speed (km/h)
M4 Motorway at Duck Creek	90	20	80
Centenary Drive, South of Parramatta Road	80	60	10
Parramatta Road, West of Norton Street	60	40	50
City West Link, East of Boomerang	70	20	20
Victoria Road, East of Devlin Street	60	25	30
M5 Motorway at Hammondville Plaza	80*	55	30
M5 East	80	35	50
King Georges Road, North of M5 East	70	30	25
Stoney Creek Road, East of King Georges Road	60	50	10
Southern Cross Drive, North of Gardeners	80	70	70
Botany Road, North of Gardeners Road	50	25	20
O'Riordan Street, North of Gardeners	60	30	25
Elizabeth Street, North of Cleveland Street	50	-	20
Eastern Distributor	80	70	40
General Holmes Drive, East of M5 East	70	65	60
Rocky Point Road, North of Sandringham Street	70	10	30
Anzac Bridge	60	55	55

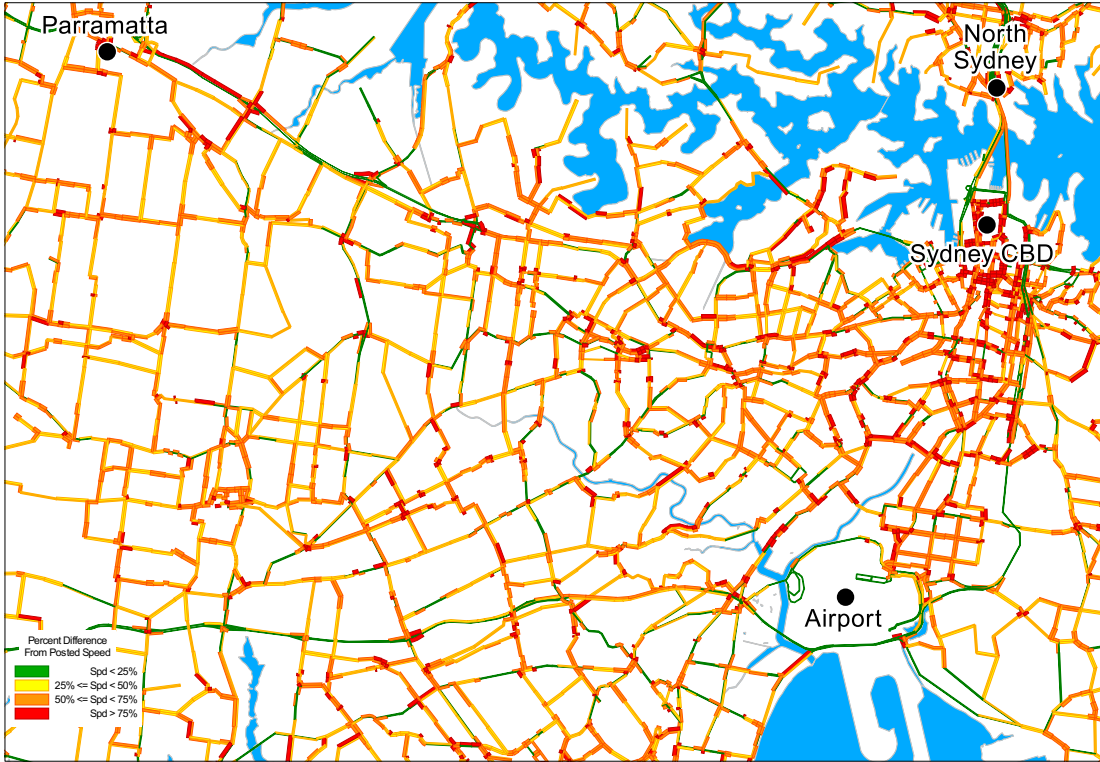
■ < 25% below limit

■ 50% to 75% below limit

■ 25% to 50% below limit

■ > 75% below limit

Figure 2.14 Speed limit vs model results speed in morning peak in 2012 and 2031  
 Source: WestConnex Road Traffic Model v2.1



2012 AM Peak - existing network - without WestConnex

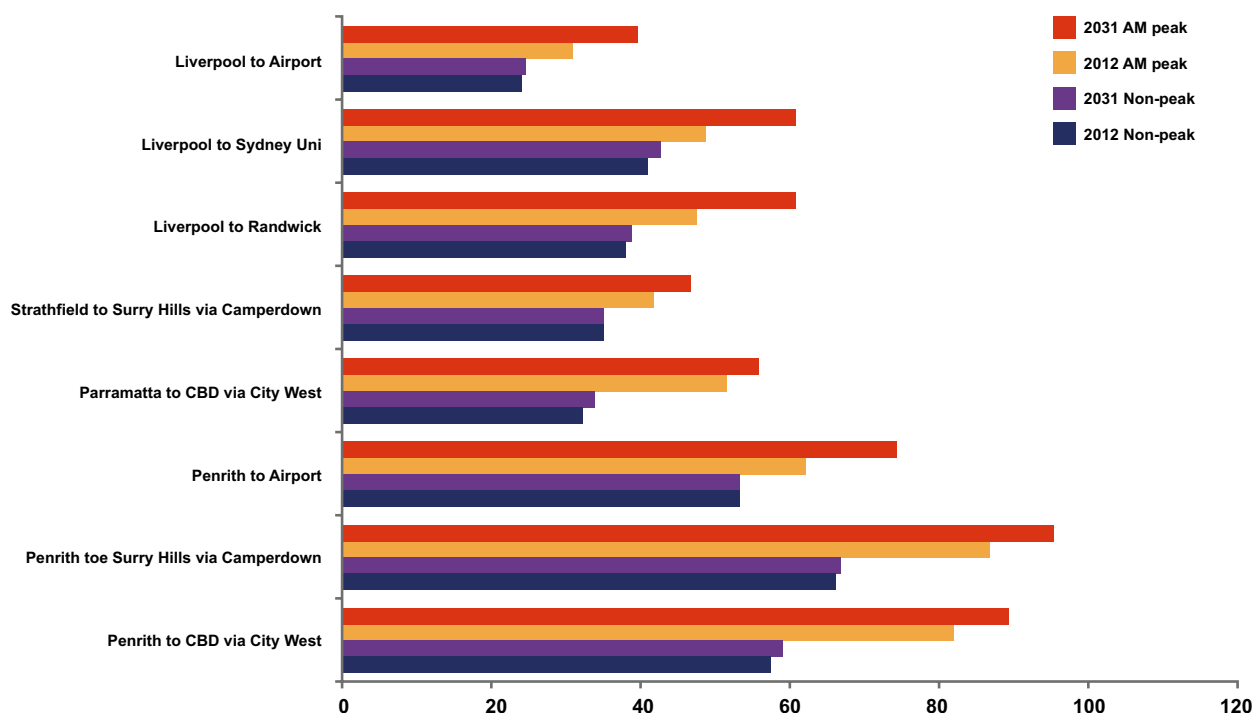


2031 AM Peak - existing network - without WestConnex

- < 25% below limit
- 25% to 50% below limit
- 50% to 75% below limit
- > 75% below limit

Figure 2.15 Modelled results for travel times – peak vs non-peak (2012 and 2031) without WestConnex

Source: WestConnex Road Traffic Model v2.1



**Figure 2.14** compares speed limits against forecast speed results for the existing network in 2012 and 2031. The slow travel speeds across large parts of the road network reflect substantial congestion during peak periods. Particularly on the major east-west and north-south roads that connect western Sydney, south western Sydney, and eastern Sydney.

Between 2012 and 2031, travel speeds significantly worsen on the road network serving western and south western Sydney (the M4, Parramatta Road, City West Link, and the M5), connections to the airport and Port Botany (Bourke Road, Botany Road, O’Riordan Street, and the Eastern Distributor), and on the main roads connecting the M4/Parramatta Road and the M5 (the A3 corridor including King Georges Road, and Bexley Road/Burwood Road).

The modelled results for 2031 are based on a series of data sources and assumptions, which include population and employment growth. These results include assumed public transport enhancements (such as Sydney Metro, improvements to the heavy rail system, and CBD and South East Light Rail) and other road enhancements already underway (such as NorthConnex).

Due to heavy congestion during peak periods, drivers are spending longer on the network. This is reflected in **Figure 2.15**, which shows a comparison of the travel times between the

morning peak period (7am to 9am) against a non-peak period from 7pm to 7am.

As speed limits do not take into account stop-starts of vehicles (e.g. for traffic lights at intersections), a comparison between the morning peak and the night non-peak period provides a more realistic comparison between ‘optimal’ (non-peak) and ‘congested’ (peak) journey times on the network.

The results show that some journeys are almost half an hour longer in the morning peak as compared to the non-peak period in 2012. For example, the travel time between Penrith and the CBD via the City West Link increases from 58 minutes off-peak to 82 minutes in peak. This is reflected in travel speeds described in **Table 2.2**, where during peak periods the City West Link is operating at speeds that are 70 per cent below the posted limit.

Penrith to the CBD via the City West Link journey is five minutes longer during the morning peak. The journey from Liverpool to Sydney University takes 10 minutes longer in 2031, and there is a 20 minute difference between peak and off-peak travel times.

The key take away point is that, even in the context of significant public transport investment, peak travel times worsen for all corridors included in **Figure 2.15**.



Figure 2.16 Average weekday traffic volumes 2012

Source: WestConnex Road Traffic Model v2.1



### Network performance now and in 2031

Average weekday traffic volumes on the existing road network are shown in **Figure 2.16**.

The existing Sydney motorway network, including the M5 Motorway, M5 East and the M4 Motorway, carries high levels of daily and peak hour traffic. This includes large volumes of heavy vehicles from western Sydney travelling to and from the Port Botany and Sydney Airport economic zone.

A large proportion of morning peak hour trips start in western Sydney and travel east of the existing M4 and to the Port Botany/Sydney Airport area.

The modelled average morning peak hour speed on the 2012 network was 32 kilometres per hour, well below the average posted speed limit of 50 kilometres per hour. The road links experiencing particularly high levels of congestion include the M5 East, Parramatta Road, City West Link and the Harbour Bridge approaches.

Given Sydney's population is projected to grow by 1.6 million between 2011 and 2031 (as discussed in **Section 2.2**), in a 'do nothing' scenario a large number of roads will experience peak congestion in 2031. A number of these roads are already congested. Growth in congestion will particularly manifest on the M4 corridor, Parramatta Road, City West Link, Anzac Bridge, Victoria Road and the Harbour Bridge/Tunnel and Southern Cross Drive corridor. This is detailed in **Table 2.3**.

Table 2.3 Modelled average weekday traffic volumes in 2012 and 2031 without WestConnex

Source: WestConnex Road Traffic Model v2.1

Location	2012 average weekday volumes	2031 average weekday volumes without WestConnex	Percentage growth
M4 Motorway	165,900	187,200	13%
M5 East	98,100	112,000	14%
General Holmes Drive	177,800	213,600	20%
Southern Cross Drive	153,300	192,300	25%
King Georges Road	83,900	104,400	24%
Parramatta Road, east of Norton Street	64,900	80,600	24%
Parramatta Road, east of Derwent Street	32,500	55,100	45%
Dobroyd Parade, east of Boomerang Street	62,400	65,600	5%
Anzac Bridge	142,700	158,100	11%
Victoria Road, south of Darling Street	61,400	67,700	10%
City West Link, east of Catherine Street	58,700	62,200	6%
Campbell Street, west of Euston Road	11,500	13,400	17%
Gardeners Road, west of Botany Road	32,000	45,100	41%

In 2031, without WestConnex, Parramatta Road just east of Norton Street, is forecast to carry up to 80,000 vehicles per day and the M5 East 112,000 vehicles per day. This is compared with 65,000 and 98,000 vehicles per day in 2012, representing growth of 24 per cent and 14 per cent respectively.

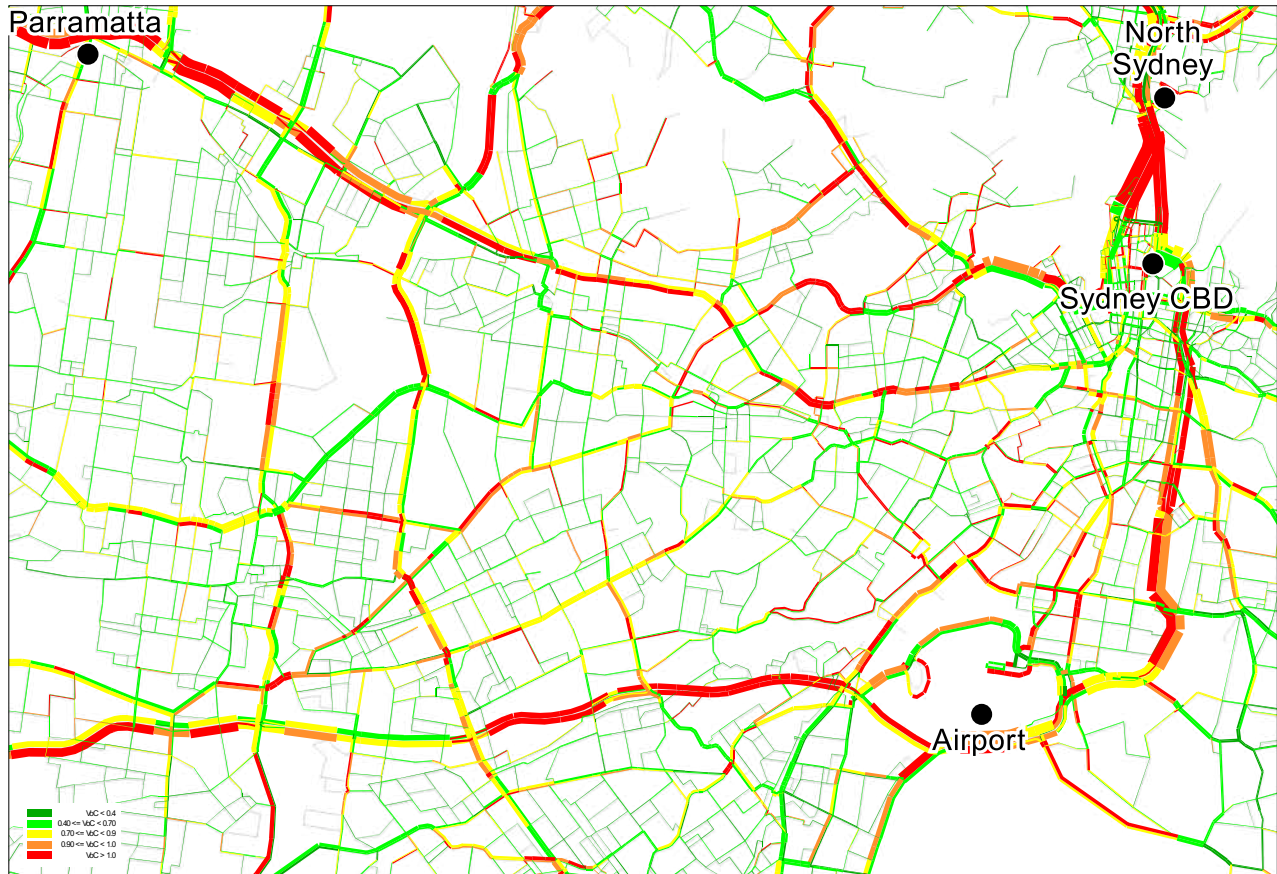
The M4 and M5 East corridor, Parramatta Road, City West Link/Anzac Bridge corridor, Victoria Road and the Harbour Bridge/Eastern Distributor corridor would operate above their capacities over all peak periods, as shown **Figure 2.17**.

By 2031 congestion would significantly reduce the average peak hour speeds on most strategic roads by up to 70 per cent. The modelled network average peak hour speed would fall to 29kilometres per hour, compared with 32 kilometres per hour in 2012.

By 2031, much of the network would operate with increased levels of congestion. Whilst the daily network utilisation would increase to accommodate daily traffic growth and a significantly higher number of trips over the day, the morning and evening peak periods would need to spread to accommodate higher levels of peak demand.

Figure 2.17 Modelled Volume to Capacity Ratios (AM peak hour, 2031) without WestConnex

Source: WestConnex Road Traffic Model v2.1



### Parramatta Road traffic volumes

Today, sections of Parramatta Road carry over 90,000 vehicles per day, with the heaviest traffic between the end of the M4 and the CBD being on the portion west of the City West Link. By 2031, this figure is expected to exceed 100,000 vehicles per day.<sup>27</sup> Included in these vehicle numbers are up to 8,000 heavy vehicles per day in 2012, a number which will exceed 10,000 by 2031.<sup>28</sup>

To put this into perspective, in 2012 the M4 Motorway at Homebush had average weekday traffic volumes of 96,100 vehicles and the M5 South West Motorway at Queen Street had 99,800 vehicles.<sup>29</sup> This means that Parramatta Road’s traffic volumes are already approaching those of some of Sydney’s busiest dedicated motorways.

Motorway-level traffic volumes on an urban road make for an unpleasant urban environment. Parramatta Road is an arterial road, which unlike a motorway, has large numbers of intersections and cross roads. This makes for a highly congested road and adjoining intersections. The road suffers slowdowns at multiple points – including at the connection between the M4 and Parramatta Road, around the Burwood Road intersection, between the Great North Road and City West Link (Wattle Street) intersections, around Hawthorne Canal, and around the Balmain Road and Pyrmont Bridge Road intersections.

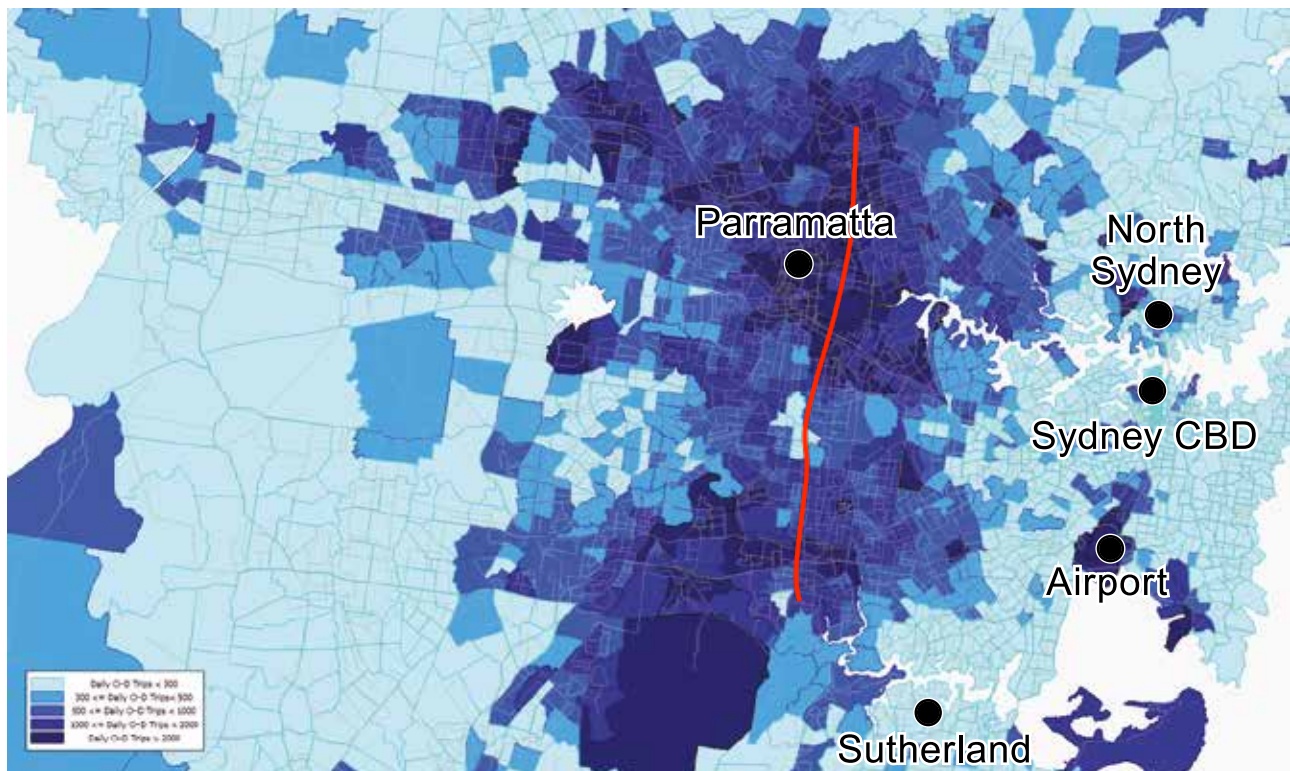
27. WestConnex 2015, WestConnex Road Traffic Model 2.1, WestConnex

28. WestConnex 2015, WestConnex Road Traffic Model 2.1, WestConnex

29. Roads and Maritime Services (RMS) 2012, Average daily traffic volume, RMS, Sydney (<http://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/index.html>)

Figure 2.18 Daily east-west vehicle movements in 2012 (origins/destinations)

Source: WestConnex Road Traffic Model v2.1



There will continue to be a real need to support diffuse trips that by their nature cannot be well serviced by public transport, including the movement of freight, and other commercial vehicle activity.

### East-west movements

As discussed in **Section 2.2.1**, there is a disparity between population growth and jobs growth when comparing eastern Sydney and western Sydney. Rail and public transport provide high quality connections between major centres for commuters – with the main western rail corridor connecting Penrith, Blacktown, Parramatta, Granville, Burwood and into the Sydney CBD.

As **Section 2.2.3** outlines, however, roads cater for different target markets to other transport modes. There will continue to be a real need to support diffuse trips that by their nature cannot be well serviced by public transport, including the movement of freight, and other commercial vehicle activity. In this context, the model can be used to identify key east-west travel patterns that rely specifically on the road network.

**Figure 2.18** shows origins and destinations for vehicles moving east-to-west or west-to-east throughout the day based on the existing network. It does this by highlighting the origin and destination zones for vehicles that travel from the west of Sydney to the east or vice versa; with the dividing line being immediately east of Parramatta.

**Figure 2.18** notably does not show strong vehicle movements to the Sydney CBD. Rather, it shows that there is significant demand to travel to the industrial, freight, and other 'non-major centre' areas in eastern Sydney that support jobs and industry – including Port Botany, Sydney Airport/Mascot, Kurnell, Bankstown/Condell Park, Earlwood, Ermington/Silverwater/Auburn, Sydney Olympic Park, Woolloomooloo/Garden Island, and Pyrmont.

Many of these origins and destinations align with Sydney's freight activity precincts (as per **Figure 2.20**).

### 2.3.4 Congestion and road safety

Congestion reduces the safety of road networks. With Sydney's 'lower order' roads forced to perform a 'higher order' function due to congestion, vehicle crashes and traffic incidents are more frequent. This impacts on personal safety, property and the performance of the road network.

Over the five years through 2013, rear-end collisions were the most common type of collision in metropolitan Sydney with over 15,000 recorded incidents.<sup>30</sup> Rear-end crashes were often the result of the stop-start conditions experienced in congested traffic in the Sydney region during that period, making up a quarter of all crashes.<sup>31</sup>

## 2.4 Serving freight and international gateway traffic

The freight industry is an essential part of the NSW economy. Goods, products, and minerals need to move between manufacturers, warehouses, farms, shops, mines, and ports. This makes freight a key facilitator or enabler of economic activity. In 2011, the gross value added to the NSW economy from the freight and logistics industry was estimated at around \$58 billion or 13.8 per cent of Gross State Product. Additionally, it is estimated that there are around half a million people working in logistics, or nearly 14 per cent of NSW employment.<sup>32</sup>

A large proportion of Australia's goods are imported and exported via Port Botany in Sydney, NSW's primary container port. The port handles the second highest volume of containers in Australia.<sup>33</sup> Port Botany is located in the same precinct as Sydney Airport, which is Australia's primary international airport, handling around 40 per cent of the country's international flights.<sup>34</sup> In 2012, there were almost 37 million passengers through Sydney Airport, and 615,000 tonnes of air freight. In 2014, Sydney Airport Corporation Limited estimated it contributes around \$30 billion per annum to the NSW economy.<sup>35</sup>

In 2011, there were approximately half a million people working in logistics, or nearly 14 per cent of NSW employment.<sup>45</sup>

In 2012, there were almost 37 million passengers through Sydney Airport, and 615,000 tonnes of air freight, and the Sydney Airport Corporation Limited estimates it contributes around \$30 billion per annum to the NSW economy.<sup>48</sup>

30. Centre for Road Safety 2015, *Crash Statistics*, TfNSW, Sydney

31. Centre for Road Safety 2015, *Crash Statistics*, TfNSW, Sydney

32. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

33. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

34. NSW Trade and Investment (NSWTI), *NSW NOW Accessible to the World*, NSWTI, Sydney

35. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

## 2.4.1 Doubling of the freight task

By 2031, the freight task in NSW is projected to nearly double to 794 million tonnes compared to 2011. As the *NSW Freight and Ports Strategy* indicates: “the implications of this growth for ports, road and rail networks, intermodal terminals and freight corridors are significant. Capacity across the freight network varies, but key parts of the network are already under pressure to match demand.”<sup>36</sup>

The NSW road network carried 63 per cent of the total freight task in 2011, or around 256 million tonnes of freight. The role of heavy vehicles in moving freight across NSW is substantial, and will continue to be so for the foreseeable future.

Road freight is also increasingly subject to capacity constraints and peak hour congestion in Sydney. The M4 and M5 motorways in particular have limited available capacity in peak periods (as explained in **Section 2.3.3**).<sup>37</sup>

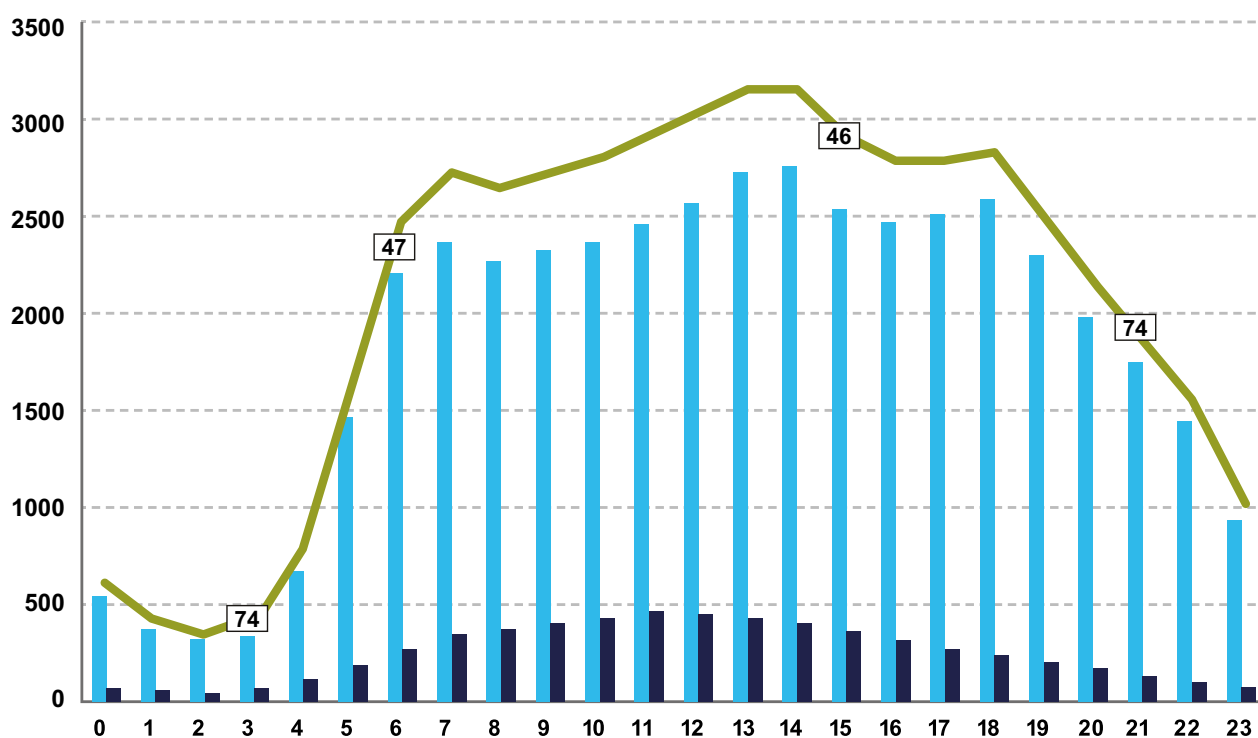
**Figure 2.19** illustrates the volumes across the M5 Motorway of both light and heavy vehicles using the M5 and traffic speeds.

The *NSW Freight and Ports Strategy* examined whether the shift from road to rail freight would address this issue. At the time the strategy was prepared, around 14 per cent of containerised freight from the major ports was carried by rail; while the NSW Government has set a target of 28 per cent.

Given the predicted population growth and increase in total freight volumes, even if this target was achieved, there will still be increases in road freight volumes. Specifically, the strategy found that: “even with the targeted increase in rail mode share, early modelling results indicate the M4 and M5 will not be able to accommodate the additional container traffic when combined with background growth from employment and population by 2031.”<sup>38</sup>

Figure 2.19 M5 hourly traffic volumes on an average day in 2011

Source: Transport for NSW 2013, *NSW Freight and Ports Strategy*



The M5 carries approximately 100,000 vehicles per day.

The share of trucks on the M5 fluctuates from 15% at 3am to 7% at 10pm (RMS RISS, July 2012).

Cars/light vehicles

Heavy vehicles

Total volumes

46 Average speed, km/hr (over 3-6 hours)

## 2.4.2 Supporting Sydney's key freight hubs

**Figure 2.20** highlights the major 'freight activity precincts' across Sydney (in purple). These precincts are heavily focused around western Sydney, as well as the port and airport.

Significant freight trip generators include:

- Port Botany and Sydney Airport
- Established intermodal terminals such as at Chullora and Macarthur
- Enfield Intermodal Terminal
- Future Moorebank Intermodal Terminal(s)
- Western Sydney Employment Lands.

These precincts are largely located on the city's major roads – particularly along the M4, M5 and M7 motorways – and rail lines, as well as at Port Botany and Sydney Airport.

There are also other discreet freight trip generators, located historically in areas which have otherwise evolved beyond their industrial roots. Port facilities at Glebe Island and White Bay are examples of this.

These hubs are dependent on good road infrastructure to ensure that trucks are able to move goods. Even those served by freight rail, such as the intermodal terminals, act as intermediary points between the road and rail networks, necessitating high quality connectivity on both networks.

Port Botany poses a significant transport challenge. NSW container freight volumes in 2010 were around 1.9 million units (measured in 'twenty-foot equivalent units' of containers) per annum. By 2020, this is forecast to grow to between three and 3.6 million; reaching between 4.9 and seven million by 2030.

This is illustrated in **Figure 2.21**. As the state's primary container port, Port Botany is growing to facilitate this task and a third container terminal was added in mid-2014.<sup>39</sup>

36. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

37. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

38. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

39. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

40. Bureau of Transport Statistics 2015, *Sydney Airport – Port Botany Freight Movement Model*, TfNSW, Sydney

The Government is supporting these freight movements, by:

- Investing in programs to improve the operational efficiency and attractiveness of rail freight
- Supporting the development of intermodal terminals like those being pursued by the Australian Government and private sector at Moorebank
- Targeting an increase in freight rail mode share for container movements
- Encouraging improvements on the road side, such as greater truck efficiencies and lengthened off-peak operations.

Given the predicted increase in container numbers over the period to 2030, there will be an undeniable increase in heavy vehicle movements supporting Port Botany, regardless of the success of these other measures.

Even with Enfield and Moorebank intermodal terminals, which will both be operational over the next few years – thereby boosting freight rail capacity substantially – truck movements are still forecast to almost triple, reaching around 8,000 per day by 2031.<sup>40</sup>

Figure 2.20 Freight activity precincts in Sydney

Source: Transport for NSW 2013, *NSW Freight and Ports Strategy*

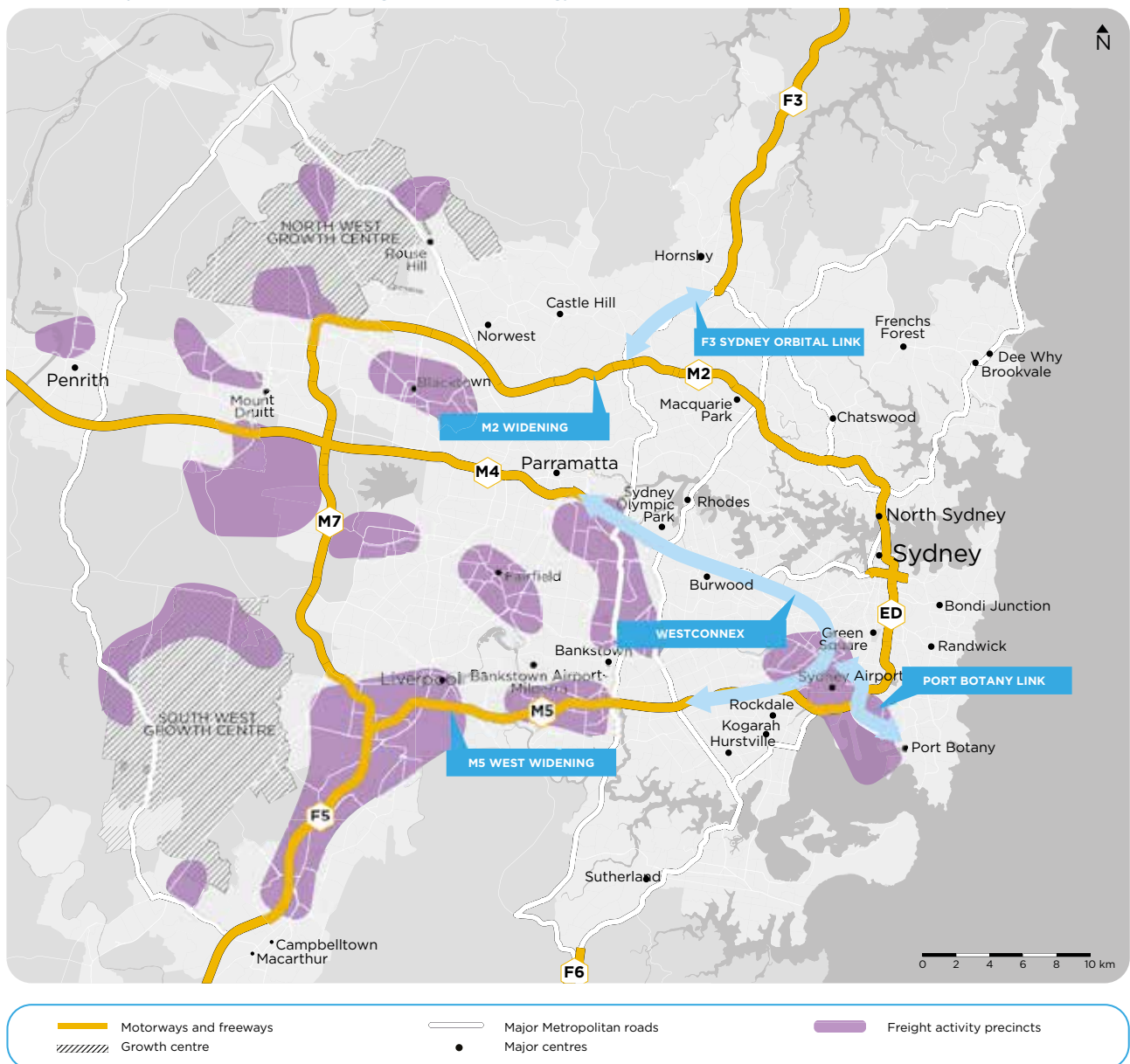
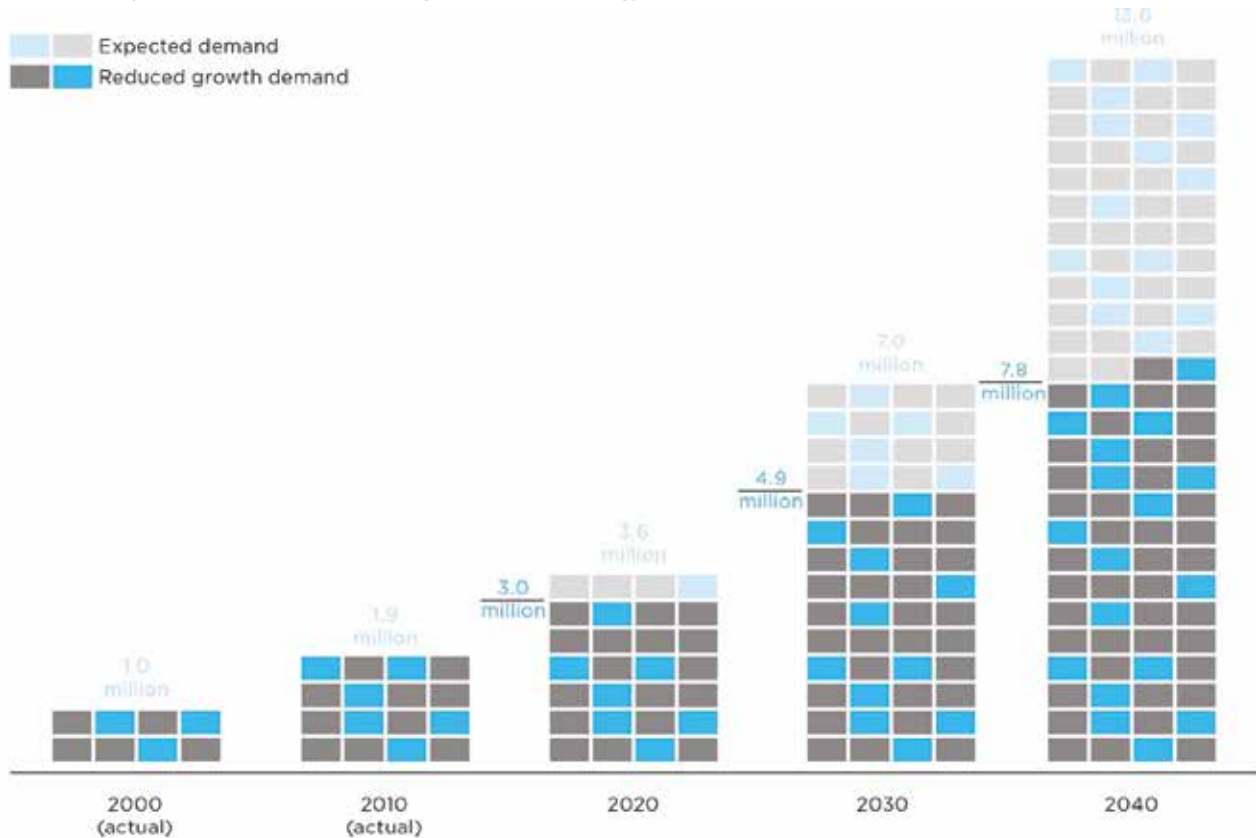




Figure 2.21 NSW container freight forecast

Source: Transport for NSW 2013, *NSW Freight and Ports Strategy*



## 2.4.3 Freight modelling results

### Port Botany/Sydney Airport

Port Botany and Sydney Airport have critical economic and freight roles in Sydney. In 2012 Infrastructure NSW stated they directly generate: “some \$10.5 billion in economic activity and handl[e] more than \$60 billion of freight each year”. Given the forecast freight growth for containers in particular (**Figure 2.21**), understanding the key freight movements to and from this precinct is of importance.

The modelling results allow for the identification of heavy vehicle movements throughout Sydney, as well as those that are destined to and from specific precincts – such as the port and airport. The morning peak results for 2012 and a 2031 forecast (without investment proposed in this business case) are shown at **Figure 2.22**.

In 2012, there was significant use of the M5 East, and the M5 South West, the A3 Corridor (King Georges Road, Roberts Road, and Centenary Drive) that connects the M5 with the M4, the M4 (from the A3 west), and the Hume Highway/The Horsley Drive (again from the A3 west). There are also more limited flows directly north via the Eastern Distributor and across the Harbour Bridge, and closer to the precinct, to Tempe/St Peters and Mascot.

All these flows grow in 2031, with the M5 East taking significant additional heavy vehicle traffic from the port and airport, flowing through to the M5 South West, A3 and M4.

The 2031 forecast assumes the new rail intermodal terminals at Enfield, at Moorebank, and at Eastern Creek are in operation.

## Heavy vehicle usage across Sydney

Heavy vehicles also operate across broader Sydney. For example, Glebe Island and White Bay provide Sydney's principal centre for receiving, storing and distributing dry bulk goods. Elsewhere, heavy vehicles move loads between manufacturers, distribution centres and retailers.

These vehicles are impacted by and add to broader traffic congestion. **Figure 2.23** maps heavy vehicle volumes against overall road congestion (overall volume over capacity) for the morning peak period in 2012 and 2031 (without WestConnex).

**Figure 2.23** illustrates that in 2012, the M5 East and M4 both had significant volumes of freight impacted by road congestion. Other roads including the Eastern Distributor, Harbour Bridge and Tunnel, and City West Link also all face congestion, although they carry a comparatively lower volume of trucks during the morning peak.

By 2031 there is a significant worsening of congestion impacting freight movements on the M5 East and M4. Congestion is also forecast to worsen in the airport and port precinct, and along the A3 and M7 corridors.

Figure 2.22 Heavy Vehicle movements from the port and airport in the morning peak period under a 'do minimum' scenario

Source: WestConnex Road Traffic Model v2.1  
2012

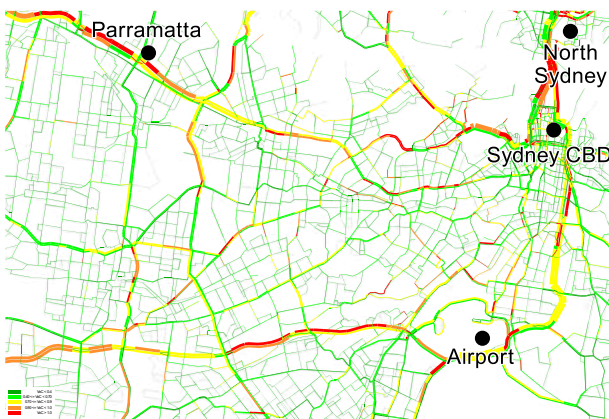


2031

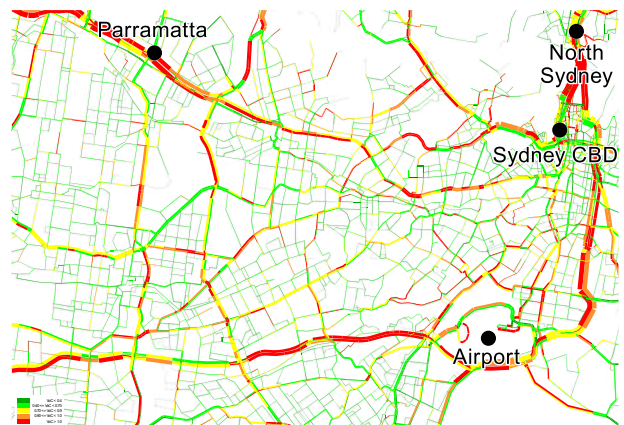


Figure 2.23 Freight volumes and congestion impact in morning peak without WestConnex 'do minimum'

Source: WestConnex Road Traffic Model v2.1  
2012



2031



## 2.4.4 Sydney as Australia's aviation gateway to the world

Sydney Airport is the busiest airport in Australia for scheduled passenger services. In 2012, it served almost 37 million passengers, one third from international destinations.

The routes between Sydney and Brisbane, and Sydney and Melbourne, are some of the busiest in the world.

As a result, the airport is central to the economic importance of Sydney, NSW, and Australia – generating an estimated \$27.6 billion in direct and indirect economic activity each year.<sup>41</sup>

The airport is also a significant employment facilitator and hub, with: *“direct and indirect employment of 283,700 jobs...including 160,000 direct jobs, 28,000 of which are on-airport.”*<sup>42</sup>

Given all this, it is a substantial ‘trip generator’ for the city’s transport network. Transport must be sufficient to ensure the airport continues to deliver economically, and maintain its role in effectively connecting Sydney to Australia and the world.

From a transport perspective, it is one of only two capital city airports in the country served by passenger rail services. Train service frequency has recently been increased, and the NSW Government is also in the process of improving bus access to further enhance the public transport offering. Despite these public transport improvements, vehicle numbers for the airport (encompassing passengers, workers, and other visitors) are anticipated to rise from 92,000 per average weekday in 2012 to 163,000 in 2031.<sup>43</sup>

The airport also serves a freight market. Sydney Airport Corporation Limited states that: *“total freight is forecast to grow from 615,378 tonnes in 2012 to 1,011,312 tonnes in 2033”*.<sup>44</sup>

The vast majority of air freight travels in the ‘belly’ of passenger aircraft; meaning that freight movement to and from the airport tends to coincide with passenger movements. Air freight transfers by nature are generally time sensitive and unsuitable for rail haulage – the majority is therefore carried on the road network.

Although it represents only a small proportion of the freight traffic in the overall airport/Port Botany precinct, air freight is generally high value in nature. It is therefore important to the NSW economy that it is able to be moved to and from the airport efficiently.

### Western Sydney Airport

In this context, it is worth noting the Australian Government’s identification of Badgerys Creek as a site for a second Sydney airport. Work has commenced on road upgrades to support the future development of this airport.

The Australian Government has indicated the new airport may become operational in the mid-2020s. Despite this new capacity, the report recommending the commissioning of Badgerys Creek outlined an expectation that the existing Sydney Airport will continue to be the primary airport for the city in terms of both passenger services and freight.<sup>45</sup>

Once open, Western Sydney Airport is expected to cater for around five million passengers per annum.<sup>46</sup> As already discussed, Sydney Airport handled close to 37 million passengers in 2012, or more than seven times this number, and this is predicted to more than double by 2033.<sup>47</sup>

This highlights that, even following delivery of the Western Sydney Airport, the existing Sydney Airport will remain a significant and growing trip generator for the road network.

41. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

42. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

43. WestConnex 2015, *WestConnex Road Traffic Model 2.1*, WestConnex

44. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

45. Steering Committee overseeing the Joint Study on aviation capacity for the Sydney region 2012, *Joint Study on Aviation Capacity for the Sydney Region*.

46. Department of Infrastructure and Regional Development (DIRD) 2015, *Western Sydney Airport Community Update Winter 2015*, DIRD, Canberra

47. Sydney Airport Corporation Limited (SACL) 2014, *Sydney Airport Master Plan 2033*, SACL, Sydney

## 2.5 Supporting job creation

In order to support the creation of jobs, businesses need to be able to access high quality transport links. Good quality connections are necessary to create attractive employment hubs and commercial centres.

Connectivity between major employment centres, and particularly with the Global Economic Corridor, is critical. It is necessary to better connect employees with employers, and support connections between businesses and their customers, suppliers and partners.

### 2.5.1 Connections to drive jobs growth

Economies of scale are derived from the co-location of businesses. This lowers the cost of providing services, and increases productivity and the exchange of ideas.

Infrastructure NSW identified one of Sydney's key strengths as its high-value economic clusters within the Global Economic Corridor.

The corridor is home to many companies specialising in activities high on the value chain, like finance and insurance sectors, and professional, scientific and technical services. 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.<sup>48</sup>

A good example of this is the concentration of jobs, business, and industry in the southern Sydney, Sydney Airport and Port Botany area (**Figure 2.24**). This precinct makes a disproportionate contribution to the NSW economy because it contains major and diverse trip generators – in terms of freight, service, business and journey to work trips.

For this jobs concentration to continue to work successfully, it is necessary to provide high quality transport infrastructure to support the businesses and their connectivity to the rest of city.

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.

### 2.5.2 Strengthening Parramatta – Sydney's second CBD

Parramatta, Sydney's western CBD, is located close to the demographic heart of the Sydney Metropolitan Area. It features a scale and mix of commercial, health and education facilities, which are all job generators. Parramatta is a major economic precinct in the western half of the Global Economic Corridor.

Parramatta's location in western Sydney, provides a multi-skilled jobs precinct that is well connected to housing areas in Sydney's west by rail and the M4 Motorway. Additional Government infrastructure investment to improve transport will:

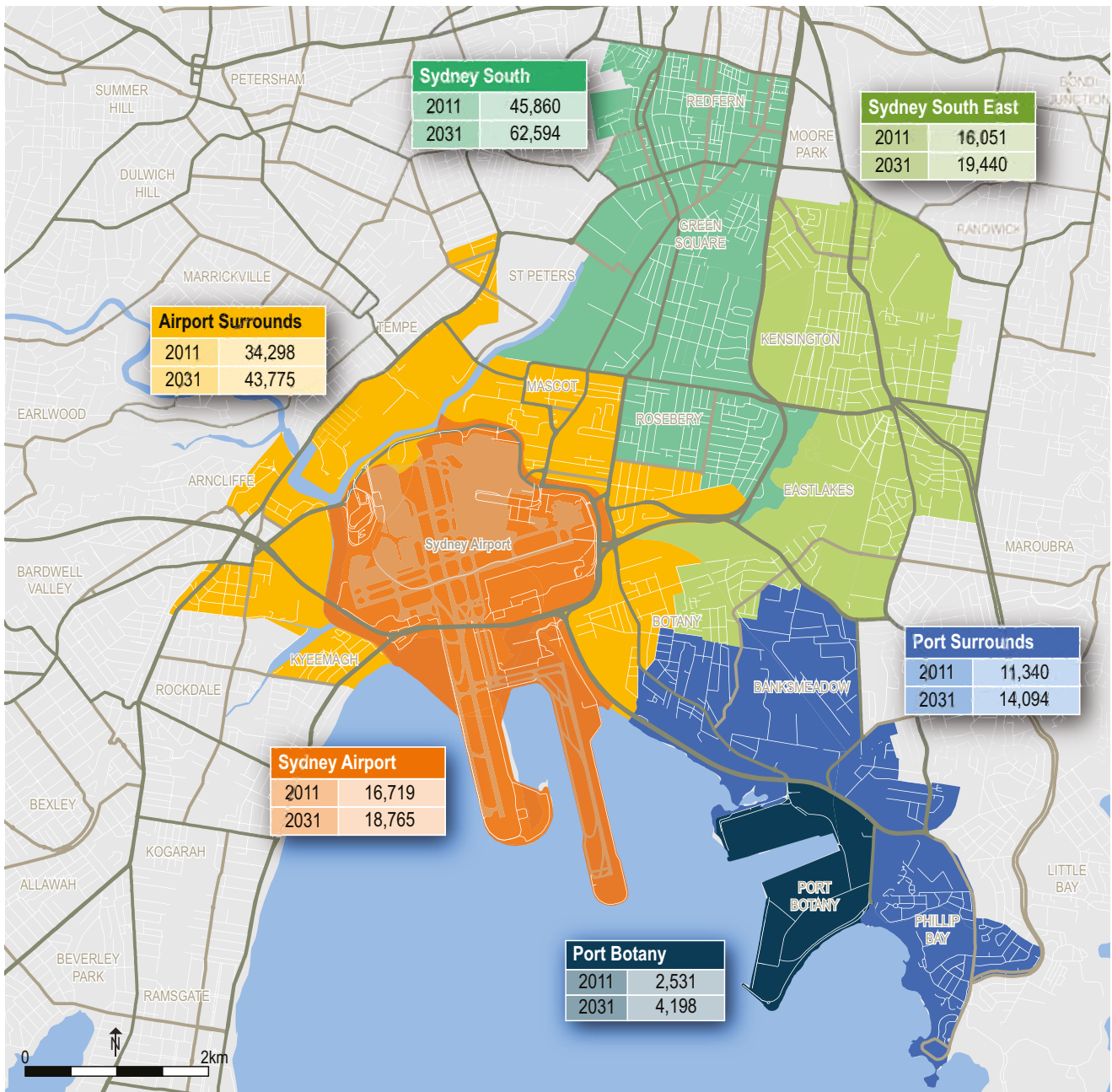
- Leverage the strength of Parramatta's location and existing connectivity
- Provide greater access to customers and workers
- Deliver improved access across the Global Economic Corridor
- Assist in increasing the desirability of Parramatta as a business location.

Other centres could benefit from similar jobs growth with better transport connections, including Burwood, Strathfield, Rhodes, Sydney Olympic Park, Westmead Health Precinct and Bankstown.

48. Infrastructure NSW (INSW) 2014, *2014 State Infrastructure Strategy Update*, INSW, Sydney

Figure 2.24 Jobs - Port Botany, Sydney Airport, and Surrounding Suburbs

Source: Bureau of Transport Statistics 2012, Population and Employment Travel Zone Forecasts



## 2.6 Urban renewal and housing supply – Parramatta Road

Parramatta Road is the primary road connecting Sydney's two most significant business districts – Sydney CBD and Parramatta.

Passing through many of the inner west suburbs of Sydney before connecting to the M4 Motorway, Parramatta Road has to balance a number of competing functions. It acts as a transport thoroughfare, a business corridor, and a connector between the many places and communities along its length.

When Parramatta Road was originally built, the road corridor was not designed to function as the primary passenger and freight route for large cities like modern-day Sydney.

Successive upgrades have been undertaken in an attempt to improve its ability to accommodate the ever-growing arterial transport task. However, these works have generally resulted in short-term improvements only, often at the expense of the corridor's other functions and uses.

Traffic volumes along the road have continued to increase with the growth of the city, and with through-traffic continuing to take priority, other activities in the corridor have declined. With close to 100,000 vehicles (including up to 8,000 trucks on some sections) passing along the road each weekday,<sup>49</sup> street-level activity has progressively declined to varying degrees along the Parramatta Road corridor.

Pedestrian activities have been pushed to the edges and a once-thriving business community has eroded to the point where many parts of Parramatta Road are devoid of vibrancy and activation. This has led to a degraded urban environment and decreasing economic activity, resulting in reduced amenity for the immediate corridor and its surrounds. Arguably, the road now represents a drag on Sydney's economic performance and housing delivery, with the movement of traffic being its major priority.

Land use along the Parramatta Road corridor has changed in response to the degradation of the street environment.

Figure 2.25 Parramatta Road

Source: UrbanGrowth NSW



The visual environment is cluttered with cables, poles and signage. Stretches of the road are dominated by vacant shop fronts. The amenity of the street environment is poor with high noise levels and a lack of trees and landscaping. There is little to entice visitors to the corridor or to spend meaningful time within it. In addition, a lack of night time activity leads to concerns for safety and security.

49. WestConnex 2015, WestConnex Road Traffic Model 2.1, WestConnex

## 2.6.1 Housing and development along the Parramatta Road corridor

To provide for forecast population growth, Sydney will need around 664,000 additional homes over the next 20 years.<sup>50</sup> As *A Plan for Growing Sydney* makes clear: “providing housing in a variety of sizes, types and locations will be essential to meeting Sydney’s future housing need... accelerating the supply and the variety of housing across Sydney, such as apartments and townhouses, will make it easier for people to find homes to suit their lifestyle and budget.”<sup>51</sup>

Given its strategic location, *A Plan for Growing Sydney* identifies the Parramatta Road corridor as a focus for increased housing, economic activity and social infrastructure.<sup>52</sup>

A significant catalyst is needed to prevent existing trends in the Parramatta Road corridor impacting the delivery of additional housing given the likelihood of:

- Further increases in traffic volumes and associated amenity impacts
- Continued degradation of existing building stock
- Limited turnover of land to other uses and limited redevelopment of sites adjacent to Parramatta Road
- Continued decline in the productivity of the Parramatta Road corridor with flow-on effects for other parts of the city.

In order to address the deteriorating state of Parramatta Road, traffic volumes must be reduced.

## 2.7 Affordability and fundability constraints

The Government has limited funds available for investment, and these are required for a broad range of projects. As the NSW Budget makes clear, infrastructure investment must address the State’s infrastructure requirements while allowing Government to sustainably manage debt.

Investment decisions need to avoid pressure on the State’s balance sheet and credit rating.<sup>53</sup>

Solutions to the growing infrastructure deficit need to be able to work within the financial constraints of the NSW Budget. This is particularly important for the Government in maintaining the State’s AAA credit rating, which directly impacts the State’s ability to fund future investments.

## 2.8 Summary

Sydney is growing and between 2011 and 2031, an additional 1.6 million people are expected to call Sydney home.

Freight movements are also expected to increase significantly, with container volumes alone tripling between 2010 and 2030. In addition, population growth is focused in western Sydney, while employment growth is skewed to the east. There are significant east–west demands on the road network, which are focused on freight, industrial and other ‘non-major centres’ rather than the CBD.

In this context, there remain significant gaps in Sydney’s motorway network. While there is substantial investment in public transport, the road network is needed to support a diverse range of trips that are not compatible with public transport.

Sydney’s roads also suffer from congestion and the associated impacts, which have a direct flow-on affect to economic productivity.

Even with the significant public transport investment underway, congestion is expected to worsen as network demand grows over time.

In addition to these issues, significant parts of the Parramatta Road corridor are ripe for regeneration, given its location between Sydney’s two largest business districts. This is unlikely to occur without a significant catalyst that deals with traffic volumes and the associated amenity impacts.

50. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

51. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

52. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

53. NSW Treasury 2014, *NSW Budget 2014-15*, NSW Treasury, Sydney

# 3



## SOLUTIONS IN A STRATEGIC CONTEXT

WestConnex forms part of NSW's transport and planning framework and is fully integrated into the Government's broader vision for Greater Sydney. The project is also central to the strategies of Infrastructure NSW, the Australian Government and Infrastructure Australia.

This Chapter examines each of the principal strategic documents, describing how WestConnex fits in the wider strategic context. Collectively the key Government strategies focus on land use and complementary transport infrastructure as a means to service Sydney's growth, increase productivity and improve liveability.

## 3.1 WestConnex and NSW strategic planning

The NSW State Priorities, released in 2015, provide key targets for NSW to grow the economy, deliver infrastructure and improve health, education and other services.

The State Priorities are supported by a series of strategic documents targeting infrastructure investment, transport investment and service improvement, and urban planning for Sydney. These documents frame the strategic issues from different perspectives, but provide a consistent and coordinated direction for Sydney. They utilise common (although continually maturing) evidence bases to understand and identify the problems faced by Sydney at a strategic level. They identify solutions for further development, which are adopted as part of the overall future direction for Sydney.

It is at this level that WestConnex was first identified as an infrastructure solution for Sydney; as part of the *2012 State Infrastructure Strategy*.

## 3.2 Achieving the State Priorities

In 2015, the NSW Premier announced a new set of State Priorities (**Figure 3.1**). These included:

- 150,000 new jobs by 2019 - creating jobs and apprenticeships for the construction sector through infrastructure investment
- Building infrastructure – key infrastructure across the state will be delivered on time and on budget to support our growing population
- Encouraging business investment – infrastructure delivered by the government will significantly improve the ease of doing business in NSW by reducing congestion, increasing reliability and productivity and driving business confidence

- Protecting our credit rating – NSW is one of only two states to retain its AAA credit rating. Strong financial management will ensure this strong fiscal position is retained.
- Boosting apprenticeships – the NSW Government is committed to training apprentices and providing the state with a lasting legacy of a highly skilled workforce with on-the-job training
- Improving road travel reliability – new transport infrastructure will help ensure consistency of journey times on key roads continues to improve, enabling better use of existing roads, building extra road capacity and contributing to improved journey reliability and road safety
- Reducing road fatalities – improved motorways and roads will generate a significant reduction in traffic incidents.

Figure 3.1 *NSW State Priorities*, released in September 2015.



## 3.2.1 Key NSW 2021 goals

As discussed in **Chapter 1**, there are also a number of key *NSW 2021* goals relevant to this business case. These include:

- Critical infrastructure will deliver economic and safety outcomes for the State and help address **Goal 19**, invest in critical infrastructure. The Government established Infrastructure NSW to remove political interests from infrastructure decisions and proceed with building the infrastructure needed to sustain the productivity of NSW.
- Providing new and improved infrastructure is an identified action to achieve **Goal 7**, reduce travel times. Good road infrastructure will address worsening congestion by providing additional capacity to meet the growing demand on the network.
- Road safety can be address from an infrastructure perspective to address **Goal 2**, improve road safety. Carrying out road development, upgrading, maintenance and safety works, such as safety barriers and works on local roads will address crash risks.
- Working to overcome impediments to industry growth across NSW is an identified action to achieve **Goal 1**, to improve the performance of the NSW economy. Impediments to business activity include traffic congestion and poor connectivity. Conversely, achieving effective business clusters and improved outcomes for freight will assist industry growth
- Developing strategies to maintain the Government's AAA credit rating are necessary to meet **Goal 2**, rebuilding State finances. Projects must be affordable and economically viable to ensure that the net result for the State economy is positive; and the Budget impact is minimised
- Improving business confidence and facilitating innovation are necessary to achieve **Goal 4**, increasing the competitiveness of doing business in NSW. In order to do so, barriers for industry, such as congestion, which impacts connectivity between businesses and the ability to deliver products, need to be tackled. NSW needs to have the infrastructure in place expected of a global city to attract high calibre global companies
- A high quality, reliable and accessible public transport system is identified as necessary to meeting **Goal 8**, growing public transport patronage. Road improvements that facilitate bus priority measures are one of the sub-actions identified here, together with broader investments and improvements in rail and ferry services. In achieving this goal, the Government also works towards reducing travel times by reducing vehicle numbers on the road
- Increasing employment and housing within transport catchments will help meet **Goal 20**, to build liveable centres. Addressing urban decay along inner urban areas such as Parramatta Road will improve liability and address Sydney's housing needs.

## Sydney's other major transport projects

WestConnex is part of a broad transport and land use solution aimed at reducing congestion in Sydney. There are a number of other significant transport projects underway which form part of solution. All of these are also identified in the various strategic documents within this Chapter.

### **Sydney Metro Northwest (formerly North West Rail Link)**

Australia's largest public transport infrastructure project, currently under construction, will be the first fully-automated rapid transit rail system in Australia. It will deliver eight new rail stations between Rouse Hill and Cherrybrook in Sydney's North West, and will also convert the existing Epping to Chatswood Link to new rapid transit operation.

### **Sydney Metro City and Southwest (formerly Sydney Rapid Transit)**

Business case development on this project, to be funded in large part by Rebuilding NSW, is progressing. Sydney Metro City and Southwest will deliver a second harbour rail crossing, with new CBD rail capacity and stations. Combined with the Western Sydney Rail Upgrade program, Sydney Metro City and Southwest will allow a 60 per cent increase in the number of trains accessing the Sydney CBD during the peak hour; with capacity for an additional 100,000 passengers per hour.

### **CBD and South East Light Rail**

The Government is delivering a new light rail line that will extend from Circular Quay, along George Street to Central Station, and south east to Kingsford and Randwick via Surry Hills, Moore Park, and Kensington. The new line is expected to carry up to 13,500 passengers every hour, this equates to about 225 buses.

### **NorthConnex**

NorthConnex is a road tunnel that will complete the missing link between the M2, part of Sydney's Orbital Motorway network, and the M1 to the Central Coast and Newcastle. When complete, the project will form part of the National Highway route and reduce congestion along Pennant Hills Road.

### **Western Sydney Infrastructure Plan**

This series of new and upgraded roads in south west and western Sydney is designed to support the future Badgerys Creek/Western Sydney Airport. It includes a new motorway from the M7 along the Elizabeth Drive corridor, upgrades to Bringelly Road and The Northern Road, as well as other local road upgrades.

## Moorebank Intermodal Terminal

This Australian Government and private sector development will see a new intermodal terminal connected to the Southern Sydney Freight Line, near the M5 at Moorebank. It will service both Port Botany and interstate rail freight, and will assist in delivering the NSW Government's target of increasing the use of rail to move containers out of the port.

## 3.3 NSW transport and infrastructure planning

The State's next level of planning – in particular the *State Infrastructure Strategy*, the *NSW Long Term Transport Master Plan* and *A Plan for Growing Sydney* provide another level of detail in terms of strategic solutions to address the problems identified.

### 3.3.1 2012 State Infrastructure Strategy

The *Infrastructure NSW Act 2011* requires Infrastructure NSW to prepare an infrastructure strategy, as independent advice to the Government. This advice is then considered by the Government and a formal Government policy document, the *State Infrastructure Strategy*, is prepared.

The first such advice was received by the Government in October 2012. It provided recommendations to the Government across a broad range of infrastructure areas, including urban roads, bus and light rail, passenger trains, and international gateways. It put forward recommendations for operational improvements to make better use of existing assets, targeted upgrades, as well as major new infrastructure.

One of the principal recommendations Infrastructure NSW made was that:

*“Government progress the development of WestConnex, an integrated toll-road scheme designed to innovatively and affordably deliver the M4 extension and M5 East expansion projects within the next 10 years.”*<sup>1</sup>

This introduced the concept of WestConnex into the State's strategic planning. In making this recommendation, Infrastructure NSW identified the following benefits of WestConnex:<sup>2</sup>

- Relieving congestion on the existing M4/ Parramatta Road and M5 East
- Supporting freight movements between Sydney's gateways and the logistics hubs in western and south western Sydney
- Supporting people movements to Sydney Airport
- Acting as a catalyst for urban regeneration along key corridors, particularly Parramatta Road
- Enhancing orbital road connectivity south and west of the CBD
- Facilitating improvements in public transport, particularly on the Parramatta Road corridor.

These benefits go directly to addressing the challenges identified in **Chapter 2**.

Figure 3.2 2012 State Infrastructure Strategy



1. Infrastructure NSW (INSW) 2012, *First Things First: The State Infrastructure Strategy 2012 – 2032*, INSW, Sydney

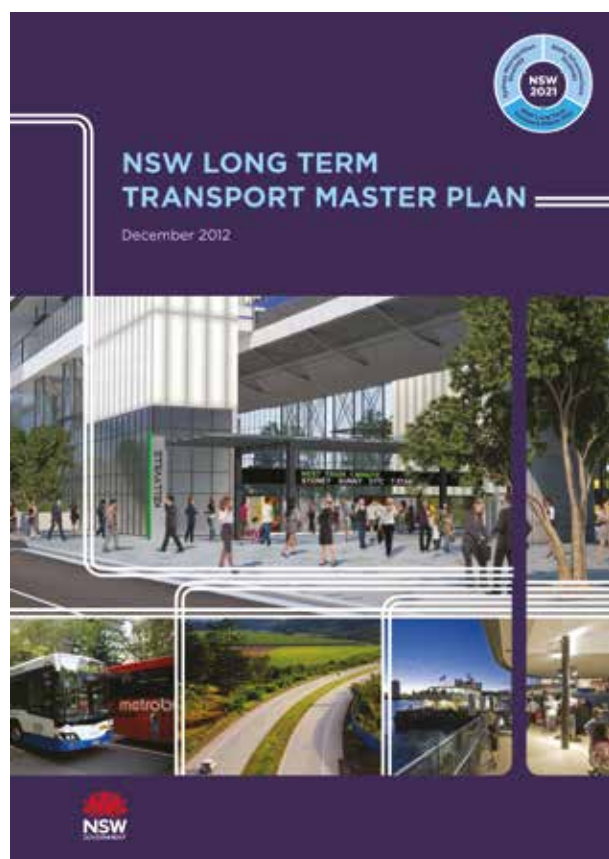
2. Infrastructure NSW (INSW) 2012, *First Things First: The State Infrastructure Strategy 2012 – 2032*, INSW, Sydney

The Infrastructure NSW recommendation for WestConnex was supported by a separate strategic concept document, which presented WestConnex as the next strategic motorway priority for the Government.<sup>3</sup>

In December 2012 the Government released its *State Infrastructure Strategy*, responding to the recommendations from Infrastructure NSW (Figure 3.2). It was developed by the Department of Premier and Cabinet in close consultation with the various expert agencies within the Government – including Transport for NSW and Roads and Maritime Services.

The strategy endorsed WestConnex as necessary for completing some of the critical missing links in the Sydney motorway network – the extension of the M4, duplication of the M5, and inner west bypass. NSW Government funding of \$1.8 billion was reserved for WestConnex, subject to business case development.

Figure 3.3 NSW Long Term Transport Master Plan



### 3.3.2 NSW Long Term Transport Master Plan

In December 2012, the Government released the *NSW Long Term Transport Master Plan* (Figure 3.3). The Master Plan presents a whole-of-NSW, multi-modal transport 20-year plan. It outlines the Government’s strategic priorities for rail, road, freight, bus, light rail, ferry, cycling and walking – covering both infrastructure development, and service delivery improvement.

The Master Plan identified Sydney’s 46 strategic transport corridors, including six constrained corridors (as discussed in Section 2.3.1). It identified strategic solutions to address the problems faced by Sydney along these corridors, including a set of major rail, light rail, bus, and road projects. The *NSW Long Term Transport Master Plan* aligns with the Government’s 2012 *State Infrastructure Strategy*.

The *NSW Long Term Transport Master Plan* identifies WestConnex as Sydney’s next motorway priority, particularly given that: *“together, the combined Western Motorway (M4) and South Western Motorway (M5) corridors contain around 30 per cent of Sydney’s population and employment and service the diverse transport demands generated in the corridor. Sydney’s international gateways - Sydney Airport and Port Botany and major freight activity areas are concentrated around the M4 and M5 corridors.”*

The Master Plan identifies WestConnex as just one of a number of major transport projects for Sydney. Other major projects included are:

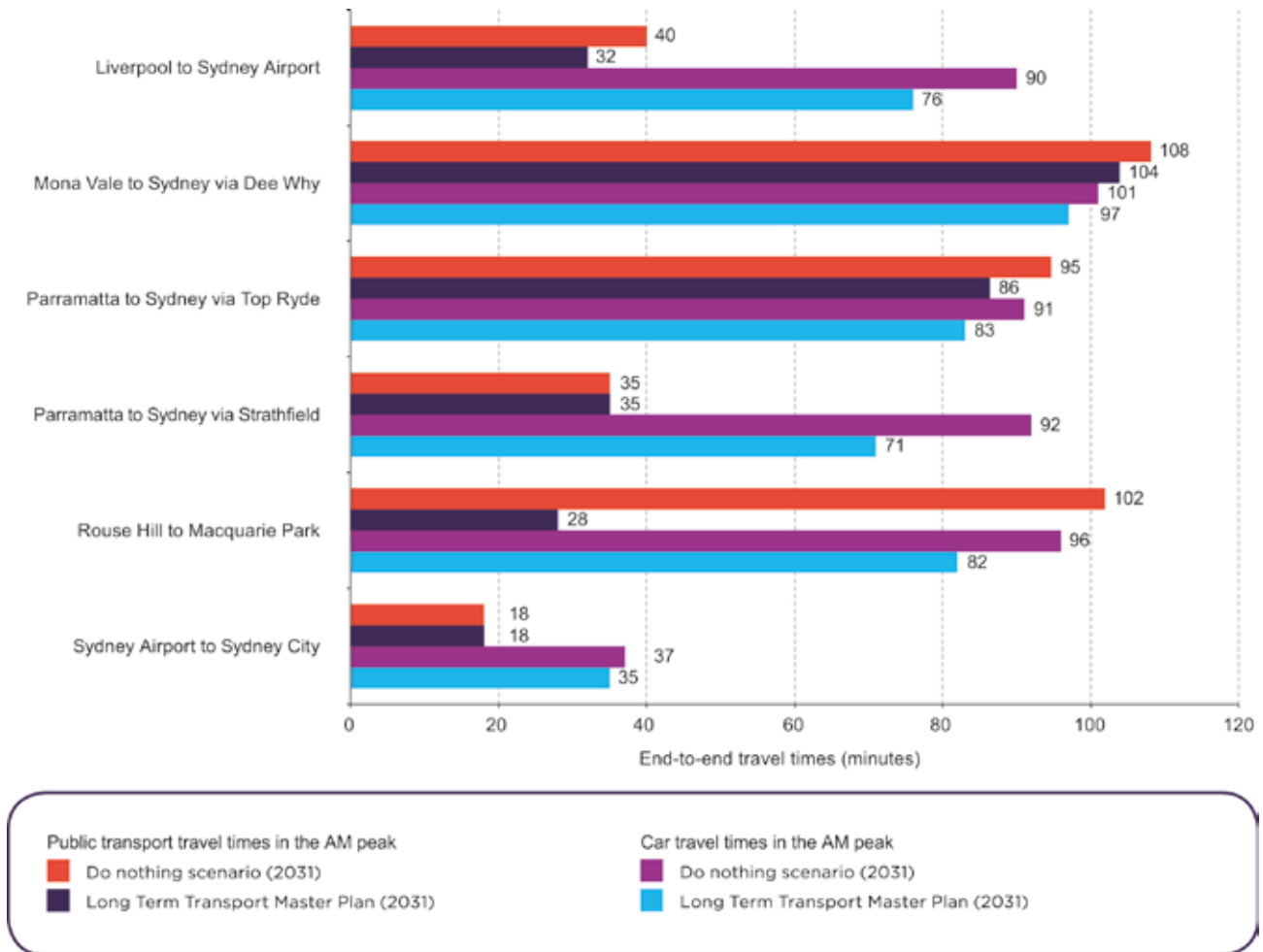
- CBD and South East Light Rail
- The North West Rail Link (now Sydney Metro Northwest).
- A second Harbour rail crossing (Sydney Metro CBD & Southwest)
- Long-term work to develop the M1(F3) – M2 Link (now the NorthConnex project) and the F6.

It is therefore important to note that WestConnex is part of an overall transport strategy for Sydney that includes significant public transport investment and operational road improvements.

3. Infrastructure NSW (INSW) 2012, *WestConnex – Sydney’s next motorway priority*, INSW, Sydney

Figure 3.4 Travel speeds in morning peak – NSW Long Term Transport Master Plan scenarios

Source: Transport for NSW 2012, *NSW Long Term Transport Master Plan*



Analysis was undertaken to provide an indication of how, in 2031, both public transport and car travel times would change when comparing the Master Plan’s solutions with the ‘do nothing’ scenario (see **Figure 3.4** focusing on the WestConnex related corridors).

Specifically, the Master Plan identifies that WestConnex will:<sup>4</sup>

- Support Sydney’s long-term economic growth through improved motorway access and connections linking Sydney’s international gateways, western Sydney, and places of business across the city
- Relieve road congestion to improve the speed, reliability and safety of travel in the M4 and M5 corridors, including parallel arterial roads

- Cater for the diverse travel demands along these corridors that are best met by road infrastructure
- Create opportunities for urban renewal, improved liveability, and public and active transport improvements along and around Parramatta Road
- Enhance the productivity of commercial and freight generating land uses strategically located near transport infrastructure
- Optimise user-pays contributions to support funding in a way that is affordable and equitable.

4. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

### 3.3.3 2014 State Infrastructure Strategy

In June 2014, the NSW Government announced 'Rebuilding NSW'. This will see the long-term lease of 49 per cent of the State's electricity transmission and distribution assets to fund a \$20 billion investment in new productive infrastructure. The Premier requested that Infrastructure NSW updated its *State Infrastructure Strategy* advice to take this \$20 billion in additional funding into consideration.

Infrastructure NSW consulted widely across the government when preparing this updated advice. The revised advice took into consideration the progress in delivering new infrastructure, as well as the additional funding available.

It made recommendations across all infrastructure portfolios, including transport and roads. In relation to WestConnex, it found:<sup>5</sup>

- The Government has made substantial progress in developing WestConnex. It recognised two potential enhancements to the scope of WestConnex, through northern and southern extensions. These proposed extensions would 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. The northern extension would enable a third harbour road crossing and northern beaches motorway, alleviating pressure on one of Sydney's most constrained 'pinch points' (the existing harbour crossings). Infrastructure NSW therefore recommended further development of these extensions
- Investigation of a new 'Western Harbour Tunnel and Beaches Link' to provide a new motorway from WestConnex across Sydney Harbour to North Sydney and the northern beaches was warranted. The Western Harbour Tunnel would create another bypass of Sydney's CBD and improving traffic flows on the Sydney Harbour Bridge, Eastern Distributor and other approaches to the CBD. Beaches Link would join to the Western Harbour Tunnel at North Sydney. It would have the potential to alleviate congestion on the Military Road and Spit Road corridor, one of the slowest corridors on Sydney's road network. It recommended that work proceed on business case development for the Western Harbour Tunnel and Beaches Link.

A 'Gateway to the South' consisting of a series of road upgrades between Sydney and the Illawarra was also recommended.

The Government, in releasing its updated *State Infrastructure Strategy*, adopted these recommendations (**Figure 3.5**).

A number of funding reservations made from the \$20 billion in additional funding included:<sup>6</sup>

- \$1.1 billion for WestConnex northern and southern extensions, together with the Western Harbour Tunnel
- \$300 million for the Gateway to the South
- \$400 million each respectively for Smart Motorways and Pinch Point upgrades.

Since the time of this announcement, the northern extension has been incorporated into a revised alignment for Stage 3 with connection to Rozelle, while the now 'Southern Connector' project, the southern extension to WestConnex, will be evaluated as part of the Gateway to the South project.

Figure 3.5 *State Infrastructure Strategy 2014*





### 3.3.4 NSW Freight and Ports Strategy

The *NSW Freight and Ports Strategy* sits alongside the *NSW Long Term Transport Master Plan* (Figure 3.6). It specifically addresses the challenges brought about by the expected doubling of the State's freight task over the next 20 years (a problem discussed in Section 2.4).

The strategy confirms that WestConnex is one of the key strategic freight projects for Sydney, as it: "will reduce freight costs through increased travel speeds and reliability and reduce the distances travelled by freight vehicles... WestConnex has the potential to deliver time savings on the M4/M5 corridors in the order of 15 to 35 minutes by 2021."<sup>7</sup>

In reducing travel times, WestConnex will improve the productivity of the freight fleet by enabling more deliveries to be conducted per day.

The *NSW Freight and Ports Strategy* recognises the need for enhanced motorway infrastructure even in the context of measures and investment to increase freight rail usage out of Port Botany. It makes it clear that accommodating 20 years of growth in this corridor will require a range of solutions – including increases in rail freight mode share, peak spreading and operational initiatives, and additional road capacity.<sup>8</sup>

### 3.3.5 Sydney's Bus Future

In developing *Sydney's Bus Future*, the NSW Government reviewed the entire bus network and its role in the wider public transport network (Figure 3.7). Like the *NSW Freight and Ports Strategy*, it sits alongside the *NSW Long Term Transport Master Plan*. *Sydney's Bus Future* identifies short and longer term priorities for bus services across Sydney.

The strategy identifies the Burwood to Sydney CBD via Parramatta Road Corridor as one for extensive service improvement. It flags the implementation of bus priority/bus lanes for this route, linked to the development of WestConnex. In September 2015, Transport for NSW released its *Strategic Transport Plan for Sydney CBD to Parramatta* (Section 7.1.2). *Sydney's Bus Future* also flags improved bus services from Sydney

Airport to the inner west; taking advantage of WestConnex to improve bus access across the Princes Highway.<sup>9</sup> Transport for NSW is advancing these improvements, which are further detailed in Chapter 7.

### 3.3.6 Sydney's walking, cycling and light rail futures

The Government has also released documents alongside the *NSW Long Term Transport Master Plan* that detail active transport (*Sydney's Walking Future* and *Sydney's Cycling Future*) and Light Rail (*Sydney's Light Rail Future*) strategic planning.

Work on the development of WestConnex has been, and will continue to be, undertaken in the context set out by these plans. In particular, this applies to elements of the project that may interact with, or enable walking, cycling or light rail infrastructure.

Figure 3.6 *NSW Freight and Ports Strategy*  
Figure 3.7 *Sydney's Bus Future*



5. Infrastructure NSW (INSW) 2014, *State Infrastructure Strategy Update 2014*, INSW, Sydney

6. Department of Premier and Cabinet (DPC), *Rebuilding NSW: State Infrastructure Strategy 2014*, DPC, Sydney

7. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

8. Transport for NSW (TfNSW) 2013, *NSW Freight and Ports Strategy*, TfNSW, Sydney

9. Transport for NSW (TfNSW) 2014, *Sydney's Bus Future*, TfNSW, Sydney

## 3.4 A Plan for Growing Sydney

*A Plan for Growing Sydney* is Sydney's metropolitan urban planning strategy (Figure 3.8). Released in December 2014, it sets out the Government's vision for Sydney. It outlines a series of goals and actions, which directly address *NSW 2021* Goal 20 – to build liveable centres. It seeks to do this by ensuring:<sup>10</sup>

- A competitive economy with world class services and transport
- Providing housing choices
- Developing strong, healthy and well connected communities
- A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources.

Figure 3.8 *A Plan for Growing Sydney*



### 3.4.1 Improving connectivity

WestConnex is fully integrated into *A Plan for Growing Sydney*, which recognises the final proposed alignment of the motorway, as consistent with this business case. The plan sees WestConnex providing:

- Improved regional connections to the Illawarra
- Improvements in connectivity between Western and South Western Sydney and the Sydney CBD
- Enhancing the freight networks that serve Sydney's global gateways at Port Botany and Sydney Airport, making the export of goods more cost effective
- Facilitating a stronger economy, by providing better connections to Global Sydney.

#### Global Economic Corridor

Intensive development of the Global Economic Corridor, including Sydney CBD, Greater Parramatta, and Sydney's international gateways (Port Botany and Sydney Airport) is a priority of the plan. Growth in these locations will sustain and expand the economy and support more jobs closer to where people live. WestConnex will prove connectivity and relieve the congestion between these locations.<sup>11</sup>

10. Department of Planning & Environment (DPE) 2014, *A Plan for Growing Sydney*, DPE, Sydney

11. Department of Planning & Environment (DPE) 2014, *A Plan for Growing Sydney*, DPE, Sydney

## 3.4.2 Urban transformation

### Parramatta Road

The role WestConnex plays in revitalising Parramatta Road is an important component of the plan:

*“The Parramatta Road Corridor is a 20km long corridor strategically connecting the two largest concentrations of jobs in Sydney – Sydney CBD and Greater Parramatta. The corridor has good access to employment, the rail network, a range of social infrastructure, and the southern foreshores of Sydney Harbour and Parramatta River. The construction of WestConnex will allow for significant improvements to local amenity by reducing through-traffic on surface roads, and allowing for enhanced north-south local connectivity.”<sup>12</sup>*

It is envisioned that urban renewal will bring new life to local communities along Parramatta Road. In September 2015, UrbanGrowth NSW released its overarching strategy for renewal of the Parramatta Road corridor: *The draft Parramatta Urban Transformation Strategy*. This outlines the importance of WestConnex in removing surface traffic and enabling revitalisation. UrbanGrowth NSW is advancing this work in consultation with the WestConnex project team. It is further detailed in **Chapter 7**.

### The Bays Precinct

Sitting just two kilometres from the CBD, *A Plan for Growing Sydney* identifies the revitalisation of The Bays Precinct as a key priority. In October 2015, UrbanGrowth NSW released the *Transformation Plan: The Bays Precinct, Sydney*. WestConnex will provide an interchange within The Bays Precinct area, ensuring an integrated connection to Sydney’s motorway network. This is further detailed in **Chapter 7**.

## 3.5 NSW Budget and State Infrastructure Plans

The *NSW Budget*, released each year, outlines the spending priorities for the State Government. Since 2013, the Budget process has evolved to include expert advice from each Government agency responsible for project delivery, and also from Infrastructure NSW.

### 3.5.1 State Infrastructure Plan

The 2013-14 *NSW Budget* included a *State Infrastructure Plan*, developed by Infrastructure NSW in conjunction with NSW Treasury. Published on an annual basis as part of the Budget, it operationalises the *State Infrastructure Strategy* by setting out a rolling five year delivery plan for the Strategy.

Development of WestConnex was included as part of that plan, highlighting at the time that business case development was still underway.<sup>13</sup> The *2014-15 Budget* included an updated *State Infrastructure Plan*, which confirmed delivery of the project would proceed.<sup>14</sup>

The project continues to remain a prominent component of the *State Infrastructure Plan*, as published in the most recent *2015-16 NSW Budget* papers.<sup>15</sup>

### 3.5.2 Financing strategy

The 2014-2015 *NSW Budget* also outlined the financing strategy for WestConnex, and how the project will be delivered while minimising the impact on the State’s finances. This is particularly important in the context of *NSW 2021 Goal 2*, to rebuild the State’s finances.

12. Department of Planning & Environment (DPE) 2014, *A Plan for Growing Sydney*, DPE, Sydney

13. NSW Treasury (TSY) 2013, *2013-14 Budget Papers*, TSY, Sydney

14. NSW Treasury (TSY) 2014, *2014-15 Budget Papers*, TSY, Sydney

15. NSW Treasury (TSY) 2015, *2015-16 Budget Papers*, TSY, Sydney

The Budget papers outlined that the balance of the funding for WestConnex not provided by the NSW and Australian governments will come from private sector debt and equity capital raised against tolls on completed stages of WestConnex. The NSW Government will then recycle the capital invested in the individual stages of WestConnex once traffic volumes are established.<sup>16</sup> This approach seeks to ensure the project is affordable and fundable. Further detail of the funding and financing approach for the project is provided in **Chapter 14**.

## 3.6 National infrastructure priorities

In February 2015, the the Australian Government confirmed its continued support to: “*build the roads of the 21<sup>st</sup> century*”, with a focus on the infrastructure to get people to their jobs.<sup>17</sup>

WestConnex is central to this priority in Sydney. As the Deputy Prime Minister made clear in confirming Australian Government funding for WestConnex in 2013, the project is recognised as delivering: “*the infrastructure that will unclog Sydney for both freight and passengers*”.<sup>18</sup>

### 3.6.1 Infrastructure Australia

Infrastructure Australia is responsible for providing advice on matters related to infrastructure. This includes the development of infrastructure plans, and the evaluation of infrastructure proposals.<sup>19</sup>

#### Infrastructure Australia’s Strategic Priorities

Infrastructure Australia has outlined seven strategic priorities for infrastructure at a national level. These are outlined in the *Better Decision Making Guidelines*.<sup>20</sup>

WestConnex, as described in this business case, addresses a number of these priorities.

**Table 3.1** outlines each of these, and further detail is contained in this and subsequent chapters.

#### 2013 National Infrastructure Plan

In June 2013, Infrastructure Australia released the *National Infrastructure Plan*. The plan lays out Infrastructure Australia’s reform priorities over the next 50 years, in the context of a growing and ageing population, and public spending constraints.

One of the aspirations set out by Infrastructure Australia in the plan is ensuring our global cities adapt to and boost economic growth, are well planned, well designed and well governed, and have world-class transport systems. Two of the reforms proposed by Infrastructure Australia are the recycling of capital in mature assets to support investment in new infrastructure, and the direct charging of users to fund infrastructure.<sup>21</sup>

WestConnex is consistent with the direction and reforms set out in the *National Infrastructure Plan*. As has been outlined in this Chapter, the motorway has been designed to address the economic needs of Sydney and in turn NSW. There is a specific focus on job creation and connecting major economic precincts in the Global Economic Corridor. The funding approach for the project has been to limit Government capital expenditure, and instead focus on recycling that investment while utilising user charges (through tolling) to support the remainder of the costs.<sup>22</sup>

In terms of WestConnex specifically, the *National Infrastructure Plan* identifies that: “*congestion in the transport corridors identified in this [the WestConnex] submission is considered to be a nationally significant problem.*”

*The primary objectives of this project are to improve accessibility, speed, congestion, reliability and connectivity of the roads linking Sydney’s international gateways and western Sydney and places of business across the city. This is to address existing demand as well as expected increase in demand for transport services provided by roads.*”<sup>23</sup>

16. NSW Treasury (TSY) 2015, *2015-16 Budget Papers*, TSY, Sydney

17. The Hon Tony Abbott MP Prime Minister of Australia 2015, *Address to the National Press Club of Australia*, Prime Minister

18. Prime Minister of Australia & Deputy Prime Minister and Minister for Infrastructure and Regional Development et. al. 2013, *WestConnex: Building the Roads of the 21<sup>st</sup> Century*, Prime Minister of Australia, Canberra

19. *Infrastructure Australia Act 2008* as amended (Cth), 1 September 2014

20. Infrastructure Australia 2014, *Better Infrastructure Decision-Making*, Infrastructure Australia, Canberra

21. Infrastructure Australia (IA) 2013, *National Infrastructure Plan*, IA, Canberra

22. Infrastructure Australia (IA) 2013, *National Infrastructure Plan*, IA, Canberra

23. Infrastructure Australia (IA) 2013, *National Infrastructure Plan*, IA, Canberra

Table 3.1 Alignment with Infrastructure Australia’s strategic priorities

Infrastructure Australia strategic priority	NSW/WestConnex alignment
Expand Australia’s productive capacity	<p>Aligns with <i>NSW 2021</i> Goal 1, to improve the performance of the NSW economy.</p> <p>WestConnex has been developed to facilitate job creation and grow Sydney’s centres by providing connections between major economic and employment hubs and population growth areas.</p>
Increase Australia’s productivity	<p>Aligns with <i>NSW 2021</i> Goal 1, to improve the performance of the NSW economy; and Goal 4, to increase the competitiveness of doing business in NSW.</p> <p>WestConnex targets congestion – particularly around Australia’s strategic economic hubs like Port Botany and Sydney Airport. This improves the productivity of users of the road network, including both commuters and freight, by reducing the time taken to perform transport tasks in Sydney. Freight and commercial vehicles are therefore able to do more work in the same amount of time.</p>
Develop our cities and/or regions	<p>Aligns with <i>NSW 2021</i> Goal 19, to invest in critical infrastructure; and Goal 20, to build liveable centres.</p> <p>WestConnex is a significant investment in the transport infrastructure in Sydney. It provides new, high quality motorway capacity to facilitate improved connectivity across the city. It also facilitates the urban renewal of major corridors within Sydney, such as along Parramatta Road.</p>
Improve social equity, and quality of life	<p>Aligns with <i>NSW 2021</i> Goal 20, to build liveable centres.</p> <p>WestConnex will improve travel times, and increase connections between people and jobs. In doing so, it will materially improve the quality of life for people in Sydney and NSW. It also enables significant urban transformation.</p>

## Australian Infrastructure Audit

In May 2015, Infrastructure Australia released an Australian Infrastructure Audit. The audit covered a broad range of infrastructure sectors and challenges, including transport. WestConnex is well matched to deliver on the Audit's findings including:

- *“Population growth will drive a significant rise in demand for infrastructure services ... [with] almost three-quarters of this growth ... projected to be in the four largest capitals – Sydney, Melbourne, Brisbane and Perth ... this growth will impose additional demands on urban infrastructure already subject to high levels of demand”<sup>24</sup>*
- *“Demand for many key urban road and rail corridors is projected to significantly exceed current capacity by 2031.”<sup>24</sup>*

WestConnex is designed to provide additional road capacity to help cater for Sydney's growth. It does this by targeting missing or underperforming connections in the motorway network. WestConnex provides additional capacity for several constrained corridors identified by Infrastructure Australia in its audit, including the King Georges Road corridor, the M4/Parramatta Road/City West Link corridor, the M5 Corridor, and the airport to CBD corridor.

- *“Government funding alone is unlikely to be sufficient to provide the infrastructure that Australia requires. Maintaining or strengthening conditions to facilitate private sector investment in and operation of Australia's infrastructure networks is fundamentally important.”<sup>24</sup>*

The financing strategy for WestConnex is designed to make best use of private sector financing, using initial government contributions to reduce project risk while allowing the private sector to fund the remainder of the project's cost.

- *“Urban transport decisions need to complement land use decisions (especially about the supply and affordability of housing).”<sup>24</sup>*

WestConnex forms an important part of a much broader land use strategy for Sydney, as part of *A Plan for Growing Sydney*. It has been developed with urban renewal in mind, particularly along the Parramatta Road corridor and in The Bay's Precinct. Enabling urban renewal and housing development is one of the objectives of the project and is discussed in **Chapter 7**.

## 3.6.2 Productivity Commission inquiry

The Productivity Commission conducted an inquiry into Public Infrastructure, which concluded in May 2014. The inquiry made a number of recommendations around the funding and procurement of infrastructure.<sup>25</sup>

A number of the recommendations made by the Productivity Commission are already reflected in the way Sydney Motorway Corporation is delivering the project:

- Rigorous cost-benefit analysis have been undertaken for the project. This includes the 2013 Business Case, the subsequent Stage 2 and Stage 3 Project Definition and Delivery Reports and this business case
- WestConnex employs transparent, innovative, and competitive processes for the selection of private sector partners for the design, financing, construction, maintenance and operation of public infrastructure through its tendering processes
- Mechanisms are in place for the review and audit of the decision-making process by an independent body. Independent reporting and oversight is undertaken by Infrastructure NSW. WestConnex processes are also subject to audit by the NSW Auditor-General.

WestConnex is highlighted in the Productivity Commission report as an example of capital recycling, and is covered as one of the Commission's case studies. A large proportion of the funding provided by the NSW Government to WestConnex is sourced from the Restart NSW fund, which includes proceeds from asset sales and leases.<sup>26</sup>

24. Infrastructure Australia (IA) 2015, *Australian Infrastructure Audit: Our Infrastructure Challenges*, IA, Canberra

25. Productivity Commission 2014, *Public Infrastructure*, Inquiry Report No. 71, Canberra

26. Productivity Commission 2014, *Public Infrastructure*, Inquiry Report No. 71, Canberra

## 3.7 Summary

WestConnex was identified by Infrastructure NSW as a solution to relieve congestion on the road network, support freight movements between Sydney's gateways and western Sydney, strengthen connections to Sydney Airport, and facilitate urban transformation along Parramatta Road.

WestConnex supports the needs of the city in terms of growth, and improving productivity and liveability through provision of a transport solution.

It addresses a number of the *NSW 2021* goals and NSW State Priorities outlined by the Government, and from a strategic sense, targets the key problem areas outlined in **Chapter 2**:

- Targets traffic congestion and supports population growth by providing additional motorway capacity on the road network
- Improves connectivity by upgrading road links between Western Sydney and the Global Economic Corridor, addressing the missing links
- Supports freight and our international gateways given its connectivity to the Port Botany and Sydney Airport precinct
- Creates jobs by improving productivity and facilitating collaboration between industries through connectivity
- Acts as a catalyst for urban renewal along Parramatta Road by reducing surface traffic
- Will be delivered utilising private sector financing and supported by toll revenue, with limited government capital.

As this Chapter illustrates, WestConnex is integrated into – and is a key part of – the State's infrastructure, transport and urban development planning strategies. It also addresses strategic priorities raised by the Australian Government and Infrastructure Australia.

### Other Australian Government priorities in Sydney

#### Moorebank Intermodal Terminal

The Moorebank Intermodal Terminal is an Australian Government and private sector project designed to improve the access for freight to the rail network. The terminal will be located near the M5 Motorway. Work on the Intermodal Terminal is well progressed in its planning, and is considered in detailed modelling and analysis.

#### Western Sydney Airport

The Australian Government is in the process of developing a Western Sydney Airport at Badgerys Creek. The NSW Government is supporting the delivery of road upgrades around the site to facilitate the airport, which will be accessible via road links from the M7, M4 and M5. The project is currently in its early stages, with operations potentially commencing in the mid-2020s.

# 4



# OBJECTIVES, CUSTOMERS AND SCOPE

The objectives of WestConnex are driven by the need to address the problems identified in **Chapter 2**, within and supporting the defined strategic context outlined in **Chapter 3**. The objectives together with the identified customer segments have informed the scope development of the project.

These objectives, customer segments and project scope are described in this Chapter.

## 4.1 Objectives

The objectives identified as part of the 2013 Business Case are still relevant today. They address issues including population growth, connectivity, congestion, growth in freight and increasing use of our international gateways, supporting job creation, facilitating urban renewal, and ensuring affordability and fundability.

The objectives of WestConnex are to:

- Support Sydney's long-term economic growth through improved motorway access and connections linking Sydney's international gateways, western Sydney and key places of business across the city
- Relieve road congestion to improve the speed, reliability and safety of travel on the M4, M5 and CBD/airport/port corridors, including parallel arterial roads
- Cater for the diverse travel demands along these corridors that are best met by road infrastructure
- Create opportunities for urban renewal, improved liveability and public and active transport improvements along and around Parramatta Road
- Enhance the productivity of commercial and freight-generating land uses strategically located near along the corridor
- Fit within the financial capacity of the State and Australian governments, in partnership with the private sector
- Optimise user-pays contributions to support funding in a way that is affordable, equitable and fair.

### 4.1.1 Additional objectives

Since the development of the 2013 Business Case, the Government has continued to evolve its integrated land use and transport planning to inform investment decisions for critical State infrastructure.

The *2014 State Infrastructure Strategy and A Plan for Growing Sydney* (see **Chapter 3**) outline additional infrastructure priorities for Sydney. These were further reinforced in the NSW State Priorities released in September this year and include the provision of additional cross-harbour road capacity, and improving connectivity to the Illawarra.

These lead to two additional objectives for the project:

- Provide the ability for an additional Sydney Harbour road crossing, the Western Harbour Tunnel and Beaches Link, to connect to WestConnex
- Support improved connectivity between Sydney, the Sutherland Shire, and the Illawarra; with the ability for the proposed 'Gateway to the South' project to connect to WestConnex.

1. Transport for NSW (TfNSW) 2012, *Long Term Transport Master Plan*, TfNSW, Sydney

## 4.1.2 Transport planning principles

In the context of the project's objectives, a set of core transport planning principles have been identified. These have guided the detailed development of WestConnex, and are outlined in **Table 4.1** below.

Table 4.1 WestConnex transport planning principles

Principle	How it is implemented
Serves key market and customer needs	<ul style="list-style-type: none"> <li>• Serves key customers in terms of:               <ul style="list-style-type: none"> <li>• Mobility: Ease of movement</li> <li>• Accessibility: Connects key land uses</li> <li>• Legibility: Direct and clear routes to major destinations</li> <li>• Productivity: Values time, reliability and costs for business (including freight) trips</li> <li>• Safety: For all road users</li> <li>• Experience: Reliable journeys and information.</li> </ul> </li> </ul>
Integrates with the existing transport system	<ul style="list-style-type: none"> <li>• Integrates with Sydney's existing road hierarchy, expanding its primary freight network and connecting with the State road network.</li> <li>• Provides high-quality connections with other primary and secondary freight routes.</li> <li>• Facilitates longer road-based trips, encouraging shorter trips by public and active transport options.</li> <li>• Supports the implementation of Sydney's core bus network with priority infrastructure.</li> <li>• Supports road movements to and from intermodal facilities at Enfield and Cooks River.</li> <li>• Retains a suitable network of toll free routes at surface and for dangerous goods movements.</li> </ul>
Transforms the city and reshapes local travel	<ul style="list-style-type: none"> <li>• Optimises use of the new infrastructure and reduces traffic congestion on the existing road network.</li> <li>• Enables changes in the function and operation of existing State and Regional roads to the benefit of localised travel and amenity.</li> <li>• Creates new opportunities for reallocating road space on the existing road network to improve public and active transport options.</li> <li>• Improves east-west and north-south travel conditions for private trips, bus and bus/rail trips, cycling and walking trips.</li> </ul>
Future proofs for long-term growth and change	<ul style="list-style-type: none"> <li>• Allows for extensions, connections and access points to and from:               <ul style="list-style-type: none"> <li>• Sydney's north (Western Harbour Tunnel and Beaches Link)</li> <li>• Sydney's south (Gateway to the South including the Southern Connector)</li> </ul> </li> <li>• Preserves opportunities for a potential mass transit system, including rapid bus and/or the long-term potential for light rail on Parramatta Road.</li> <li>• Provides opportunities for growth and change in higher productivity vehicles (supporting greater height, length, and mass), which improve efficiency and productivity.</li> </ul>

## 4.2 Customer definition

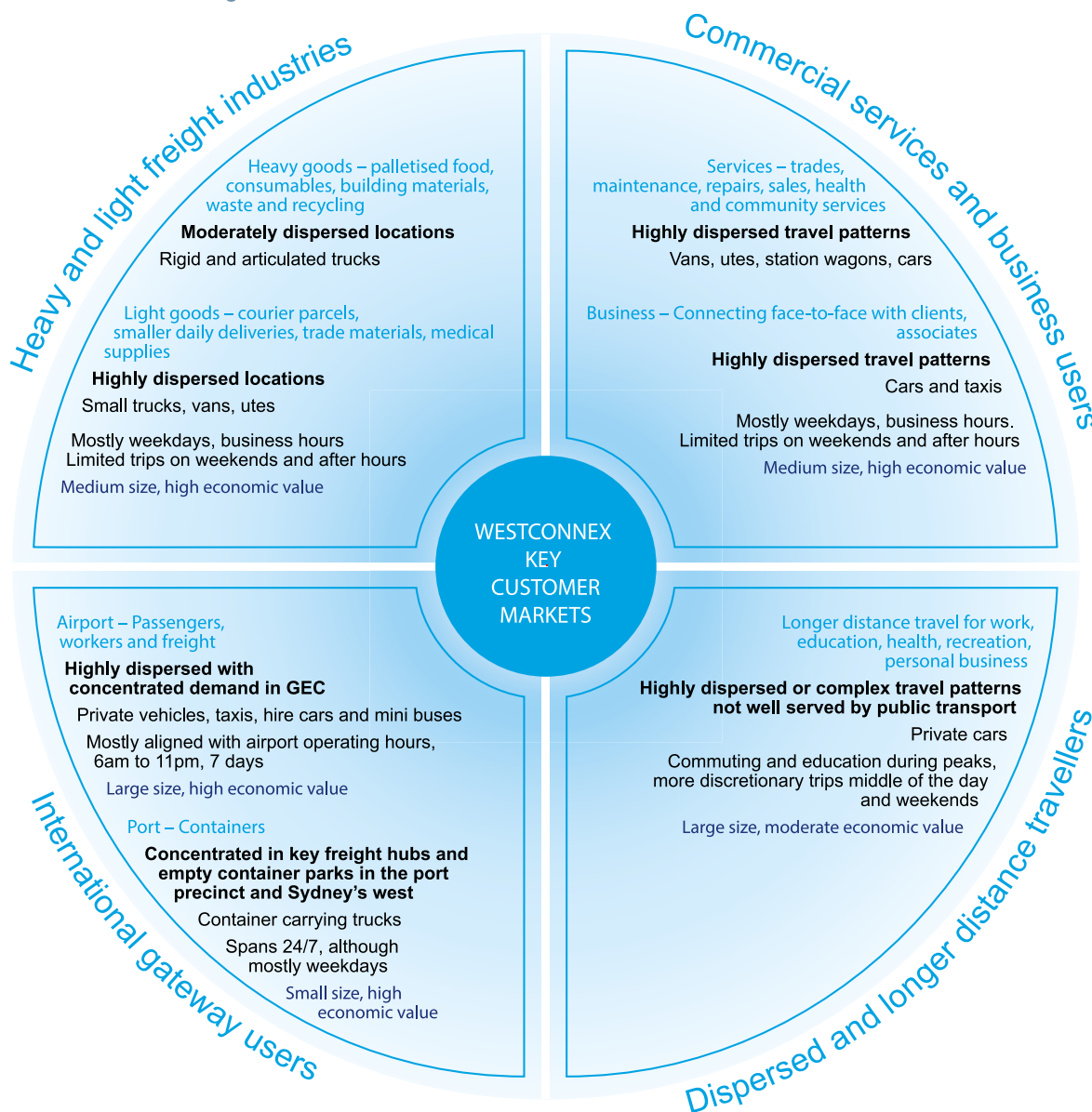
The *NSW Long Term Transport Master Plan* outlines the Government's strategic focus on the customer as the key driver of transport service and infrastructure delivery in NSW.<sup>1</sup> Accordingly, in designing WestConnex it has been important to understand potential customers and their needs.

**Chapter 2** sets out key user groups that are reliant on road-based travel and will likely benefit from WestConnex. These groups are broadly identified as:

- International gateway users – to and from Sydney Airport and Port Botany
- Heavy and light freight industries
- Dispersed and longer-distance travellers
- Commercial services and business users.

These are outlined in **Figure 4.1** below.

Figure 4.1 Customer segments for direct users of WestConnex



## 4.2.1 Customer requirements

The future requirements of these customers have guided the evolution of WestConnex from the original business case through to reference design and further detailed design and modelling. The primary requirements include:

- Ensuring the right connections to the right locations:
  - Catering for key market origins and destinations so customers can get to where they need to go in an efficient and timely way
  - Integrating with the existing network to offer direct and clear routes, for the entire end-to-end journey
  - Removing heavy vehicles from local roads, improving local connectivity, safety and reliability of travel times
  - Adequately spacing connections so they support access, but do not unduly compromise speed and traffic flows on the motorway.
- Ensuring WestConnex offers value for money to its customers, by offering the capacity and connections to deliver real benefits to road users on a user-pays basis
- Catering for heavy vehicles and higher productivity vehicles, by ensuring:
  - Reasonable gradients to allow the efficient movement of trucks
  - Sufficient tunnel height for use by existing and future high capacity heavy vehicles
  - Sufficient interchange design for longer vehicles
  - Bridge strength to accommodate higher mass limits.
- Providing quality real-time information and incident response mechanisms, particularly for freight, light commercial, service, and business customers for whom productivity and reliability are critical.

## 4.2.2 Network strategy to deliver for customers

A road network strategy for WestConnex was developed based on transport planning principles, identified customer requirements and the objectives as set out in this Chapter. This network strategy outlines the functional requirements that have guided the development of the alignment, connection and movement options for WestConnex.

The functional requirements of WestConnex vary along the length of the motorway, depending on the needs of particular users. The network strategy was developed based on analysis of key trip origins and destinations, major congestion areas and patterns of employment and workforce availability (as summarised in **Chapter 2**).

The network strategy for WestConnex is segmented at a high level as follows:

- Travel to and from Sydney's central west to the east
- Travel to and from Sydney's south west to the east
- Travel to and from distributed locations throughout the southern end of the Global Economic Corridor, in particular Sydney Airport
- Travel within the inner west
- Travel needs of freight, particularly to and from Port Botany.

Figure 4.2 Customers from Sydney's central west



### Customers from Sydney's central west

Key requirements for travel heading east from Sydney's central west include:

- Improved access to key employment hubs, including Parramatta, the Westmead Health Precinct, Sydney Olympic Park, Burwood and the Western Sydney Employment Lands
- Improved access to the Global Economic Corridor, specifically the southern CBD, Sydney Airport and Port Botany and adjoining employment hubs (Green Square/Mascot)
- Continued access to the City West Link, to ensure a manageable division of traffic for journeys east from Haberfield
- Reduced car and heavy vehicle flows along Parramatta Road to support urban renewal and improved public transport.

Trips from Sydney's central west are shown in **Figure 4.2**.

Figure 4.3 Customers from Sydney's south west



## Customers from Sydney's south west

Key requirements for travel heading east from Sydney's south west include:

- Improved capacity for longer-distance journeys to the Global Economic Corridor and employment hubs along the M5 corridor, and for regional and interstate journeys
- Improved access to Sydney Airport and Port Botany, and adjoining employment hubs (e.g. Green Square/Mascot), currently constrained by a single crossing of the Alexandra Canal, airport tunnel height restrictions and congestion on General Holmes Drive.

Trips from Sydney's south west are shown in **Figure 4.3**.

Figure 4.4 Customers travelling through the Global Economic Corridor



### Customers travelling through the Global Economic Corridor

Key requirements for travel through the Global Economic Corridor include:

- Provide a new route to effectively distribute trips from both Sydney’s central west (M4) and the south west (M5) seeking access to major hubs of economic activity – Green Square, Mascot, Sydney Airport, Port Botany and surrounds
- Reduce traffic flows on arterial and local roads connecting the CBD/airport/port corridor to support urban renewal
- Provide a southern CBD connection near Broadway/Parramatta Road to facilitate north-south movement between the CBD and airport via WestConnex
- Allow for future motorway extensions to the north and south of WestConnex:
  - Northwards (the Western Harbour Tunnel and Beaches Link) to duplicate the north-south route through the northern part of the Global Economic Corridor
  - Southwards (the Gateway to the South and Southern Connector) facilitating improved access to the Global Economic Corridor from the Sutherland Shire and Illawarra.

Trips through the Global Economic Corridor are shown in **Figure 4.4**.



Figure 4.5 Customers from the inner west



### Customers from Sydney’s inner west

Key requirements for travel in the inner west include:

- Regularly interspersed high-quality connections to service freight, commercial, business and dispersed personal trips
- Managed traffic flows to encourage more personal trips by public and active transport
- Optimised traffic reductions at surface to allow road space/priority to be allocated to local traffic, public and active transport in support of urban renewal
- Improved local connectivity and options for business and personal journeys.

Trips in Sydney’s inner west are shown in **Figure 4.5**.

### Freight customer needs

Key requirements for freight customers include the ability to support:

- A more direct route to Port Botany on both the M4 and M5 corridors for trucks up to 4.6 metres in height. They are currently required to travel via a longer route through Mascot. This impacts travel times, reliability and productivity
- Additional higher mass limit alternatives to access Port Botany from the south and north. There are currently higher mass limit restrictions on some of the routes to Port Botany
- Productivity gains from the future use of 32-metre B-Doubles to Port Botany.

## 4.3 High-level scope

### 4.3.1 Scope of the project

Taking into consideration the strategic definition of the project, the objectives, the customer requirements, and the network strategy outlined in **Section 4.2.2**, the core components of WestConnex are outlined in **Table 4.2**.

In addition to these major works, WestConnex includes:

- Whole-of-motorway facilities necessary to operate the motorway, including tolling systems, traffic control functionality, smart motorway systems, and environmental and safety systems
- Connectivity and systems to facilitate a future Western Harbour Tunnel and Beaches Link and Southern Connector
- Partial funding (\$200 million) for the urban renewal of Parramatta Road – to be utilised by UrbanGrowth NSW.

**Chapter 6** provides more detail on the WestConnex project.

### 4.3.2 Facilitated works delivered by other NSW Government entities

A number of projects are facilitated by WestConnex, but are the responsibility of other agencies within the NSW Government:

- Development and delivery of urban renewal works, including the activation of key suburban hubs adjoining the Parramatta Road corridor (noting that \$200 million from WestConnex is provided for urban renewal), and The Bays Precinct. Delivery of these works is the responsibility of UrbanGrowth NSW
- Development and delivery of the Western Harbour Tunnel and Beaches Link. WestConnex will enable this important initiative, which is the responsibility of Transport for NSW
- Development and delivery of the Gateway to the South. The project includes a 'Southern Connector', which will connect to WestConnex and is the responsibility of Transport for NSW and Roads and Maritime Services

Table 4.2 WestConnex stages

Stage	Sub-project	Description
Stage 1	Stage 1A - M4 Widening (Parramatta to Homebush)	Widening the existing M4 Motorway from Parramatta to Homebush.
	Stage 1B - M4 East (Homebush to Haberfield)	Extending the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for the future connection to M4 – M5 Link.
Stage 2	New M5 (Beverly Hills to St Peters)	Duplicating the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters Interchange allows for connections to the Sydney Gateway. The New M5 tunnels include provision for a future connection to the proposed Southern Connector (part of Gateway to the South) and the M4 – M5 Link.
	King Georges Road Interchange Upgrade (Beverly Hills)	Upgrade of the King Georges Road Interchange between the newly widened M5 West and the M5 East at Beverly Hills, in preparation for the New M5.
	Sydney Gateway (St Peters to Sydney Airport and Port Botany)	A high-quality, high-capacity connection between the new St Peters Interchange and the Sydney Airport and Port Botany precinct.
Stage 3	M4 – M5 Link (Haberfield to St Peters)	Tunnels connecting to the M4 East and New M5 via Rozelle and Camperdown. Includes ramps connecting to the St Peters Interchange and an interchange at Rozelle with provision for a future connection to the Western Harbour Tunnel and Beaches Link.

- Development and delivery of WestConnex-enabled public transport improvements. These are the responsibility of Transport for NSW
- Upgrades to surrounding roads to ensure integration with the network. These elements are outside the primary motorway scope, but for efficiency purposes may be delivered by WestConnex contractors. These are not considered part of the financial scope of the project
- Development and delivery of other improvements to the road network adjoining WestConnex. This includes road upgrades around Parramatta and enabling works around Port Botany/Sydney. Roads and Maritime Services is responsible for delivery of these works.

All of these works are part of the NSW Government's vision for Greater Sydney. The WestConnex project team is working closely with each of the agencies responsible for these projects to ensure the Government's strategic objectives are achieved and to realise cost synergies and delivery efficiencies.

## 4.4 Summary

This Chapter outlines the objectives of the WestConnex project, which are consistent with the 2013 Business Case, with the addition of two new objectives to meet the current strategic environment.

In delivering the scope articulated in **Table 4.2**, the project will specifically work to address each of the customer needs identified:

- **International gateway users:**  
WestConnex connects western Sydney directly to both Sydney Airport and the Port Botany precinct
- **Heavy and light freight industries:**  
WestConnex will deliver improved freight vehicle access to Port Botany and Sydney Airport, including additional routes for heavy vehicles. Connectivity into the M4 and M5 motorways, which service a large number of freight precincts, will also provide significant benefit for freight customers
- **Dispersed and longer distance travellers:**  
Commuters, particularly from western Sydney, are provided improved access to the Parramatta Road/M4 and M5 corridors. This is particularly important in areas that are otherwise not well serviced by public transport and do not have sufficient business density to justify targeted public transport improvements
- **Commercial services and business users:**  
WestConnex will deliver improved connectivity between Sydney's major employment centres of Sydney CBD and Parramatta. It will also improve connectivity to strategic centres at Sydney Olympic Park and Burwood. For businesses and commercial services in western Sydney, WestConnex improves access to Green Square, the Randwick education and health precinct, and Sydney Airport.

# 5

# OPTIONS DEVELOPMENT AND THE EVOLUTION OF WESTCONNEX

This Chapter outlines the options development process for WestConnex, leading to the project that is being delivered today.

## 5.1 Original concept

As outlined in **Chapter 3**, WestConnex was originally recommended as a strategic concept by Infrastructure NSW in its advice for the *2012 State Infrastructure Strategy*. In preparing its advice, Infrastructure NSW examined a broad range of infrastructure-related solutions for Sydney and NSW. In terms of transport and roads, it made recommendations relating to the rail system, to the improving existing road and transport assets through targeted investment, and for new bus and other public transport infrastructure.<sup>1</sup>

Having assessed a broad and multi-modal series of solutions, Infrastructure NSW recommended WestConnex as one of the projects that should proceed for further development.

The WestConnex concept was then further developed by a joint team that included Roads and Maritime Services, Transport for NSW and Infrastructure NSW. The proposal brought together a series of separate projects that had been discussed with the community since 2004.<sup>2</sup> In this 2012 concept, WestConnex was described in terms of a northern sector:

- Widening of the existing M4 from Parramatta to Haberfield
- An M4 Extension connecting the existing M4 at Haberfield to Taverners Hill in Petersham. The M4 extension would be constructed with sections in tunnel, cutting (“slot”), at grade, or on elevated road
- A tunnel from Taverners Hill to the St Peters area via Camperdown.

And a southern sector:

- A Sydney Airport Access Link between the St Peters area and the M5 East portals, with links to the airport terminals, Port Botany and surrounding industrial areas
- Duplication of the M5 East.

Business case development and further assessment on this concept commenced following the Government’s endorsement of WestConnex in 2012.

## 5.2 Options development process and 2013 Business Case

In undertaking business case development in 2012 and 2013, a thorough options development process was followed. This section outlines that process.

### 5.2.1 Sydney Motorways Project Office and industry engagement

The Government established a ‘Sydney Motorways Project Office’ to develop the business case for WestConnex with a dedicated team to work on the project’s development (**Figure 5.1**).

The Sydney Motorways Project Office sought early involvement from the private sector in the design and development of the WestConnex ‘reference design’. The purpose of the reference design was to demonstrate the technical and commercial viability of the project – from economic, financial, engineering and traffic/transport perspectives.

In line with Infrastructure NSW advice for “greater private sector involvement at the design phase”<sup>1</sup>, four Australian and international design and construction industry consortia were selected as partners to assist with developing improved design and construction solutions for specific sections of WestConnex:

- Two consortia were assigned to the northern corridor: Between Parramatta Road at Homebush Bay Drive and Campbell Road, St Peters
- Two consortia were assigned to the southern corridor: From the M5 to the Airport Link at St Peters.

This created a ‘market for ideas’ to ensure a wide variety of efficient and innovative options were identified and considered for WestConnex.

An infrastructure solutions challenge and review team was also formed to work with the industry partners and identify a broad range of infrastructure design options.

Figure 5.1 Sydney Motorway Project Office (SMPO) structure



1. Infrastructure NSW (INSW) 2012, First Things First: *State Infrastructure Strategy 2012-2032*, INSW, Sydney

2. Infrastructure NSW (INSW) et al. 2012, WestConnex – Sydney’s Next Motorway Priority, INSW, Sydney

## Can public transport replace the need for new roads?

Infrastructure NSW recommended WestConnex within the context of the broader transport need for Sydney. In assessing the need for new road infrastructure, Infrastructure NSW stated:

*“As in other major cities, public transport is the best option for journeys to dense employment centres – such as the Sydney CBD and Parramatta. In these areas, public transport is already the preferred choice for many employees and that will continue to be the case in future.*

*However, the overwhelming majority of Sydney’s journeys are dispersed in nature. For such trips the flexibility of the private car makes it the dominant choice. This pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand will change in future”.*

*“The vast majority of the growth in travel demand is expected to be accommodated by road. The same is true for freight movements. The Government has set a target to double the share of port container freight that is moved by rail by 2021. However ... meeting this target will still leave two-thirds of the growth in container demand to be moved by road over the next 20 years.”<sup>3</sup>*

In terms of the better management and utilisation of existing roads, Infrastructure NSW stated:

*“Measures to improve asset utilisation are favoured by Infrastructure NSW as they often provide a cheaper and faster means of addressing congestion than investment in major new infrastructure. In the case of roads, Infrastructure NSW has considered two main ‘better use’ options:*

- *managing existing motorways more efficiently*
- *road pricing.*

*These are valuable options that should be progressed ... however; because of the underlying demand growth these options will provide only part of the solution to the capacity constraints on the [Sydney Strategic Road Network], which ultimately needs further development.”<sup>3</sup>*

3. Infrastructure NSW (INSW) 2012, *First Things First: The State Infrastructure Strategy 2012-2032*, INSW, Sydney



Infrastructure NSW concluded that:

*“It is unfortunate that roads and public transport have often been positioned as opposing alternatives competing for scarce public funding. In reality these modes are complementary to each other, each having a valuable, but different role.*

*The evidence is clear that private road transport is – and will remain – the only viable option for most journeys in Sydney most of time, even with the targeted growth in public transport and rail freight sought by Government, and the expected increase in the population density of the city.”<sup>3</sup>*

In this context, the NSW Government is not just investing in roads, but also Sydney Metro, Light Rail and enhancements to the rail network.

## 5.2.2 2013 Business Case options design process

The development of the original WestConnex reference design included in the 2013 Business Case had two main phases as shown in **Table 5.1**.

Both phases focused on exploring a wide range of possible ideas to optimise value for money and functionality, while ensuring feasibility and deliverability.

In developing options, the industry partners and the review team were asked to consider the following components:

- Option alignment
- Engineering structure (tunnel, slot, viaduct, surface road, or a combination of these)
- Interchange locations
- Tunnel portal locations.

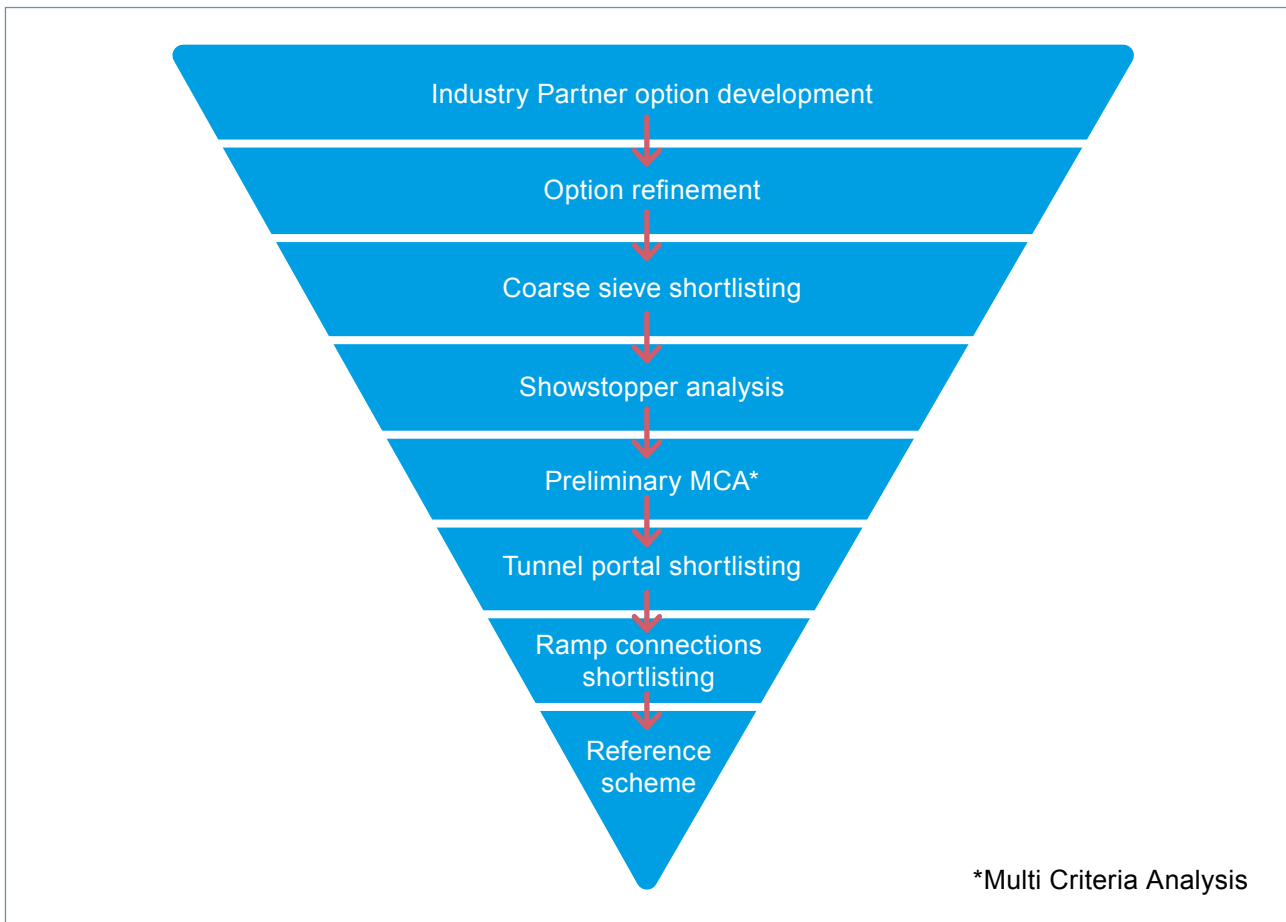
The industry partners initially developed a wide range of options. A preliminary assessment of each option was conducted by the review team, to identify whether it offered enhanced value compared with the design put forward in the *2012 State Infrastructure Strategy* (**Figure 5.2**).

The outcome of this process was five shortlisted options for the northern section and six options for the southern section to progress to the next stage (see **Figure 5.3**).

Table 5.1 Early options design phases

Design phase	Intent
1	<ul style="list-style-type: none"> <li>• Industry partner options development and refinement.</li> <li>• Refinement of options through an infrastructure solutions challenge and review team-led process.</li> </ul>
2	<ul style="list-style-type: none"> <li>• Option assessment and refinement.</li> <li>• Further detailed design refinement using traffic, financial and economic evaluation.</li> </ul>

Figure 5.2 Options development process for 2013 Business Case



The next step taken was to identify the best value for money, functional design from the shortlisted options in **Figure 5.3** through a multi-criteria analysis. The criteria used were derived from the project's objectives and the strategic planning directions (as per **Chapter 4**):

- Provides improved connectivity between western Sydney and the Global Economic Corridor, and sufficient connections for efficient road network performance
- Supports High Productivity Vehicle movements across Sydney with high-quality connections to primary and secondary freight routes
- Reduces travel duration, improves road safety and increases consistency of travel times for the WestConnex study area
- Enables ease of delivery, considering:
  - Staging and packaging
  - Constructability, including minimising construction impacts
  - Land acquisition requirements
  - Duration of work
  - Access
- Traffic management
- Operation and maintenance.
- Maximises urban amenity (liveability) and overall environmental outcomes across the study area
- Provides opportunities for urban renewal along and across the motorway corridor by:
  - Reducing traffic using the existing arterial network
  - Providing opportunities for alternative transport modes.
- Enables the longer-term development of the road network as identified in the *NSW Long Term Transport Master Plan*
- Enables efficient management, maintenance and operations of WestConnex
- Improves user experience of the WestConnex study area by ensuring logical route choice
- Capital and whole-of-life costs
- Toll revenue.

Figure 5.3 Industry partner options shortlisted



Option	Description
<b>Northern corridor options</b>	
N1	The design in the <i>2012 State Infrastructure Strategy</i> .
N2	Direct connection to City West Link and an alignment slightly further south of Parramatta Road.
N3	Connection to the WestConnex Southern Corridor further west, around Petersham.
N4	Direct east-west alignment between Parramatta Road and City West Link, returning to Parramatta Rd at Camperdown.
N5	Identical to option N2 from Parramatta to the City West Link connection. It then continues in a south easterly direction towards the WestConnex Southern Corridor beneath Summer Hill and Dulwich Hill, while also providing a tunnel to Parramatta Road at Camperdown.
<b>Southern corridor options</b>	
S1	The design in the <i>2012 State Infrastructure Strategy</i> .
S2	Refinement of option S1 with a motorway standard connection to the north and a more efficient connection to the Sydney Airport International Terminal.
S3	Deviates from the existing M5 East corridor around Bexley Road, with a new tunnel towards Bayview Road. Connection to the Airport is via a cut-and-cover tunnel which heads north-east between Princes Highway and Alexandra Canal. It includes connections to Airport Drive and the industrial area north of Sydney Airport before re-entering a tunnel south of Sydney Park.
S4	Similar to S3, but avoids the impact on Tempe Reserve, and has a less direct connection to the international terminal (via a new connection to Airport Drive) and a single connection point to the industrial precinct north of Sydney Airport.
S5	Similar to options S3 and S4, but deviates from the existing M5 East corridor west of Bexley Road. It resurfaces west of Waterworth Park, continuing in a viaduct before returning to a tunnel at Princes Highway. The tunnel leg to the north follows a more westerly alignment. This option also includes two connections to the Airport.
S6	This option leaves the existing M5 East corridor at the same point as option S5, but follows an alignment between Option S2 and S3/S4/S5 through Turrella. It does not surface again until it reaches an interchange at St Peters. The northern leg of this intersection returns to a tunnel south of Sydney Park. The other legs of the intersection provide an eastern connection to the industrial precinct north of the airport and a new connection to Airport Drive.

## Northern corridor alignment selection – 2013 Business Case

After the options selection process, the 2013 Business Case identified a preferred alignment for the M4 extension, which would largely follow that of Parramatta Road to Camperdown (shown as N1 in **Figure 5.3**). In effect, this was the same alignment indicated in the *2012 State Infrastructure Strategy*.

It was confirmed that the M4 extension should include connectivity via the southern Sydney CBD, rather than connecting directly to Sydney Airport/Port Botany. Although CBD trips are not one of the primary focuses of WestConnex, this provided an effective bypass of Parramatta Road to enable improved surface transport and urban renewal activities. It also allows CBD traffic to access WestConnex and bypass other congested routes like King Street and the Princes Highway.

The other options that deviated from the Parramatta Road alignment, options N4 and N5, were discounted because they:

- Were not expected to provide the same level of traffic reduction to Parramatta Road
- Did not provide the same level of transport benefits for journeys to and from the Global Economic Corridor as the other options.

## Northern corridor engineering options – 2013 Business Case

The *2012 State Infrastructure Strategy* proposed the M4 extension could be built along Parramatta Road in a 'mixed' engineering structure that included deep tunnels, shallow tunnels, road in cutting (slot sections), at grade and elevated road.

The industry partners considered a wide variety of engineering solutions for this route. The options assessment process identified that the most cost-effective engineering solution would be tunnel for the length of Parramatta Road east of Strathfield.

This approach would:

- Minimise the need for property acquisition and public utility relocation
- Reduce traffic impacts during construction of the motorway
- Offer greater opportunity for urban renewal and new transport solutions by reducing land take and removing through traffic from the surface environment.

## Enhancements to Stage 3 alignment

Since the 2013 Business Case, the alignment of Stage 3 has been changed (discussed later in this Chapter). The tunnels now follow the alignment of the CityWest Link.

Given the objectives for the project around achieving traffic reductions along Parramatta Road are unchanged, the new alignment has been modelled in detail to ensure the desired traffic outcomes are still achieved.

## Northern corridor connectivity – 2013 Business Case

The options development process generated several potential interchange locations for the northern corridors as shown in **Table 5.2**.

Table 5.2 Northern corridor connection options – 2013 Business Case

Locale	Option	East bound	West bound
Strathfield	Concord Road	Entry	Exit
	Wentworth Road	Entry	Exit
	Shaftesbury Road	Entry	Exit
City West Link	Parramatta Road west of Wattle Street	Exit	Entry
	Wattle Street north of Ramsay Street	Exit	Entry
	Parramatta Road east of Wattle Street (#1)	Exit	Entry
	Parramatta Road east of Wattle Street (#2)	Entry	Exit
Petersham	Parramatta Road at Tebbutt Street	Exit	Entry
	Parramatta Road at Flood Street	Entry	Exit
Sydney CBD	Parramatta Road at Camperdown	Exit	Entry

Following traffic and costing analysis, the following northern corridor interchange locations were selected for the 2013 Business Case:

- **Strathfield connections: Concord Road** – this option performed better than Wentworth Road or Shaftsbury Road in terms of traffic usage, transport integration and potential for urban renewal
- **City West Link connections: Wattle Street, and Parramatta Road** – a split arrangement is required at this location because of the high traffic demand at Wattle Street and Parramatta Road. This option offered improved access to City West Link and substantial traffic reduction on Parramatta Road
- **Petersham connections: Flood Street** – this option was selected as it allowed access for Hume Highway traffic eastbound and for the Petersham/Leichhardt area
- **Sydney CBD connection: Parramatta Road at Camperdown** – this connection was included to provide access to and from the inner city area and southern part of the CBD.

For the northern corridor there were two options for tunnel portal location, where the existing M4 and new M4 East would meet:

- Concord Road portals (as per the *2012 State Infrastructure Strategy*)
- Powells Creek portals (approximately 700 metres west of Concord Road).

The Powells Creek portals offered more acceptable tunnel exit grades. They also performed better in terms of constructability and deliverability. As such, they were selected for the reference design.

## Southern corridor alignment selection – 2013 Business Case

A number of options for the southern corridor. Three of these options were shortlisted – S1, S4 and S6. These are shown in **Figure 5.4**.

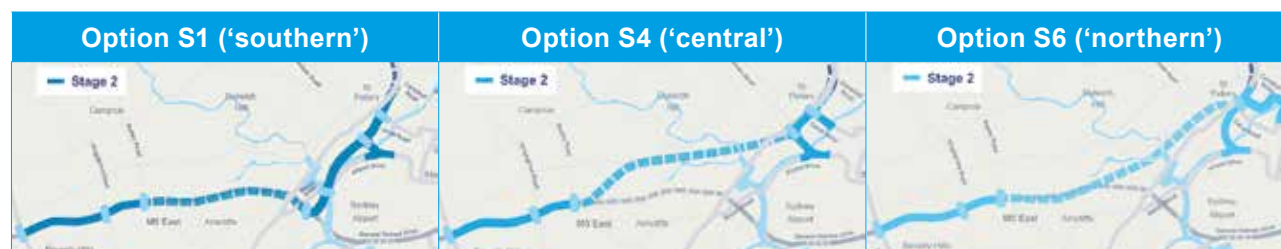
The strategic concept in the *2012 State Infrastructure Strategy* was based on option S1, which minimised tunnelling and utilised a surface solution north of the airport. Options S4 and S6 included longer tunnels.

Option S4, the central alignment, was adopted for the 2013 Business Case on the basis that it provided a better value solution than the original concept, while achieving similar traffic and network outcomes including taking pressure off Marsh Street and providing a new gateway to the airport. The business case acknowledged that more detailed analysis would be necessary on the route.

## Southern corridor engineering options – 2013 Business Case

The engineering options proposed for all three southern corridor options were similar, with surface roads from King Georges Road to Bexley Road, and tunnels to the airport precinct. For the link into the airport precinct itself, surface roads with elevated structures were proposed.

Figure 5.4 Shortlisted southern corridor alignment options – 2013 Business Case



## Southern corridor connectivity – 2013 Business Case

It was assumed that interchanges would be located as per the selected S4 option:

- A connection to Airport Drive, allowing movements to both international and domestic terminals
- Connections at Bexley Road, Kingsgrove Road and King Georges Road, as per the existing M5 East.

Tunnel portal locations were assumed, where the southern corridor tunnels would start and end, at:

- Airport area portals: south of Canal Road, Tempe
- M5 East portals: Bexley Road, Earlwood.

## 5.2.3 2013 Business Case reference design

Given the completion of this options analysis, a proposed reference design utilising corridor options N1 in the north, and S4 in the south was selected for the 2013 Business Case. This is illustrated below in **Figure 5.5**.

## 5.2.4 Delivery timeframe in 2013 business case

The delivery timeframe in the 2013 Business Case was in line with Infrastructure NSW's proposal to build WestConnex over a 10-year period.<sup>4</sup> Based on the funding and financing strategy to recycle State capital from one stage into the next (see **Section 3.5.2**), the intent was to stagger delivery from 2013 to 2023, as shown in **Figure 5.6**.

Figure 5.5 2013 Business Case WestConnex reference design



4. Infrastructure NSW (INSW) et. al. 2012, *WestConnex – Sydney's next motorway priority*, INSW, Sydney

## 5.3 Change drivers since 2013

The following section describes the evolution of the project since 2013, the evaluation of enhancements, and the basis of the decision-making processes that supported them.

### 5.3.1 Acceleration of Stage 2

Stage 2 of WestConnex was originally intended to be delivered by the end of 2020. In May 2014, the Australian Government entered into a Memorandum of Understanding with NSW to provide \$1.5 billion in funding for WestConnex. As part of that agreement, the Australian Government also provided a concessional loan of \$2 billion to support the acceleration of Stage 2.

Under the Memorandum of Understanding construction of Stage 2 was required to commence by mid-2015. This has been achieved, with work underway on King Georges Road Interchange Upgrade. Under this revised timeframe, the New M5 will be delivered in 2019.

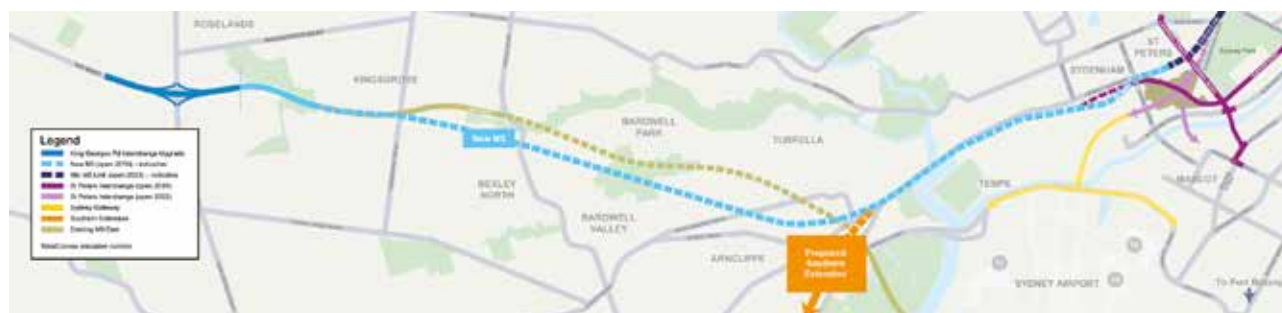
### 5.3.2 Stage 2 tunnelling solution and surface works

In undertaking further development and analysis in 2013-2014 for Stage 2 it was found that:

- Remaining in a deep tunnel until surfacing in the vicinity of St Peters avoids the constraints posed by existing land uses, utilities and ground conditions
- Ground conditions present better opportunities for construction of the eastern portal close to St Peters. The Alexandria Landfill site at St Peters was identified as suitable for the construction of the eastern portal of the main tunnels. The site was considered large enough to accommodate the required construction activities, while minimising impacts to the surrounding community
- An alignment directly to St Peters provides a more direct and shorter route to the Stage 3 interchange site. It also avoids viaduct and at-grade construction issues.



Figure 5.6 Selected Stage 2 reference design



As a result, a preferred option was selected with a more northerly alignment than that of the 2013 Business Case, utilising a longer tunnel. The new design consisted of twin tunnels running from Kingsgrove towards the airport along the existing M5 corridor to St Peters. At St Peters the new tunnel would connect with Stage 3 of WestConnex.

This design was included in the 2014 Stage 2 Definition and Deliveries Report to Government.

### St Peters surface works

The Stage 2 Definition and Delivery Report also identified surface works to support the revised New M5 design including:

- Surface works around the tunnel portals:
  - St Peters Interchange – an above ground interchange and portals south of Campbell Road
  - King Georges Road Interchange Upgrade and widening – upgrading the existing interchange with the M5 and widening the surface sections of the M5 East between the interchange and the western portals.
- Additionally, a number of network upgrades at St Peters and Mascot were identified:
  - Campbell Road widening – to enhance links to the suburbs west of the St Peters Interchange
  - Euston Road widening – to improve connectivity to Alexandria
  - Gardeners Road extension – to link the St Peters Interchange with Mascot.

The reference design for Stage 2, as part of the Stage 2 Definition and Delivery Report, was approved by the Government in August 2014 (Figure 5.6).

### 5.3.3 Northern and southern extensions and Stage 3 alignment change

In March 2014, the Government approved funding to commence studies for initial business cases into a number of missing links on the motorway network beyond WestConnex – an F6 extension, Western Harbour Tunnel and Beaches Link (to the Northern Beaches).

In undertaking the initial investigations for these motorways, it became evident that there was an opportunity to design WestConnex to support the connectivity of these motorways in the future. This would be through a northern extension, which would connect to the proposed Western Harbour Tunnel and Beaches Link, and a southern extension, to facilitate a future Southern Access Motorway (now known as 'Gateway to the South') (see Figure 5.7).

In mid-2014, the Government directed WestConnex Delivery Authority to investigate these extensions.

Investigations were undertaken to understand constructability, economic and financial feasibility, and traffic impacts. In parallel with this work, the northern and southern extensions, the Western Harbour Tunnel and Beaches Link and Gateway to the South were included in the 2014 State Infrastructure Strategy (see Chapter 3).

## Changing the Stage 3 alignment

In late 2014, WestConnex Delivery Authority put forward a Strategic Project Definition and Delivery Plan to Government. The plan confirmed the economic viability of the northern extension, and recommended that the extension be incorporated into the alignment of WestConnex Stage 3. This would see the M4 – M5 Link diverting from the previous Parramatta Road alignment, to instead follow a City West Link alignment to Rozelle, before turning south to Camperdown.

The change in alignment for Stage 3 then underwent its own option evaluation and testing process.

Sixteen options and a number of sub-options with differing connectivity were identified and evaluated. These were intended to facilitate the northern extension and allow a future connection to a Western Harbour Tunnel and Beaches Link, while still delivering on the objectives of WestConnex. This strategic analysis evaluated the options based on expected traffic outcomes on Parramatta Road, the broader road network (the impact on the Anzac Bridge in particular), and the impact on Stage 3 itself.

The evaluation identified two designs (with particular sets of network connectivity) for further analysis, broadly:

- The WestConnex reference design, with the addition of northern and southern extensions (as per **Figure 5.7**)
- The amended design, with Stage 3 duplicating the City West Link, and the addition of a southern extension (as per **Figure 5.8**).

These options were costed and a preliminary economic and financial evaluation was undertaken. The original WestConnex reference design from the 2013 Business Case (as per **Figure 5.5**) acted as the 'base case' for this analysis.

The analysis recommended proceeding with the amended Stage 3 design, duplicating the City West Link to Rozelle. This delivered the functionality of the northern extension, but did so within the main WestConnex project.

This recommended option:

- Is more cost effective, and has a stronger economic case, than delivering a northern extension as a separate addition to Stage 3
- Will be able to accommodate the Western Harbour Tunnel and Beaches Link without additional infrastructure investment
- Provides similar reductions in surface traffic flows for WestConnex that followed the Parramatta Road corridor. This means it will still enable urban renewal.

Figure 5.7 Northern and southern extension investigations – as at mid-2014

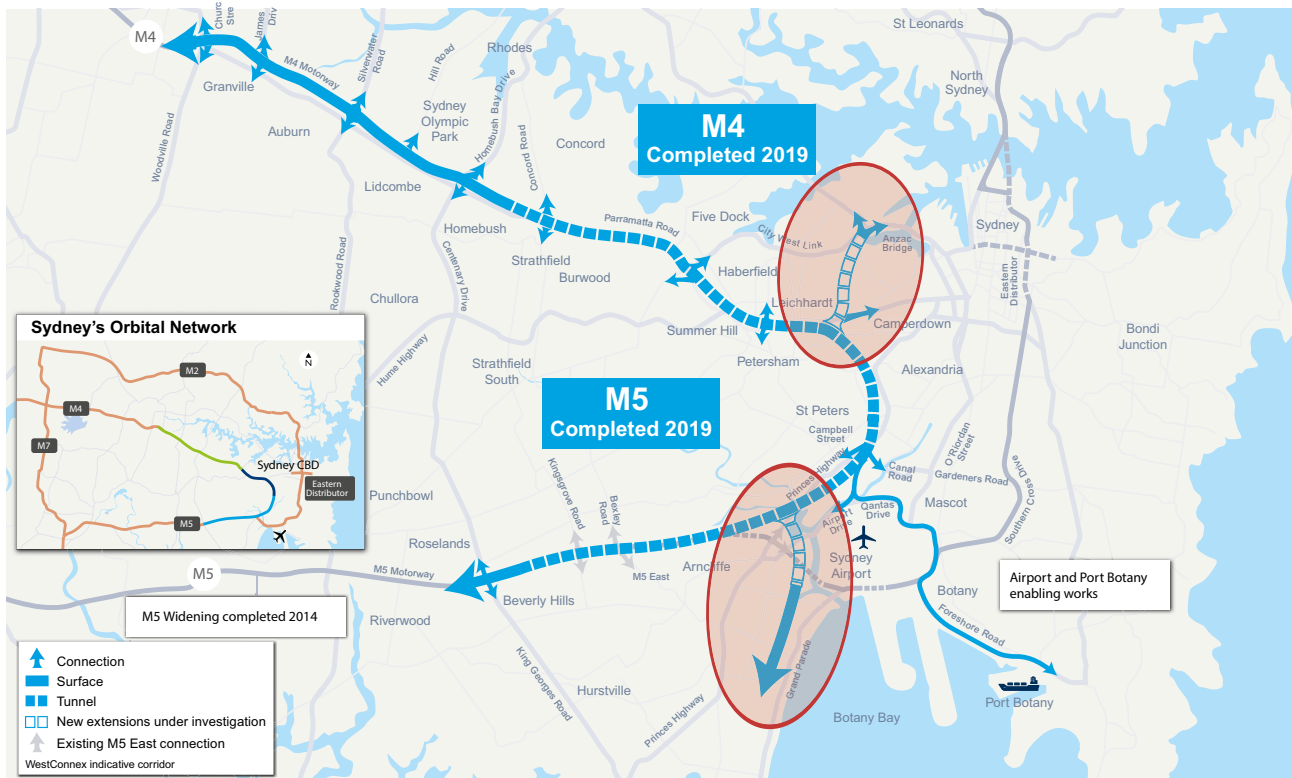
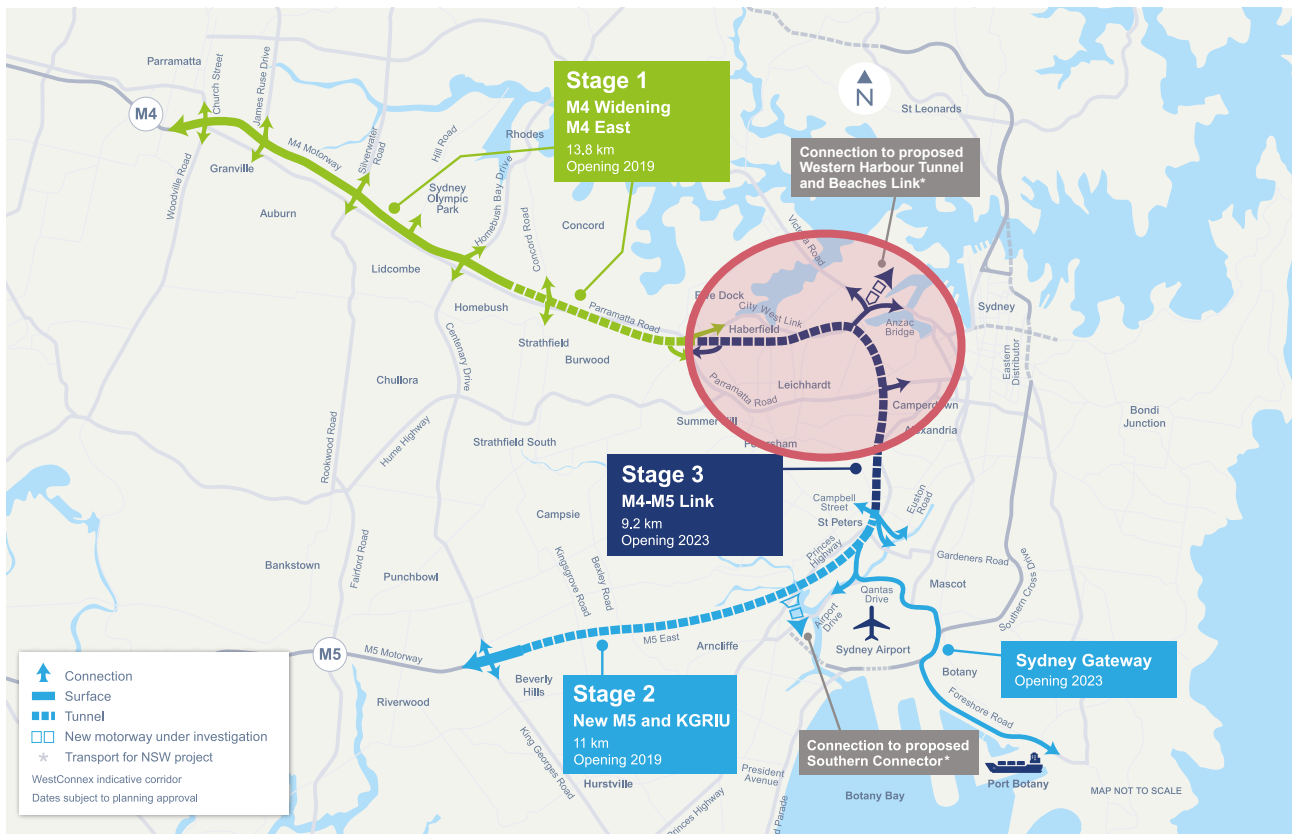


Figure 5.8 WestConnex incorporating revised Stage 3 alignment including northern extension



Based on this advice, Government accepted the change in alignment in October 2014.

A final Project Definition and Delivery Report for Stage 3 has been approved for the revised Stage 3 alignment (stages 1 and 2 having already received Government approval to proceed). It also found that the Southern Connector (as the southern extension to WestConnex) was economically viable, but recommended that further development work was needed on the concept. As such, Government recommended that the Southern Connector be further developed as part of the Gateway to the South project.

As part of WestConnex Stage 2, 'tunnel stubs' will be delivered providing for a future connection of the Southern Connector to the New M5 tunnels.

### 5.3.4 Sydney Gateway

As explained in Chapter 2, Sydney Airport and Port Botany are major contributors to the State and Australian economies.

The roads supporting and connecting this precinct experience heavy congestion and high volumes of heavy vehicle traffic and are currently disconnected from Sydney's motorway network.

Sydney Gateway will help to correct this by providing a high-quality, high-capacity connection between the airport and port precinct and the St Peters Interchange (being delivered as part of the New M5 project).

Infrastructure NSW has undertaken further planning for Sydney Gateway and provided an enhanced solution for government's consideration, to be undertaken as part of WestConnex.

### 5.3.5 Procurement approach

Following the example of NorthConnex and to maximise industry innovation, the procurement process is based on an 'output specification approach'. A detailed design is not dictated to tenderers. Instead, tenderers are able to compete on final design, allowing optimisation of tunnel route, depth and intersection design.

One of the key features of this approach is that the environmental impact assessment for each stage is prepared after or during, rather than prior to, awarding of the contract. This is necessary given that the final designs are not confirmed until the tender process is completed.

The procurement approach was endorsed by the WestConnex Delivery Authority Board and an independent review in 2014.

## 5.4 Evaluation of variations

Aside from Stage 1, which has been tendered, design of WestConnex put forward in this business case is a reference design intended to facilitate the Government's analysis of the project. It forms the basis of the analysis undertaken from cost, economic, financial, and project delivery perspectives. It also demonstrates to the Government that the project can be delivered from a construction and traffic perspective and that the Benefit Cost Ratio for the project remains positive. The detail of the reference design is outlined in **Chapter 6**.

Because of the chosen procurement approach, there is scope for the final delivered design for the project to differ from the reference design described in this business case. Ultimately, the design intended for delivery will form part of the planning approvals process put forward for each stage.

WestConnex has a robust governance structure in place that includes the Auditor-General recommended 'gateway process', in line with the Infrastructure Investor Assurance Framework.

Following internal endorsement of recommendations, approval is sought from the Minister for Roads, Maritime and Freight, who has responsibility for the project within the government.

Variations that have significant financial, functional, or community impacts are then taken by the Minister to the relevant Cabinet subcommittee – generally either the Cabinet Standing Committee for Expenditure Review or the Cabinet Standing Committee for Infrastructure.

Approvals are documented and supported by evidence and analysis, as required by the Cabinet process. This ensures that Ministerial and Cabinet oversight is maintained, and that major changes are properly documented, explained, and face appropriate cross-government scrutiny.

The detail of the governance and approval arrangements for WestConnex is provided in **Chapter 18**.





# DETAILS OF THE WESTCONNEX MOTORWAY

This Chapter details the updated reference design of the WestConnex motorway. The design outlined here is a result of the option development process outlined in **Chapter 5**. The design as described forms the basis of evaluation throughout the rest of this business case.

The Chapter is broken up by major project segment (as per **Table 6.1**). It also describes the 'whole-of-motorway' elements, such as Smart Motorways, the operations approach, and urban design approach.

## 6.1 Staging strategy

The size and scale of WestConnex requires the program of work to be delivered in stages.

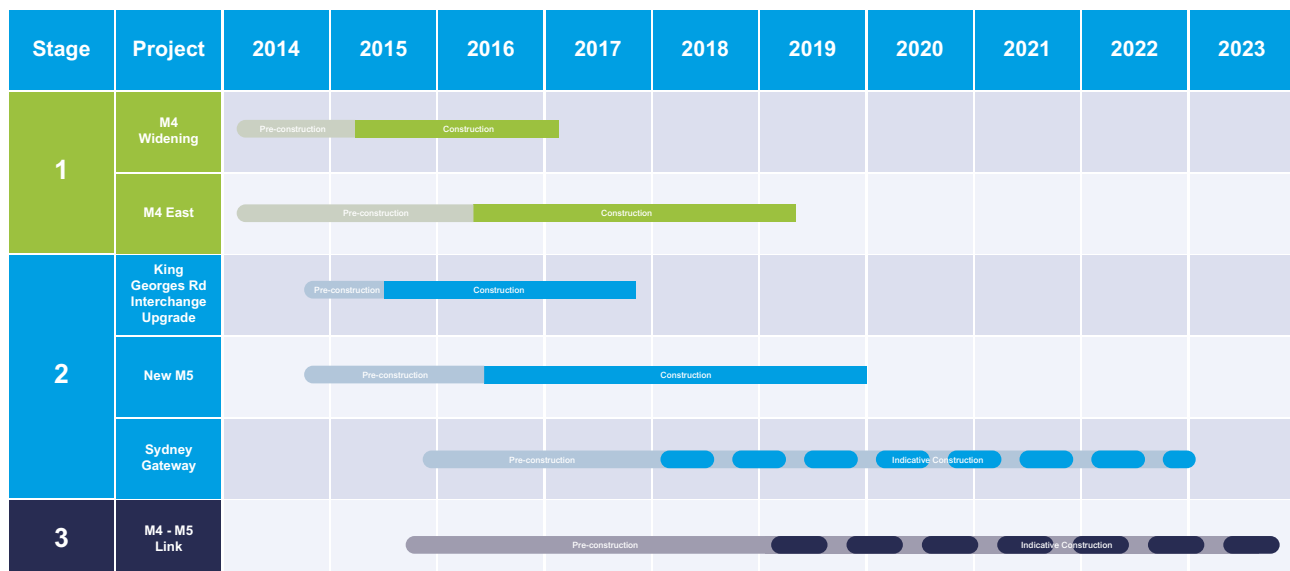
The staging strategy described in this Updated Strategic Business Case is largely a product of the 2013 Business Case.

In 2013, a set of evaluation factors were established and used to determine the project stages, as explained in **Table 6.1**.

Table 6.1 Assessment factors for WestConnex staging

Factor	Considerations
Transport benefits and traffic management	The interim implications for the transport network during WestConnex's construction.
Timing of pre-construction activities	The level of design certainty and complexity of construction varies by stage, which will potentially impact planning timeframes.
Government funding requirement	Stages with high revenue to capital cost ratios will allow funding to be recycled into the later stages of the scheme, thereby minimising Government funding requirements.
Infrastructure market capacity	Packages should be staged and packaged to meet time and cost objectives for example, create competitive tension, capture scale of economies and limit interfaces.

Figure 6.1 WestConnex delivery schedule



'Pre-construction' period commences after Government approval of project. It includes design refinement, tendering, and environmental approvals processes

Sydney Gateway delivery timeframe is marked 'Indicative Construction'. It is dependant on further development work, so timeframes may change. At the latest, it will open by 2023.



The original WestConnex proposal consisted of six sub-projects (**Table 6.2**) that naturally aligned into three construction stages. This is primarily

due to natural “break points” where the project can be cost effectively integrated into the surrounding road network.

Table 6.2 WestConnex stages

Stage	Sub-project	Description
Stage 1	Stage 1A - M4 Widening (Parramatta to Homebush)	Widening the existing M4 Motorway from Parramatta to Homebush.
	Stage 1B - M4 East (Homebush to Haberfield)	Extending the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for the future connection to M4 – M5 Link.
Stage 2	New M5 (Beverly Hills to St Peters)	Duplicating the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters Interchange allows for connections to the Sydney Gateway. The New M5 tunnels include provision for a future connection to the proposed Southern Connector (part of Gateway to the South) and the M4 – M5 Link.
	King Georges Road Interchange Upgrade (Beverly Hills)	Upgrade of the King Georges Road Interchange between the newly widened M5 West and the M5 East at Beverly Hills, in preparation for the New M5.
	Sydney Gateway (St Peters to Sydney Airport and Port Botany)	A high-quality, high-capacity connection between the new St Peters Interchange and the Sydney Airport and Port Botany precinct.
Stage 3	M4 – M5 Link (Haberfield to St Peters)	Tunnels connecting to the M4 East and New M5 via Rozelle and Camperdown. Includes ramps connecting to the St Peters and Interchange an interchange at Rozelle with provision for a future connection to the Western Harbour Tunnel and Beaches Link.

The widening and extension of the M4 (Parramatta to Haberfield) ranked highest against these staging factors when assessed in 2013. Some of the key differentiating factors listed in the 2013 Business Case were:

- The design of the M4 Widening and M4 East was more developed than other stages due to more limited alternative alignment and connection options
- Constructability of the M4 Widening and M4 East rated highly due to the location portals (in Homebush and at Haberfield) for connections to the existing road network
- Traffic volumes were anticipated as highest for this stage. This would help support the funding and financing strategy for the overall project
- The M4 Widening and M4 East could be packaged into contract sizes that can be readily met by the construction industry.

The M4 Widening and M4 East (Parramatta to Haberfield) was therefore selected to be the first stage of WestConnex to be delivered. The remaining two stages were assessed as having relatively similar overall ratings.

Key considerations were:

- For both the New M5 and M4 – M5 Link, further work was required in 2013 to confirm and better define alignments and connections
- Property acquisition requirements for both the New M5 and M4 – M5 Link (for example, around Sydney Airport) required further analysis.

The New M5 was identified as having higher revenues and lower capital cost than the M4 - M5 Link, and therefore was adopted as Stage 2 of the project. This staging was confirmed following the Australian Government’s decision to provide concessional loan financing to accelerate Stage 2. Following this acceleration, the revised schedule for the project is presented at **Figure 6.1**.

## 6.2 Stage 1A – M4 Widening (Parramatta to Homebush)

**Table 6.3** and **Figure 6.2** describes the key elements of the intended design of Stage 1A the M4 Widening.

This is based on the approved project design.

The double arrows (↔) indicate connectivity on and/or off the motorway.

Table 6.3 Stage 1A - M4 Widening

<b>Parramatta</b>	M4 at Church Street, Parramatta.
↔	Upgrading existing ramps at Church Street.
	Constructing a new viaduct between Church Street, Parramatta and Wentworth Street, Granville; and re-configuring traffic lanes on the existing viaduct structure (to make four lanes in each direction).
↔	Widening and lengthening of existing ramps at James Ruse Drive.
	Widening the existing motorway carriageway between Wentworth Street, Granville and Duck River, Auburn.
	Building a new bridge/viaduct over Duck River at Auburn.
↔	Widening and lengthening of existing ramps at Silverwater Road.
	Lengthening of existing westbound on-ramp at Hill Road.
↔	Construction of a new eastbound on-ramp to the M4 Motorway from Hill Road, Lidcombe. Roads and Maritime Services has commissioned WestConnex to complete this work. It is outside the WestConnex scope.
	Widening of the existing motorway between Junction Street, Auburn and Homebush Bay Drive, Homebush to provide four traffic lanes in each direction.
↔	New westbound on-ramp loop to the M4 Motorway from Homebush Bay Drive, Homebush, replacing the existing signalised right turn.
<b>Homebush</b>	M4 at Homebush Bay Drive, Homebush.

Length	General lane configuration
Approximately 7.5 kilometres	Four lanes in each direction (upgraded from three lanes in each direction)

Figure 6.2 Stage 1A – M4 Widening



## 6.2.1 Status of the M4 Widening

As at completion of this business case, the status of the M4 Widening was:

Table 6.2 Stage 1A - M4 Widening status

Major milestone	Status	Date
Planning consent	Granted	December 2014
Delivery contract award	Awarded	December 2014
Enabling works	Commenced	March 2015
Major construction	Commenced	May 2015
Opening to traffic	On Track	Q1 2017

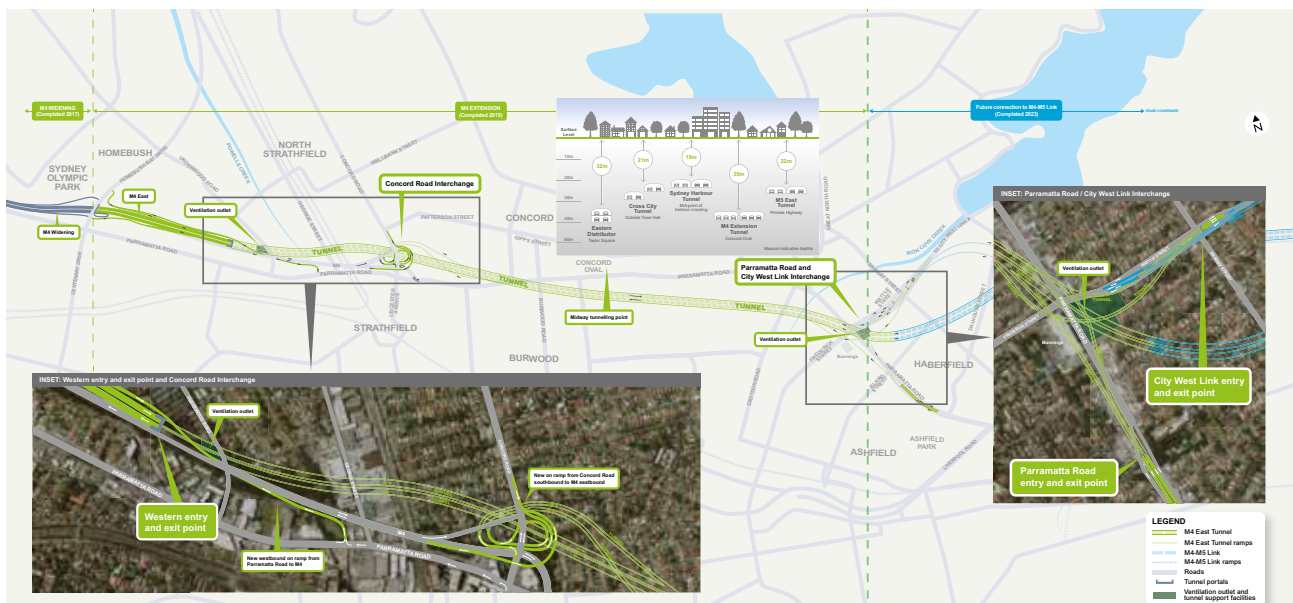
# 6.3 Stage 1B – M4 East (Homebush to Haberfield)

**Table 6.5** and **Figure 6.3** describe the key elements of the intended design of Stage 1B the M4 East. This design is subject to planning approvals. The double arrows (↔) indicate connectivity on and/or off the motorway.

Table 6.5 Stage 1B - M4 East elements

<b>Homebush</b>	M4 at Homebush Bay Drive, Homebush.
Tunnel	Surface road widening from Homebush Bay Drive, Homebush, to Powells Creek, Homebush (approximately one kilometre), to provide three lanes in each direction.
	Western tunnel portal located at Powells Creek, Homebush. Tunnel through to Haberfield.
	Eastbound on-ramps and westbound off-ramps at Concord into the tunnel, connecting with Parramatta Road via Concord Road, and to Concord Road adjacent to the current end point of the M4. Existing westbound motorway access and eastbound motorway exit retained.
	Westbound on-ramps and eastbound off-ramps connecting the tunnel to Parramatta Road at Ashfield.
	Eastern tunnel portal surfaces at the City West Link, Haberfield.
	Once Stage 3 is built, the City West Link portal will operate as westbound on-ramps and eastbound off-ramps for the integrated motorway tunnel.
	Tunnel stubs to be constructed to facilitate underground connection of Stage 3.
<b>Haberfield</b>	City West Link, Haberfield.
<b>Length</b>	
Approximately 6.5 kilometres	<b>General lane configuration</b>
Three lanes in each direction (5.5 kilometres in tunnel)	

Figure 6.3 Stage 1B – M4 East



## 6.3.1 Status of the M4 East

As at completion of this business case, the status of the M4 East was:

Table 6.6 Stage 1B - M4 East status

Major milestone	Status	Date
Delivery contract award	<b>Awarded</b>	June 2015
Planning consent	On Track	Early 2016
Major construction	On Track	Mid 2016
Opening to traffic	On Track	Early 2019

## 6.4 Stage 2

Stage 2 is divided into three sub-projects:

- The New M5 (Beverly Hills to St Peters) – the main tunnel
- The King Georges Road Interchange Upgrade – a major interchange upgrade on the western end of the New M5
- Sydney Gateway – a high-capacity, high-quality connection from St Peters Interchange to Sydney Airport and Port Botany precincts.

**Table 6.7** and **Figure 6.4** describe the key elements of the reference design for the New M5 main tunnel, which in effect duplicates the existing M5 East motorway.

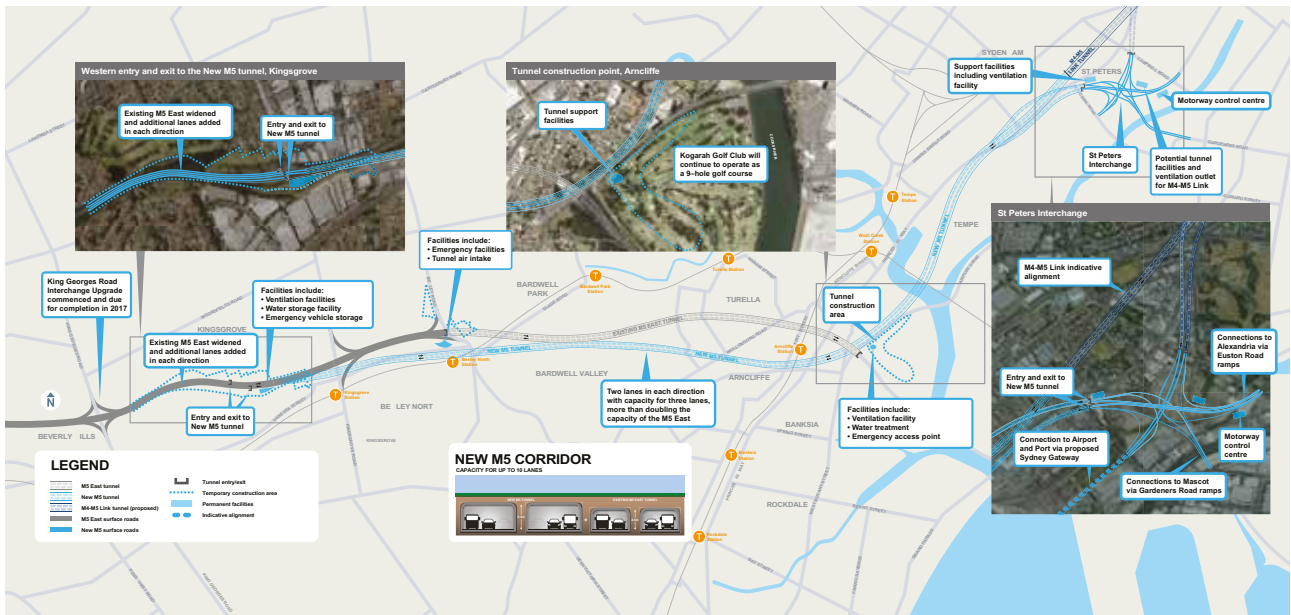
The double arrows (↔) indicate connectivity on and/or off the motorway.

Table 6.7 Stage 2 elements

Beverly Hills	M5 at King Georges Road, Beverly Hills.
Tunnel	Widening the existing M5 East surface road to four lanes in each direction, from King Georges Road, Beverly Hills, to just west of Kingsgrove Road, Kingsgrove.
	↔ Western tunnel portal just west of Kingsgrove Road. Tunnel in close proximity to existing M5 East, before heading east to St Peters.
	Stub tunnels off the main tunnel, to facilitate the future construction of the Southern Connector at Arncliffe as part of the Gateway to the South project.
	↔ Eastern portal near the corner of Princes Highway and Canal Road, St Peters; creating the 'St Peters Interchange'. St Peters Interchange will also provide connections for the M4 - M5 Link and Sydney Gateway.
	↔ Tunnel stubs to facilitate an underground connection with Stage 3 M4 – M5 Link.
	Supporting upgrades to local streets around St Peters Interchange (commissioned by Roads and Maritime Services).
St Peters	Alexandria Landfill site, St Peters.

Length	General lane configuration
Approximately 9 kilometres	<ul style="list-style-type: none"> <li>Widening of the M5 East at Kingsgrove to four lanes in each direction</li> </ul> <p>Twin tunnels:</p> <ul style="list-style-type: none"> <li>Marked for two lanes in each direction, but built to accommodate three between Kingsgrove and Arncliffe</li> <li>Marked for two lanes in each direction, but built to accommodate five lanes between Arncliffe and St Peters, when the Southern Connector is complete.</li> </ul> <p>Any future changes to lane configuration will be subject to separate planning approvals.</p> <p>This approach allows for the tunnels to manage any increase in traffic volumes in the future as a result of population growth and/or the addition of the Southern Connector (part of the Gateway to the South).</p>

Table 6.4 Stage 2 - New M5



## 6.4.1 Status of the New M5

As at completion of this business case, the status of the New M5 was:

Table 6.8 Stage 2 - New M5 status

Major milestone	Status	Date
Contract award	On Track	Late 2015
Planning consent	On Track	Early 2016
Major construction	On Track	Mid 2016
Opening to traffic	On Track	Late 2019

## 6.4.2 Other New M5 items of note

- The St Peters Interchange will be located within a large industrial landfill site (the former 'Dial a Dump' site, also known as Alexandria Landfill). This site was selected to minimise impact on residential and commercial property. Formal remediation and closure of this site forms part of the scope of work, and is being assessed as part of the project's Environmental Impact Statement
- The local street upgrades around the St Peters Interchange include:
  - Widening and extension of Campbell Road over Alexandria Canal
  - Widening of Euston Road
  - Extension of Gardeners Road, with a new bridge over Alexandria Canal.
- These upgrades are important to ensure appropriate integration with the local road network. This work is funded by Roads and Maritime Services, and while it falls outside the scope of work for WestConnex, it will be delivered by WestConnex contractors to realise the cost efficiencies offered by this approach.

## 6.4.3 Stage 2 King Georges Road Interchange Upgrade (Beverly Hills)

The upgrade of the current intersection of the M5 East and King Georges Road is the first step in the delivery of Stage 2. This work was accelerated using the Australian Government's concessional loan (see **Section 5.3.1**). The interchange will facilitate the connection between the newly widened M5 West and the New M5 tunnels.

Figure 6.5 Stage 2 - King Georges Road Interchange Upgrade



## 6.4.4 Status of the King Georges Road Interchange Upgrade

As at completion of this business case, the status of the King Georges Road Interchange Upgrade was:

Table 6.9 Stage 2 - King Georges Road Interchange Upgrade status

Major milestone	Status	Date
Planning consent	Granted	March 2015
Contract award	Awarded	May 2015
Construction	Commenced	July 2015
Opening to traffic	On Track	2017

## 6.4.5 Stage 2 – Sydney Gateway

The Sydney Gateway will connect the St Peters Interchange to the Sydney Airport precinct. It will provide the major link between Sydney's motorway network and international gateways. Although it falls as part of the Stage 2 project, it is anticipated to be delivered in a similar timeframe as Stage 3.

## 6.4.6 Status of Sydney Gateway

As at completion of this business case, the status of Sydney Gateway was:

Table 6.10 Stage 2 - Sydney Gateway status

Major milestone	Status	Date
Design development	Underway	Ongoing
Opening to traffic	On Track	2023



## 6.5 Stage 3 – M4 – M5 Link (Haberfield to St Peters)

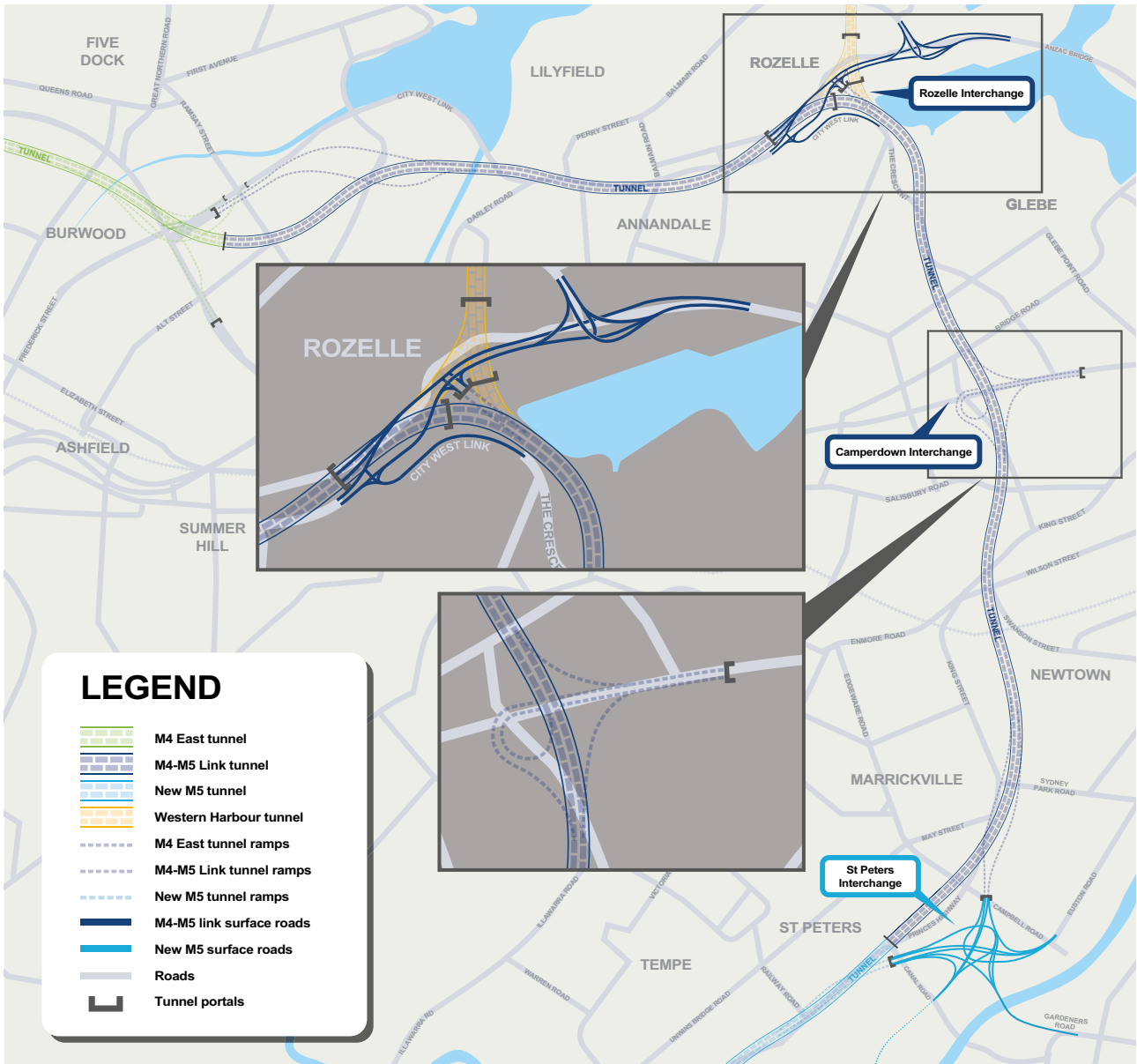
**Table 6.11** and **Figure 6.6** describe the key elements of the reference design for the M4 – M5 Link, which incorporates the northern extension. The double arrows (↔) indicate connectivity on and/or off the motorway.

Table 6.11 Stage 3 - M4 – M5 Link elements

<b>Haberfield</b>	Haberfield (Stage 1B) stub tunnel.
Tunnel	Mainline tunnel running from Haberfield stub, underground along City West Link alignment to portals at Rozelle.
	↔ Portal at Rozelle (within the disused Rozelle Goods Yard) with connections to a realigned City West Link, Victoria Road, and the Anzac Bridge.
	↔ Stub connections off the Rozelle Interchange to facilitate the connection of a future Western Harbour Tunnel and Beaches Link.
	↔ Tunnels from Rozelle to St Peters.
	North and south-bound on and off-ramps at Camperdown for drivers coming to and from the CBD.
	On and off-ramps at surface, connecting to St Peters Interchange.
	Tunnels (fully underground) connecting to the New M5.
	<b>St Peters</b>

Length	General lane configuration
Approximately 9.2 kilometres	Three lanes in each direction throughout the main tunnel.

Figure 6.6 Stage 3 – M4 – M5 Link (indicative only)



### 6.5.1 Status of the M4 – M5 Link

As at completion of this business case, the status of the M4 – M5 Link was:

Table 6.12 Stage 3 - M4 – M5 Link status

Major milestone	Status	Date
Main works contract award	On Track	2018
Main works planning consent	On Track	2018
Start main works major construction	On Track	2019
Opening to traffic	On Track	2023

## 6.52 Other M4 – M5 Link items of note

- The connections between Stage 3 and stages 1 and 2 will be underground; with tunnel ‘stubs’ to be constructed as part of the stage 1 and 2 projects to facilitate this.
- The reference design shows the Rozelle Interchange will be within the disused freight yard beside the City West Link. The design of the interchange is intended to facilitate future urban renewal of the Rozelle Goods Yard as part of the broader Bays Precinct Transformation and has been developed in consultation with UrbanGrowth NSW. The Rozelle Interchange also allows the future connection of a Western Harbour Tunnel and Beaches Link directly to WestConnex.
- The construction of the Rozelle Interchange will also include the redesign and improvement of the current Victoria Road intersection with City West Link and Anzac Bridge. This is included as part of the WestConnex scope.
- Public transport has been taken into consideration in designing the main interchanges:
  - The design of the portal connection onto Parramatta Road at Camperdown uses existing road reservations along the corridor, and is intended to allow for future public transport improvements, including the ability for Transport for NSW to implement dedicated bus lanes or light rail along that section of Parramatta Road in the future
  - The Rozelle Interchange has been designed to facilitate a dedicated bus lane on Victoria Road.

## 6.6 Whole of motorway elements

### 6.6.1 Tunnel and road design

In line with the customer definition in **Chapter 4**, WestConnex is designed to facilitate the unrestricted movement of heavy freight vehicles. To do this, WestConnex is being designed around the principles of ‘flatter, higher and wider’ tunnels. This philosophy has been adopted on the NorthConnex project and takes on board lessons learnt from other motorway tunnels elsewhere in Sydney.

WestConnex infrastructure has been designed to accommodate 25/26-metre B-double trucks. Flatter tunnels with lower gradients reduce excessive braking and engine strain for heavy vehicles, higher vertical clearance minimises the risk of large vehicles impacting the tunnel roof, while wider lanes provide greater separation of vehicles.

The key design parameters for WestConnex have been developed with reference to relevant Austroads guidelines, specifically:

- Guide to Road Design – Part 3: Geometric Design (2009)
- RTA Supplement to Austroads Guide to Road Design Part 3 (2009) – Geometric Design (3 March 2011)
- Guide to Road Tunnels – Part 2: Planning, Design and Commissioning (2010).

## 6.6.2 Smart Motorways

WestConnex infrastructure has been designed to allow the incorporation of Smart Motorway technologies.

A 'Smart Motorway' uses technology components in an integrated way to improve safety, reliability, and efficiency. The technologies that are deployed as part of a Smart Motorway allow for higher traffic throughput, at a higher travel speed, with improved reliability.

A subset of components to enable future implementation of Smart Motorways will be provided as part of WestConnex. Roads and Maritime Services will be responsible for the final fit out and introduction of Smart Motorways if and when required.

Smart Motorway technologies included in WestConnex are explained in Table 6.13. These technologies help reduce delays due to incidents, deliver information to drivers in real-time to assist in route choice, and provide more controlled access to the motorway to improve traffic flow. In NSW, Smart Motorways are designed to operate and integrate with the broader road network and the existing traffic control system (the 'Sydney Coordinated Adaptive Traffic System' or SCATS).

Table 6.13 Smart Motorway technologies included as part of WestConnex.

Smart Motorways technology	WestConnex project scope
<b>Vehicle detection technologies:</b> used for continuous traffic monitoring and intelligence gathering. They enable network performance to be continually monitored and assessed, so that appropriate operational adjustments can be made in real-time to maintain optimal flow on the motorway.	To be provided by WestConnex within tunnels
<b>CCTV cameras:</b> allow for early detection and immediate confirmation of any congestion issues or accidents, which then allows for a prompt response.	To be provided by WestConnex within tunnels
<b>Ramp signalling:</b> smooths the rate at which vehicles enter the motorway during periods of high demand. When synchronised along the length of the motorway, ramp signalling allows for steady flow by minimising the impact of new traffic joining the motorway.	Ramps will be built to facilitate future installation
<b>Lane use management and variable speed limits:</b> alerts drivers, through signs along the motorway and on overhead gantries, in advance of any changes they need to make based on traffic conditions ahead. They can progressively reallocate lanes and reduce the speed of drivers when approaching incidents and roadwork. This helps to minimise the need for sudden braking and lane changes, which otherwise can result in sharp reductions in speed and side-swipe crashes.	Overhead gantries to be provided by WestConnex
<b>Enhanced traveller information (on the motorway and the surrounding road network):</b> variable message signs and variable ramp control signs helps drivers make informed decisions in determining route choice, by providing continuous real-time traffic and condition information.	To be provided at a future point in time
<b>Emergency bays or wide shoulders:</b> provide an area where vehicles that are experiencing trouble, have broken down, or are involved in a crash can be moved to while they await or receive incident response. This ensures the main traffic lanes are quickly cleared for through traffic.	To be provided by WestConnex within tunnels
<b>Emergency telephones:</b> located appropriately along the motorways, these allow for drivers requiring assistance to immediately advise the appropriate authorities of their situation and allow for incident response measures to be initiated.	To be provided by WestConnex within tunnels

### 6.6.3 Emergency egress

WestConnex is being designed to comply with normal conventions for road tunnel emergency egress in Australia. This provides emergency egress points at intervals no greater than 120 metres. Emergency egress points will lead from the incident tunnel to a 'safe place', such as an adjoining tunnel. Where it is not possible to provide direct access to an adjoining tunnel a 'long egress passage' may be used to facilitate egress to a safe location.

All emergency egress passages must comply with the Disability Discrimination Act 1992 requirements for equitable access, which includes guidelines on access width, limits on ramp slopes, and the like.

An additional requirement agreed by the WestConnex project with Fire and Rescue New South Wales is that access be provided for emergency services to an incident tunnel from a non-incident tunnel at a maximum spacing of 250 metres. This access does not need to comply with the Disability Discrimination Act requirements, and can include stairs, but cannot be via a long egress passage in the incident tunnel.

### 6.6.4 Tolling systems

Tolling gantries and roadside equipment will be fitted to each stage of the motorway to enable collection of tolls.

A tolling 'back office' system, utilising technology provided by Roads and Maritime Services, will interface with the roadside tolling equipment. It will calculate appropriate toll transactions as per the flagfall and distance-based tolling regime applied to WestConnex (see **Chapter 9**).

### 6.6.5 Motorway operations

Each stage of WestConnex will progressively transition from a 'design and construct' phase to 'standalone operations' and finally to 'coordinated operations'.

In the design and construct phase, a single operations and maintenance provider will be contracted to assist with design reviews and undertake operational readiness and ramp-up activities.

### Prior to the M4 – M5 Link operations

During the construction of the M4 Widening, the design and construct contractor will be responsible for maintenance. On completion of the widening, operations and maintenance will transfer to the Transport Management Centre and Roads and Maritime Services respectively.

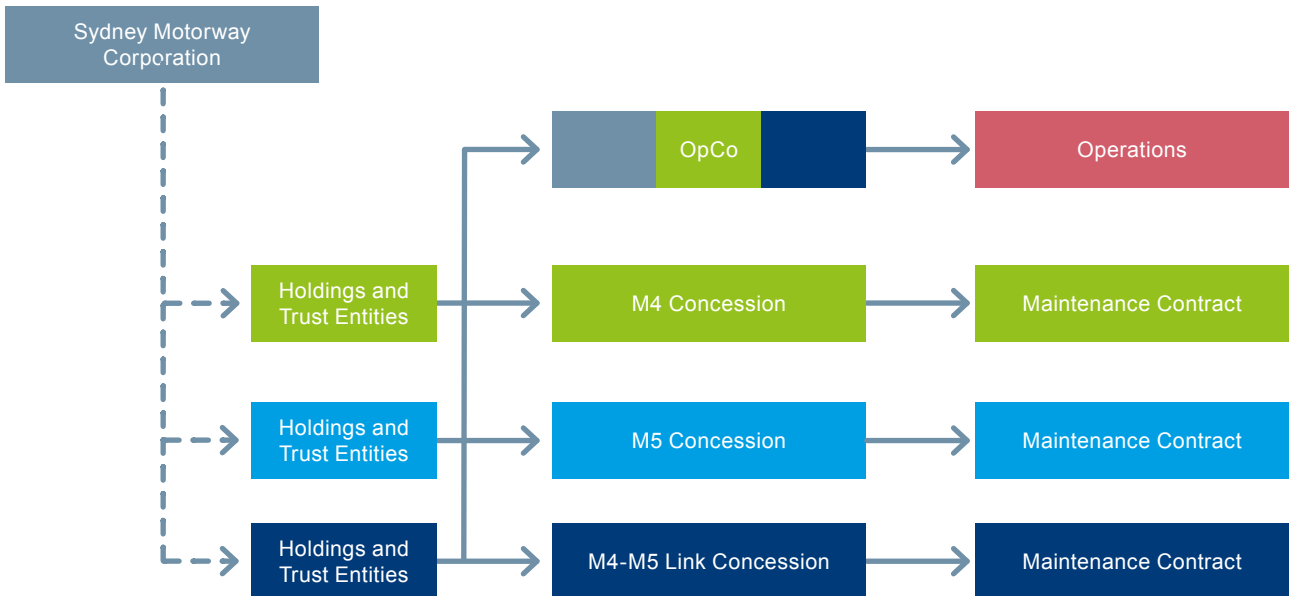
Once standalone operations commence on the M4 East and New M5 tunnels, a single operations and maintenance provider will undertake services for both these components of WestConnex from standalone motorway control centres. The existing M5 East will also be transferred to the single operations and maintenance provider. Roadside electronic toll collection maintenance subcontracts will either be novated to the single operations and maintenance provider or be contracted directly the motorway concession ownership entities.

### Following integration of full motorway

The transition to coordinated operations will occur on completion of the M4 – M5 Link. A single entity will undertake operations for the widened M4, M4 East, New M5, M5 East, and M4 – M5 Link from a combined control centre at St Peters Interchange. The operating entity will use an integrated operations and management control system to manage the entire WestConnex network.

Each motorway concession owner will continue to have accountability for the maintenance of its asset. WestConnex is currently considering the merits of establishing a discrete 'operations company', that could be jointly owned by the individual stages of WestConnex. This potential arrangement is shown in **Figure 6.7**.

Figure 6.7 Operations and maintenance strategy overview



## 6.6.6 Motorway urban design

A *WestConnex Urban Design Framework* has been developed to provide urban design direction for the project. It applies guidance of the Roads and Maritime Services' *Beyond the Pavement: Urban Design Policy, Procedures and Design Principles*<sup>1</sup> to achieve a set of common design principals for the motorway. It will guide the detailed analysis and design development for each WestConnex component.

The *WestConnex Urban Design Framework* sets out a number of objectives, which will be followed in designing the visual form of the motorway including:

- **Leading edge environmental responsiveness** – planning, design, construction and long-term management will be based on a natural systems approach, which is responsive to the environment and promotes the high levels of sustainability
- **Connectivity and legibility** – building connectivity across the city, within and beyond the boundaries of the motorway corridor, and promoting increased legibility of places, buildings, streets and landmarks. This will include use of appropriate architectural features to visually break up the extent of tunnel length, and the provision of visual cues for drivers to understand their vertical and horizontal location. It also sets out a principle for early warning of decision points for drivers, reinforcement of road safety, and the requirements for a simple and effective wayfinding and signage strategy
- **Placemaking** – creating streets, structures and landscapes that draw their form, colour, character and materiality from local context and the intrinsic natural and cultural qualities of each locale
- **Urban renewal and liveability** – enable opportunities for urban renewal and provide high levels of urban amenity and liveability

- **Memorable identity and a safe, pleasant experience** – provide a project identity and experiences for road users and adjacent stakeholders, which is safe, convenient and enjoyable. This includes use of landscape to define different character zones from broad landscape regeneration through to impact landscape design, and maximising opportunities to provide a well-vegetated 'green' corridor
- **A new quality benchmark** – aiming to provide design and construction quality of world class standard. WestConnex will seek to set a new benchmark for integrated sustainability, engineering, art, architecture and urban design.<sup>2</sup>

This design framework will be applied in conjunction with Roads and Maritime Services' technical design documents on bridge aesthetics, shotcrete design, noise wall design, landscape guidelines, and biodiversity guidelines.

The *WestConnex Urban Design Framework* provides urban design guidance for elements including:

- Bridges, viaducts and underpasses
- Walls
- Tunnel portals, ventilation outlets, and control centres
- Road furniture (including signage, gantries, security cameras, lighting, crash barriers, fencing, emergency phones, reflective bollards, hydrants, and service boxes)
- Tunnel interiors
- Feature lighting
- Landscape, landform, and water sensitive urban design
- Art installations.

1. Roads and Maritime Services (RMS), *Beyond the Pavement: Urban Design Policy, Procedures and Design Principles*, Sydney

2. WestConnex Delivery Authority (WDA) 2013, *WestConnex Motorway Urban Design Framework*, WDA, Sydney

## 6.6.7 Property

In delivering a project the scale of WestConnex, there is an inevitable need for the acquisition of property. The extensive use of tunnelling means that property requirements are significantly reduced when compared to a largely above ground infrastructure projects. However, land for tunnel portals and ramps, interchanges, and construction facilities are required.

Where feasible, existing road reservations have been used and land has been selected to minimise overall disruption to residential areas. Locating of the St Peters Interchange on the Alexandria Landfill site and the Rozelle Interchange on the disused Rozelle Goods Yard are two examples of this.

Where acquisition of non-NSW Government owned property is required, it is being conducted by Roads and Maritime Services in accordance with the *Roads and Maritime Services land acquisition information guide*. As the guide outlines: *“Roads and Maritime strives to work with landowners and prefers to achieve a mutually acceptable agreement for purchase. Reaching an agreement with landowners is central to Roads and Maritime’s land acquisition procedures. However, if agreement is not reached, the property may be acquired by compulsory acquisition.”*<sup>3</sup>

Where compulsory acquisition is necessary, this is undertaken in line with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

A summary of the overall acquisition process is at **Figure 6.9**.

### Independent property acquisition support service

As part of the acquisition process, some property owners and tenants in exceptional circumstances need special assistance.

An ‘Independent Property Acquisition Support Service’ has been implemented to assist property owners and tenants impacted by property acquisition.

The service provider acts independently from WestConnex and Roads and Maritime Services providing confidential services. It has the appropriate skill set to assist residential property owners and tenants with exceptional needs (e.g. elderly, pensioners, someone with illness, single mother, carers etc.) and provide support throughout the acquisition process.

Roads and Maritime and WestConnex consider individual circumstances when assessing customers’ suitability for this assistance, as the customer must have exceptional circumstances to be eligible.

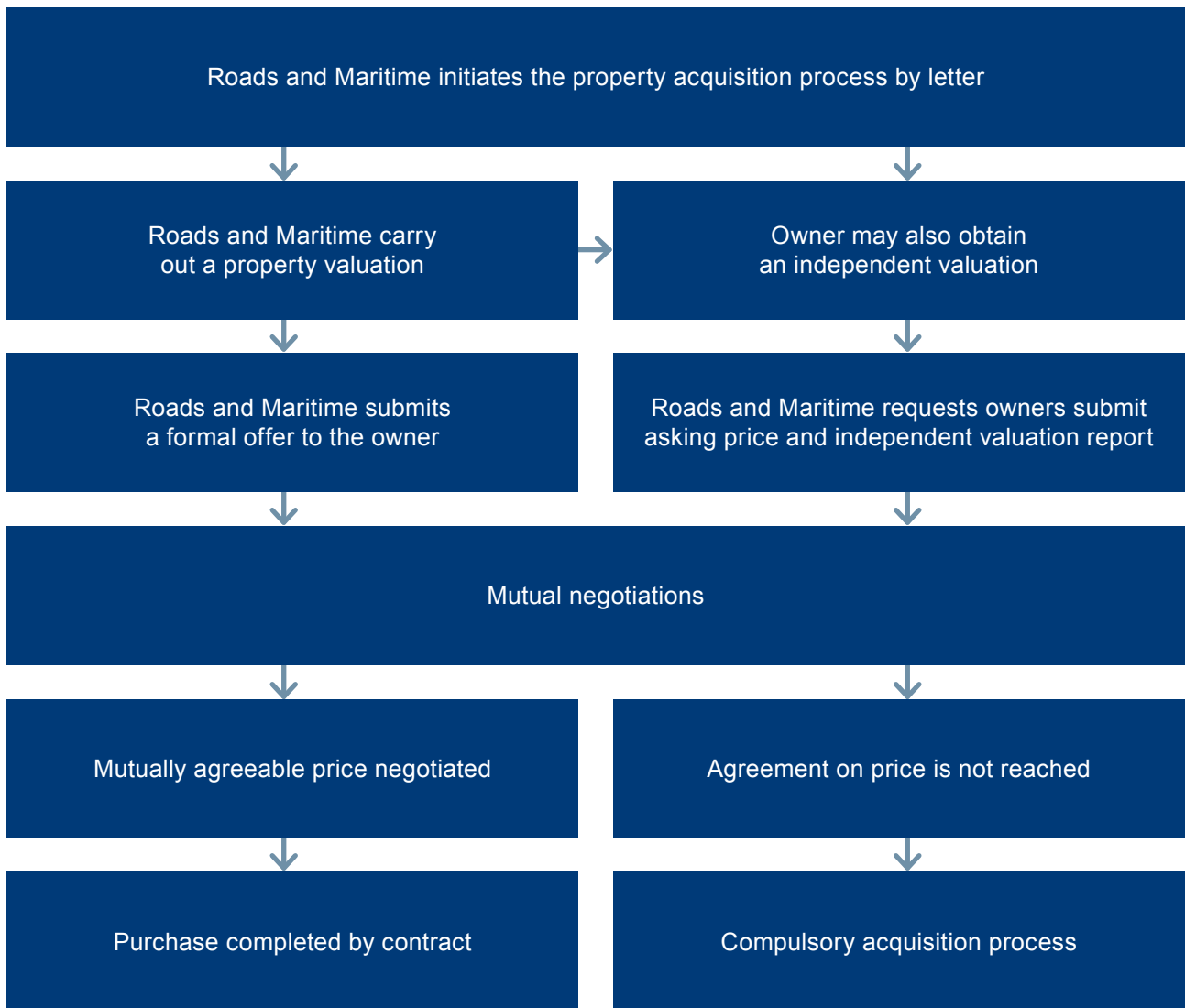
Assistance provided may include:

- Locating a rental property or assisting to research properties for sale (including driving to open house inspections/real estate agents)
- Obtaining removalist quotes and supervising packing of items/collection of items etc
- Cancelling of services e.g. utility accounts such as electricity and gas
- Arranging and possibly attending appointments with banks, accountants and other professional service providers
- Liaising with Roads and Maritime Services and WestConnex on the status of the acquisition from the property owners point of view
- Liaising with a Buyers Agent (if one is made available – this will be a ‘last resort’ service, subject to additional consideration and approval if merited).

3. Roads and Maritime Services (RMS) 2014, *Roads and Maritime Services land acquisition information guide*, RMS, Sydney



Figure 6.9 Summary of the acquisition process



## 6.7 Building WestConnex

As explained in **Section 6.1**, due to the size and scale of WestConnex, it will be constructed in three stages, this assists with managing risk, attaining best value commercial terms and the ability of Government to finance the project.

Each stage will be subject to a competitive tender process and robust governance strategies are in place to manage contracts and project deeds.

Contracts have been awarded for the King Georges Road Interchange Upgrade, M4 Widening and M4 East. A preferred contractor has been identified for Stage 2 - New M5.

As explained in **Figure 6.1**, construction of WestConnex will span from 2015 to 2023.

While most of the construction work involves tunnelling underground, there will be some construction work at the surface to support tunnelling and build tunnel entries and exits, interchanges and motorway operation facilities.

Tunnelling of the WestConnex tunnels will start with the M4 East and is programmed to commence in 2016 (subject to planning approval).

### 6.7.1 Protecting the environment and WestConnex communities during construction

A Construction Environmental Management Plan and a suite of sub-plans is prepared for each project stage. These plans provide a detailed approach to the management of environmental issues during construction and must be approved by the Department of Planning and Environment before major construction work can start.

The Construction Environmental Management Plan encompasses the mitigation and management measures established in the Environmental Impact Statement, the submissions report (and preferred infrastructure report, if applicable) and any conditions of approval applied by the Department of Planning and Environment and the Commonwealth Department of the Environment.

The Construction Environmental Management Plan will:

- Describe the project, including construction activities and relative timings
- Set objectives and targets for environmental performance
- Provide specific mitigation measures and controls to be carried out on-site to avoid or minimise negative environmental impacts
- Demonstrate how the project will comply with applicable policies, approvals, licences, permits, consultation agreements and legislation
- Describe the roles and responsibilities of staff in relation to environmental management
- Outline monitoring regimes to ensure controls are in place and working during construction.

Likely sub-plans to be developed for use during construction include:

- Traffic and Access Management Plan (including pedestrian and cyclist access plans)
- Flora and Fauna Management Plan
- Noise and Vibration Management Plan
- Soil and Water Quality Management Plan
- Heritage Management Plan
- Air Quality Management Plan
- Waste and Energy Management Plan
- Compound and Ancillary Facilities Management Plan.

## Tunnelling fast facts

- The tunnels will be mainly constructed in good quality Hawkesbury sandstone, with short sections constructed in Ashfield shale.
- Road header machines will excavate the top section of the main tunnels. Drill and blast techniques will be used to excavate the lower section of the tunnels.
- Blast patterns will be designed and sequenced to minimise noise or vibration for residents and businesses above the tunnels. Blasting will only be used underground and in locations where the geology is suitable and safe.
- Construction compounds along the alignment of WestConnex tunnels will support tunnelling activity by providing power, ventilation, water, construction water treatment plants, workforce facilities and facilities to stockpile and remove the material excavated.
- Some properties may experience vibration and noise where the tunnelling is less than 40 metres deep and directly below the property.
- In most cases, ground-borne noise generated by tunnelling activities will be less than 35 dBA, or equivalent to a 'quiet' environment. As a comparison, normal conversation is about 60dBA and a refrigerator generates about 50dBA.
- Tunnelling will typically progress at about seven metres per day, in the deeper sections of the tunnel and at around two to five metres per day around the entries and exits.
- Environmental Impact Statements assess the likelihood of structural or cosmetic property damage as a result of the tunnelling and recommend appropriate mitigation where needed.
- Selected properties will be offered a property condition survey before and after construction. This will ensure a clear record of property conditions before construction starts. Any damage attributed to the project would be repaired at no cost to the property owner.

## 6.8 Summary

The design for WestConnex outlined in this Chapter is the reference design for the motorway. This design will continue to evolve as project procurement occurs, as tendered designs are put forward, and as further development on Sydney Gateway is completed.

The design responds directly to the problems identified in **Chapter 2**, and meets the customer needs and project objectives discussed in **Chapter 4**. The design presented in this Chapter does this by:

- Providing one of Sydney's most significant missing motorway links – the M4 East
- Providing new motorway-grade capacity to address congested north-south and east-west corridors
- Providing direct connectivity into Sydney Airport and Port Botany, and linking them to Parramatta and Western Sydney
- Incorporating a design specifically intended to carry heavy vehicles, with lessons on tunnel height and grade incorporated into the design
- Including features that allow future public and active transport improvements to proceed
- Targeting surface traffic on Parramatta Road (operating in parallel to the corridor) to enable urban transformation
- Facilitating connections for future Western Harbour Tunnel and Beaches Link and Gateway to the South projects.

The analysis undertaken in the following chapters of this business case will demonstrate how this design achieves the project's objectives, from a traffic and transport network, economic, financial, and urban renewal perspective.





# URBAN RENEWAL AND TRANSPORT PROJECTS ENABLED BY WESTCONNEX

This Chapter describes how WestConnex will enable the improvement of Sydney's urban fabric; particularly along Parramatta Road. The project achieves this by reducing current and future surface traffic numbers, putting cars and trucks underground, giving local roads back to their communities. With fewer cars and trucks on the surface roads, road space becomes available for improvements to public and active transport.

## 7.1 Transforming the Parramatta Road corridor

The renewal of Parramatta Road forms part of *A Plan for Growing Sydney*. WestConnex will enable this transformation by reducing traffic on Parramatta Road, facilitating the delivery of improvements to public and active transport. As these transport improvements are delivered, the NSW Government will work with local communities to deliver new mixed use development and improved public transport outcomes.

The transformation of the Parramatta Road corridor will deliver new dwellings to help address Sydney's housing needs, together with commercial, office and community developments. New development will support new employment opportunities and provide significant public amenity improvements for the Parramatta Road corridor and surrounding residential and mixed-use hubs.

1. Department of Planning & Environment (DPE) 2014, *A Plan for Growing Sydney*, DPE, Sydney



## 7.1.1 Parramatta Road – a core Government and WestConnex priority

The Parramatta Road corridor is highly significant to metropolitan Sydney. It has the potential to make a strong contribution to State planning and transport initiatives including housing, public transport, and employment.

*A Plan for Growing Sydney* (see **Chapter 3**) identifies the corridor as being of particular importance to the “new economy” of Sydney, given its status as a principal link between the two CBDs of Parramatta in the west and Sydney in the east.

When WestConnex was originally put forward by Infrastructure NSW in 2012, one of its central features was to enable urban renewal and regeneration along Parramatta Road. This remains one of the main objectives of the project (as per **Chapter 4**).

This urban renewal and regeneration will be achieved by shifting a portion of traffic off surface roads and onto WestConnex.

Traffic modelling of the Parramatta Road corridor shows WestConnex will reduce traffic volumes overall:

- Between the current end of the M4 Motorway at Concord and Wattle Street (where the City West Link starts), traffic volumes are forecast to be well below volumes experienced today, even in 2031 – with an approximate halving of vehicle numbers
- East of Wattle Street, between Haberfield and Camperdown, traffic volumes are expected to reduce such that they only reach today’s levels again in around 2031.

In addition, WestConnex is expected to reduce truck volumes along Parramatta Road by around 4,000 trucks per day. See **Chapter 10** for further information on the traffic changes predicted on Parramatta Road.

These changes are particularly important in addressing the degraded urban environment that is present along Parramatta Road, caused by heavy vehicle and general traffic levels (see **Section 2.6**).

The NSW Government will be able to optimise the new road environment by revising land use, introducing new design and significant transport improvements. This will include enhancing public and active transport opportunities along and adjacent to Parramatta Road as described in **Table 7.1**.

Table 7.1 Parramatta Road transport environment

Current Parramatta Road transport environment	Future Parramatta Road transport environment with WestConnex
<ul style="list-style-type: none"> <li>• Parramatta Road is dominated by east-west through-traffic movements.</li> <li>• High volume of heavy vehicle traffic, particularly between the end of the M4 Motorway and the City West Link.</li> <li>• Significant local traffic of varying trip length, including north-south crossing of the main corridor.</li> </ul>	<ul style="list-style-type: none"> <li>• Traffic volumes decrease, as east-west through traffic shifts to WestConnex.</li> <li>• Reduced heavy vehicle usage, with freight utilising WestConnex.</li> <li>• Improved north-south access across the corridor.</li> <li>• Public and active transport networks reshaped to support local travel.</li> </ul>

## 7.1.2 Parramatta Road transport initiatives

### Sydney CBD to Parramatta – Strategic Transport Plan

In September 2015, Transport for NSW released the *Sydney CBD to Parramatta – Strategic Transport Plan*, prompted by WestConnex and the *Draft Parramatta Road Urban Transformation Strategy (Section 7.1.3)* and *A Plan for Growing Sydney*.

The plan is focused on the role of Parramatta as Sydney's second CBD and the possibility of up to 29 per cent growth in employment in greater Parramatta in the next 20 years, as outlined in *A Plan for Growing Sydney*.

The plan is a guide to assist decision-making by State agencies and local government and focusses on the kinds of trips people take, rather than the type of transport they choose, including:

- Local trips – less than five kilometres, and make up 85 per cent of all trips that start and finish in the corridor. These trips could generally be made on foot or on bicycle
- Intermediate trips – between five and 10 kilometres and make up the majority of trips into and out of the corridor. These trips could be better served with improved capacity and efficiency in the transport network without significant new infrastructure investment
- Regional trips – longer than 10 kilometres and account for around 30 per cent of trips into and out of the corridor. These trips can be made by rail and, in future, WestConnex.

The plan targets outcomes including:

- Improving regional mobility to and through the corridor
- Enhancing the movement of people and goods to, through and within the corridor
- Increasing walking and cycling access to public transport for trips that start or finish within the corridor
- Improving access to centres and public transport nodes
- Optimising existing infrastructure
- Improving connections between key centres and outside the corridor.

The plan identifies a response for each type of trip taken:

- Local trips:
  - Shift more trips to active transport
  - Integrate cycling and walking into the design of transport interchanges
  - Work with councils to co-fund local cycling infrastructure
  - Consider other initiatives like speed limit reductions and signal phasing.
- Intermediate trips:
  - Shift more trips to existing and potential bus rapid transit routes as WestConnex is delivered
  - Ensure travel modes link major residential areas with local and regional employment
  - Ensure heavy rail continues to play its role
  - Increase the frequency of ferry services.
- Regional trips:
  - Locate more activity (particularly jobs) in the western part of the corridor
  - Support transport connections into Parramatta
  - Deliver pinch points and clearways programs to optimise the advantages of WestConnex
  - Deliver the Western Sydney Rail Upgrade Program – introducing faster and more frequent services
  - Consider the impacts of Sydney Metro projects in alleviating capacity constraints on the heavy rail corridor.

### Burwood to Sydney CBD public transport

Sydney's Bus Future identifies 13 'Rapid' bus routes in Sydney – including Burwood to CBD via Parramatta Road, which is directly relevant to this business case. It also identifies this route for further investigation as a bus rapid transit or light rail service.<sup>2</sup>

These bus services are already well patronised and provide one of the principal public transport services to support future population and employment growth along the Parramatta Road Corridor. In order to support growth, Transport for NSW is investigating improved bus services or, alternatively, bus rapid transit or light rail.

2. Transport for NSW (TfNSW) 2014, *Sydney's Bus Future*, TfNSW, Sydney

Kerbside bus improvements could include:

- Extra services and higher-capacity vehicles
- Extending bus lane operating hours and improving service speeds through wider bus-stop spacing
- Redesigning the bus network for the Parramatta Road corridor to support the increased need for north-south and all-day public transport travel
- Additional bus lanes, and bus priority measures at intersections on Parramatta Road, completed in parallel with WestConnex stages
- Improving connections between local services and the Burwood–CBD rapid route
- Upgrading bus stops and interchanges to support access and connections between different bus services.

Alternatively, bus rapid transit could feature:

- Very frequent bus services using ‘bendy buses’ or other high-capacity fleet
- Using dedicated lanes on Parramatta Road exclusively for bus operations to meet capacity, travel time and reliability requirements across the whole day and reduce conflict between buses and left-turning general traffic
- High-quality stops and interchanges, integrated with existing local centres, future urban renewal nodes, and the local bus network
- Other high-standard customer-facing features including real-time service information
- Flexible design features to allow for conversion to on-street light rail in the longer term if required.

In the longer term, a potential light rail service could include:

- Very frequent light rail services
- Using dedicated lanes on Parramatta Road exclusively for light rail operations to meet capacity, travel time, and reliability requirements across the whole day
- Light rail stops and interchanges, integrated with existing local centres, future urban renewal nodes, and the local bus network
- Other high-standard customer-facing features including real-time service information.

## Burwood–Parramatta bus service improvements

The transport strategy supporting the Parramatta Road Corridor west of Burwood incorporates the following bus network and service improvements:

- A high-frequency Parramatta–Burwood trunk bus route using Parramatta Road
- Improved north-south bus routes (both rapid and suburban tiers, as defined by *Sydney’s Bus Future*) connecting centres including Macquarie Park, Bankstown, Sydney Olympic Park and Hurstville with direct and frequent public transport services
- The use of parts of Parramatta Road (and stops/interchanges on the road) in the north-south services, to provide cross-regional connections between residential development along the corridor and major centres in addition to Parramatta and the Sydney CBD
- The provision of rapid bus lanes on Parramatta Road west of Burwood where reduced traffic from WestConnex makes this possible.

## Parramatta Light Rail

Light rail is a proven way of moving large numbers of people around quickly and efficiently. It can improve customer service, encourage public transport use, manage congestion, support economic growth, and facilitate urban renewal opportunities.

Transport for NSW is investigating a shortlist of four potential light rail routes to Parramatta, including a route from Parramatta to Strathfield/Burwood via Sydney Olympic Park.

## Active transport

Walking and cycling plays an important role in the city’s transport mix. The changed traffic volumes on Parramatta Road will create an environment more conducive to cycling and walking. Transport for NSW will take advantage of the opportunity presented by WestConnex to enhance cycling and walking facilities along and to Parramatta Road where possible, with investigations underway on:

- Improved north-south links across the Parramatta Road corridor
- New facilities along the Parramatta Road corridor where traffic has reduced and road space allows.

## 7.1.3 Urban transformation along the Parramatta Road corridor

The reduced traffic and improved active and public transport environment will result in the Parramatta Road corridor becoming attractive for a range of land uses, providing a unique opportunity for urban renewal.

As highlighted in **Chapter 2**, Sydney is forecast to require significant additional housing to meet demand over the next 20 years. *A Plan for Growing Sydney* has identified Parramatta Road as one focus for this growth.<sup>3</sup> This is particularly the case given its access to employment hubs including Sydney CBD, Parramatta CBD, Sydney Olympic Park, Macquarie Park, Rhodes and Burwood.

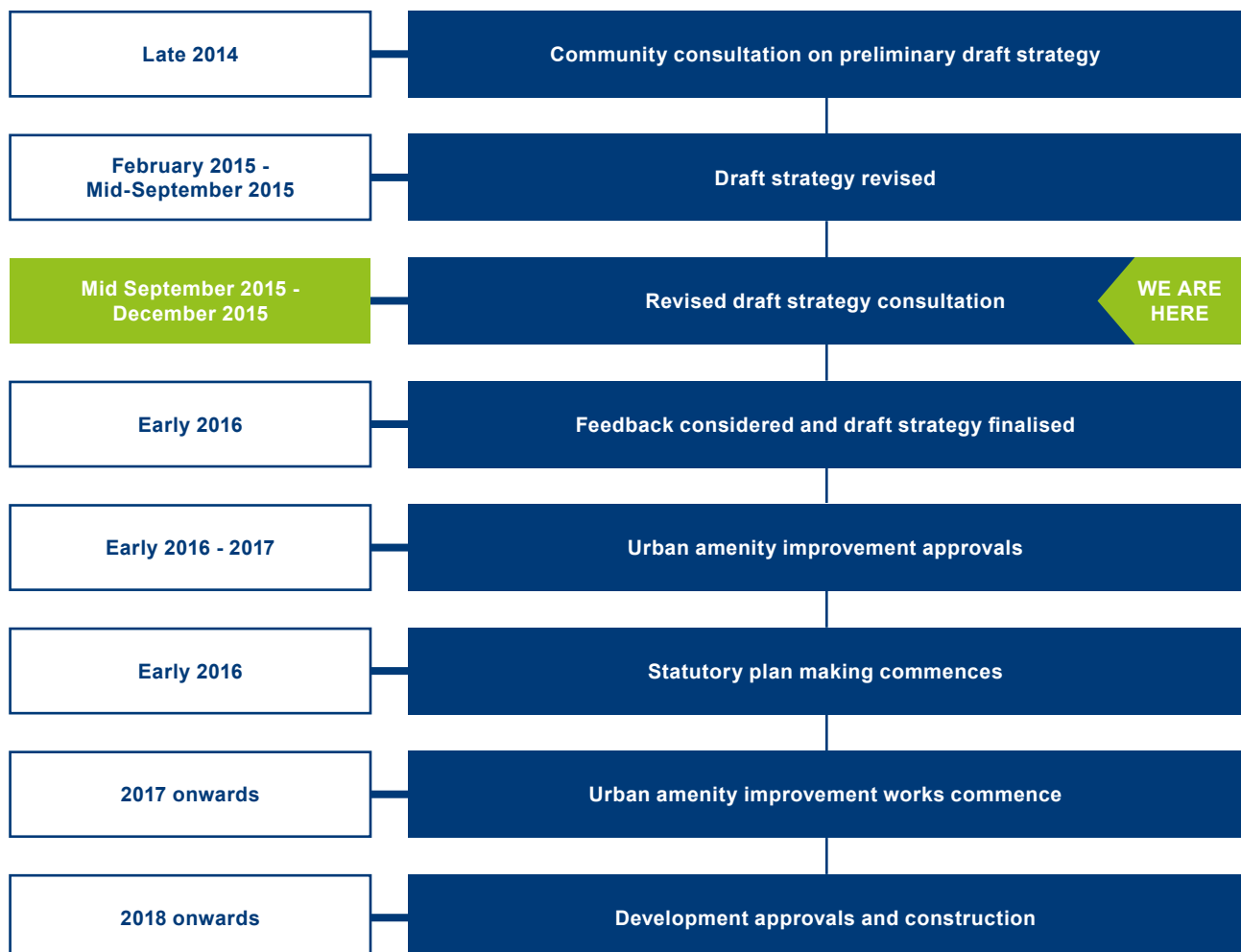
In order to deliver on the new potential of the corridor, in September 2015 UrbanGrowth NSW released the *Draft Parramatta Road Urban Transformation Strategy*, a 30-year plan outlining the revitalisation and growth plans for the 20-kilometre Parramatta Road corridor.

The vision, principles and strategic actions of the draft strategy will contribute to a future Parramatta Road corridor that is home to:

- 40,000 new homes for up to 70,000 people, close to transport and services
- Workplaces for productive and prosperous businesses that support 50,000 new jobs, with a focus on investment to support emerging employment generating industries in the corridor's west
- Eight thriving precincts, each with diverse spaces and places, convenient walking and cycling paths, new housing and transport options and shops, services and workplaces (see **Figure 7.2**)
- Better public transport, the ability to walk or cycle, and easier ways to travel east-west and north-south.<sup>4</sup>

Figure 7.1 Parramatta Road Urban Transformation Program timeline

Source: UrbanGrowth NSW 2015, *New Parramatta Road – Draft Parramatta Road Urban Renewal Strategy*



3. NSW Department of Planning & Environment (DP&E) 2014, *A Plan for Growing Sydney*, DP&E, Sydney

## Development of the Draft Urban Transformation Strategy

The vision for the Parramatta Road corridor is: *A high quality, multi-use corridor with improved transport choices, better amenity and balanced growth of housing and jobs.*<sup>5</sup>

This vision is supported by five key principles:

- Diverse housing and jobs – plan for diversity in housing and employment to meet existing and future needs
- Accessible and connected – reshape and better connect places and associated movement networks to better serve customers and encourage sustainable travel
- Community and places – promote quality places and built form outcomes to transform the corridor over time
- Sustainability – create liveable local precincts along the corridor that are sustainable, resilient and make Sydney a better place
- Delivery - deliver, drive, facilitate and monitor action.

The *Draft Parramatta Road Urban Transformation Strategy* was prepared by an integrated project team which included UrbanGrowth NSW, Transport for NSW, the Department of Planning and Environment, and Roads and Maritime Services, in consultation with WestConnex Delivery Authority and Sydney Motorway Corporation.

Early concepts were developed through a range of stakeholder engagement forums, including:

- Interactive workshops with councils and advisors
- A community panel with expert speakers providing insight and responding to community questions
- Over 150 meetings with councils and other stakeholders
- Briefings with local Members of Parliament

The timeline for the Parramatta Road Urban Transformation Program is shown in **Figure 7.1**.

The following section presents key aspects of the draft strategy.

Figure 7.2 Growth precincts along Parramatta Road

Source: UrbanGrowth NSW 2015, *New Parramatta Road – Draft Parramatta Road Urban Transformation Strategy*



4. UrbanGrowth NSW (UGNSW) 2015, *New Parramatta Road – Draft Parramatta Road Urban Transformation Strategy*, UGNSW, Sydney

5. UrbanGrowth NSW (UGNSW) 2015, *New Parramatta Road – Draft Parramatta Road Urban Transformation Strategy*, UGNSW, Sydney

## New Parramatta Road

New Parramatta Road is a project to transform the corridor – this includes land adjoining and at least one block back from the 20 kilometre Parramatta Road, as well as eight precincts that are areas of proposed growth based on their different functions and character.

Every planning decision made in the Parramatta Road corridor will be influenced by the outcomes of this project. This includes day-to-day planning proposals and development applications, and local statutory planning documents such as Local Environmental Plans, Development Control Plans and contributions plans. The project will also be a mechanism to translate *A Plan for Growing Sydney* at a regional scale.

New housing and jobs will be focused in and around new and existing centres across eight key precincts with access to public transport. An appropriate mix of land uses, densities, good design, and housing choice, will be supported by safe and convenient active and public transport connections. This will support delivery of new connected neighbourhoods, local town centres, activity and employment centres and other places of interest.

The New Parramatta Road, will benefit from improved streetscapes and a lift in the overall amenity of the area for residents and businesses. This will be achieved through a series of well-serviced and well-connected communities. The corridor will provide a diverse range of spaces, places and links for people to visit, landscaping and streetscape improvements; supported by reductions in traffic volumes and congestion, facilitated by WestConnex – resulting in improved air quality and reductions in noise impacts.

### Precinct plans

The draft strategy identifies eight precincts, specifically targeted for renewal due to their access to jobs, infrastructure, public transport, or how well they can support new housing types (**Figure 7.2**). The eight precincts are places with unique character – diverse places that attract visitors and new residents and have potential to be revitalised.

Each is subject to a precinct implementation plan, detailed in the draft strategy. These plans include:

- A vision for the precinct, why it has been identified as a growth precinct, and what it will be like in the future – including population, housing and job projections
- Three plans that illustrate how the vision will be delivered:
  - A structure plan outlining the way land uses will be distributed and how the precinct will change over time
  - A built form plan showing the potential height of buildings
  - An access and movement plan that detailing how people will move in and around the precinct
- The ways the vision can be delivered.

### Urban Amenity Improvement Program

The Urban Amenity Improvement Program, funded as part of WestConnex, is a \$200 million package dedicated to delivering improved places and spaces along the Parramatta Road corridor. This program will complement the *Draft Parramatta Road Urban Transformation Strategy*.

The funds have been allocated to improve the amenity of the public domain across the eight precincts, and initiatives may include:

- Creation of new or improved open spaces, urban plazas and town squares
- Streetscape upgrades, with tree planting and landscaping, new bus shelters, shaded seating, lighting and bins
- New or improved walking and cycling links and upgraded and widened footpaths
- Traffic lights to improve pedestrian safety
- New active transport facilities including bike racks.

UrbanGrowth NSW is responsible for the governance and management of this program in consultation with relevant agencies including Infrastructure NSW, Transport for NSW and Sydney Motorway Corporation.

## 7.1.4 Implementation of the transformation and urban renewal

The recommendations of the *Draft Parramatta Road Urban Transformation Strategy* and *Sydney CBD to Parramatta Strategic Transport Plan* will be implemented in parallel with the delivery of WestConnex, through a combination of State and local government entities.

Market soundings undertaken as part of the preparation of the urban renewal work indicate the private sector would be willing to invest in development of the corridor, provided the land use planning system was more supportive and given the public transport improvements to be delivered in parallel with WestConnex.

## 7.2 The Bays Precinct

Located just two kilometres west of the Sydney CBD, The Bays Precinct comprises 5.5 kilometres of harbourfront, 95 hectares of largely Government owned land and 94 hectares of waterways including Sydney Harbour.

The NSW Government's ambition for the Bays Precinct is: "To drive an internationally competitive economy, through the creation of great destinations on Sydney Harbour that will transform Sydney, New South Wales and Australia."

In October 2015, UrbanGrowth NSW released the Transformation Plan: The Bays Precinct, Sydney. It establishes a strategy for how The Bays Precinct can build on its heritage, support its local communities, provide safe and exciting places and spaces, optimise maritime uses and develop social capital to support the growth of Sydney as an internationally competitive and globally relevant city.

Figure 7.3 The Bays Precinct Destinations

Source: UrbanGrowth NSW 2015, *Transformation Plan: The Bays Precinct, Sydney*



## 7.2.1 The Bays Precinct and the Rozelle Interchange

The former Rozelle Rail Yard is one of eight precincts identified in *The Bays Precinct Transformation Plan* (**Figure 7.3**). The site adjoins major road and light rail infrastructure, and will be transformed by the proposed WestConnex Rozelle Interchange, part of the M4 – M5 Link.

In addition to the necessary road links to the Anzac Bridge and Western Harbour Tunnel and Beaches Link, the new interchange has the potential to reconnect areas to the north and south of the Rail Yard, and to improve connections from Lilyfield to the harbour and Bays Precinct. Future uses of Rozelle Rail Yard could include a mix of different housing, including affordable housing, as well as public spaces and employment uses.

The concept design for the Rozelle Interchange will be developed further with Urban Growth NSW and will aim to achieve the following objectives and benefits:

- Providing greater housing choice
- Creating new open space and nature reserves to link to the Harbour
- Integrating and reconnecting communities
- Providing new pedestrian and cycle links between Lilyfield and Rozelle
- Raising awareness of and interpreting heritage of rail transport.



## Other WestConnex-related urban renewal

### **Cooks Cove**

Cooks Cove is located in Arncliffe, 10 kilometres south of the Sydney CBD in the Rockdale local government area. It is close to Sydney Airport and Port Botany, and is bordered by the Cooks River to the east.

The site encompasses the Kogarah Golf Course and Barton Park, along the foreshores of the Cooks River. It includes a proposed gateway, commerce and advanced technology centre, comprising 20 per cent of the 100 hectare site. The site interacts with the WestConnex Stage 2 alignment and operational facilities.

Construction of WestConnex (together with further planning and development of the Southern Connector by Transport for NSW) will bring further certainty to medium and long-term land use planning in this area.

This will allow the council, the Department of Planning and Environment and the community to consider a wide range of possible land uses for Cooks Cove and to plan for those uses into the future.

### **Greater Parramatta to Olympic Peninsula Urban Renewal Area**

The Greater Parramatta to Olympic Peninsula Urban Renewal Area is one of the Department of Planning and Environment's Priority Growth Areas and Precincts. Five priority locations have been identified within the area - Wentworth Point, Carter Street, Camellia, Parramatta North and Rhodes East.

WestConnex M4 Widening works essentially run parallel to this area and will provide expanded capacity and connectivity (including improved ramp access) along this stretch of the motorway, supporting the delivery of the Greater Parramatta to Olympic Park Urban Renewal Area.

### **Mascot Station Town Centre Precinct Masterplan**

In early 2015, City of Botany Bay Council released a Masterplan to inform the development of Mascot Station Town Centre. The Mascot Station Town Centre Precinct is a key centre in planning and development in the City of Botany Bay and is nominated as a Growth Centre in state and local planning strategies.

The northern boundary of the study area in the masterplan runs along Gardeners Road, Mascot, which will be upgraded and joined to the St Peters Interchange as part of WestConnex Stage 2, providing this precinct direct access to WestConnex.

## 7.3 Public and active transport improvements for Sydney Airport

### Public transport

WestConnex provides an opportunity for more frequent and reliable cross-regional bus services along both east-west and north-south corridors connecting to Sydney Airport. This will be facilitated by the change in traffic profiles on roads utilised by bus routes servicing the airport and through the provision of new road infrastructure supporting the motorway project.

Bus priority measures for services operating to and from Sydney Airport being considered include:

- **Bus lanes and airport access:**  
Reduced traffic along important east-west and north-south routes will make bus lanes a possibility on surface streets
- **Traffic signal pre-emption:**  
Provide a priority phase for buses at traffic signals
- **Improved bus stop infrastructure:**  
Bus stops can be redesigned to provide an improved customer experience, with better travel information, accessible paths, weather protection and seating
- **Re-prioritisation of roads:**  
An opportunity to change the road network hierarchy to reflect changing roles and functions.

Bus priority measures will improve services, the customer experience and accessibility to the airport precinct. Better public transport will generate demand for additional or extended cross-regional bus services, connecting key strategic and employment centres. They will join other measures already taken by Government to improve airport rail services.

### Active transport

As part of Stage 2, Roads and Maritime has commissioned upgrades to the local roads around the St Peters Interchange, including providing important regional links in the cycleway network in St Peters and Mascot (Section 7.4.3).

Some of the changes to local traffic conditions will also allow cycling and walking infrastructure improvements to better connect the airport precinct with the inner west to be explored, including:

- A new connection from the Sydenham/Marrickville area across Princes Highway to the Sydney Airport area
- Improved facilities through Sydenham and Marrickville
- New facilities in the Princes Highway/Alexandra Canal corridor either where traffic has been reduced, or as part of the new road link.

Roads and Maritime Services is also working with stakeholders to plan and deliver active transport in the precinct under the Priority Cycleway Program. Two projects are currently under construction, being delivered by the City of Botany Bay:

- On-road cycleway at Coward Street, Mascot
- Shared user path at Bourke Street, Mascot

Roads and Maritime is also planning pedestrian and cyclist facilities at Marsh Street as part of its proposal for the Airport West precinct, see **Section 7.4.2**.

## 7.4 Enabling road infrastructure

### 7.4.1 Facilitating Sydney's future strategic plans

In addition to WestConnex, the Government has identified new road infrastructure to complete other missing links within the Sydney motorway network.

This includes the proposed 'Western Harbour Tunnel and Beaches Link' and the 'Gateway to the South' (including the 'Southern Connector'). These projects were identified in the *NSW Long Term Transport Master Plan and Rebuilding NSW State Infrastructure Strategy 2014*.

They are intended to improve road accessibility by providing better transport integration and connection to the wider Sydney motorway network, including WestConnex. They also provide future cross regional travel across Greater Sydney to the growing residential and employment hubs in the north and south of Sydney.

#### Western Harbour Tunnel and Beaches Link

The NSW Government is developing a third road crossing of Sydney Harbour to link WestConnex with North Sydney. The Western Harbour Tunnel will bypass the Sydney CBD, and relieve pressure on the Sydney Harbour Bridge and Sydney Harbour Tunnel.

On the northern side of the harbour, an option is being explored to link the northern beaches with the Western Harbour Tunnel via a Beaches Link project. This would also provide a direct connection to the Warringah Freeway corridor, improving journeys from the northern beaches to major employment centres and reduce pressure on the Spit at Mosman.

Sydney Motorway Corporation has designed the Rozelle Interchange to include the necessary functionality for a future direct connection with the Western Harbour Tunnel and Beaches Link.

Transport for NSW is currently developing a business case including preliminary feasibility investigations for the Western Harbour Tunnel and Beaches Link, and is working closely with the Sydney Motorway Corporation to ensure compatibility of the project with WestConnex.

#### Gateway to the South

Scoping of options to complete the missing motorway link between the M1 Princes Motorway at Waterfall and Sydney's motorway network is underway. This missing link was previously known as the future F6 Motorway, and is now incorporated into the Gateway to the South package of works.

There are three components for Gateway to the South:

- Short and medium term pinch point investments on the A1, A3 and A6 corridors, including bus priority infrastructure. This investment will provide improved traffic flow for future connections to the M1 (F6) preserved corridor
- Business case development of a Southern Connector, connecting directly into WestConnex and heading south towards Monterey
- Scoping studies for larger scale investment options on the A6 and M1 (previously known as the F6) corridors.

Together, these components are designed to manage congestion across Sydney's southern suburbs and improve freight efficiency for vehicles travelling to and from the Illawarra.

The Gateway to the South work is being developed by Transport for NSW and Roads and Maritime Services. The WestConnex project team is supporting this work, and the New M5 has been designed to provide a connection for the future Southern Connector (**Section 6.4**).

## 7.4.2 WestConnex Enabling Works around the port and airport precinct

The NSW Government is planning to upgrade roads around Sydney Airport to improve access and traffic flow in the precinct. The proposed upgrades will complement the WestConnex Sydney Gateway and other Sydney Airport road network upgrades also taking place.

Three precincts have been identified for upgrades to improve traffic movements:

- **Airport east precinct (Figure 7.6):**  
This package will deliver upgrades to the roads that connect the WestConnex Sydney Gateway at Airport Drive with Port Botany,

improving freight connections to WestConnex. Roads and Maritime Services will upgrade Wentworth Avenue, Botany Road, Mill Pond Road, Joyce Drive, and General Holmes Drive on the eastern side of the airport; including the grade separation of the General Holmes Drive rail level crossing

- **Airport west precinct:**  
This will involve widening Marsh Street, Arncliffe to three lanes westbound to relieve congestion and improve traffic flow. As part of this work, the Flora Street/Marsh Street intersection will be upgraded, improving access to the planned WestConnex construction compound and permanent motorway facilities at Arncliffe
- **Airport north precinct:**  
This will involve associated upgrades in the vicinity of O’Riordan Street, Mascot.

Figure 7.6 WestConnex Enabling Works – Airport East

Source: Roads and Maritime Services 2015



## 7.4.3 St Peters and Mascot local road upgrades

As part of the New M5, WestConnex will deliver a major new interchange at St Peters.

This interchange will allow access to the New M5 and the M4 – M5 Link, and join these motorways with the Sydney Gateway connection to the airport.

In order to integrate WestConnex with the broader road network, Roads and Maritime Services has commissioned a number of upgrades to the local streets around St Peters and Mascot. These are funded outside of WestConnex, but will be delivered concurrently by Sydney Motorway Corporation. The upgrades include:

- A new, signalised intersection at the corner of Campbell Road and Euston Road, joining to the St Peters Interchange
- A new road bridge over Alexandra Canal, extending Campbell Road to join with Bourke Road, Mascot
- Widening Euston Road between Campbell Road and Maddox Street
- Upgrading the intersection of Euston, Sydney Park Road and Huntley Street, including installing traffic signals
- Widening and extension of Bedwin Road, Campbell Street and Campbell Road between the railway bridge near Camdenville Park and Bourke Road, Mascot
- Upgrading and widening Bourke Road/Bourke Street, Mascot between Church Street and the Campbell Road extension
- Widening Gardeners Road
- Other minor local road changes (to connect the upgraded roads to the existing local streets)
- New and upgraded pedestrian and cycle infrastructure
- Changes to some bus stops.

The St Peters Interchange and supporting local road upgrades are shown in **Figure 7.7**.

Figure 7.7 WestConnex St Peters Interchange and local road upgrades - September 2015 design.



## 7.5 Summary

The projects referenced in this Chapter reflect the State's broader planning strategies – the NSW Long Term Transport Master Plan, Strategy Infrastructure Strategy, and A Plan for Growing Sydney.

Many of them, such as the urban and transport transformation of Parramatta Road, Western Harbour Tunnel and Beaches Link, the Southern Connector, the WestConnex Enabling Works (Airport East Precinct) and the St Peters and Mascot local road upgrades are a part of, or directly support WestConnex's objectives (**Chapter 4**).

Because they are separate projects, costs and benefits specific to these projects are not part of the financial and economic analysis in this business case. However, given the importance of WestConnex to enabling these other key projects, the indirect benefits of WestConnex to the city are demonstrably broad and strategic in nature.

8

# BUDGET AND COST ESTIMATES

This Chapter presents a summary of the latest financial budgets for WestConnex, providing the cost estimate for the project as described in **Chapter 6**. The summary takes into consideration:

- Capital costs including design and construction costs, land acquisition costs, project management costs and contingencies
- Management and project delivery costs
- Operating, maintenance and lifecycle costs
- Incorporation of the northern extension into Stage 3
- The Enhanced Sydney Gateway solution.

## 8.1 Macroeconomic assumptions

The key macroeconomic assumptions used in the Business Case are as follows:

Table 8.1 Key macroeconomic assumptions

Index	Rate of increase
Consumer Price Index (CPI)	2.5% per annum
Average Weekly Earnings Index	4.0% per annum
Construction Cost Index	3.0% per annum
Asphalt Resurfacing Index	5.0% per annum
Electricity Index	5.0% per annum

## 8.2 Capital and delivery cost

The latest cost estimates include initial construction costs, operating and maintenance costs and lifecycle costs.

Construction costs have been broken up into a number of key expense categories for presentation purposes. These are:

- Design and construction costs
- Property costs and other resourcing and associated project costs.

The updated cost estimates have been determined based on a variety of input sources. This includes contract values for components that have already been let, advice from subject matter experts including quantity surveyors and internal assessments.

### 8.2.1 Capital estimate

#### Stage 1 – M4 Widening and M4 East

**Table 8.2** provides a summary of the estimated capital cost by expense type for the Stage 1 program of works.

##### Stage 1A (M4 Widening)

- The cost estimate for Stage 1A (M4 Widening) has firmed following the award of the delivery contract to the Rizzani De Eccher Leighton Joint Venture
- A tolling equipment contract for the project has also been awarded to Kapsch TrafficCom Australia
- Construction has commenced, with work due to be completed in 2017
- The current cost estimate for the M4 Widening is \$497 million.

##### Stage 1B (M4 East)

- The cost estimate for Stage 1B (M4 East) has also firmed with the award of the delivery contract to the Leighton Contractors, Samsung C&T and John Holland Joint Venture
- The planning approvals process for the M4 East is now underway, along with property acquisition
- Construction is expected to commence in 2016 with completion in 2019
- The current cost estimate for the M4 East is \$3,802 million
- This excludes ████████ of initial Stage 3 works being constructed at Haberfield as part of the delivery of the M4 East.



Table 8.2 Stage 1 capital costs

Stage 1 capital costs – Actuals/contracted costs (\$ millions, nominal, P50)		
Stage 1A (M4 Widening)	Design and construction	██████
	Property, resourcing and associated project costs	██████
	<b>M4 Widening Total</b>	<b>497</b>
Stage 1B (M4 East)	Design and construction	██████
	Property, resourcing and associated project costs	██████
	Urban renewal	██████
	<b>M4 East Total</b>	<b>3,802</b>

### Stage 2 – New M5, King Georges Road Interchange Upgrade, and Sydney Gateway

Table 8.3 provides a summary of the estimated capital cost spend by expense type for Stage 2 based on the current design.

#### Stage 2 (New M5)

- The New M5 component of Stage 2 is currently under negotiation and is being finalised
- The Leighton Dragados Samsung Joint Venture has been selected as the preferred tenderer
- The Environmental Impact Statement is due for exhibition by the end of 2015
- Construction work is expected to commence in mid-2016 with completion in 2019
- The current cost estimate for the New M5 is \$4,335 million
- This excludes ██████ of initial Stage 3 works being constructed at St Peters as part of the delivery of the New M5.

#### Stage 2 (King Georges Road Interchange Upgrade)

- The contract for the Stage 2 King Georges Road Interchange upgrade has been awarded to Fulton Hogan
- Construction has started, with work due to be completed in 2017. The cost estimate for the upgrade is \$131 million.

#### Stage 2 – New M5

##### Stage 2 (Sydney Gateway)

- The budget estimate for the Sydney Gateway is \$800 million
- Further scoping work on the Sydney Gateway solution is being undertaken, coordinated by Infrastructure NSW.

Table 8.3 Stage 2 capital costs

Stage 2 capital costs – Budget costs (\$ millions, nominal, P50)		
Stage 2 (New M5)	Design and construction	██████████
	Property, resourcing and associated project costs	██████████
	<b>New M5 Total</b>	<b>4,335</b>
Stage 2 Early Works (King Georges Road Interchange Upgrade)	Design and construction	██████████
	Property, resourcing and associated project costs	██████████
	<b>King Georges Road Interchange Upgrade Total</b>	<b>131</b>
Stage 2 (Sydney Gateway)	Design and construction	██████████
	Property, resourcing and associated project costs	██████████
	<b>Sydney Gateway Total</b>	<b>800</b>

### Stage 3 – M4–M5 Link

The M4 – M5 Link will connect the M4 and M5 components of WestConnex, and facilitate connectivity with the future Western Harbour Tunnel and Beaches Link through the realignment of the project's route, and the addition of a major new interchange at Rozelle (connecting to the Anzac Bridge and Victoria Road).

**Table 8.4** provides a summary of the estimated capital cost spend by expense type for the M4 – M5 Link.

Table 8.4 Stage 3 capital costs

Stage 3 capital costs – Budgeted costs (\$ millions, nominal, P50)		
Stage 3 (M4 – M5 Link)	Design and construction	██████████
	Urban renewal	██████████
	Property, resourcing and associated project costs	██████████
	<b>M4 – M5 Link Total</b>	<b>7,247</b>

## 8.3 Operating and maintenance costs

A detailed assessment of the operating and maintenance costs has been undertaken for each stage of WestConnex as shown in **Table 8.5**.

The total nominal operating and maintenance costs for the project have been estimated through to 2060. Further details and financial assessments of the operating and maintenance cost are included in **Chapter 13**.

## 8.4 Lifecycle costs

Lifecycle cost estimates give the details of periodic replacement and renewal costs. **Table 8.6** provides a summary of the 2025 lifecycle costs for WestConnex together with the total nominal costs to 2060 and net present costs for the project. The total nominal lifecycle cost for the project is [REDACTED].

Table 8.5 Operating and maintenance costs

Operating and maintenance (\$ million)	FY2025 costs	Total nominal costs	Net Present Cost @ 12.0% to 30 June 2015
M4 Widening and M4 East	[REDACTED]	[REDACTED]	[REDACTED]
New M5 (inc. M5 East and Sydney Gateway)	[REDACTED]	[REDACTED]	[REDACTED]
M4 – M5 Link	[REDACTED]	[REDACTED]	[REDACTED]
<b>Total WestConnex cost</b>	[REDACTED]	[REDACTED]	[REDACTED]

Table 8.6 Lifecycle costs

Lifecycle costs (\$ million)	FY2025 costs	Total nominal costs	Net Present Cost @ 12.0% to 30 June 2015
M4 Widening and M4 East	[REDACTED]	[REDACTED]	[REDACTED]
New M5 (inc. M5 East and Sydney Gateway)	[REDACTED]	[REDACTED]	[REDACTED]
M4 – M5 Link	[REDACTED]	[REDACTED]	[REDACTED]
<b>Total WestConnex cost</b>	[REDACTED]	[REDACTED]	[REDACTED]

## 8.4.1 Revised scope implications

The cost to deliver the revised scope for WestConnex, in nominal, out-turn terms is \$16,812 million, which includes the incorporation of the northern extension into Stage 3, the M4 – M5 Link to facilitate the connection to the future Western Harbour Tunnel and Beaches Link, and the enhanced solution for Sydney Gateway as recommended by Infrastructure NSW.

The breakdown in costs by stage is outlined in **Table 8.7**.

## 8.4.2 Additional works outside of the direct scope

Tertain roads and intersections along the WestConnex route will be progressively upgraded during the construction of WestConnex.

Examples of this include the Hill Road ramp at Auburn as part of Stage 1, and the significant upgrade of roads around St Peters Interchange as part of Stage 2.

To achieve efficiencies, Roads and Maritime Services has engaged Sydney Motorway Corporation to deliver these works concurrently with WestConnex. As such, they are considered outside the direct scope and cost of WestConnex.

## 8.5 Financial controls

Any change to these project cost budgets will be managed by a formal change request process. Any change would require the approval of the Chief Executive Officer, Chief Financial Officer and Chief Operating Officer before being formally recognised.

Contingency will be managed separately to the approved property, construction and client costs budgets. Any draw against contingency would need to be approved via the formal budget change request process.

Original WestConnex	(\$m)	Original WestConnex + Additions	(\$m)
Stage 1	4,197	Enhanced Sydney Gateway connection	402
Stage 2	4,737		
Stage 3	5,947	Extension of Stage 3 to Anzac Bridge, Victoria Road and the future Western Harbour Tunnel and Beaches Link	1,207
Original Business Case Total	14,881	Acceleration costs and associated delivery costs for scope enhancements	322
		<b>Enhanced WestConnex Total</b>	<b>16,812</b>

Table 8.7 WestConnex costs

## 8.5.1 Contingency and risk

The key commercial decisions that impact on risk allocation and cost are included as part of the procurement processes. This ensures procurement capital cost estimates are being tracked against approved budget estimates and management of contingency values as needed. Project risk assessments are undertaken to ensure all key procurement, construction and operation phase risks are being identified and effectively managed.

Where necessary, external subject matter experts are engaged to assess the capital cost or operation and maintenance and lifecycle cost estimates. Mitigation strategies to manage key risks are developed together with risk valuation and estimation exercises to determine the appropriate value to price risks and achieve P50 and P90 levels of confidence. Risk activities are subject to the oversight of the relevant Audit and Risk Committees.

## 8.6 Summary

The current approved scope for WestConnex, including the revised route via Rozelle, is estimated to cost \$16,812 million.

The operations, maintenance and lifecycle costs for this scope through to 2060 are estimated as

██████████.

The costs of WestConnex are provided in **Table 8.7**.



# TOLLING REGIME

This Chapter outlines the assumed tolling regime applied to WestConnex, as has been used in the traffic demand modelling and revenue figures, and therefore the economic and financial analysis within this business case. Assumptions have also been made on the tolls applied across the broader motorway network.

The tolling regime that will be applied to the motorway will take into consideration both the financial requirements of the project itself and the needs of the broader road network and transport system.

## 9.1 Broader network tolling policy

The NSW Government is in the process of undertaking detailed work on developing an overall tolling regime for Sydney's road network. This was first flagged in the *NSW Long Term Transport Master Plan* in 2012, which stated: "*we will consider options for tolling new and upgraded roads on the Sydney motorway network on a consistent cents-per-kilometre basis. WestConnex will be the first trial of a new distance-based tolling scheme for Sydney's motorway network*".<sup>1</sup> This work involves an examination of a broad range of tolling scenarios and approaches. The work is being conducted by Transport for NSW.

In October 2014, the NSW Government agreed to a broad set of principles for tolling for Sydney's motorways. The principles identified will be applied to WestConnex, NorthConnex, the Western Harbour Tunnel and Beaches Link and Gateway to the South motorways.

The tolling assumptions for WestConnex are consistent with these principles.

1. Transport for NSW (TfNSW) 2012, Long Term Transport Master Plan, TfNSW, Sydney



## Government's tolling principles

- 1) New tolls are applied only where users receive a direct benefit.
- 2) Tolls can continue while they provide broader network benefits or fund ongoing costs.
- 3) Distance-based tolling for all new motorways.
- 4) Tolls charged for both directions of travel on all motorways.
- 5) Tolls charged reflect the cost of delivering the motorway network.
- 6) Tolls take account of increases in expenses, income and comparable toll roads.
- 7) Tolls will be applied consistently across different motorways, to the extent practicable, taking into account existing concessions and tolls.
- 8) Truck tolls at least three times higher than car tolls.
- 9) Regulations could be used so trucks use new motorway segments.
- 10) Untolled alternative arterial roads remain available for customers.

## 9.1.1 Consistent assumptions across projects

The NSW Government has formed an assumptions working group that includes Transport for NSW, Roads and Maritime Services and Urban Growth NSW.

In developing the original business case for WestConnex in July 2013, a tolling regime for the new motorway needed to be identified to allow traffic, financial, and economic modelling to be undertaken. This became the 'Reference Tolling Regime'.

The Reference Tolling Regime outlined in Table 9.2, was developed in 2013 to inform the original business case and was reaffirmed by government in October 2014 at the same time the tolling principles were adopted.

The 2012 Infrastructure NSW State Infrastructure Strategy recommended: "the tolling arrangements for WestConnex... be based on experience on other roads, in particular the M7. It is proposed that WestConnex's tolls will comprise a distance-based charge, a flagfall charge and a maximum toll cap".

The detail of these elements was further expanded in the companion document to the Infrastructure NSW report, which detailed the original WestConnex strategic concept. The document presented a framework for determining a tolling regime for WestConnex, described in Table 9.1.

A number of factors influenced the adoption of the tolling framework, including consideration of:

- Affordability and equity principles by providing:
  - Tolling proposition tailored to usage
  - Mechanisms to limit the total cost of a trip.
- Wider road impacts, by:
  - Minimising diversion (for example, by setting toll levels at appropriate levels)
  - Discouraging shorter trips at certain times, which has a disproportionate impact on congestion.
- Contribution of WestConnex to wider transport planning objectives:
  - Supporting public transport use
  - Ensuring freight efficiency outcomes
  - A tolling proposition which is efficient to administer and straightforward to understand.
- Alignment with the WestConnex financing and procurement strategy to provide a basis for private sector involvement for the relevant WestConnex stages
- Alignment with NSW and Australian government policy frameworks.

Table 9.1 Tolling framework

Element	Rationale
Distance-based tolling	This approach has been successfully used on the M7 since its opening and is accepted as an equitable approach that reflects appropriate charges for journeys of different lengths.
Higher tolls for heavy vehicles	Most Sydney toll roads charge heavy vehicles a multiple of two to three times the charge for light vehicles. This reflects the additional wear and tear caused by heavy vehicles and the fact that freight transport is a significant driver for the WestConnex project itself.
Minimum charge - flagfall or connection charge	A charge at particular access/exit points on WestConnex reflects the high cost of providing motorway connections and better reflects the true cost and value of short trips on WestConnex.
Maximum charge - toll cap	As on the M7, the total toll will be capped at a certain level to provide certainty to users and improve the overall value for money to the community.

With this framework as a basis, a benchmarking exercise was undertaken to identify potential tolling approaches for WestConnex. This looked at motorways across Sydney, as well as examples interstate.

Tolling regimes for a number of roads were examined, including:

- M5 South West
- Hills M2
- Eastern Distributor
- Westlink M7
- Lane Cove Tunnel
- Cross City Tunnel
- Harbour Bridge/Harbour Tunnel
- NorthConnex
- CityLink (Melbourne)
- EastLink (Melbourne).

This Reference Tolling Regime formed the basis of the analysis in the 2013 Business Case, as well as subsequent business cases produced for WestConnex, including this Updated Strategic Business Case.

In order to contextualise the WestConnex tolling regime, the toll roads already in place in Sydney are summarised in Table 9.3, noting that WestConnex is longer and largely in tunnel (and therefore more costly than surface road solutions).

Table 9.2 Reference tolling regime

Component	Jan 2013	Jan 2015
Flagfall	\$1.04	\$1.12
Toll per km	\$0.38	\$0.42
Toll Cap	\$7.35	\$7.95
Truck Multiplier	3x	
Escalation	Max of 4% or CPI	
Concession term	To 2060	

Once operational, toll indexation will be consistent for all three stages with a maximum of four per cent or CPI, whichever is greater for the first 20-years, reverting to CPI thereafter.

Table 9.3 Sydney's Motorway tolls

\*Concession term means from project opening to traffic to the end of tolling

Road	Toll level (\$2015, 1 Oct 2015 to 31 Dec 2015)	Indexation	Heavy Vehicle Multiplier	Concession term	Length
M5 South West	\$4.48	CPI	3.0x (from 2017)	34 years	20.8 km
Hills M2	\$6.55 (main toll)	CPI or 4% (whichever is greater)	3.0x	51 years	20.1 km
Eastern Distributor	\$6.61	37.5% CPI + 63.5% Average Weekly Earnings or 4% (whichever is greater)	2.0x	48 years	5.4 km
Westlink M7	38.56c/km capped at 20km (\$7.71)	CPI	3.0x (from 2017)	43 years	40.0 km
Lane Cove Tunnel	\$3.16 (main tunnel)	CPI	3.0x (from 2017)	41 years	3.6 km
Cross City Tunnel	\$5.27 (main toll)	CPI or 3% to 31/12/17 CPI to the end of the term	2.0x	30 years	2.1 km
Harbour Tunnel	\$2.50 - \$4.00 (based on time of day)	N/A	1.0x	30 years	2.1km
Sydney Harbour Bridge	\$2.50 - \$4.00 (based on time of day)	N/A	1.0x	N/A	
NorthConnex	\$6.36	CPI or 4% (whichever is greater)	3.0x	29 years	9.0 km

## 9.2 Summary

The tolling regime developed for WestConnex is consistent with the government's principles for tolling, and has been endorsed by government as the basis for analysis of WestConnex.

A tolled motorway applies a 'user-pays' principle, which allows an alternative source of funding to government. This reduces the burden on NSW taxpayers by allowing the project to better fit within the financial capacity of the government – one of the objectives of WestConnex. In doing so, it facilitates the overall financing strategy for the motorway (as discussed in **Chapter 14**).

10

# TRAFFIC DEMAND MODELLING RESULTS

This Chapter provides details of the strategic traffic modelling outputs for WestConnex.

Strategic traffic modelling forecasts the expected changes to traffic numbers on the broader road network due to WestConnex, as well as the performance of the motorway.

## 10.1 Traffic model methodology

Traffic modelling has been used to build road network base models (2012 network situation), which have been validated against existing network traffic flows and journey times.

These base models have been used to forecast traffic flows and changes on the future road network in 2031, both with and without WestConnex.

Two types of road network models have been used:

- Strategic network model (the WestConnex Road Traffic Model, version 2.1). This uses information from the Transport for NSW multi-modal Strategic Travel Model to investigate network link performance. The results of this model are covered in this Chapter
- Traffic simulation operational models to investigate traffic effects at interchanges and intersections within the scope area. These results are provided in **Chapter 11**.

An internationally recognised approach has been used to estimate induced traffic from the WestConnex project (discussed in further detail in **Technical Paper 1**). This includes trip mode shifts from public transport on to the road network, and new trips on the road network due to WestConnex, in line with a recommendation from Infrastructure Australia's assessment of WestConnex.<sup>1</sup>

The modelling approach was subject to a peer review.

The key basis of the modelled traffic forecasts are:

- Existing driver and traffic flow behaviour
- Land use (population and employment projections) for future modelling years up to 2031
- Planned road network improvements up to 2031
- Surveyed values of travel time savings for traffic assignment onto the network and toll diversion estimates.

Future land use and transport scenarios have been modelled both with and without WestConnex to determine the forecast traffic effects within the project area. Traffic modelling results for the network without WestConnex are provided in **Chapter 2**.

Existing travel conditions across WestConnex networks were modelled for a range of traffic measures including link vehicle volumes (both average weekday traffic and peak hour traffic), congestion (capacity utilisation as measured by 'volume to capacity' ratios) and average network peak speeds.

1. Infrastructure Australia (IA) 2015, *2014-15 Assessment Brief NSW WestConnex*, IA.



## 10.1.1 Modelled WestConnex design

WestConnex is a motorway linking Sydney's south west and west with the Sydney Airport and Port Botany precinct.

The specific motorway design modelled is detailed in **Chapter 6**. The model includes connections between WestConnex and the broader road network at:

- The existing M4 access at Church Street, James Ruse Drive, Hill Road and Silverwater Road
- A new eastbound on ramp at Hill Road
- An upgraded interchange at Homebush Bay Drive providing access to the M4 Widening westbound and the M4 East eastbound
- A redesigned interchange at Concord with new east facing ramps providing access to the new M4 East
- South and east facing on and off-ramps to Wattle Street at Haberfield providing access to and from the M4 East and the M4 – M5 Link
- West facing on and off-ramps to Parramatta Road at Haberfield, west of Dalhousie Street, providing access to and from the M4 East
- South and west facing on-ramps from City West Link and Anzac Bridge/Western Distributor to the M4 – M5 Link
- West facing on and off-ramps to Parramatta Road at Camperdown
- South facing on and off-ramps at Campbell Road, St Peters
- West facing on and off-ramps at Gardeners Road, St Peters.

The WestConnex design also includes the enhanced Sydney Gateway linking the New M5 at St Peters Interchange to the domestic and international airport terminals and Port Botany.

## 10.2 Traffic volumes on the new motorway

The forecast volumes on WestConnex in 2031 are shown in **Table 10.1**. They illustrate that the motorway will carry between 37,000 vehicles on an average weekday on the New M5 tunnel and up to 164,000 vehicles on an average weekday on the widened M4 motorway.

## WestConnex Road Traffic Model

The WestConnex Road Traffic Model has evolved over time.

- Version 1 used August 2012 land use demographics and was the model used for the M5 West Environmental Impact Statement.
- Version 2 was updated with NSW Planning 2014 Land Use Projections, together with updated value-of-time parameters. It used three travel modes – private, business and heavy vehicles.
- Version 2.1 also used the NSW Planning 2014 Land Use Projections, but incorporated induced traffic demands and has the ability to incorporate toll capping in the model. This version was used for the modelling contained in this business case.

The road 'zone-to-zone' demands for the forecast years are derived from the Transport for NSW Strategic Travel Model using the latest land use projections. These are distributed and assigned by the WestConnex Road Traffic Model based on factors including least cost travel equations and input values of travel time savings from surveys.

Table 10.1 Forecast average weekday volumes on WestConnex in 2031

Source: WestConnex Road Traffic Model v2.1

Location	Average weekday volumes in 2031 (vehicles per day)	Number of Lanes (two way)
Widened M4 Motorway, east of James Ruse Drive	163,800	8
M4 East, east of Concord Road	132,400	6
M4 – M5 Link (between Haberfield to Rozelle)	105,000	6
M4 – M5 Link (between Camperdown and Rozelle)	99,800	6
M4 – M5 Link (between Camperdown and St Peters)	111,200	6
Existing M5 East	49,300	4
New M5 tunnel	37,200	4
Sydney Gateway (link to airport precinct)	89,400	4

## 10.3 Congestion relief on the road network

WestConnex will change traffic patterns on major corridors through Sydney and across large parts of Sydney's road network. It will extend and provide additional motorway capacity and improve traffic conditions on a number of surface roads on the network.

Some of the key improvements delivered by WestConnex are:

- A substantial reduction in average weekday and peak hour volumes on Parramatta Road, Queens Road and Lyons Road in the Five Dock area, around the M4 East. Approximately 132,000 vehicles on an average weekday will use this section of WestConnex in 2031
- Reductions in traffic on the City West Link (Dobroyd Parade) and Marion Street in Leichhardt, with a 19 per cent reduction in volume along Parramatta Road. Volumes along the M4 – M5 Link in this section are around 105,000 vehicles per average weekday in 2031
- A reduction in traffic on Southern Cross Drive of approximately 24,000 vehicles per day. The WestConnex tunnel north of St Peters Interchange will carry around 110,000 vehicles per average weekday in 2031
- A reduction in traffic in the existing M5 East tunnel of 60,000 vehicles per average weekday. The New M5 will carry around 37,000 vehicles on an average weekday in 2031
- The large reduction in the existing M5 East tunnel is due to:
  - The New M5 (Stage 2 of Westconnex)
  - Drivers changing their travel pattern to M5 East route using WestConnex M4 – M5 Link instead of using M4 to King Georges Road
  - The introduction of a toll.
- The reduction on General Holmes Drive of around 15,000 vehicles per day in 2031.

There are sections on the network, however, that will share the growth in traffic numbers over time:

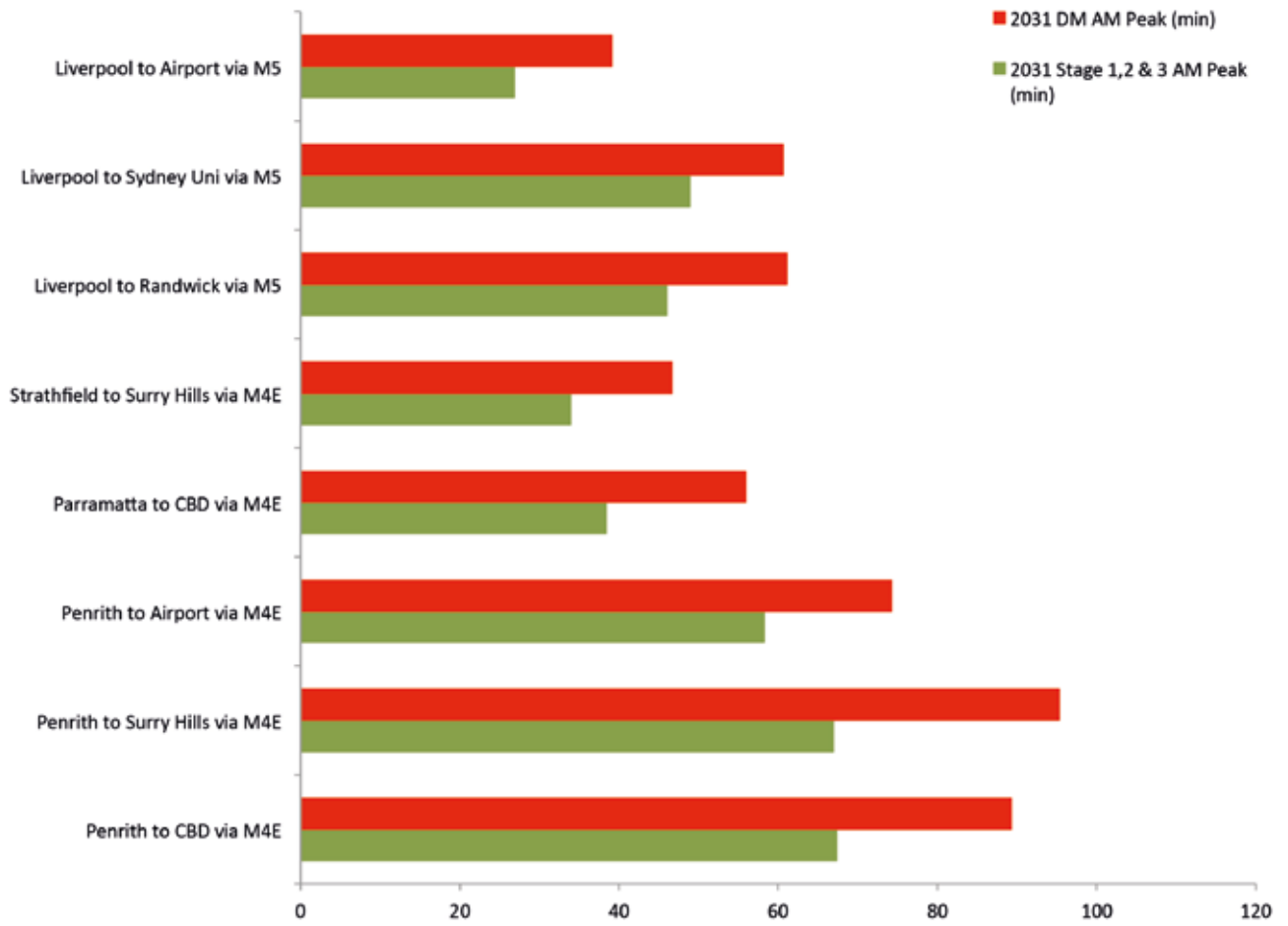
- On the surface network along Victoria Road at Rydalmere and Parramatta Road at Auburn, with a percentage increase of 12 per cent and 19 per cent respectively
- On the Anzac Bridge in 2031 an additional 18,000 vehicles per average weekday are expected, noting the Western Harbour Tunnel, when completed, will provide relief
- On Concord Road, which shows increases in volume of 8,500 vehicles per day in 2031 due to the introduction of the east facing ramps at Concord Road and forecast traffic growth generally
- Euston Road is being upgraded as part of the local road upgrades to support the integration of the St Peters Interchange. Following the upgrade, the road is predicted to carry an extra 50,000 vehicles
- On Stoney Creek Road, with an increase of around 5,000 vehicles per day in 2031
- Beyond the eastern end of WestConnex on Parramatta Road (that is, east of Camperdown towards Sydney CBD) (Section 10.4).

Travel time savings on a selection of key routes are shown in Figure 10.1, which compares a 2031 morning peak scenario both without WestConnex (in the red) and with WestConnex (in the green).

This demonstrates that WestConnex will deliver improvements in travel times to and from the Sydney Airport and Port Botany precinct from the west and south west. A comparison of morning peak network performance in 2031 with and without WestConnex shows that travel times improve by as much as 10 to 20 minutes from the west with WestConnex. Trips to the Sydney CBD will also improve by up to 15 to 20 minutes.

Figure 10.1 Travel times in 2031 morning peak, with and without WestConnex.

Source: WestConnex Road Traffic Model v2.1



## 10.3.1 Improvements to commercial and freight movement

WestConnex will result in a similar pattern of reductions for heavy vehicles as that for vehicles overall. WestConnex improves heavy vehicle access to the Port Botany and Sydney Airport precinct by changing movement from the west (M4, King Georges Road and M5), the south (M5) and the north (Harbour Crossing, Western Distributor, Eastern Distributor).

WestConnex provides additional north-south motorway capacity and a bypass of the Sydney CBD for heavy vehicles.

The improved travel times to and from the Port Botany and Sydney Airport precinct from the west and south west (as presented in **Figure 10.1**) are also applicable to freight vehicles travelling to this precinct.

## 10.4 Delivering for Parramatta Road

As described in Chapter 7, WestConnex enables an extensive program of urban renewal and public transport improvements along the Parramatta Road corridor. In order to facilitate the revitalisation of this corridor, WestConnex has been designed to shift traffic from the surface road into motorway tunnels.

The predicted changes in traffic volumes delivered by WestConnex for Parramatta Road are shown in **Figure 10.2**:

- The blue bars represent traffic volumes on Parramatta Road in 2012
- The orange bars represent traffic volumes on Parramatta Road in 2031 without WestConnex
- The green bars represent traffic volumes in 2031 with WestConnex open.

As demonstrated in **Figure 10.2**, changes in traffic volumes vary throughout the length of Parramatta Road when WestConnex is completed.

The highest reductions in traffic volumes will be experienced between Concord and Haberfield, with up to 45,000 fewer vehicles per day on Parramatta Road in 2031 when compared to a scenario without WestConnex. This corresponds to the section of Parramatta Road between the end of the existing M4 motorway and the City West Link.

As Parramatta Road continues east, there will be reductions in traffic on Parramatta Road all the way through to Camperdown.

In summary, traffic volumes on Parramatta Road between Wentworth Road and Wattle Street show significant traffic reductions. East of Wattle Street the 2031 traffic volumes with WestConnex are similar to the 2012 volumes (in essence delaying 20 years of growth).

These results assume that by 2031 with WestConnex in place, Parramatta Road between Concord Road and Camperdown will comprise two general traffic lanes and one bus lane in each direction where possible.

## 10.4.1 Heavy vehicles along Parramatta Road

Without WestConnex, the volume of heavy vehicles on Parramatta Road in 2031 will grow significantly when compared with the 2012 volumes. WestConnex will significantly reduce truck volumes along Parramatta Road between Concord and Camperdown.

The truck volumes along Parramatta Road west of Concord are forecast to increase by an average of 1,500 vehicles per day in 2031 when compared against a scenario without WestConnex.

Significantly, truck volumes along Parramatta Road east of Concord will reduce by around 10,000 vehicles per day in 2031 when compared against a scenario without WestConnex. The eastern end of Parramatta Road at Missenden Road reduces by around 1,000 vehicles per day.

The section of Parramatta Road east of Camperdown, around Glebe Point Road, will continue to experience the same number of trucks per day as compared with the no WestConnex case.

These results are illustrated in Figure 10.3.

As per the previous graph, the blue bars represent traffic volumes on Parramatta Road in 2012, the orange bars represent traffic volumes on Parramatta Road in 2031 without WestConnex, and the green bars represent the traffic volumes in 2031 with WestConnex.

Figure 10.2 Average weekday traffic volumes on Parramatta Road

Source: WestConnex Road Traffic Model v2.1

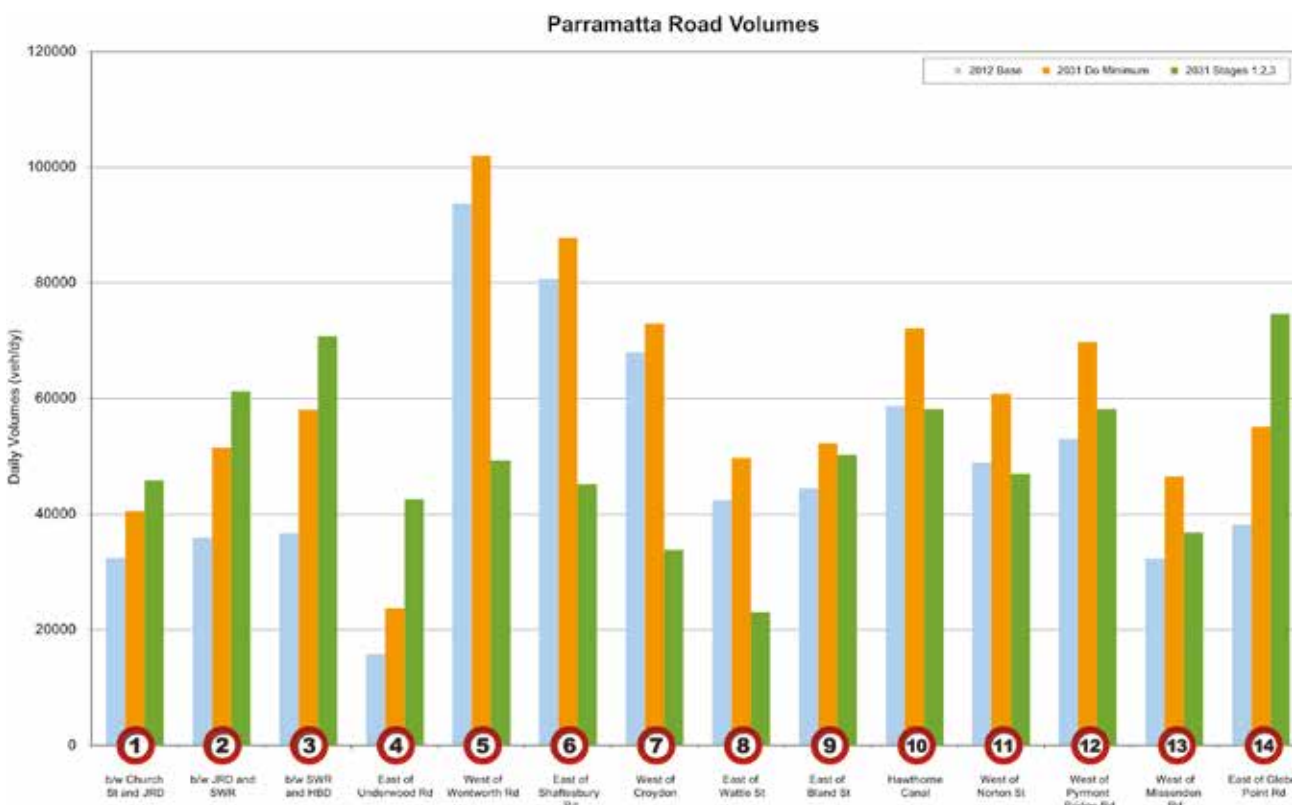
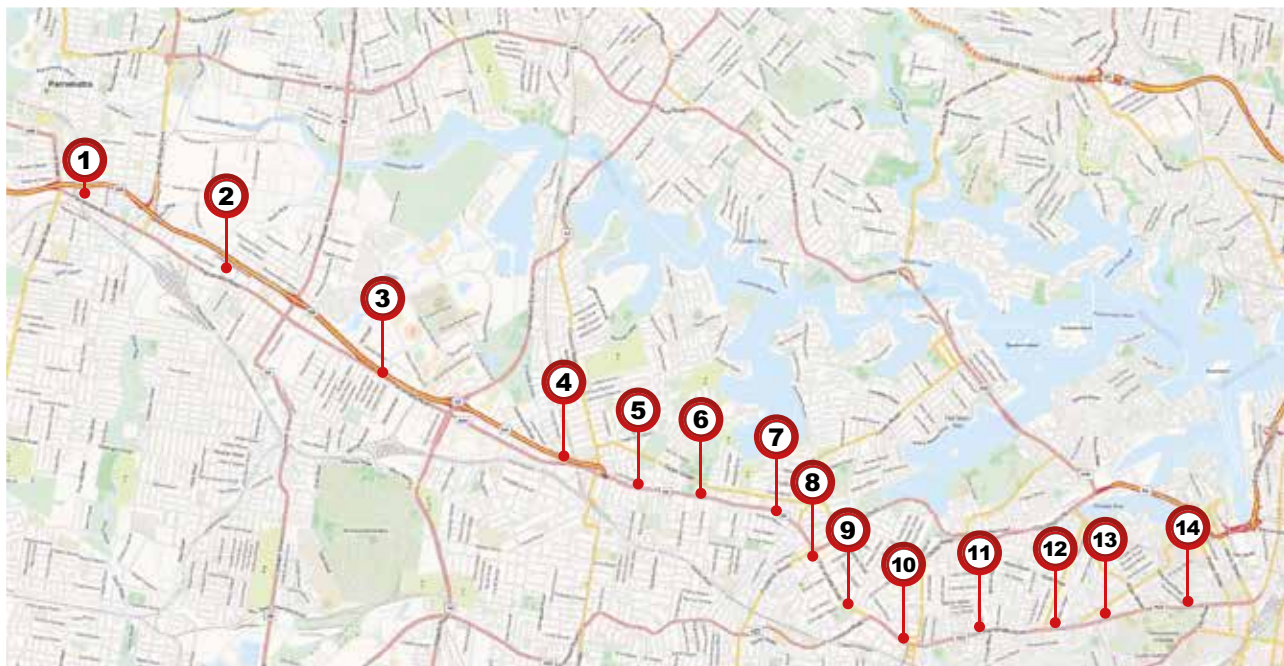
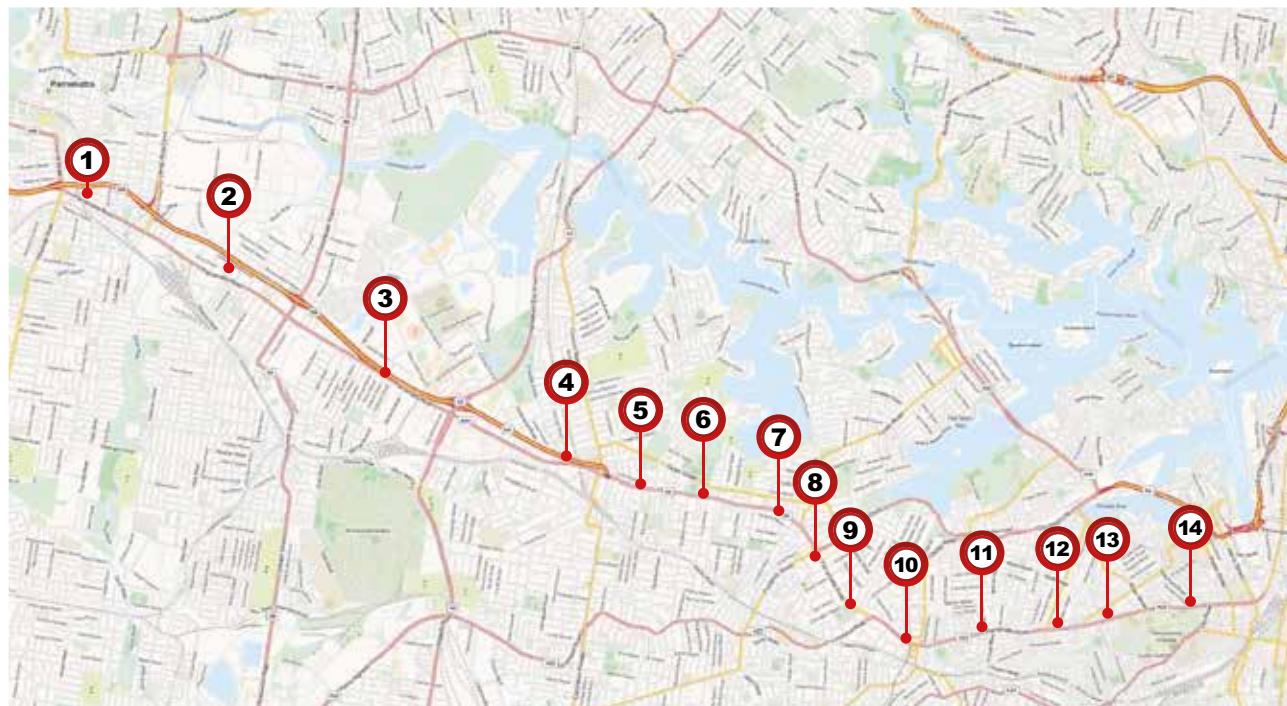
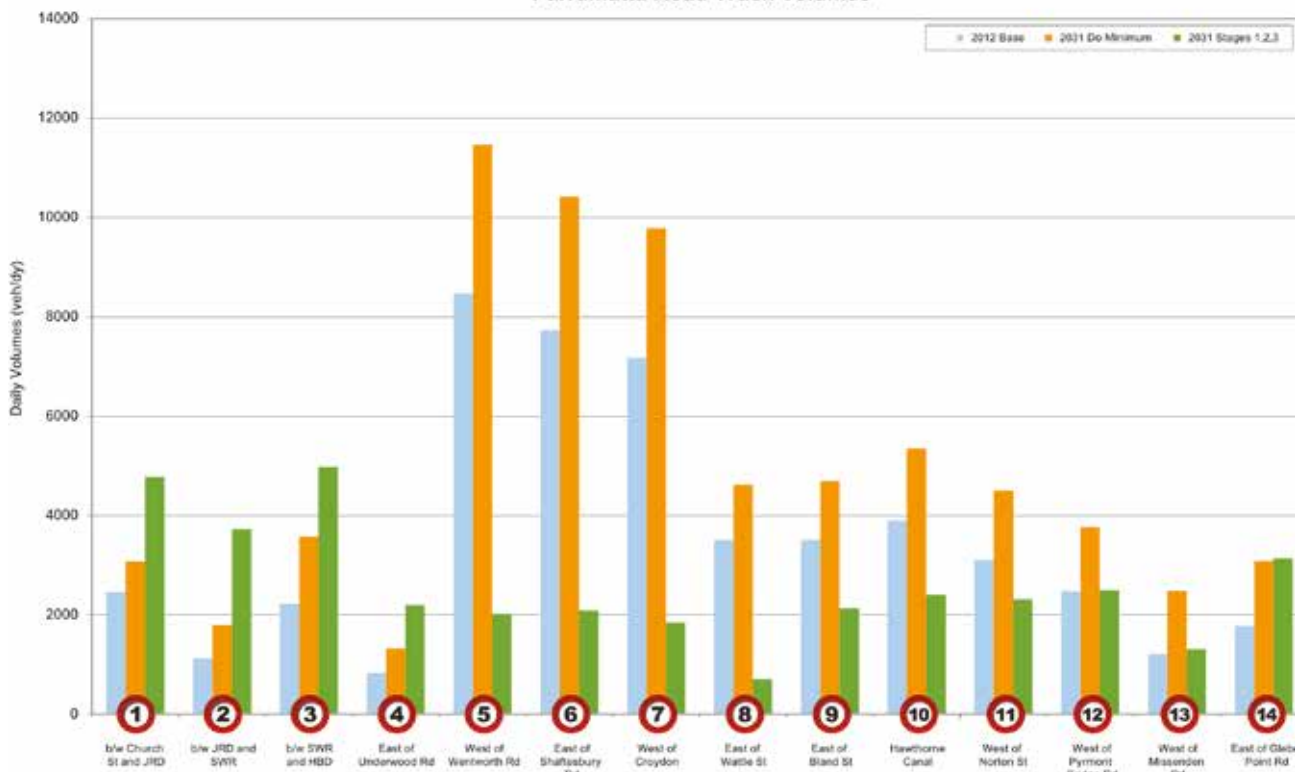


Figure 10.3 Daily heavy vehicle volumes along Parramatta Road

Source: WestConnex Road Traffic Model v2.1



Parramatta Road Truck Volumes



## 10.5 Traffic induced by WestConnex

Delivering new road infrastructure induces more people to travel on the road network, shifting public transport users or generating new trips. Infrastructure Australia recognise this phenomena as an unintended consequence of a new motorway and requested it be included in traffic modelling and economic assessment for WestConnex.

WestConnex is the state's first motorway project to factor induced demand into modelling.

On an average weekday in 2031, the combined number of new road trips and trips redeployed from public transport as a result of improved traffic conditions from the full WestConnex project is estimated to be around 0.4 per cent of the total number of daily car trips on the WestConnex Road Traffic Model Sydney-wide network at that time.

## 10.6 Measuring network productivity with WestConnex

Network productivity changes can be understood through two sets of key metrics:

- The change in 'vehicle kilometres travelled' on the road network
- The change in 'vehicle hours travelled' on the network.

The results for these metrics are in **Table 10.2**.

Table 10.2 Vehicle kilometres travelled and vehicle hours travelled in 2031

This table does not include links that allow connectivity to the network as part of this analysis.

Location	Vehicle kilometres travelled (000's)		Vehicle hours travelled (000's)	
	No WestConnex	With WestConnex	No WestConnex	With WestConnex
Motorways	29,600	30,700	570	540
Other roads	90,500	90,000	3,980	3,900
<b>Total</b>	<b>120,100</b>	<b>120,700</b>	<b>4,550</b>	<b>4,440</b>

These results show that WestConnex will reduce the vehicle kilometres travelled on the surface network with an increase in kilometres travelled along motorway and highway routes. In essence, this is a diversion of traffic off surface roads and onto the motorway network delivering a positive network outcome.

Meanwhile the vehicle hours travelled results show a reduction on both the surface road and on motorway routes. This translates into travel time savings for both motorway users and broader road network users, with less time spent on the road in traffic.

In 2031, WestConnex is forecast to result in:

- An increase in vehicle kilometres travelled on the motorway network of around 600,000
- A reduction in vehicle hours travelled of around 110,000.

This indicates while vehicles will travel more on the network, they are spending less time getting to their destinations.



## 10.7 Effect of the Western Harbour Tunnel on WestConnex

One of the objectives of WestConnex is to facilitate the future Western Harbour Tunnel and Beaches Link. This new harbour crossing will connect to WestConnex at Rozelle.

At a high level, the Western Harbour Tunnel:

- Completes a north-south inner bypass of the CBD
- Releases additional north-south capacity across Sydney Harbour and relieves traffic on the existing Sydney Harbour Tunnel and Bridge.

The Western Harbour Tunnel and Beaches Link is subject to its own business case, and the benefits of the project more broadly, will be assessed by government through the gateway assurance process. In relation to WestConnex, the completion of the Western Harbour Tunnel will result in an increase in road users choosing to use WestConnex:

- The eight-lane section of the widened M4 Motorway will carry around an additional 4,000 vehicles per average weekday
- There will be an increase in traffic volumes in all new WestConnex tunnels. This increase ranges from an additional 10,000 vehicles per day in the M4 East tunnel to an extra 35,000 vehicles per average weekday in the M4 – M5 Link
- There will be a further drop of 3,000 vehicles per average weekday from the existing M5 East, and an increase on the New M5 of up to 6,000 vehicles.

This will help to further improve network conditions.

## 10.8 Summary

The implementation of WestConnex will provide new and upgraded motorway for road users, resulting in improved performance of the overall Sydney road network.

The motorway will accommodate anticipated traffic growth, particularly on the major corridors of M4, M5 and Parramatta Road. Key east-west roads including M5 East, General Holmes Drive, M4, parts of Parramatta Road and City West Link will experience lower traffic volumes and reduced peak congestion and delay. Similarly, key north-south roads including Southern Cross Drive, Princes Highway and King Georges Road will experience traffic relief, with reduced congestion and fewer delays.

Overall, the productivity of Sydney road network is measurably improved and journey times reduced.

These results demonstrate that WestConnex will deliver on key objectives, as set out in **Chapter 4**, including:

- Providing relief of road congestion resulting in improved speed and reliability on the M4, M5 and CBD, port, airport corridors, including parallel arterial roads
- Relieving key surface roads, including Parramatta Road, of through-traffic; facilitating opportunities for urban transformation, improved liveability and public and active transport improvements
- Supporting Sydney's long-term economic growth through improved motorway access and connections linking Sydney's international gateways, western Sydney and key places of business across the city
- Supporting improved connectivity between Sydney, the Sutherland Shire and the Illawarra.

**Technical Paper 1** provides further details of the demand modelling results.



# OPERATIONS MODELLING RESULTS

In addition to the strategic traffic modelling undertaken for WestConnex (**Chapter 10**), simulation modelling has been used to investigate operational effects at interchanges and intersections. The results of these are outlined in this chapter.

Micro-simulation and micro-analytical traffic models have been used to test traffic operations on WestConnex motorways to inform acceptable designs for access to the surface road network and the proposed Western Harbour Tunnel and Beaches Link.

# 11.1 Operational modelling approach

To support the strategic modelling set out in **Chapter 10**, a more detailed assessment of WestConnex interchanges and adjacent intersections was undertaken using micro-simulation and micro-analytical traffic models.

Figure 11.1 Sub regional areas of WestConnex used in the operational analysis



The detailed modelling reflects likely driver behaviours and assesses the effects of the following on traffic:

- Changes to key intersections (lane additions, removals or reconfigurations)
- Changes to ramps at interchanges (lane additions, removals or reconfigurations)
- Traffic signal changes (optimisation of green signal times at intersections and interchanges)
- Public transportation priority (bus priority at traffic signals)
- Pedestrian needs at intersections
- Congestion and queuing.

Given the size of the WestConnex program of works, for the purposes of describing traffic operations, smaller sub-regions were used as shown in **Figure 11.1**.

The following sections describe the traffic modelling outcomes for each of these subregions.

## 11.2 Motorway traffic operations in 2031

### 11.2.1 Western Sydney

#### **M4 Widening: Church Street to Homebush Bay Drive**

In 2031, traffic movements on the M4 Widening are expected to operate with free-flow conditions.

The widened section of the M4 will transition via a surface connection into the M4 East tunnels at Homebush.

#### **Approaching the Concord Road Interchange**

The in-tunnel traffic movements near the Concord Interchange are forecast to be at, or approaching capacity during peak periods in 2031.

In the morning peak the westbound tunnel is likely to experience traffic speeds below the posted speed limits, however, the design will be able to accommodate vehicles merging as they enter and exit along the motorway route. Modelling indicates that it is unlikely that queuing on the off-ramps at the Concord Interchange will impact in-tunnel operations.

## 11.2.2 Inner west and inner Sydney

### **M4–M5 Link: Wattle Street through Rozelle and Camperdown interchanges**

In-tunnel vehicle movements near the interchanges at Rozelle and Camperdown will generally operate at or close to posted speeds. Modelling indicates stationary queuing will not occur in 2031 peak periods. Traffic will be able to effectively navigate through the tunnel between entry and exit points during the peak periods.

In 2031, the M4 East tunnels near the Haberfield Interchange are predicted to operate at levels approaching capacity during peak times. The tunnel design satisfactorily accommodates traffic merging as it enters and exits along the motorway. Detailed modelling is ongoing to assess and mitigate any impacts of queuing on the off-ramps caused by potential surface-road congestion surrounding the Haberfield Interchange.

Traffic in the tunnels near the Rozelle Interchange will continue to operate efficiently in 2031. Both the southbound on-ramp and westbound on-ramp merges can cater for the surface traffic entering the tunnel, without any queuing back to the surface streets. The interchange is therefore expected to operate satisfactorily.

Traffic in the tunnels near the Camperdown Interchange will also operate without significant delay. The off-ramps from the tunnel to Parramatta Road will accommodate the predicted traffic volumes in 2031, and the on-ramps also accommodate surface traffic movements entering the tunnel from Parramatta Road. Vehicles from the northbound and southbound on-ramps are predicted to merge effectively with the in-tunnel vehicles and retain acceptable motorway conditions.

### **Approaching the St Peters Interchange**

The analysis undertaken for the St Peters Interchange assumes the delivery of local road upgrades supporting WestConnex in 2019 (**Section 7.3.4**) and the delivery of the Southern Connector (part of Gateway to the South) by 2023 in line with the completion of WestConnex.

Modelling of the peak period indicates the northbound tunnels will adequately accommodate the merging of vehicles manoeuvring to exit the WestConnex tunnels to Sydney Airport and Port Botany.

However, modelling results indicate some delays may occur in the southbound tunnels as a result of vehicles weaving to take the airport exit during peak periods. To mitigate this, directional signage well in advance of the exit will assist drivers to select the appropriate lane, distributing merging movements over a greater distance.

Modelling of the St Peters Interchange also indicates:

- Off-ramps to Gardeners Road, Campbell Road, Joyce Drive and Airport Drive will operate satisfactorily
- The southbound on-ramp and northbound on-ramp merges into the tunnel will adequately cater for the surface traffic movements entering the tunnel.

Therefore the interchange's on-ramps and off-ramps are expected to operate satisfactorily in 2031.

## 11.2.3 Southern Sydney

### **Southern Connector**

WestConnex will provide an in-tunnel connection stub at Arncliffe for the future Southern Connector. Vehicles will be able to enter and exit the Southern Connector via in-tunnel ramps in the New M5. The WestConnex design provides a merge length for these ramps that will adequately accommodate the predicted traffic volumes accessing the Kogarah area. Operational modelling of this connection between the main tunnel and Southern Connector is ongoing as part of the future design development being undertaken by Transport for NSW.

### **Approaching the King Georges Road Interchange**

The existing King Georges Road Interchange is being upgraded as part of WestConnex. Operational modelling shows the interchange will operate with acceptable conditions as a result of WestConnex. Modelling also indicates that queuing of vehicles exiting WestConnex to King Georges Road will remain on the ramps and not extend back to the motorway.

## 11.3 Performance of proposed interchanges in 2031

### 11.3.1 Western Sydney surface access

WestConnex will deliver six new and upgraded interchanges in the western areas of Sydney:

- Church Street Interchange
- James Ruse Drive Interchange
- Silverwater Road Interchange
- Hill Road Interchange
- Homebush Bay Drive Interchange
- Concord Road Interchange.

In line with forecast population growth by 2031, the strategic model predicts traffic increases on the surface network adjacent to these six interchanges.

Further modelling is being undertaken to understand how potential surface road congestion at Church Street, Silverwater Road and Hill Road can be managed. This may involve a combination of short-term improvements to adjacent road network intersections and increasing the capacity of the exit ramps if required.

#### **Church Street, James Ruse Drive and Homebush Bay Drive interchanges**

The existing connections to the widened M4 Motorway from surface roads between Church Street and Homebush Bay Drive will be retained. In addition, a new eastbound on-ramp will be provided at Hill Road and new westbound on-ramps will be provided at Homebush Bay Drive.

Operational modelling indicates that traffic volumes on the James Ruse Drive and Homebush Bay Drive off-ramps will accommodate the predicted traffic volumes exiting the motorway during peak periods. Therefore it is expected that James Ruse Drive and Homebush Bay Drive interchanges will operate satisfactorily in 2031.

Further modelling is being undertaken to understand how surface road congestion around Church Street will effect queuing on the interchange ramps. Roads and Maritime is undertaking this work as part of the development of the Road Network Performance Mitigation Plan required by the Department of Planning and Environment Conditions of Approval for the M4 Widening.

#### **Silverwater Road and Hill Road Interchange**

The operation of the Hill Road and Silverwater Road off-ramps is subject to an ongoing study to identify ways to manage the congestion by maximising the available ramp storage.

#### **Concord Road Interchange**

The Concord Road Interchange provides eastbound and westbound access between the M4 East tunnels and Concord Road via a series of ramps. In addition, access to the westbound carriageway of the widened M4 motorway is provided via a new ramp from Parramatta Road at Powell's Creek. Concord Road between Patterson Road and Parramatta Road will be upgraded to accommodate the expected increases in traffic in 2031.

Modelling indicates the upgraded Concord Road will accommodate the predicted traffic volumes exiting the tunnel during the peak periods, without queuing back into the main tunnels.

### 11.3.2 Inner west and inner Sydney surface access

WestConnex will deliver five new interchanges in the inner west and inner Sydney:

- Wattle Street Interchange
- Parramatta Road Interchange at Haberfield
- Rozelle Interchange
- Camperdown Interchange
- St Peters Interchange.

### **Wattle Street/Haberfield Interchange**

The surface roads around the proposed ramp locations are currently heavily congested during peak periods. Traffic volumes are expected to increase in the future and this may, in turn, affect the performance of the interchange ramps. Traffic heading towards the Sydney CBD on the City West Link may impact on exit ramp performance for the M4 East.

Further investigation is ongoing to better understand the extent and impacts of existing congestion at these locations. Traffic management measures will be investigated and where appropriate, put in place to ensure this interchange satisfactorily integrates with the surrounding road network.

### **Rozelle Interchange**

The Rozelle Interchange contains a connection at City West Link and provides for a future connection to the Western Harbour Tunnel and Beaches Link. At the time of opening, the Rozelle Interchange will allow traffic to enter the WestConnex tunnels from the Anzac Bridge. However, access from the M4–M5 Link to the Anzac Bridge will be managed to optimise traffic flow until the opening of the Western Harbour Tunnel in order to effectively optimise traffic flow.

Modelling indicates the Rozelle Interchange will provide effective access to the WestConnex tunnels in 2031. Victoria Road and the Western Distributor will continue to be congested during peak periods in 2031.

### **Camperdown Interchange**

The Camperdown Interchange contains a connection between the WestConnex tunnels and Parramatta Road. This connection will complete the Parramatta Road bypass and is therefore a key strategic connection.

Operational modelling indicates that Parramatta Road can accommodate the traffic predicted to exit the main tunnels. Modelling of traffic exiting at the Camperdown Interchange is shown to operate satisfactorily in 2031. Furthermore, traffic volumes on the northbound and southbound on-ramps are predicted to effectively merge with the in-tunnel vehicles without generating any queuing back to the surface roads. Modelling also indicates the Camperdown Interchange will perform satisfactorily in the WestConnex tunnel and on the surface roads during the peak periods in 2031.

### **St Peters Interchange**

Modelling of this Interchange indicates the intersection at Gardeners and Kent roads will accommodate the predicted traffic volumes exiting the tunnel, with the exit ramp able to contain the exiting traffic. The intersection at Campbell and Euston roads will also cater for the predicted traffic volumes exiting the main tunnel in 2031. Queuing from the exit ramp is similarly predicted to be contained within the length of the ramp and not extend back to the main WestConnex tunnels.

Operational analysis also indicates both Joyce Drive and Airport Drive surface roads will operate with acceptable conditions in 2031.

Finally, the southbound and northbound on-ramp merges from the St Peters Interchange onto the main tunnels will accommodate surface traffic entering the tunnel. Both these merges will operate effectively and will not create any queuing back to the surface streets. The St Peters Interchange is therefore expected to adequately accommodate traffic from WestConnex to the surface roads in 2031.

## **11.3.3 Southern Sydney surface access**

WestConnex will upgrade one existing interchange in Sydney's south:

- King Georges Road Interchange.

### **King Georges Road Interchange**

The existing King Georges Road Interchange is being upgraded as part of WestConnex, increasing capacity on all ramps at the interchange. Modelling indicates that after this upgrade, queuing for vehicles exiting WestConnex to King Georges Road will remain on the ramps and will not extend back to the motorway. As such, the interchange will operate satisfactorily in 2031.



## 11.4 Summary

The modelling indicates that in 2031, WestConnex will play a major role in optimising traffic across the network. Some interchanges are the subject of ongoing investigations to ensure their satisfactory operation. However, on the whole the motorway will manage the expected growth in traffic volumes.

The operational modelling undertaken for this updated strategic business case represents a high-level analysis. More detailed modelling results will be presented in each of the environmental impact statements prepared for the project, which will include more detailed technical analysis and solutions to optimise network performance. The operations modelling and analysis undertaken for the business case has supported and guided the ongoing development of WestConnex.

Modelling has also been undertaken on the impacts of the opening of the Western Harbour Tunnel on WestConnex. These are further detailed in **Technical Paper 1**. The Western Harbour Tunnel will provide improvements to conditions along the Anzac Bridge and Western Distributor, facilitating the staged opening of the Rozelle Interchange off-ramps.

12

## ECONOMIC APPRAISAL

Economic cost benefit analysis provides a key set of metrics for government decision-making, including information on whether a project is economically positive. This appraisal is based on costs as outlined in **Chapter 8** and traffic modelling as outlined in **Chapter 9**.

WestConnex engaged KPMG to provide economic advisory services for this business case. The full KPMG report is provided at **Technical Paper 2**.

# 12.1 Introduction

## 12.1.1 Approach and scenario for analysis

The assessment of the economic viability of WestConnex has been undertaken by KPMG, an independent professional services firm, through the use of cost benefit analysis and wider economic impacts analysis.

Cost benefit analysis is a systematic approach to analysing the economic, social and environmental costs and benefits associated with a project. It uses a discounted cashflow analysis to compare the transport-related marginal cost and benefits of project scenarios (i.e. a new road project) relative to a 'do minimum' base case scenario.

This business case measures the economic costs and benefits of the WestConnex program of works against a 'do minimum' scenario, where it was assumed for the purposes of modelling that WestConnex does not proceed.

A scenario is summarised in **Table 12.1**.

The approach adopted for the analysis is consistent with relevant project evaluation guidelines, including:

- Austroads (2014), National Guidelines for Transport System Management in Australia, December
- NSW Treasury (2007), NSW Government Guidelines for Economic Appraisal, July
- Transport for NSW (2015), Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives, March
- Department for Transport UK (2014), WebTag Unit A1.3 User and Provider Impacts, January.

## 12.1.2 Key economic parameters

The economic parameters and expansion factors adopted for the analysis are summarised in **Table 12.2**.

Table 12.1 Project case and base case definitions for analysis

Appraisal Scenario	Project Case	Base Case (Do Minimum)
WestConnex (Stages 1, 2 and 3)	Includes: <ul style="list-style-type: none"> <li>• M4 Widening and M4 East</li> <li>• New M5</li> <li>• M4 – M5 Link</li> </ul>	Network without WestConnex

Table 12.2 Economic appraisal parameters used for WestConnex appraisal

\*Dates indicate calendar year for construction start

Parameter	Value	Description
<b>Discount rate (real)</b>	7%	Consistent with Infrastructure Australia and NSW Treasury recommended rates. Sensitivity tests undertaken at 4% and 10%.
<b>Appraisal period</b>	34 years (2019 to 2052 inclusive)	Starting from the first year of operation of WestConnex Stage 1 in 2019 and finishing 30 years after the opening of the final stage of WestConnex (in 2023) in 2052 (Infrastructure Australia, 2013).
<b>Base year for discounting</b>	2015	Year in which construction starts (Australian Transport Council, 2006).
<b>Price base</b>	2015 (Q1)	The price base is a reference point in time against which all monetised values (for both costs and benefits) are presented in the economic appraisal.
<b>Construction period*</b>	Stage 1: Mar 2015 - Jun 2019 Stage 2: Jan 2015 - Jun 2019 Stage 3: Jan 2019 - Jun 2023	Incremental opening by stage.
<b>First year of operation</b>	Stage 1: 2019 Stage 2: 2019 Stage 3: 2023	Incremental opening by stage.
<b>Expansion factors for WestConnex Road Traffic Model 2.1</b>	AM peak to daily – 2.0 Inter-peak to daily – 6.0 PM peak to daily – 3.0 Evening to daily – 7.3 Weekday to annual - 345	Expansion factors are consistent with those applied in the WestConnex Road Traffic Model.
<b>Modelled years</b>	2012, 2021 and 2031	Modelled years are as specified by the WestConnex Road Traffic Model. Benefits were interpolated between WestConnex Road Traffic Model years 2012, 2021 and 2031 (interpolation approach discussed below).
<b>Interpolation and extrapolation</b>	Linear interpolation 2019 to 2021 Linear interpolation 2021 to 2031 Decayed extrapolation 2031 onwards	Linear interpolation has been used to estimate benefits between 2012 and 2021 modelled years, however the benefits have only been counted from 2019 onwards. Linear interpolation has been used to estimate benefits between 2021 and 2031 modelled years.  For benefits beyond 2031 and the last year of the appraisal period, a 'decay' function has been used which assumes there is some growth in the benefit stream beyond the final model year, but this growth plateaus over time due to increased traffic resulting from economic growth over time in the Sydney region. This is a conservative approach.

## 12.1.3 Consideration of induced demand

The demand analysis undertaken considers induced demand on the Sydney road network, which is expected to result from the introduction of WestConnex. Potential sources of induced demand include:

- Changes in mode of travel as improvements make road transport a more attractive option than bus or rail
- Changes to final destinations as improved travel times allow access to more distant destinations
- Changes in time of travel as drivers choose to travel during peak times due to reductions in journey times.

The economic analysis quantifies benefits associated with induced demand, to approximate the change in consumer surplus generated by WestConnex. This method applies to user benefits including travel time savings, vehicle operating cost savings and travel time reliability. The approach is consistent with Infrastructure Australia recommendations. Further details are in **Technical Paper 1**.

## 12.1.4 Key inputs

Key inputs to the economic appraisal include:

- **Capital costs**  
All non-recurrent capital costs that are expected to be incurred after the economic appraisal period commences
- **Operating and maintenance costs**  
All necessary recurrent costs to operate and maintain the asset over the evaluation period
- **Demand analysis**  
Outputs from the WestConnex Road Traffic Model - Version 2.1, a strategic transport model that uses information from the Transport for NSW multi-modal Strategic Travel Model to investigate network link performance. The model is further discussed in **Chapter 10**.

## 12.2 Capital costs

The economic appraisal relies on estimates of the capital costs associated with the project scenario. These are detailed in **Chapter 8**. All nominal terms have been converted to real values based on the Reserve Bank of Australia's target inflation rate of 2.5 per cent.

Capital cost estimates for the project including scope enhancements are summarised in **Table 12.3**.

The components of real capital cost for WestConnex include property, design and construction contracts, tolling equipment, retained works, contamination and remediation works, client costs and provision for urban renewal works.

The analysis takes into consideration the benefits and capital costs associated with the revised alignment of the M4 – M5 Link to facilitate connectivity with the future Western Harbour Tunnel and Beaches Link, excluding the tunnel 'stubs'.

## 12.3 Operating and maintenance costs

The economic appraisal relies on estimates of the operating and maintenance costs associated with the project scenario. Annual operating and maintenance costs and lifecycle costing estimates were developed. The average annual operating and maintenance costs (including risk contingency) for Stage 1, 2 and 3, are \$██████████, \$██████████ and \$██████████ per annum, respectively.

Table 12.3 Capital costs cash flow (real dollars)

Financial Year	Stage 1A - M4 Widening	Stage 1B - M4 East	Stage 2 - King Georges Rd Interchange	Stage 2 - New M5	Stage 2 - Sydney Gateway	Stage 3 - M4 - M5 Link	Total WestConnex Project (\$m)
FY2014/15							
FY2015/16							
FY2016/17							
FY2017/18							
FY2018/19							
FY2019/20							
FY2020/21							
FY2021/22							
FY2022/23							
FY2023/24							
Total (real)							\$15,083.1
Total (nominal)							\$16,811.6

## 12.4 Demand analysis

Outputs were provided for an average weekday for the years 2012, 2021 and 2031. For each modelled year, outputs were provided for the following time periods:

- AM peak – between 7am and 9am
- Inter peak – between 9am and 3pm
- PM peak – between 3pm and 6pm
- Evening (off peak) – between 6pm and 7am.

Model outputs were provided for five vehicle type definitions, namely:

- Privately registered car – business
- Privately registered car – commuter
- Privately registered car – other
- Business registered light commercial vehicle
- Heavy commercial vehicles.

Key traffic modelling outputs that informed the economic appraisal included the:

- Change in daily traffic volumes between the base case and project case
- Change in vehicle kilometres travelled between the base case and project case
- Change in vehicle travel times between the base case and project case
- Impact of induced demand.

It is important to note that the traffic modelling outputs and the economic appraisal exclude any effects associated with the operation of the future Western Harbour Tunnel and Beaches Link project.

## 12.4.1 Change in traffic volumes

The introduction of WestConnex is expected to result in:

- Relief of traffic and congestion on key east-west roads including M5 East, General Holmes Drive, M4 Motorway, Parramatta Road east and City West Link
- Lower traffic volumes and reduced peak congestion on north-south roads, including Eastern Distributor, Southern Cross Drive, Prince's Highway and King Georges Road
- Provision of new free-flowing capacity between the M5 Motorway to M4 Motorway allowing a predicted 90,000 vehicles travelling at the posted speed between the two motorways each weekday in 2031 (3,000 per hour each way in the peak hour).

The change in traffic volumes is a key input to the estimation of the travel time reliability benefits in the economic appraisal.

## 12.4.2 Change in distance travelled

The WestConnex Road Traffic Model outputs highlight that the total vehicle kilometres travelled increase under the WestConnex project case. The kilometres travelled by cars increase by 0.5 per cent and light commercial vehicle kilometres increase by 1.0 per cent. There is only a marginal increase in the number of truck kilometres travelled.

The change in vehicle kilometres travelled under each scenario is a key input in the estimation of vehicle operating cost savings, crash cost savings and environment externalities. The change in vehicle kilometres travelled is summarised in **Table 12.4**.

Table 12.4 Change in vehicle kilometres travelled in 2031.

This table includes links that allow connectivity to the network as part of this analysis. These links comprise 0.1 per cent of VKT.

Scenario (km)	Cars	Light commercial	Heavy commercial
Base Case	82,035,160	36,408,320	10,136,040
Scenario One	82,431,920	36,778,060	10,110,480
Change	396,760	369,740	-25,560



### 12.4.3 Change in travel times

The change in travel times along key road corridors resulting from WestConnex is illustrated in **Figure 12.1**. The model outputs indicate that WestConnex results in a reduction in modelled travel times for key corridors to and from the west and south west Sydney road network.

Further details of these results are discussed in **Chapter 10**.

### 12.4.4 Tolling

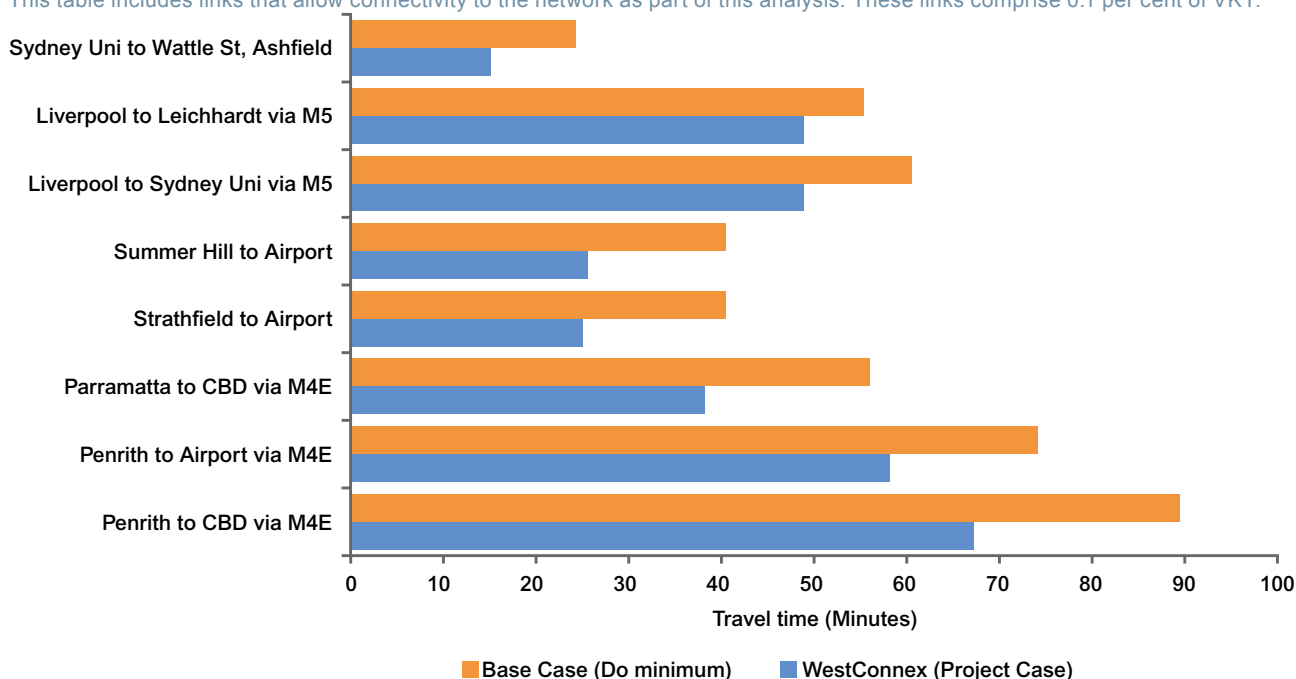
A tolling regime has been applied within the WestConnex Road Traffic Model to consider the impact of tolling on traffic demand forecasts, for both mode choice and route assignment.

See Section 9.1.1 for more information on the tolling regime.

As such, the traffic demand outputs used in the economics include these tolling impacts within the forecasts. For the purposes of the economic analysis, tolling of WestConnex is considered as a transfer payment from the user to operator, and as such, it is considered to have a neutral effect on overall benefits and costs of the scheme.

Figure 12.1 Change in modelled travel times in selected vehicle corridors (AM Peak, 2031)

This table includes links that allow connectivity to the network as part of this analysis. These links comprise 0.1 per cent of VKT.



## 12.5 Benefits

The benefits associated with WestConnex comprise of:

- **User benefits:**  
Benefits to private and public transport users as a result of the introduction of WestConnex. User benefits include the travel time savings, vehicle operating cost savings and reliability benefits
- **Other benefits:**  
Benefits accruing to society as a whole as a result of changes to travel behaviour following the introduction of WestConnex. This includes changes in road crash costs, environmental externalities and road maintenance savings

- **Wider Economic Impacts:**  
Including improving the ability of business to access other businesses (agglomeration economies) and increased labour supply benefits.

Quantification of the economic benefits relied on the outputs of the WestConnex Road Traffic Model. These model outputs were provided for an average weekday (divided into four time periods) for the years 2012, 2021, and 2031 for each component of the WestConnex project.

The approach used to calculate the identified project benefits is summarised in **Table 12.5**.

Table 12.5 Summary of approach to quantification of benefits

Benefit categories	Broad approach
<b>User benefits</b>	
Travel time	Quantified using the WestConnex Road Traffic Model outputs (change in consumer surplus relating to travel time), calculated at Origin-Destination level, and applying values of time from Transport for NSW guidelines. <sup>1</sup>
Vehicle operating costs	Quantified using WestConnex Road Traffic Model outputs (change in consumer surplus relating to vehicle operating costs), calculated at Origin-Destination level, and applying valuation parameters from Austroads. <sup>2</sup>
Travel time reliability	Quantified using WestConnex Road Traffic Model outputs (change in volume/capacity ratio, speed and number of vehicles on each link in the network) and applying valuation parameters from the UK WebTAG guidance. <sup>3</sup>
<b>Other benefits</b>	
Crash cost savings	Quantified using WestConnex Road Traffic Model outputs (change in vehicle kilometres travelled on each link type e.g. freeway, arterial etc.), applying crash rates derived from Austroads <sup>4</sup> and applying 'willingness to pay' values for crashes avoided from Transport for NSW. <sup>5</sup>
Environmental externalities (including greenhouse gas savings)	Quantified using WestConnex Road Traffic Model outputs (change in vehicle kilometres travelled throughout network) and applying applicable valuation parameters from Austroads. <sup>6</sup>
Residual value of asset	Quantified using weighted average economic life less depreciation using the straight line method. The residual value is incorporated as a benefit in the last year of the appraisal period.
<b>Wider Economic Impacts</b>	
Agglomeration economies (WB1)	Agglomeration impacts were calculated as the incremental change in the effective density metric (i.e. the mass of economic activity) across the modelled area, resulting from changes in the respective accessibility of firms and workers to each other.
Improved labour supply (WB2)	Labour market deepening was estimated as the additional tax revenue resulting from more people choosing to work as a result of better accessibility to employment (lower after commuting cost wage), resulting from WestConnex.

## 12.5.1 User benefits

The user benefits of WestConnex are outlined in **Table 12.6** in both discounted (present value) and undiscounted (total value) terms over the appraisal period.

Table 12.6 User benefits for WestConnex – discounted and undiscounted

Benefits by vehicle type	Discounted (present value \$m)	Undiscounted (total value \$m)
<b>Travel time savings</b>		
Cars – Privately registered, Business use <sup>7</sup>	4,305.9	18,303.4
Cars – Privately registered, Commuter	1,687.6	7,290.7
Cars – Privately registered, Other	991.8	4,541.3
Light Commercial Vehicles	3,389.3	14,094.9
Heavy Commercial Vehicles	2,528.3	10,895.1
<b>Vehicle operating cost savings</b>		
Cars – Privately registered, Business use	1,570.6	6,639.7
Cars – Privately registered, Commuter	1,065.2	4,581.8
Cars – Privately registered, Other	620.8	2,835.1
Light Commercial Vehicles	1,163.6	4,876.3
Heavy Commercial Vehicles	1,761.6	7,522.5
<b>Travel time reliability savings</b>		
Cars – Privately registered, Business use	336.9	1,463.0
Cars – Privately registered, Commuter	285.5	1,242.7
Cars – Privately registered, Other	209.5	939.2
Light Commercial Vehicles	438.7	1,906.1
Heavy Commercial Vehicles	194.6	832.5

## 12.5.2 Non-user benefits

The non-user benefits calculated for the appraisal are summarised in **Table 12.7** in both discounted (present value) and undiscounted (total value) terms over the appraisal period.

Table 12.7 Non-user benefits for WestConnex – discounted and undiscounted

Non-user benefits	Discounted (present value \$m)	Undiscounted (total value \$m)
Crash cost savings	11.3	300.6
Greenhouse gas emission saving	831.9	3,580.1
Environmental externality savings	63.1	-3.6
Residual value of assets	734.8	9,171.1

## 12.5.3 Wider economic impacts

Wider Economic Impacts include agglomeration economies and labour market deepening. Agglomeration economies arise from positive externalities related to improving connectivity between areas with high employment densities. Labour market deepening benefits arise from reduction in the costs of commuting encouraging more people to take up employment.

The Wider Economic Impacts (benefits) calculated for the appraisal are summarised in **Table 12.8** in both discounted (present value) and undiscounted (total value) terms over the appraisal period.

Agglomeration economies are realised through increases in the effective density of employment. This occurs when improvements in transport network performance improve the ability of business to access other businesses. WestConnex improves the effective density of employment primarily in the areas around Mascot (to the north of Sydney Airport) and Rozelle, although marginal improvements in effective density are apparent in the surrounding area as well, including the Sydney CBD.

Labour market deepening is realised through reductions in the generalised cost of commuting leading to more people electing to join the workforce. These benefits are largely due to the improved accessibility provided by WestConnex into Sydney CBD where the highest density of employment is located.

## 12.6 Economic analysis results

The following economic performance measures are calculated to estimate the economic viability of the WestConnex project:

- Benefit Cost Ratio:**  
 A measure of the magnitude of net benefit to society derived from the capital investment in the project. We have adopted the NSW Treasury definition for the Benefit Cost Ratio metric, defined as equal to the present value of benefits less the present value of operating costs, divided by the present value of capital expenditure on the project. This metric is also known as the Net Benefit Investment Return
- Net Present Value:**  
 A measure of the magnitude of net benefit to society from the project, equal to the present value of benefits less the present value of costs of the project
- Internal Rate of Return:**  
 The discount rate at which the present value of costs equals the present value of benefits (i.e. the breakeven point).

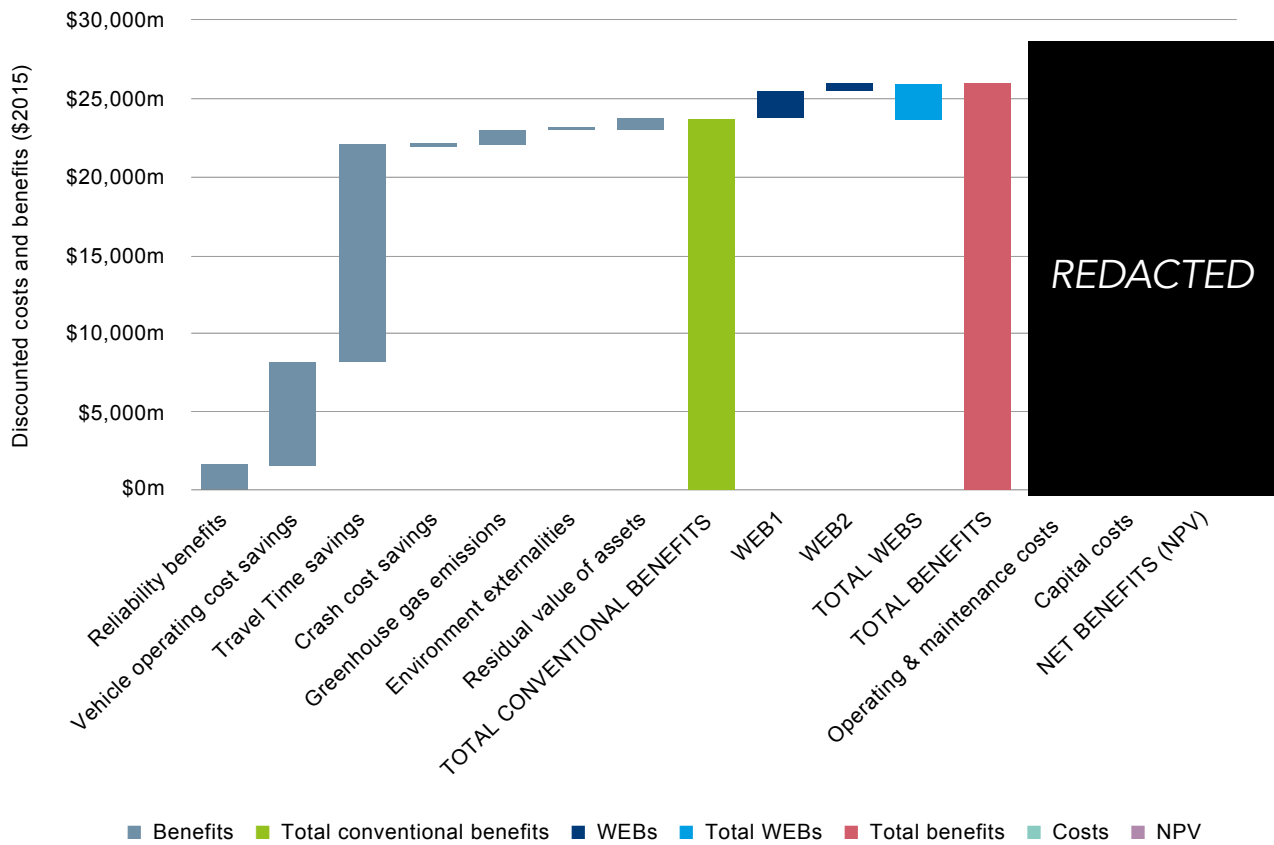
Analysis of the results considers the Benefit Cost Ratio, Net Present Value and Internal Rate of Return metrics using the conventional Cost Benefit Analysis method (without Wider Economic Impacts) as the primary measures of economic viability. The same metrics were calculated inclusive of both conventional Cost Benefit Analysis and Wider Economic Impacts analysis as a secondary measure of viability.

Table 12.8 Wider Economic Impacts of WestConnex – discounted and undiscounted

Benefit Type	Discounted (present value \$m)	Undiscounted (total value \$m)
Agglomeration economies (WB1)	1,681.5	7,067.8
Labour market deepening (WB2)	452.7	2,020.7

- Transport for New South Wales (TfNSW) 2015, Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives, TfNSW, Sydney
- Austrroads 2014, National Guidelines for Transport System Management in Australia, Austrroads
- Department for Transport UK (DforT) 2014, WebTag Unit A1.3 User and Provider Impacts, DforT, UK
- Austrroads 2014, National Guidelines for Transport System Management in Australia, Austrroads
- Transport for New South Wales (TfNSW) 2015, Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives, TfNSW, Sydney
- Austrroads 2014, National Guidelines for Transport System Management in Australia, Austrroads
- This result is reflective of WRTM outputs, (particularly for 'special generator' zones), and the classification of business trip purposes for privately registered cars within WRTM.

Figure 12.2 Cumulative benefits and costs, WestConnex core scenario



### 12.6.1 Scenario results

The WestConnex scenario represents an economically viable project, as evidenced by a Benefit Cost Ratio of 1.71 (1.88 with Wider Economic Impacts), and a Net Present Value of \$8.7 billion (\$10.9 billion with Wider Economic Impacts) in 2015 prices, discounted at seven per cent. The cumulative benefits and costs of WestConnex are illustrated in **Table 12.9** and **Figure 12.2**.

Of the total \$24.3 billion in benefits attributable to WestConnex, conventional benefits account for 91 per cent and Wider Economic Impacts account for the remaining nine per cent.

Of the conventional benefits (\$22.2 billion): travel time savings and vehicle operating cost savings account for 86 per cent (58 per cent and 28 per cent respectively). Travel time reliability benefits, environmental externalities, greenhouse gas savings, crash savings and residual value of assets account for the remaining 14 per cent of conventional benefits.

The capital expenditure estimates for WestConnex include costs associated with off-ramps to facilitate the operation of the Western Harbour Tunnel but exclude underground tunnel stubs. This expenditure will enable additional user and non-user benefits associated with the Western Harbour Tunnel and Beaches Link, but these benefits are excluded from the economic analysis for WestConnex.

Table 12.9 Monetised costs and benefits of WestConnex

<b>Project costs</b>		<b>Result (\$m)</b>
Capital costs		████████
Operating costs		████████
<b>Total costs</b>		████████
<b>Project benefits</b>		
<i>Reliability benefits</i>		
Car - business		336.9
Car - commuter		285.5
Car - other		209.5
Light commercial vehicles		438.7
Heavy commercial vehicles		194.6
<i>Vehicle operating cost benefits</i>		
Car - business		1,570.6
Car - commuter		1,065.2
Car - other		620.8
Light commercial vehicles		1,163.6
Heavy commercial vehicles		1,761.6
<i>Travel time savings</i>		
Car - business*		4,305.9
Car - commuter		1,687.6
Car - other		991.8
Light commercial vehicles		3,389.3
Heavy commercial vehicles		2,528.3
<i>Other benefits</i>		
Crash cost savings		11.3
Greenhouse gas emissions		831.9
Environmental externalities		63.1
Residual value of assets		748.9
<b>Total benefits (without Wider Economic Impacts)</b>		<b>22,204.9</b>
<b>Wider Economic Impacts</b>		
Agglomeration economies		1,681.5
Labour market deepening		452.7
<b>Total benefits (with Wider Economic Impacts)</b>		<b>24,339.1</b>
<b>Results (without Wider Economic Impacts)</b>		
Net Present Value		8,657.9
Benefit Cost Ratio		Ratio of 1.71
Internal Rate of Return		10.2%
<b>Results (with Wider Economic Impacts)</b>		
Net Present Value		10,792.1
Benefit Cost Ratio		Ratio of 1.88
Internal Rate of Return		11.4%

This result is reflective of WRTM outputs, (particularly for 'special generator' zones), and the classification of business trip purposes for privately registered cars within WRTM.

Table 12.10 Sensitivity analysis results

Benefits by vehicle type	Present value costs (\$m)	Present value benefits (\$m)	Net present value (\$m)	Benefit Cost Ratio (without Wider Economic Impacts)	Benefit Cost Ratio (with Wider Economic Impacts)
Central scenario	13,547.0	22,204.9	8,657.9	1.71	1.88
Discount rate 4%*	15,528.8	40,197.3	24,668.6	2.9	3.1
Discount rate 10%*	12,150.7	13,187.8	1,037.1	1.1	1.2
Capital and Operating cost increase by 30%	████████	████████	████████	1.3	1.5
Capital costs increase by 10%	14,768.7	22,279.7	7,511.1	1.6	1.7
Benefits increase by 10%	13,547.0	24,425.3	10,878.3	1.9	2.1
Benefits decrease by 10%	13,547.0	19,984.4	6,437.4	1.5	1.7
Linear trend extrapolation of all benefits beyond 2031 using 2026 to 2031 trend	13,547.0	25,965.9	12,418.9	2.0	2.2
No growth in benefits beyond 2031	13,547.0	20,623.3	7,076.3	1.6	1.7
Low annualisation factor (300)	13,547.0	19,406.3	5,859.3	1.5	1.7
High annualisation factor (365.25)	13,547.0	23,464.2	9,917.2	1.8	2.0

\*The economic analysis is subject to a range of sensitivities in accordance with Treasury guidelines

## 12.6.2 Sensitivity analysis

Sensitivity analysis was undertaken to assess the impact of changes in key assumptions on the conventional cost benefit analysis findings (i.e. excluding Wider Economic Impacts). The analysis is based on four areas, which could affect the economic viability of a project such as WestConnex, namely:

- Discount rates
- Capital and operating expenditure
- Extrapolation methods beyond the final modelled year
- Annualisation factor from daily to annual.

The results of sensitivity analysis for WestConnex are outlined in **Table 12.10**.

Key findings of the sensitivity analysis are outlined below:

- WestConnex remains economically viable against all sensitivity tests undertaken, with benefit cost ratios remaining above 1 in all cases
- WestConnex remains economically viable against potential cost increases of up to 30 per cent to both Capital and Operating Costs, reducing the benefit cost ratio to 1.5 (with Wider Economic Impacts), which is still considered a very positive Benefit Cost Ratio.

8. [http://www.treasury.nsw.gov.au/\\_dta/assets/pdf\\_file/0016/7414/tpp07-5.pdf](http://www.treasury.nsw.gov.au/_dta/assets/pdf_file/0016/7414/tpp07-5.pdf)

## 12.7 Summary

The Updated Strategic Business Case has a Benefit Cost Ratio of 1.88, which takes into consideration:

- The full cost of the Stage 3 realignment is included in this business case. However, the full benefits are unlocked when the Western Harbour Tunnel is delivered. This business case has adopted a more conservative approach by not capturing benefits that are delivered as a result of Western Harbour Tunnel
- The additional cost associated with enhancing Sydney Gateway to better facilitate connectivity with the port and airport
- Updated traffic modelling inclusive of induced demand (as requested by Infrastructure Australia) and most recent land use forecasts.

Even with these changes, the economic analysis undertaken demonstrates that WestConnex remains an economically viable project. Indeed, the original analysis by Infrastructure NSW (for which it based its recommendation for WestConnex to the Government) assumed a Benefit Cost Ratio of 1.5 (noting that this is described as a 'high-level' economic assessment by Infrastructure NSW).<sup>9</sup> As demonstrated, the project remains above this value.

9. Infrastructure NSW (INSW) 2012, *First Things First: The State Infrastructure Strategy 2012 – 2032*, INSW, Sydney





13

# FINANCIAL APPRAISAL

This chapter presents the financial appraisal undertaken on the WestConnex reference design. A key purpose of this chapter is to summarise project cashflows to provide a financial perspective on WestConnex based on the Reference Tolling Scenario (see **Chapter 9**).

It considers direct cash-based expenses and revenues generated by the project in contrast to the economic perspective which includes both direct and indirect project costs and benefits. This appraisal has been split into the following parts:

- Financial appraisal approach and assumptions
- Financial appraisal findings.

# 13.1 Financial appraisal approach

## 13.1.1 Methodology

This financial appraisal is based on NSW Treasury's *TPP07-4 Guidelines for Financial Appraisal* and *TPP08-05 Guidelines for Capital Business Cases*. The purpose of the financial appraisal is to summarise the costs and revenues associated with the project, and hence determine the net present value to the NSW Government as a result of developing the project.

A discounted cashflow financial model has been developed for WestConnex that captures the construction and operating period cost and revenue assumptions for the individual stages, and presents the net cashflows to the end of the analysis period (31 December 2060). This approach reflects a typical cashflow analysis methodology for the assessment of toll road projects. The financial model presents all cashflows on a nominal basis over the evaluation period. Key components of the model are outlined in **Table 13.1**.

Table 13.1 Key financial appraisal inputs

Component	Description
<b>Key project cashflows</b>	
Capital Costs	<ul style="list-style-type: none"> <li>Capital cost cashflows have been modelled on an annual basis.</li> </ul>
Recurrent Costs	<ul style="list-style-type: none"> <li>Operational and maintenance costs have been modelled on a quarterly basis and then aggregated to annual cashflows.</li> <li>Life cycle costs have been modelled on a quarterly basis and then aggregated to annual cashflows.</li> </ul>
Revenue	<ul style="list-style-type: none"> <li>Tolling revenue has been profiled on a quarterly basis, and then aggregated to annual cashflows.</li> </ul>
<b>Escalation</b>	
Capital Costs	<ul style="list-style-type: none"> <li>Capital costs have been provided on a nominal basis and are therefore not escalated in the model.</li> </ul>
Operation and maintenance costs	<ul style="list-style-type: none"> <li>Operations and maintenance and lifecycle costs have been provided on a real basis, and are escalated on an annual basis in the model from a 2015 base date.</li> </ul>
Revenue	<ul style="list-style-type: none"> <li>Toll charges have been escalated from a 2012 base date.</li> </ul>

## 13.2 Evaluation assumptions and parameters

### 13.2.1 Sources of inputs

The key sources of input data are summarised in **Table 13.2** below. The financial appraisal focuses on project cashflows rather than assuming an underlying capital structure, and excludes detailed tax considerations as the project is expected to be tax exempt while under government ownership.

Table 13.2 Sources of inputs

Input	Source		
Capital cost	Stage 1 (Contracted)	Stage 1A Main D&C Contract Stage 1B Main D&C Contract	Sydney Motorway Corporation
	Stage 2 (Under Tender)	Stage 2 Tender Submissions	
	Stage 3	WestConnex Capital Cost Estimates	
Operating and maintenance costs	Combined WestConnex Maintenance and Lifecycle Costing Report, July 2015		Rider Levett Bucknall
Lifecycle costs	Combined WestConnex Maintenance and Lifecycle Costing Report, July 2015		Rider Levett Bucknall
Revenue	WestConnex Road Traffic Model v2.1 traffic projections		Sydney Motorway Corporation

## 13.2.2 Timing assumption

WestConnex will be delivered over a number of stages across a 10-year period from 2014 to 2023. The timing assumptions for the discounted cashflow analysis are shown in **Table 13.3**

Table 13.3 Key timing assumptions

Timing assumption	Timing	
<b>Design and construction phase</b>		
Start date	Stage 1	2014
	Stage 2	2015
	Stage 3	2019
End date	Stage 1	2019
	Stage 2	2019
	Stage 3	2023
Duration	Stage 1	4 years
	Stage 2	4 years
	Stage 3	5 years
<b>Operational phase</b>		
Start date	Stage 1	January 2017
	Stage 2	January 2020
	Stage 3	January 2024
End date	All stages	December 2060
Duration	Stage 1	44 years
	Stage 2	41 years
	Stage 3	37 years
<b>Evaluation</b>		
Base date for evaluation	All stages	June 2015

## 13.2.3 Cost escalation assumption

The cost escalation assumptions within the financial appraisal are shown in **Table 13.4**. The escalation assumptions used for capital costs and recurrent costs are outlined in **Chapter 8**.

Table 13.4 Operations and maintenance escalation rate assumptions

Escalation category	Rate (per annum)	Source
Consumer Price Index	2.50%	Mid-point of Reserve Bank of Australia's (RBA) consumer price inflation target of between 2% to 3% on average over the medium term
Average Weekly Earnings Index	4.00%	Based on historic ABS estimates (Catalogue 6302.0 – Average Weekly Earnings)
Blended operations and maintenance rate	3.48% (62.5% AWE) + (37.5% CPI)	WestConnex Delivery Authority

## 13.2.4 Tolling assumption

The analysis and findings in this report are based around the Reference Tolling Regime developed for the original business case, as previously endorsed by Government (see **Chapter 9**).

**Table 13.5** summarises the tolling assumptions on the motorway that are part of the proposed funding arrangements, as detailed in **Chapter 9**.

Table 13.5 Tolling assumptions

Component	Jan 2013	Jan 2015
Flagfall	\$1.04	\$1.12
Cost per kilometre	\$0.38	\$0.42
Toll Cap	\$7.35	\$7.95
Truck Multiplier	3x	
Escalation	Max of 4% or CPI	
Concession term	To 2060	

Once operational, toll indexation will be consistent for all three stages with a maximum of four per cent or CPI, whichever is greater for the first 20 years, reverting to CPI thereafter.

## 13.2.5 Discount rate

WestConnex nominal project cashflows have been discounted to a base date of 30 June 2015, at a nominal discount rate of 12.0 per cent per annum. This discount rate reflects an appropriate Weighted Average Cost of Capital, and takes into account construction, ramp-up and a combination of greenfield and brownfield traffic risk.

It should be noted that the discount rate assumption used in this analysis, while based on relevant Australian toll road transactions, does not reflect the actual cost of financing as the risk profiles of the individual stages of WestConnex vary. Hence, this rate has been adopted for purpose of preservation and consistency.

The approach to application of discount rates differs between financial and economic analysis. For financial analysis, the WestConnex nominal project cash flows have been discounted at a nominal discount rate of 12.0 per cent per annum. This discount rate reflects an appropriate Weighted Average Cost of Capital, and takes into account construction, ramp-up and a combination of greenfield and brownfield traffic risk across the different stages and elements of the project. This is also consistent with the discount rate applied in the 2013 Business Case.

Sydney Motorway Corporation is the NSW Government's investment vehicle for WestConnex, which has mandate of investing in Designated Road Projects (a road or motorway as specified by written notice from the Shareholders of Sydney Motorway Corporation) that its Board has determined are reasonably expected to generate a return. Accordingly, Sydney Motorway Corporation has a broad investment envelope, with the Board determining the appropriate return thresholds for individual projects on a case-by-case basis. The discount rate sensitivity analysis in **Section 13.3.1** illustrates the net present value impact at different rates of return.

## 13.2.6 Capital cost – WestConnex (base project)

As shown in **Table 13.6**, the capital cost for WestConnex Stages 1, 2 and 3 excluding property and urban renewal amounts to \$[REDACTED] million (nominal) over the construction period and \$[REDACTED] million in present value terms. Total capital cost increases to \$16,812 million (nominal) and \$[REDACTED] million in present value terms when property and urban renewal are included.

Table 13.6 Capital costs for the full concession period

- Capital costs for Stage 3 are based on P50 estimates
- For the purpose of this analysis capital costs exclude land acquisition, network enhancements and development costs
- May not add precisely due to rounding

Original Business Case	Original WestConnex (Nominal Outturn) (\$m)	Original WestConnex + Additions (\$m)	
Stage 1	4,197	Enhanced Sydney Gateway	402
Stage 2	4,737		
Stage 3	5,947	Extension of Stage 3 to Anzac Bridge, Victoria Road and the future Western Harbour Tunnel and Beaches Link	1,207
		Acceleration costs and associated costs for scope enhancements	322
<b>Total</b>	<b>14,881</b>	Original Business Case	14,881
		<b>Enhanced WestConnex Total</b>	<b>16,812</b>



## 13.2.7 Recurrent costs

This section examines both the cash flow and total value of operating, maintenance and lifecycle costs. These costs are considered for the entirety of the WestConnex scheme.

The annual recurrent costs which incorporate both regular operations and maintenance activity and life cycle costs which include major periodic

maintenance (for example, road resurfacing). These costs will amount to \$ [REDACTED] million (nominal) in the first year all three stages are operational FY2025, \$ [REDACTED] million (nominal) over the life of the project and \$ [REDACTED] million in present value terms. **Table 13.7** shows the total recurrent costs of the WestConnex.

Table 13.7 Recurrent costs for the full concession period

Recurrent costs have been discounted at a rate of 12.0% p.a to June 2015, for the purposes of this analysis

Motorway	Financial year 2025 (\$m)	Nominal terms (\$m)	Present value terms (\$m)
WestConnex Stage 1 – M4 Widening and M4 East	[REDACTED]	[REDACTED]	[REDACTED]
WestConnex Stage 2 – New M5 (inc. M5 East)	[REDACTED]	[REDACTED]	[REDACTED]
WestConnex Stage 3 – M4 – M5 Link	[REDACTED]	[REDACTED]	[REDACTED]
WestConnex total	[REDACTED]	[REDACTED]	[REDACTED]

**Table 13.8** and **13.9** summarise the breakdown of operating and maintenance costs, and lifecycle costs for WestConnex respectively.

Table 13.8 Forecast operation and maintenance costs

Motorway	Financial year 2025 (\$m)	Nominal terms (\$m)	Present value terms (\$m)
WestConnex Stage 1 – M4 Widening and M4 East	[REDACTED]	[REDACTED]	[REDACTED]
WestConnex Stage 2 – New M5 (inc. M5 East)	[REDACTED]	[REDACTED]	[REDACTED]
WestConnex Stage 3 – M4 – M5 Link	[REDACTED]	[REDACTED]	[REDACTED]
WestConnex total	[REDACTED]	[REDACTED]	[REDACTED]

Table 13.9 Forecast lifecycle costs

Motorway	Financial year 2025 (\$m)	Nominal terms (\$m)	Present value terms (\$m)
WestConnex Stage 1 – M4 Widening and M4 East	██████████	██████████	██████████
WestConnex Stage 2 – New M5 (inc. M5 East)	██████████	██████████	██████████
WestConnex Stage 3 – M4 – M5 Link	██████████	██████████	██████████
WestConnex total	██████████	██████████	██████████

## 13.2.8 Tolling revenues

This section examines toll receipts from the project in terms of the annual cashflow profile and the total value. In each case, these receipts are presented over the full operating period.

Forecast annual revenue indicates receipts from tolling WestConnex will amount to approximately:

- ██████████ (nominal) in the first year all three stages are operational (financial year 2024–25)
- ██████████ (nominal) over the life of the project
- ██████████ in present value terms.

Table 13.10 Forecast revenue for the full concession period

Source: Sydney Motorway Corporation (Financial Model July 2015)

Toll receipts have been discounted at a rate of 12.0% p.a. to June 2015 for the purposes of this analysis

Motorway	Financial year 2025 (\$m)	Nominal terms (\$m)	Present value terms (\$m)
WestConnex Stage 1 – M4 Widening and M4 East	██████████	██████████	██████████
WestConnex Stage 2 – New M5 (inc. M5 East)	██████████	██████████	██████████
WestConnex Stage 3 – M4 – M5 Link	██████████	██████████	██████████
WestConnex total	██████████	██████████	██████████

## 13.3 Financial appraisal results

This section draws this information together to show the overall cashflow position of WestConnex. The financial analysis in **Tables 13.11** and **13.12** are based on cashflows presented in **Section 13.2** relating to capital cost, recurrent costs and tolling revenue.

The financial model does not include a terminal value however the asset reverts to the Government at the end of the concession period.

Table 13.11 WestConnex summary for the full concession period

Original WestConnex + Additions (\$m)	
Extension of Stage 3 to Anzac Bridge, Victoria Road and the future Western Harbour Tunnel and Beaches Link	1,207
Enhanced Sydney Gateway	402
Acceleration costs and associated delivery costs for scope enhancements	322
Original Business Case	14,881
<b>Enhanced WestConnex Total</b>	<b>16,812</b>

## 13.3.1 Sensitivity analysis

### Cashflow sensitivities

Sensitivities have been applied to WestConnex cashflows to assess the impact of movements in the key drivers of the project's net present value. **Table 13.13** shows the results of testing the key cashflows by up to +/- 20 per cent and **Table 13.14** shows the results of varying the discount rate.

While the business case considers a range of discount rates, 7% is considered an appropriate Government discount rate for a business case evaluation for a project of this type in current market conditions.

Actual funding costs will vary stage by stage as the project is financed. At an average funding cost of 7% the project will deliver a surplus net present value of \$4.857 billion.

Table 13.13 Cashflow sensitivities for the full concession period

1. May not add precisely due to rounding

2. For the purpose of this analysis capital costs exclude land acquisition, network enhancements and development costs

Sensitivity (\$m) (Present value terms)	Downward sensitivity					Upward sensitivity			
	+20%	-11,023	+10%	-10,104	-9,187	-10%	-8,267	-20%	-7,349
Capital costs	+20%	■	+10%	■	■	-10%	■	-20%	■
Recurrent costs	+20%	■	+10%	■	■	-10%	■	-20%	■
Toll revenue	-20%	■	-10%	■	■	+10%	■	+20%	■
<b>Net present value</b>		<b>-6,746</b>		<b>-4,923</b>	<b>-3,101</b>		<b>-1,278</b>		<b>545</b>

### Discount rate sensitivity

Table 13.14 Discount rate sensitivities for the full concession period

Sensitivity (\$m) (Present value terms)	4% discount rate	7% discount rate	10% discount rate	12% discount rate
Capital costs	-12,466	-11,049	-9,867	-9,187
Recurrent costs	■	■	■	■
Toll revenue	■	■	■	■
<b>Total</b>	<b>20,605</b>	<b>4,857</b>	<b>-1,239</b>	<b>-3,101</b>

## 13.4 Summary

It is expected that the proceeds from the sale of the initial investments will be sufficient to cover the costs for Stage 3.

14

# PROCUREMENT AND FINANCING

14

This Chapter covers the key issues and considerations for the staging, delivery and financing strategies for the entire WestConnex project. It includes an outline of:

- How the staging, delivery and financing of WestConnex has evolved over time
- The actual delivery and financing strategies for stage 1 and 2
- The current preferred strategy for Stage 3.

## 14.1 Background

The staging, delivery and financing strategies for WestConnex have been considered in a number of historical documents and Government decisions following the endorsement of the original business case in 2013. These form the basis of the current staging, delivery and financing approach for WestConnex.

### 14.1.1 Original business case financing approach

At a high level, the 2013 Business Case and financing strategy was based upon the sequential delivery of the three WestConnex stages.

This approach included the Federal and NSW governments contributing initial seed capital of \$3.6 billion, which was to be supplemented by:

- Limited-recourse private debt financing
- An asset recycling approach that involved the sale of developed stages with proceeds being used to finance subsequent stages.

Following a qualitative assessment the original business case concluded that the M4 Widening (Parramatta to Homebush Bay Drive) and the M4 East (Homebush Bay Drive to City Westlink) should be the first stage of WestConnex (see **Section 6.1**).

The financing strategy was developed based on a reference staging strategy that focused on the financing capacity of each stage. Given the M5 East Airport Link (Stage 2, now known as the New M5) was projected to have higher and more certain revenues and a lower capital cost compared to the M4 – M5 Link, it was adopted as the second stage for reference staging strategy.

Following the Government's endorsement of the 2013 Business Case and financing strategy, there has been an evolution of the staging, delivery and financing strategies. This follows from further project development and changes to the capital available to finance the project.

### 14.1.2 M4 East procurement

A significant change was made to the planning approval approach for the M4 East (Stage 1B). Rather than requesting tenders based on a detailed government design with planning approval obtained prior to contract award, the procurement of the M4 East was based on an output specification approach with planning approvals to follow contract award.

The approach follows the approach taken on the NorthConnex project, where significant design innovation was achieved by allowing the preferred tenderer to finalise their design, and then allowing planning approvals and property acquisition to be based on the actual design (rather than an initial concept design).

A similar approach has also been taken for the New M5.

### 14.1.3 Federal funding and Stage 2

An agreement was signed by the Premier and Prime Minister in May 2014, which included:

- Federal grant funding of \$1.5 billion (\$300 million less than assumed in the 2013 Business Case, although without the conditions the previous Federal Government was imposing)
- Additional funding of \$2 billion in the form of a subordinated loan to enable the acceleration of Stage 2.

In response, a Stage 2 Project Definition and Delivery Report was developed to refine the approach for the delivery and financing of Stage 2 on an accelerated basis.



The key catalyst driving the acceleration of the Stage 2 delivery timeline was the \$2 billion subordinated loan negotiated with the Federal Government. The conditions of the loan include the start of Stage 2 construction in 2015 and completion of construction in 2019.

The subordinated loan de-linked the delivery of Stage 2 from the sale proceeds of Stage 1. Stage 2 was shown to be fully financeable in its own right if stapled to a new concession on the M5 West from 2027, using a combination of residual seed capital, senior limited-recourse debt finance, the subordinated loan and third-party equity finance.

The preferred delivery model for Stage 2 was called a 'sale of business' model, which involved the NSW Government developing a business incorporating three distinct components:

- Greenfield Component: M5 East Duplication
- Brownfield Component: Existing M5 East Tunnel
- Potentially the existing M5 West (post 2026).

Under this model, the Sydney Motorway Corporation and the WestConnex Delivery Authority took the lead role in structuring the business as a typical limited-recourse project finance structure, supported by a concession granted by Roads and Maritime Services.

## 14.1.4 Additional government capital for Stage 2

Following industry engagement and further internal development, the approach of selling a controlling equity stake in Stage 2 prior to construction commencement was identified as potentially a sub-optimal strategy. As an alternative to selling equity in Stage 2 prior to construction commencement, in November 2014 the NSW Government agreed in principle that:

- A further additional NSW Government equity investment of up to \$1 billion be made to enable a majority ownership stake to be retained in Stage 2 of WestConnex, subject to further advice and final approval by the NSW Government.

The proceeds of the sale of the investments on Stage 2 will be recycled towards the costs of Stage 3.

## 14.2 Procurement and delivery strategy

This section outlines the key delivery objectives and the preferred delivery model that is currently being implemented for stages 1 and 2. In addition to including a number of the key considerations that have helped define the preferred delivery model, it also sets out the current status of its implementation, including:

- Set-up of the corporate structure
- Contract package considerations and packages let to date
- Approach to tolling, operations and maintenance
- Delivery timeframes
- Next steps.

## 14.2.1 Delivery objectives

The WestConnex delivery objectives outlined in the original business case have been reassessed, and it has been determined that they are still the key guiding principles to drive the delivery approach. These objectives include:

- To achieve long-term value for the state
- To procure services that will design and deliver assets and services with safer outcomes
- To optimise the value of new and existing assets in terms of net present capital costs and lifecycle costs, whilst meeting fitness for purpose objectives
- To stage the works to optimise the use of funds and consider other staging factors such as technical deliverability and market capacity
- To adopt a risk profile that balances market ability to efficiently price risks with the state's desire to minimise its exposure to delivery risks
- To maximise opportunities to capture value for the state through market innovation
- To procure assets and services that will deliver a motorway system that satisfies long-term operational, maintenance, and capacity requirements of the network.

## 14.2.2 Procurement and financing model options analysis

A variety of delivery and financing models were considered for WestConnex. These are summarised in **Table 14.1**.

In essence, the key features of the 'limited-recourse project financing' and the 'sale of business' include:

- A state entity holding equity in the special purpose vehicle created to deliver the project
- The state acting as a 'contract aggregator' and taking the lead role on structuring and procurement
- Raising limited-recourse private sector debt finance against future toll revenue to fund a significant portion of construction costs
- Retaining flexibility for the state to progressively sell-down equity in the project at appropriate points in time to optimise value.

As outlined above, the initial intention for Stage 2 was to sell a majority of equity to the private sector upfront, hence the term 'sale of business' model. With the NSW Government's in principle agreement to invest up to an additional \$1 billion into Stage 2, the sale of equity to the private sector can be delayed until after construction completion or until proceeds are required for construction of Stage 3.

Table 14.1 Delivery and financing model options analysis

Document	Options considered	Conclusion
Original business case (2013)	<p><b>Procurement models</b></p> <ul style="list-style-type: none"> <li>• Design and construct</li> <li>• Public private partnership (PPP)               <ul style="list-style-type: none"> <li>• Patronage</li> <li>• Availability.</li> </ul> </li> <li>• Alliance</li> <li>• Managing contractor</li> <li>• State financing</li> <li>• Patronage (with cap and collar)</li> <li>• Availability</li> <li>• Development partner</li> <li>• Private sector limited-recourse project financing.</li> </ul>	<p><b>Procurement model</b></p> <p>Fixed time and fixed price delivery models are preferred over the relationship delivery models (alliance and managing contractor). This is because they provide a higher degree of certainty of outcome in terms of time, cost, quality and value for money.</p> <p>Other material benefits include market familiarity, capability and capacity, the comprehensive transfer of quantifiable risks, the potential for innovation, the assurance of time, cost and fitness for purpose, and warranties for performance and durability. Maximum innovation will be achieved if performance based specifications are used rather than highly prescriptive specifications.</p> <p><b>Financing model</b></p> <p>The limited-recourse project financing model was recommended, with the rationale including:</p> <ul style="list-style-type: none"> <li>• A State-owned special purpose vehicle will provide the maximum flexibility meeting the financing objectives, including:               <ul style="list-style-type: none"> <li>• Project level debt potentially reducing impact on the State's credit metrics (in line with project objectives to minimise impact on the NSW AAA-credit rating).</li> </ul> </li> <li>• Ability to implement financing during construction or post construction</li> <li>• Ability for the model to also be used with availability public private partnership if necessary.</li> </ul>
Stage 2 Project Definition and Delivery Report (2014)	<ul style="list-style-type: none"> <li>• Development Partner</li> <li>• Patronage Risk PPP</li> <li>• Limited-recourse project financing model or 'sale of business model.'</li> </ul>	<p>The 'sale of business' model was the preferred model for Stage 2, with the rationale including:</p> <ul style="list-style-type: none"> <li>• Model involves the State running separate procurement processes to select contractors for the major components of the project, maximises competitive tension and reduces the dominance of key market players</li> <li>• State maintains procurement control, providing flexibility for project delivery timelines (other models can have long lead-time)</li> <li>• Both the patronage risk PPP and 'Sale of Business' model are expected to provide favourable risk transfers to the private sector during construction and operations</li> <li>• Financing cost premium for transferring full greenfield traffic risk and construction risk to the private sector (brownfield sales would drive higher sale proceeds)</li> <li>• Maximises market capacity across various components of the project through the use of separate procurement packages.</li> </ul>

## 14.2.3 Delivery strategy execution

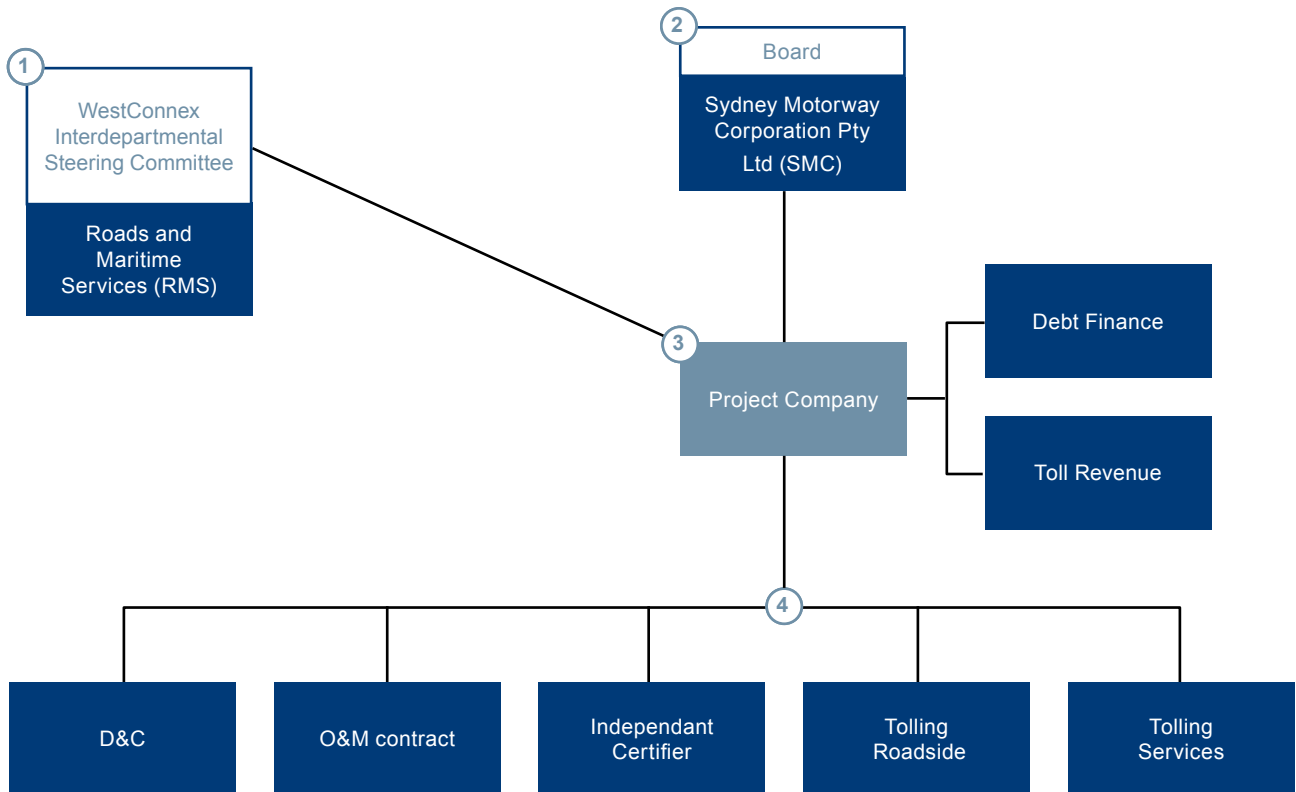
To implement the limited-recourse project finance and fixed price and time design and construction approach, an entity structure for WestConnex was approved by the NSW Government in April 2014. The NSW Government established:

- Sydney Motorway Corporation Pty Limited, a *Corporations Act 2001 (Cth)* company, which is jointly owned by the NSW Treasurer and the Minister for Roads, Maritime and Freight, on behalf of the State. Governed by a majority independent Board of Directors, it is responsible for managing the State's investment in WestConnex projects
- A separate project entity, WCX M4 Pty Limited, established for the delivery of Stage 1 of WestConnex, which is a wholly-owned subsidiary of Sydney Motorway Corporation, responsible for:
  - Holding the long-term toll concession for Stage 1
  - Entering into requisite contract packages with the private sector to deliver the functional components of the project
  - Raising private sector limited-recourse debt finance to supplement Sydney Motorway Corporation's equity investment to fund construction.

These entities do not represent the State and are expressly not guaranteed by the State. Any debt raised will be self-supporting and without recourse to the State, that is, there is no Government guarantee.

The structure has been used for the delivery of Stage 1, a variant will be used for Stage 2, and it is also the current preferred structure for Stage 3. It is based on private sector project financing principles, with the key aim of ring fencing the financial performance and commercial risks of each stage of WestConnex within 'special purpose vehicles'. This structure also supports future sell-down to the private sector. The structure is summarised in **Figure 14.1**.

Figure 14.1: Generic WestConnex stage delivery model structure



**1 RMS is the overall client for the WCX projects**

- Concession grantor and road lessor
- Land acquirer
- Planning Approval proponent
- WCX will revert upon expiry of concessions

**2 SMC - Corporations Act limited liability company**

- Manages the State's investments in designated road projects
- Invests and recycle State funds to finance WCX
- Shareholder of WCX project companies
- Arranger of private sector finance

**3 Project Co - Corporations Act limited liability company**

- WCX concessionaire with tolling rights
- Manages and procures contracts relating to the D&C and O&M of WCX
- In-house project delivery team
- D&C and O&M counterparty

**4 Key contracts for Project Co**

- Design & Construct
- Operations & Maintenance
- Independent Certifier
- Tolling (Roadside and Services)

## 14.2.4 Downstream contracting considerations

The model requires the Project Company to procure a number of “downstream” contracts to deliver the key functional components of the project. Industry’s capacity and capability to deliver these contracts, along with the NSW Government’s desire to achieve optimal risk allocations and value for money, have been important considerations in going to market for these contracts.

### Functional components

The main functional components of each stage of WestConnex are summarised in **Table 14.2**.

### Market capacity and capability

During the construction period for the WestConnex stages, there will be a number of concurrent major road projects in Australia and New Zealand that could compete for resources. In addition, there will be at least three other major tunnelling projects expected to be underway in NSW, which include:

- Sydney Metro Northwest (2014 to 2019)
- NorthConnex (2015 to 2019)
- Sydney Metro City and Southwest (Proposed – 2017 to 2024).

The size of the WestConnex contract packages, particularly for the design and construction, have also been important considerations in structuring packages for the market. Market feedback from contractors on contract size (during the development of the original business case) is summarised in **Table 14.3**.

Table 14.2 Key functional components

Phase	Activity	Description
Delivery	Detailed Design	Detailed design of project infrastructure, including incentives for innovation and timely delivery of construction drawings that satisfy performance standards.
	Planning	Statutory planning processes required to deliver the project (if not achieved prior to the delivery phase).
	Construction	Construction of the project works in accordance with the performance standards and approval conditions.
Operations	Maintenance	Activities to maintain the constructed assets in accordance with nominated performance standards.
	Operations	Activities to ensure the safe, efficient and reliable passage of transport, including incident management and scalability considerations.
	Tolling	Design and delivery of tolling infrastructure, including provision of back-office and support services.

Figure 14.3 Approach to contract size

Contract size	Market approach
Less than \$1 billion	Likely to attract local senior contractors on a stand-alone basis
Between \$1 and \$2.5 billion	Likely to attract senior contractors on a joint venture basis
Over \$2.5 billion	Likely to require particular consideration of the specific character of the work, the level of risk transfer to the private sector, and possible alternative delivery models

As a part of further market engagement for Stage 3, the project team will consult the construction industry to understand the practical implications of delivering tunnel works in a constrained market with significant resourcing requirements.

### Maximising competitive tension

Detailed procurement strategies were developed for going to market prior to commencing competitive tender processes. The strategies were developed with the primary objective of maximising competition during the procurement to drive value for money. These strategies were complemented with draft contracts adopting public private partnership market standard risk allocations.

There was strong market appetite from domestic and international contractors when contracts for stage 1 and 2 were put to market. A summary of the expressions of interest lodged for the various packages is outlined in **Table 14.4**.

Table 14.4 Expressions of interest received

Stage	Discrete package	Number of expressions of interest submitted
Stage 1	M4 Widening (D&C)	Five, with a mixture of international and domestic constructors involved in consortia.
	M4 East (D&C)	Four, with a mixture of international and domestic constructors involved in consortia.
Stage 2	KGIRU (Construct)	Seven, with largely domestic constructors involved.
	New M5 (D&C)	Five, with a mixture of international and domestic constructors involved in consortia.

## 14.2.5 Contract packages

The development of the detailed procurement strategies identified a number of different contract packages for the various functional components of stages 1 and 2. **Table 14.5** outlines the packages across the WestConnex stages.

Table 14.5 WestConnex contract packages

Stage	Project	Design and Construction	Tolling	Operations	Maintenance
Stage 1	M4 Widening	Awarded - Rizzani Leighton De Eccher JV	Awarded - Kapsch (roadside) Roads and Maritime Services (back office)	Awarded - Construction: Management Centre	Awarded - Construction: Rizzani De Eccher Leighton JV
	M4 East	Awarded - Leighton Contractors, Samsung C&T Corporation and John Holland JV	Awarded - Kapsch (roadside) via design and construct contractor Roads and Maritime Services (back office)	Tender process underway	
Stage 2	King Georges Road Interchange Upgrade	Awarded - Fulton Hogan	Tender process underway via New M5 design and construct contractor - preferred contractors	Awarded - Construction: Transport management centre	Awarded - Construction: Fulton Hogan
	New M5	Tender process underway - Leighton Dragados Samsung JV preferred contractor	Kapsch (roadside) Roads and Maritime Services (back office)	After construction: Tender process underway	
	Sydney Gateway	Tender process yet to begin			
Stage 3	M4 – M5 Link	Tender process yet to begin			



## 14.2.6 Tolling, operations and maintenance strategies

The operations and maintenance strategy for WestConnex has three key priorities:

- Safety
- Network capacity/efficiency
- Concession value.

Once Stage 3 is operational, in order to meet the safety criteria, a number of operational activities need to be integrated between the concessionaires for each stage when all three stages are operational ('Integrated Activities'). Examples of Integrated Activities include traffic incident management, emergency management and threat management.

The current operational strategy envisages:

- A single initial operator is engaged under separate operations and maintenance contracts for each stage for 10 years to provide full operations and maintenance services. An agreement to negotiate in good faith will be required for Stage 3
- When Stage 3 is being procured, the Stage 3 scope of work will include:
  - An Integrated Operations Management Control System and combined Motorway Control Centre
  - Relevant operational systems to facilitate the Integrated Activities.

If agreement on Stage 3 operations and maintenance arrangements cannot be reached with the initial operator, a separate operator will be engaged for Stage 3 (including the Integrated Activities for all three Stages), and the Integrated Activities scope will be removed from the scope of the Initial Operator. After the initial 10-year term, the concessionaires for each individual stage will be able to choose their own operations and maintenance provider, apart from the Integrated Activities.

With respect to tolling, Roads and Maritime will provide tolling back office services for each stage of WestConnex. Roads and Maritime has an existing operational tolling services back-office and is the market leader in terms of tag penetration in the Sydney market. Long-term arrangements will be included in a tolling services agreement. In order to implement the proposed tolling structure, a trip reconstruction and rating module is currently being procured by Roads and Maritime to allow for distance-based tolling. This component will be complete for the tolling of Stage 1A by the end of 2016.

## 14.2.7 Delivery timeframe

As mentioned in **Section 14.1.2**, in order to facilitate private sector innovation, certainty of design, and accelerate procurement processes, the display of the environmental impact statement and ultimate planning approval is after contract award.

Timing for M4 – M5 Link and Sydney Gateway are still under consideration. The current Stage 3 construction program has the main civil works commencing in early 2019 and finishing in 2023. The desired delivery timeline for these projects is a critical factor that will impact on their respective delivery and financing strategies.

## 14.2.8 Next steps

The staging, delivery and financing strategies for the M4 – M5 Link and Sydney Gateway will continue to be developed by Roads and Maritime and Sydney Motorway Corporation, with key influencing factors including:

- The desired timing for delivering these works
- The capital cost of individual contract packages, noting the likely challenges faced by the M4 – M5 Link given its design and estimated cost
- Commercial positions accepted by the operations and maintenance market in relation to building in additional flexibility to accommodate integrated activities
- The availability of additional government funds for investment or whether equity stakes in stages 1 and 2 will need to be sold to generate funding for these components.

## 14.3 Financing strategy

Similar to the original delivery strategy, the original financing strategy for WestConnex has also evolved over time to accommodate project developments. This section outlines:

- The financing objectives
- A summary of the original reference financing strategy
- A summary of the actual and expected financing strategies for stages 1 and 2
- Key considerations for the M4 – M5 Link and Sydney Gateway financing objectives.

The key financing objectives are to ensure:

- Value is delivered to the State
- There is no material impact on the State's credit rating
- Flexibility is maximised to deliver individual stages of WestConnex without a commitment to future stages from the State
- There is sufficient confidence in market capacity and minimising financing cost to the State
- Acceptable risk allocation
- Contingent liabilities on the State's balance sheet.

### 14.3.1 Original reference financing strategy

The original limited-recourse financing strategy for all three stages of WestConnex is summarised as:

- Stage 1 was assumed to be predominately financed by grants and/or equity investments from the Federal and NSW governments
- As tolls were introduced and traffic volumes established, limited-recourse private sector debt was to be raised against the toll revenue to help finance subsequent stages
- After Stage 1 completion, the State's equity investment was to be sold with proceeds recycled to support construction of stages 2 and 3. Investors require a lower rate of return if private capital is raised once traffic volumes are known, thereby, lowering the scheme's overall cost of capital
- The additional finance requirements for stages 2 and 3 beyond the recycled Stage 1 capital were to come from a number of financial instruments that were dependant on future market conditions. The Reference Financing Strategy assumed that a new concession was let on the existing M5 Motorway and also included bridging financing at the end of Stage 2/3 delivery prior to the sale of the State's equity in those stages.

Under the Reference Financing Strategy, the State retains ownership of stages 2 and 3 until June 2025, at which point the State's equity is to be sold down and recycled into other State investment projects.

### 14.3.2 Financing strategy execution

#### Stage 1

In December 2014, WCX M4 Pty Limited signed a project deed with Roads and Maritime Services for the M4 Widening as well as associated downstream contracts. In June 2015, WCX M4 Pty Limited executed a deed of amendment for a restated and amended project deed that was broadened to incorporate the M4 East, giving it the right to toll the M4 Widening and M4 East until 2060. Additional downstream contracts for M4 East were also executed in June 2015.

Around [REDACTED] of private sector senior debt capital is expected to be raised following the completion of the M4 Widening (early 2017) to be used as a source of funds for the M4 East. Sydney Motorway Corporation's equity in WCX M4 Pty Limited is expected to be sold at a point in time that aligns with Sydney Motorway Corporation's commercial and delivery objectives.

### Stage 2

Sydney Motorway Corporation is in the process of establishing new subsidiaries to deliver Stage 2 to facilitate financial close in late 2015. In addition to Sydney Motorway Corporation's residual seed capital, the NSW Government, subject to final approval, will also inject up to an additional \$1 billion of equity into the Stage 2 entities to maintain full ownership at the commencement of construction. Maintaining full ownership during construction is expected to maximise the return to the State on eventual sale. Sydney Motorway Corporation's equity in WCX M5 entities is expected to be sold at a point in time that aligns with Sydney Motorway Corporation's commercial and delivery objectives.

### Stage 3

At this point in time, a similar delivery model is envisaged for Stage 3, with the findings of the delivery model options analysis for stages 1 and 2 also relevant for Stage 3. The current delivery timing for Stage 3 would see capital costs incurred prior to the construction completion dates of stages 1 and 2.

The financing strategy for the M4 - M5 Link cannot rely solely on revenue generated by Stage 3, and may need to be supplemented by other funds, services or the sale proceeds from stages 1 and 2.

## 14.4 Summary

WestConnex will be financed through user tolling in the long term, supported by short to medium term investment by both government and the private sector. A non-recourse debt model will be used to raise private finance while protecting the NSW Government's credit rating metrics. This is in line with the overall objectives for WestConnex (as per **Chapter 4**), dealing with the affordability and funding constraints outlined in **Section 2.7**.

Procurement for WestConnex will largely be conducted as a series of design and construct tenders, and will utilise the 'output specifications' approach adopted successfully on NorthConnex. To date, there has been significant market interest in the project as evidenced by the responses received for tendering that has already been undertaken.

15

# ENVIRONMENTAL PLANNING AND SUSTAINABILITY

A key part of the planning and development of WestConnex has been the consideration of potential environmental issues. It is intended that WestConnex will be delivered in a manner that meets sustainability requirements throughout its planning, construction and operational life.

This Chapter sets out the environmental and sustainability principles for WestConnex. It reflects the project's *Strategic Environmental Review* and provides an overview of the planning approvals process.

## 15.1 Sustainability Principles

WestConnex Delivery Authority and Sydney Motorway Corporation developed a vision to guide the sustainability goals for the project:

“WestConnex will be a sustainable, high quality and transformational project for the people of Sydney and NSW. Exhibiting innovative design excellence, it will be sensitively integrated into the natural and built environment, help build communities and contribute to the future liveability of Sydney.”

In order to deliver on this vision, WestConnex aims to:

- Demonstrate sustainability leadership and continual improvement
- Protect and enhance the natural environment and local heritage
- Contribute to liveable communities (ease congestion, connect communities, integrate land use and transport planning and facilitate urban revitalisation)
- Optimise resource efficiency (materials, energy, water, land) and waste management
- Increase resilience to future climate changes
- Allow for future transport needs (transport modes, extensions, access points)
- Implement sustainable procurement considering whole-of-life environmental, social and economic factors
- Maximise equitable training and employment opportunities.

A standalone Sustainability Strategy which describes how sustainability considerations are integrated into the planning, construction and operation of the scheme was released in September 2015.

The strategy includes clear commitments and targets across each of the objectives outlined above.

This includes addressing the creation of 500 apprenticeships/traineeships across WestConnex. This will deliver half of the overall NSW Government commitment to create 1,000 apprenticeships/traineeship positions from major infrastructure projects.<sup>1</sup>

## 15.2 Environmental planning approach

The State's planning system recognises that major infrastructure projects like WestConnex deliver significant benefits for the community and the economy, it also recognises that inherent in any major project are risks that need to be assessed and managed. As such, the *Environmental Planning and Assessment Act 1979* has specific provisions for the assessment of major infrastructure projects.

Under the current planning framework, it is anticipated that all components of WestConnex will be declared as 'State significant infrastructure'.

Public projects recognised as State significant infrastructure are assessed under *Part 5.1* of the *Environmental Planning and Assessment Act*. This planning approval path is shown in **Figure 15.1**.

The Act requires preparation of an environmental impact statement for each component of WestConnex. The requirements to be met in each environmental impact statement are set by the Secretary of the Department of Planning and Environment.

An environmental impact statement outlines the key features of the proposal, its possible benefits and potential environmental and social impacts during construction and operation. Importantly, it also outlines measures to minimise and manage potential impacts.

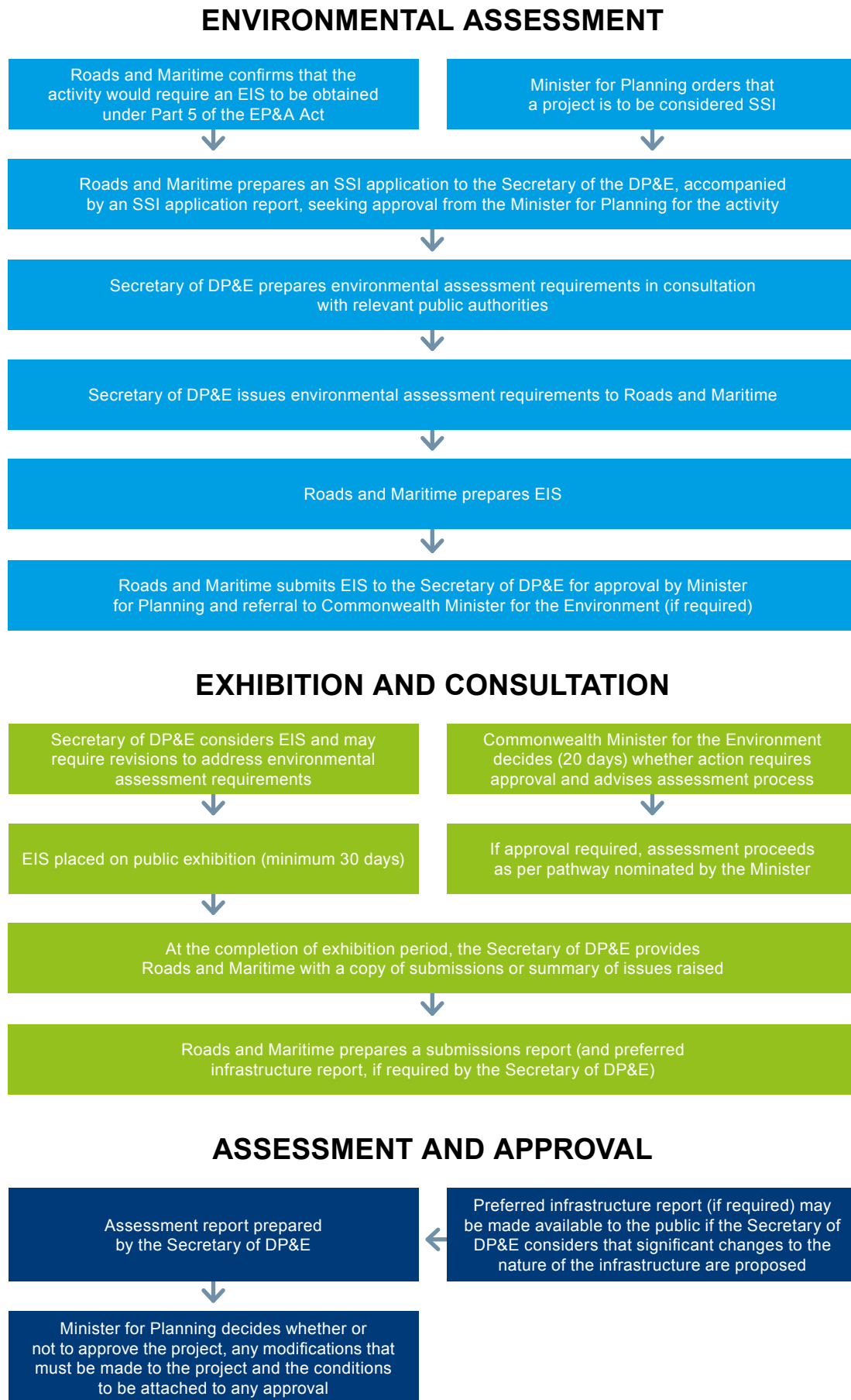
Environmental impact statements are exhibited by the Department of Planning and Environment for a minimum of 30 days. All interested parties are encouraged to make a submission to the Department of Planning and Environment during the public exhibition.

Issues raised by the public are then addressed in a Submissions Report, which is also publicly released. The WestConnex environmental impact statements and submissions reports are being prepared by Sydney Motorway Corporation on behalf of the proponent, Roads and Maritime Services (see **Chapter 18** for more information on the Governance arrangements).

Ultimately, the Department of Planning and Environment will then undertake an independent review of the project-related environmental documents, and will make its recommendations to the Minister for Planning for consideration, with any relevant project conditions if approved.

1. Premier Mike Baird, Media Release, '1,000 new apprentices to help deliver infrastructure program', 4 June 2014

Figure 15.1 Environmental planning approvals process



The public consultation processes for environmental impact statements form an integral part of the overall communication strategy for WestConnex. This is covered in Chapter 16.

At present, two components of WestConnex have completed the environmental approvals process – the M4 Widening, and the King Georges Road Interchange Upgrade. The environmental impact statement exhibition period ended on 2 November 2015 for M4 East. An environmental impact statement submissions report is currently being prepared and will be provided to the NSW Department of Planning and Environment. The environmental impact statement preparation is currently underway for the New M5.

## 15.3 Strategic Environmental Review

There are a number of environmental issues related to WestConnex, which are of significant public interest. These include air quality and tunnel ventilation, energy efficiency, property impacts and noise and vibration. These issues are typically addressed in detail for each project stage as part of the individual environmental impact statements.

As part of the development of WestConnex, a broader environmental review was undertaken to consider the project as a whole at a strategic level.

The Strategic Environmental Review provides an overarching understanding of key issues and constraints and sets the scene for subsequent project-specific environmental impact assessment and approvals documents.

There is some overlap between this Strategic Business Case and the Strategic Environmental Review, particularly in the areas of project justification, economic impacts and benefits and traffic. The Strategic Environmental Review, however, is written from an environmental planning perspective.

The following sections present extracts of key environmental areas not otherwise dealt with in this Business Case. The full Strategic Environmental Review is provided in **Technical Paper 3**.

### 15.3.1 Air quality

A strategic air quality assessment was undertaken to evaluate the potential effects of WestConnex on regional and local air quality, as well as in-tunnel air quality, ventilation outlets and tunnel portals.

Key findings are:

- Regional air quality is unlikely to change due to WestConnex
- Transferring vehicles from surface roads into tunnels is likely to improve the air quality along existing surface roads, where surface traffic is reduced. However, measuring local effects will need further, more detailed assessment based on the project specific features and detailed traffic modelling
- In-tunnel air quality criteria will guide the ventilation design
- Locating ventilation outlets close to the tunnel portals provides the most effective and efficient ventilation solution
- The most effective way to manage air quality both in and around road tunnels is to manage it at the source, that is, through vehicle fleet emission reductions brought about by better quality fuels and engine designs
- WestConnex is expected to reduce travel times by improving traffic conditions across the road network.

### 15.3.2 Energy efficiency

A key challenge for WestConnex will be to minimise energy use over its design life.

Potential energy use of both traffic and operation of the tunnel infrastructure has been reviewed, and the key findings are:

- The net energy use from traffic with WestConnex compared to without WestConnex will be relatively unchanged because energy efficiency savings from improved traffic flow will likely offset by tunnel ventilation energy requirements
- Tunnel ventilation and lighting represent the largest energy consuming activities for tunnels.

Energy efficiency measures will be considered and incorporated into the design of tunnel ventilation, lighting and water management systems.



In line with the WestConnex Sustainability Strategy, a minimum six per cent of energy needed to operate WestConnex will be sourced from renewable energy generated onsite, and/or accredited GreenPower.

### 15.3.3 Noise and vibration

The key noise challenge for WestConnex will be to construct major new infrastructure in a highly-congested urban environment. Some of the construction activity will be required to occur at night to reduce impacts on traffic.

Mitigation measures will be detailed in the respective environmental impact statements of each stage. Work practices and measures to mitigate construction noise impacts will be identified in accordance with the *NSW Interim Construction Noise Guidelines*.

During the operation the diversion of traffic into new tunnels is likely to reduce noise on some surface roads.

Noise impacts resulting from the operation of the motorway will be assessed and managed in accordance with the *NSW Road Noise Policy, Roads and Maritime Services Road Criteria Guidelines and Roads and Maritime Services Noise Mitigation Guidelines*.

### 15.3.4 Potential for cumulative impacts

WestConnex construction will take place between 2015 and 2023.

Where stages and phases of construction work intersect, cumulative impacts may result, including:

- Noise and vibration (particularly night time works)
- Local traffic impacts and accessibility
- Amenity effects of construction compounds and associated activities
- The handling and removal of excavated material by heavy vehicles, potentially resulting in traffic and amenity impacts.

Each project's environmental impact statement will consider these issues from a cumulative impact perspective as relevant, particularly with respect to noise, construction traffic, business disruptions and impacts on local amenity.

### 15.3.5 Other environmental issues

Other important environmental considerations have been identified in the *Strategic Environmental Review* and assessed at a strategic level, including:

- Biodiversity
- Resource management
- Aboriginal heritage
- Non-Aboriginal heritage
- Climate change risk and adaptation
- Geology soils and water
- Hydrology/flooding
- Urban design, landscape and visual amenity
- Land use and property.

## 15.4 Summary

The issues of environmental sustainability and environmental planning are central to major infrastructure projects like WestConnex.

WestConnex will change the broader environment and fabric of Sydney, providing economic and social benefits for the whole city. All environmental issues are being managed adequately and effectively through careful strategic planning, design development and delivery.

As the *Strategic Environmental Review* concludes:

*"There are unlikely to be any significant issues that cannot be effectively avoided, managed, minimised and/or mitigated to an acceptable level provided appropriate attention is given to defining clear and transparent performance outcomes at the project planning, design and delivery stages."*

16

# COMMUNICATION AND STAKEHOLDER STRATEGY

Communication with key stakeholders, including the general public, is central to WestConnex.

This Chapter covers the key principles and objectives of consultation, a brief consultation history, and overview of planned consultation activities. It also details the key stakeholders, community values and feedback, and the methodologies WestConnex has developed to ensure clear, consistent project communication.

## 16.1 Introduction

Key government documents including the 2014 State Infrastructure Strategy and the NSW Long Term Transport Master Plan provide clear evidence of the need for WestConnex and have helped to inform the development of the communication and stakeholder engagement process.

Since the start of the project we have:

- Distributed around 688,000 community updates to local residents and businesses.
- Engaged with more than 2,500 community members at consultation sessions and public forums and another 32,000 people at dedicated shopping centre kiosks.
- Met with impacted property owners individually.
- Responded to more than 6,700 email and phone enquiries.
- Held more than 200 meetings or briefings with industry groups, councils, community groups and other organisations.

There are two key elements to consultation:

- WestConnex program consultation and communication
- Project/stage specific consultation and communication.

### 16.1.1 Stage-specific consultation and communication

Communication and consultation activities support and underpin project development and construction activities for each stage of WestConnex.

During project development, the critical objective is to provide clear opportunities for feedback on the project design and its potential benefits and impacts. The stages of consultation mirror project milestones, as shown in **Table 16.1**. During construction, Sydney Motorway Corporation is committed to keeping the community informed and providing clear channels for feedback or complaints about impacts.

## 16.1.2 WestConnex program consultation and communication

Engagement on WestConnex started with early consultation during the development of the original *Strategic Environmental Review* and the original business case in 2012.

During these early years, the main focus of communication and engagement was to articulate the local and broader regional and state-wide benefits of the project. The key aim was to identify key issues and community and stakeholder concerns and to develop design solutions to mitigate impacts on local communities.

Consultation on the overall WestConnex Program is ongoing and includes project briefings with key stakeholders about progress across all stages.

Table 16.1 Opportunities for consultation during project development (generic approach)\*

\* Note that this is an indicative timeline with indicative activities. Each stage and stages may have slightly different project plans. Detailed consultation plans are developed for each project to reflect these specifics.

Project milestone	Related opportunities for communication and consultation	Ongoing consultation activities
Lodge planning application and receive Secretary's Environmental Assessment Requirements (SEARS)	<ul style="list-style-type: none"> <li>• Set up project-specific website</li> <li>• Distribute Community Update to residents and businesses in project corridor</li> <li>• Briefings with key agencies and stakeholders</li> <li>• Media release</li> </ul>	<ul style="list-style-type: none"> <li>• Website updates to respond to key enquiries and feedback</li> <li>• WestConnex information lines (email and phone)</li> <li>• Logging of all feedback for input to Environmental Impact Statement and design process</li> <li>• Meetings and briefings with community members and key stakeholders (proactive and in response to requests)</li> <li>• Encourage sign-up to subscription service to receive email updates on project</li> <li>• Advertise community engagement opportunities in local and metropolitan media, including ethnic media and via letterbox drops and website</li> </ul>
Preliminary concept design prepared	<ul style="list-style-type: none"> <li>• Website update</li> <li>• Community Update/s distributed with geographically relevant information to related communities</li> <li>• Doorknocking directly-affected residents and businesses</li> <li>• Community information sessions</li> <li>• Advertisements in local papers</li> <li>• Briefings with key stakeholders</li> <li>• Workshops with local councils</li> <li>• Feedback gathered and consolidated for use in environmental impact statement preparation and tender design process</li> <li>• Media release</li> <li>• Email to subscribers</li> </ul>	
Expressions of interest from construction companies	<ul style="list-style-type: none"> <li>• Media release</li> <li>• Website update</li> </ul>	
Request tenders from shortlisted contractors	<ul style="list-style-type: none"> <li>• Website update</li> </ul>	

Project milestone	Related opportunities for communication and consultation	Ongoing consultation activities
Select contractor and display preferred design	<ul style="list-style-type: none"> <li>● Website update</li> <li>● Community Update/s distributed with geographically relevant information to related communities</li> <li>● Doorknocking directly affected residents and businesses</li> <li>● Community information sessions</li> <li>● Advertisements in local papers</li> <li>● Briefings with key stakeholders</li> <li>● Workshops with local councils</li> <li>● Feedback gathered and consolidated for use in environmental impact statement preparation and tender design process</li> <li>● Media release</li> <li>● Email out to subscribers</li> </ul>	<ul style="list-style-type: none"> <li>● Website updates to respond to key enquiries and feedback</li> <li>● WestConnex information lines (email and phone)</li> <li>● Logging of all feedback for input to Environmental Impact Statement and design</li> <li>● Meetings and briefings with community members and key stakeholders (proactive and in response to requests)</li> <li>● Encourage sign-up to subscription service to receive email updates on project</li> </ul>
Exhibit Environmental Impact Statement	<ul style="list-style-type: none"> <li>● Website update</li> <li>● Community Update/s distributed with geographically relevant information to related communities</li> <li>● Community information sessions</li> <li>● Advertisements in local papers</li> <li>● Briefings with key stakeholders</li> <li>● Workshops with local councils</li> <li>● Feedback gathered and consolidated for use in environmental impact statement preparation and tender design process</li> <li>● Media release</li> <li>● Email to subscribers</li> </ul>	<ul style="list-style-type: none"> <li>● Website updates to respond to key questions</li> <li>● WestConnex information lines (email and phone)</li> <li>● Formal submissions to Department of Planning and Environment (responded to in the project Submissions Report)</li> <li>● Meetings and briefings with community members and key stakeholders (proactive and in response to requests)</li> <li>● Encourage sign-up to subscription</li> </ul>
Planning assessment decision	<ul style="list-style-type: none"> <li>● Website update</li> <li>● Community Update/s distributed with geographically relevant information to related communities</li> <li>● Community information sessions</li> <li>● Advertisements in local papers</li> <li>● Briefings with key stakeholders</li> <li>● Workshops with local councils</li> <li>● Feedback gathered and consolidated for use in environmental impact statement preparation and tender design process</li> <li>● Media release</li> <li>● Email to subscribers</li> </ul>	<ul style="list-style-type: none"> <li>● Website updates to respond to key questions</li> <li>● WestConnex information lines (email and phone)</li> <li>● Responding to feedback in detailed design and Construction Environmental Management Plan (where feasible and possible)</li> <li>● Meetings and briefings with community members and key stakeholders (proactive and in response to requests)</li> </ul>

Project milestone	Related opportunities for communication and consultation	Ongoing consultation activities
Detailed design and approval of Construction Environmental Management Plan	<ul style="list-style-type: none"> <li>• Community Update/s distributed</li> <li>• Email to subscribers</li> </ul>	<ul style="list-style-type: none"> <li>• Website updates to respond to key enquiries and feedback</li> <li>• WestConnex information lines (email and phone)</li> <li>• Responding to feedback in detailed design and Construction Environmental Management Plan (where feasible and possible)</li> <li>• Meetings and briefings with community members and key stakeholders (proactive and in response to requests)</li> </ul>
Start of major work	<ul style="list-style-type: none"> <li>• Community Update/s distributed</li> <li>• Construction notifications</li> <li>• Meetings and doorknocking directly impacted properties</li> </ul>	<ul style="list-style-type: none"> <li>• Website updates to respond to key enquiries and feedback</li> <li>• WestConnex information lines (email and phone)</li> <li>• Responding to feedback and complaints following complaints procedure</li> <li>• Meetings and briefings with community members and key stakeholders (proactive and in response to requests)</li> </ul>

## 16.2 Principles and objectives of engagement

### 16.2.1 Principles

For both the program and project-specific consultation activities, Sydney Motorway Corporation engages with the community and stakeholders about WestConnex following a set of key principles:

- **Proactive:**  
Identify and capitalise on opportunities to involve stakeholders and the community
- **Responsive:**  
Respond to enquiries and follow-up on agreed actions in a timely manner
- **Accessible:**  
Arrange engagement activities at times and places that are convenient for the community and stakeholders involved
- **Flexible:**  
Respond positively to the reasonable requests from the community and stakeholders for additional engagement activities
- **Empathetic:**  
Acknowledgement of the adverse impacts on some peoples' lives
- **Accountable:**  
Document all engagement activities and use feedback received (values, ideas and issues) to positively influence the project.

### 16.2.2 Objectives

The WestConnex communications and stakeholder engagement plan has been developed to:

- Raise awareness and understanding of the full economic and travel benefits of the WestConnex project
- Ensure clear and transparent communications
- Continue to foster stakeholder engagement and community support
- Manage project and government reputation risk.

By adhering to these principles and objectives Sydney Motorway Corporation is able to:

- Ensure an open, accountable and transparent community involvement process
- Increase community and stakeholder awareness of the need for the project
- Increase community and stakeholder awareness of the project development and environmental assessment process and opportunities for participation
- Engage stakeholders and affected local communities early in the planning process, so that issues raised can help refine the design and inform the environmental impact statements
- Engage early with property owners regarding the potential need for property acquisition for the development of the project
- Ensure the views of the community and stakeholders are considered and addressed during the preparation of the environmental assessments
- Provide timely information on environmental assessment outcomes
- Ensure community concerns regarding environmental and community impacts are properly addressed
- Keep the community updated on project progress regularly
- Ensure appropriate consultation tools are used, taking into account demographics such as language, literacy and access to the internet.



## 16.3 Secretary's Environmental Assessment Requirements

In accordance with Section 115Y of the *Environmental Planning and Assessment Act 1979*, the Secretary's Environmental Assessment Requirements (SEARs) broadly determine the minimum standard for consultation required on WestConnex projects, usually including engagement with:

- Local, State and Commonwealth government authorities
- Specialist interest groups, including Local Aboriginal Land Councils, Aboriginal stakeholders, and pedestrian and bicycle user groups
- Utilities and service providers
- The public, including community groups and adjoining and affected landowners.

Planning applications have been lodged for the M4 Widening, King Georges Road Intersection Upgrade, M4 East and New M5 projects, and the SEARs for these projects have been set.

As the SEARs set the minimum requirement for consultation, they form the backbone of the consultation approach for each project.

## 16.4 WestConnex stakeholders

### 16.4.1 WestConnex program stakeholders

Key stakeholders have been identified for WestConnex based on:

- Previous engagement work
- The proposed alignment
- The project objectives and benefits
- The WestConnex consultation and engagement Principles and Objectives (**Section 16.2**).

These key program stakeholders are outlined in **Table 16.2**, noting that this list is not exhaustive, and does not include stakeholders for each project or separate stage of WestConnex (see **Section 16.4.2**).

Table 16.2 WestConnex program-level stakeholders

Stakeholder group	Stakeholders	Indicative tools for informing, engaging and consulting
WestConnex future customers	WestConnex will be used by those that are reliant on road-based travel, including: <ul style="list-style-type: none"> <li>• International Gateway users – to and from Sydney Airport and Port Botany</li> <li>• Heavy and light freight</li> <li>• Dispersed and longer distance travel</li> <li>• Commercial services and business users.</li> </ul>	<ul style="list-style-type: none"> <li>• Media</li> <li>• Website</li> <li>• Public announcements</li> <li>• Industry and business forums</li> <li>• Community forums</li> <li>• Advertising campaign</li> </ul>
Sydney Motorway Corporation Shareholders	<ul style="list-style-type: none"> <li>• Minister for Roads, Maritime and Freight</li> <li>• NSW Treasurer</li> </ul>	<ul style="list-style-type: none"> <li>• Regular briefings and reports</li> <li>• Cabinet submissions.</li> </ul>
Other State Ministers	<ul style="list-style-type: none"> <li>• Premier and Minister for Western Sydney</li> <li>• Minister for Planning</li> <li>• Minister for Environment and Assistant Minister for Planning</li> <li>• Minister for Transport</li> <li>• Minister for Health</li> </ul>	<ul style="list-style-type: none"> <li>• Regular briefings and reports</li> <li>• Cabinet submissions</li> </ul>

Stakeholder group	Stakeholders	Indicative tools for informing, engaging and consulting
Federal Ministers	<ul style="list-style-type: none"> <li>• Prime Minister</li> <li>• Minister for Cities and the Built Environment</li> <li>• Minister for Major Projects</li> </ul>	<ul style="list-style-type: none"> <li>• Briefings of ministers and staff</li> <li>• Reports and departmental briefings</li> </ul>
Inter-related agencies	<ul style="list-style-type: none"> <li>• Roads and Maritime Services</li> <li>• UrbanGrowth NSW</li> <li>• Transport for NSW</li> <li>• Sydney Light Rail</li> <li>• Sydney Metro</li> <li>• Department of Planning and Environment</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination meetings and workshops</li> <li>• Regular updates and inter-agency collaboration on consultation and engagement activities where possible.</li> </ul>
Other Government agencies	<ul style="list-style-type: none"> <li>• Greater Sydney Commission</li> <li>• Environment Protection Authority</li> <li>• Heritage Council of NSW</li> <li>• Department of Primary Industries</li> <li>• Department of Lands</li> <li>• NSW Office of Water</li> <li>• NSW Health</li> <li>• NSW Land and Housing Corporation</li> <li>• Department of Education</li> <li>• Air Services Australia</li> <li>• Civil Aviation Safety Authority</li> <li>• Council of Social Service Australia</li> <li>• Department of the Environment – Commonwealth</li> <li>• Department of Premier and Cabinet</li> <li>• NSW Heritage Office</li> <li>• NSW Trade and Investment</li> <li>• Office of the Commissioner for Small Business</li> <li>• Sydney Olympic Park Authority</li> <li>• Sydney Trains</li> <li>• Sydney Water</li> <li>• Infrastructure NSW</li> <li>• Infrastructure Australia</li> </ul>	<ul style="list-style-type: none"> <li>• Meetings and briefings</li> <li>• Phone, emails and letters</li> <li>• Community updates</li> </ul>

Stakeholder group	Stakeholders	Indicative tools for informing, engaging and consulting
Peak bodies and interested stakeholders	<ul style="list-style-type: none"> <li>• Infrastructure Partnerships Australia</li> <li>• Road Freight Industry Council</li> <li>• NatRoads Ltd</li> <li>• NRMA</li> <li>• Planning Institute of Australia (NSW Division)</li> <li>• Urban Taskforce</li> <li>• Western Sydney Chamber of Commerce</li> <li>• NSW Business Chamber</li> <li>• Pedestrian Council</li> <li>• Bicycle NSW</li> <li>• Action for Public Transport</li> <li>• AusRoads</li> <li>• Business Council of Australia</li> <li>• Business Events Sydney</li> <li>• CEDA</li> <li>• Eco Transit</li> <li>• Motorcycle Council of NSW</li> <li>• Property Council of Australia</li> <li>• Roads Australia</li> <li>• Sydney Airport Corporation (SACL)</li> <li>• Sydney Port Corporation</li> <li>• Sydney Business Chamber</li> <li>• Total Environment Centre</li> <li>• Tourism and Transport Forum</li> <li>• Urban Development Institute of Australia (UDIA)</li> <li>• Urban Taskforce</li> </ul>	<ul style="list-style-type: none"> <li>• Meetings and briefings</li> <li>• Forums</li> <li>• Phone, emails and letters</li> <li>• Community updates</li> </ul>
Media	<ul style="list-style-type: none"> <li>• Metropolitan media</li> <li>• National Media</li> <li>• Languages other than English publications</li> </ul>	<ul style="list-style-type: none"> <li>• Media releases</li> <li>• Media conferences/briefings</li> <li>• Telephone and email contact</li> </ul>

## 16.4.2 Stage-specific stakeholders

In addition to the program-level stakeholders, each project has specific community members and stakeholders, broadly categorised as detailed in **Table 16.3**.

Table 16.3 Categories for WestConnex stage-specific stakeholders

Stakeholder group	Stakeholders	Indicative tools for informing, engaging and consulting
Elected representatives	<ul style="list-style-type: none"> <li>State Members of Parliament</li> <li>Federal Members of Parliament</li> <li>Local Councillors</li> </ul>	<ul style="list-style-type: none"> <li>Group and one-on-one briefings</li> <li>Community updates</li> <li>Forums</li> </ul>
Local councils	<ul style="list-style-type: none"> <li>Local councils within project area</li> <li>Officers from infrastructure, planning and environment business areas</li> <li>Chief Executive/General Manager and broader executive</li> </ul>	<ul style="list-style-type: none"> <li>Briefings and meetings</li> <li>Reference Group Meetings and Technical Workshops</li> <li>Community updates</li> <li>Direct email (subscription service)</li> </ul>
Local community/communities	<ul style="list-style-type: none"> <li>Residents in surrounding suburbs.</li> <li>Resident and community action groups</li> <li>Employees of local businesses</li> <li>Community groups/clubs (Rotary and Lions Club, Probus Club)</li> <li>Places of worship</li> <li>Cultural and ethnic community groups</li> </ul>	<ul style="list-style-type: none"> <li>Invitation to community events</li> <li>Community updates</li> <li>Newspaper advertising</li> <li>Direct email (subscription service)</li> <li>Press releases and local media stories</li> <li>Project information line</li> <li>Project website</li> </ul>
Aboriginal groups	<ul style="list-style-type: none"> <li>Local Aboriginal Land Councils and Aboriginal stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Involvement in Aboriginal Heritage assessment for the Environmental Impact Statement</li> <li>Invitation to community events</li> <li>Community updates</li> <li>Newspaper advertising</li> <li>Direct email (subscription service)</li> <li>Press releases and local media stories</li> <li>Project information line</li> <li>Project website</li> </ul>

Stakeholder group	Stakeholders	Indicative tools for informing, engaging and consulting
Community/interest groups	<ul style="list-style-type: none"> <li>• Cyclists and bicycle user groups</li> <li>• Sporting groups, clubs and facilities (including Sydney University Sporting Clubs)</li> <li>• P&amp;C Associations</li> <li>• Other recreational clubs</li> <li>• Various social media activist groups</li> </ul>	<ul style="list-style-type: none"> <li>• Briefings and/or meetings</li> <li>• Community information sessions/public displays</li> <li>• Community update newsletters</li> <li>• Newspaper advertising</li> <li>• Press releases and local media stories</li> <li>• Project information line</li> <li>• Project website</li> <li>• Direct email (subscription service)</li> </ul>
Businesses	<ul style="list-style-type: none"> <li>• Business owners and tenants</li> <li>• Local chambers of commerce</li> </ul>	<ul style="list-style-type: none"> <li>• Briefings and/or meetings/forums</li> <li>• Community information sessions/public displays</li> <li>• Community update newsletters</li> <li>• Newspaper advertising</li> <li>• Press releases and local media stories</li> <li>• Project information line</li> <li>• Project website</li> <li>• Direct email (subscription service)</li> </ul>
Community service providers	<ul style="list-style-type: none"> <li>• Childcare centres and primary schools</li> <li>• Hospitals</li> <li>• Nursing homes and aged care facilities</li> <li>• Utilities (including Ausgrid, Jemena, Sydney Water,</li> <li>• Telstra, Optus, NBNC0)</li> </ul>	<ul style="list-style-type: none"> <li>• Invitations for briefing sessions</li> <li>• Community information sessions/public displays</li> <li>• Community update newsletters</li> <li>• Newspaper advertising</li> <li>• Press releases and local media stories</li> <li>• Project information line</li> <li>• Project website</li> <li>• Direct email (subscription service)</li> </ul>
Media	<ul style="list-style-type: none"> <li>• Local media outlets</li> </ul>	<ul style="list-style-type: none"> <li>• Media releases</li> <li>• Media conferences/briefings</li> <li>• Telephone and email contact</li> </ul>

## 16.5 Communication channels

A variety of channels are used to engage with stakeholders and the community on a range of milestones and construction activities. The communication channels used are listed below in

**Table 16.4.**

Table 16.4 Channels used to engage with stakeholders and the community about WestConnex milestones and activities

Channel	Description
Media announcements	<ul style="list-style-type: none"> <li>Media announcements, events and briefings have occurred at key project milestones. Media releases and news items have also been regularly uploaded onto the project website.</li> <li>Responses to media enquiries have been provided on a daily basis.</li> </ul>
WestConnex project website updates	<ul style="list-style-type: none"> <li>The WestConnex website is regularly updated following major project milestones and as new information has become available.</li> <li>The website also provides details of translation services available in Arabic, Greek, Italian, Korean, Chinese, Vietnamese and Hindi.</li> </ul>
Project information line and email address	<ul style="list-style-type: none"> <li>The 1300 660 248 project information line is managed by the project team between 8.30am and 5.00pm Monday to Friday.</li> <li>As of July 2015 calls made to the WestConnex project information line have been answered by Service NSW 24 hours a day. More technical and detailed project questions are transferred directly to Sydney Motorway Corporation.</li> <li>The project email has been a mechanism for community feedback and project team responses.</li> </ul>
'Have your say' online feedback form	<ul style="list-style-type: none"> <li>The online 'Have your say' form has provided a channel for feedback on specific stages of WestConnex, including the M4 East project.</li> </ul>
Subscribe to updates	<ul style="list-style-type: none"> <li>Community members have been invited to register their interest in subscribing to updates via the online form, over the phone or during face-to-face discussions.</li> </ul>
Stakeholder database	<ul style="list-style-type: none"> <li>A contact and issues database was established to record contacts made, stakeholder contact details, feedback received, issues raised and responses provided.</li> <li>This database also contains details of more than 4,330 community members and stakeholders who registered to receive project updates on the project.</li> </ul>
Letters	<ul style="list-style-type: none"> <li>Written correspondence has been prepared by the project team to clarify project information and respond to enquiries received directly and via the Minister and Premier's offices.</li> </ul>
Email broadcasts	<ul style="list-style-type: none"> <li>Email broadcasts have been sent to registered stakeholders on a regular basis to provide updates on the project.</li> <li>In addition to the broadcasts outlined above in relation to key project milestones, broadcasts have also been sent to update stakeholders on the project delivery strategy, tender assessment and technical investigations underway.</li> </ul>

Channel	Description
WestConnex information kiosks	<ul style="list-style-type: none"> <li>• A network of WestConnex information kiosks was established in key shopping precincts throughout western and south western Sydney to provide residents with up to date and accurate information about WestConnex and its component parts.</li> <li>• The kiosks, at Westfield Parramatta, Westfield Burwood, Westfield Hurstville and Centro Roselands, are open during regular shopping hours, seven days a week.</li> <li>• The kiosks were established in February 2015 and Westfield Burwood, Westfield Hurstville and Centro Roseland kiosks are still operating. More than 22,750 people have visited the kiosks to find out more about the project (as of July 2015).</li> </ul>
National Translation and Interpreting Service	<ul style="list-style-type: none"> <li>• Details of the translation services available for members of the community who speak languages other than English have been promoted on the WestConnex website and on all communication materials distributed to the community.</li> </ul>
WestConnex Assist counselling services	<ul style="list-style-type: none"> <li>• WestConnex has engaged an independent organisation to provide free and confidential counselling services to support members of the community.</li> </ul>
Environmental and technical investigation notification and engagement	<ul style="list-style-type: none"> <li>• Activities to notify community members and key stakeholders of environmental and technical investigations have included notification letters, phone calls to property owners and tenants, and door knocking.</li> </ul>
Stakeholder meetings and briefings	<ul style="list-style-type: none"> <li>• Regular briefings on the status of stages 1, 2 and 3 are held with a variety of stakeholder groups. These include: <ul style="list-style-type: none"> <li>• State and Federal Member meetings and briefings</li> <li>• Industry briefings</li> <li>• Resident meetings (individual and group meetings)</li> <li>• Community, business, interest and user group briefings and meetings</li> <li>• Bicycle and pedestrian user groups.</li> </ul> </li> </ul>

## 16.5.1 Communications and stakeholder engagement and activities to date

The community and key WestConnex stakeholders have been extensively consulted since 2012. A timeline of communications and stakeholder engagement activities is outlined **Technical Paper 4**.

## 16.6 Community perceptions and values

### 16.6.1 Community perceptions in 2012

Engagement with key stakeholders, including the community, commenced following the announcement of WestConnex in October 2012. This initial phase of consultation and engagement was aimed at identifying stakeholders including community members, business owners, and road users, and reviewing known and predicted issues associated with major motorway proposals.

This engagement also raised community awareness about the strategic rationale for WestConnex, its benefits and potential impacts and ensured that ideas and opinions received through feedback and research were incorporated in to the early design and business case.

During the development of the original business case, qualitative research was conducted involving residents of Sydney, business owners and other key stakeholders. This research was also used to inform the planning and communication of WestConnex.

Focus groups with six to eight participants were held in Parramatta, Hurstville and the CBD with residents of Sydney selected according to their proximity to the proposed route and their experience of using the roads likely to be within the WestConnex corridor.

While there was a broad understanding from industry stakeholders of WestConnex, there was less awareness of the project from the participants of the research groups.

However, most Sydney residents and commercial road users who travel within the vicinity of the WestConnex corridor agreed that the extension of the M4 and the expansion of the M5 were pressing transport problems and WestConnex appears to offer a solution to address this.

Key issues raised at this time included:

- **Economic efficiency:**

The groups welcomed the proposed route as a logical step towards a solution which could provide substantial gains in economic efficiency for Sydney, with few, if any, suggestions for improvement. Residents from Parramatta and further west acknowledged WestConnex could improve access to western

Sydney and increase the area's potential as a commercial hub. Their greatest frustration with the current arrangements were directed at two main regions:

- Parramatta Road east of the M4, which was seen as one of Sydney's worst congested roads and a 'natural barrier' to residents of suburbs along its route
- The M5 tunnel, which was seen as seriously failing to provide capacity during peak hours but able to provide real benefits at other times. There were also significant concerns about the air quality inside the tunnel.

- **Tunnels:**

The success of a road tunnel was measured by participants as the number of lanes and cost of the toll. There was a general acceptance that tunnels can address major congestion, but there was also concern about air quality. The M5 East Tunnel was singled out as a health concern. Most participants perceived surface motorways had air quality benefits when compared to tunnels.

- **Tolls:**

There was a clear distinction between regular road commuters and casual road users, with regular road users more likely to be resistant to the idea of paying a toll. Value-for-money was important when deciding to take a toll road and the M7 was identified as an example to emulate for future motorway development.

- **Transport issues:**

There was cautious optimism that Government would deliver on WestConnex, partly based on the urgency of the need to solve Sydney's transport problems. Substantial questions were raised in terms of whether the proposal would deliver adequate long-term capacity by the time it is operational unless an integrated program of public transport improvements was included. There was also concern from south west residents that the project would bring more heavy vehicles to the road network in general.

- **Delivery and funding:**

The commercial failure of several infrastructure projects in Australia also led some participants to feel sceptical about whether WestConnex would be delivered and offer value-for-money. Residents were also wary of Government's capacity to fund the project given a prevailing view that the State's budget is limited. Consequently, they recognised the inevitability of tolls but had a high expectation that these would be justified only if WestConnex delivers good routes and capacity.



There was a general desire to see broad plans and then delivery rather than extended periods of public consultation.

- **Urban renewal:**

Most participants recognised the value of urban renewal within some parts of Sydney which have until now experienced significant decline due to congestion and associated issues, with Parramatta Road a symbolic example of its adverse consequences. However, most participants were unable to recognise how the development of WestConnex would enable urban renewal. There was a willingness to consider mixed use development to encourage this, provided it did not diminish local access.

- **Construction issues:**

Business owners in the Petersham area of Parramatta Road were anxious about disruption to their operations and reported strong frustration at a lack of maintenance of local infrastructure. There was also concern about the potential of tunnelling work to impact heritage buildings.

## 16.6.2 Community perceptions in 2015

Research into community perceptions with regard to WestConnex,<sup>1</sup> compiled in January 2015 found that overall most respondents had a positive opinion of WestConnex or feel neutral towards it.

Most respondents believed WestConnex will have a positive effect on Sydney as a whole (68 per cent). WestConnex is seen to have a net positive effect on travel times, businesses, congestion, the NSW economy, quality of life and the amenity of local areas.

However, the research found knowledge levels about the project were low and there was only moderate community awareness (50 per cent across Greater Sydney and 61 per cent in the local area) and interest (52 per cent across Greater Sydney and 62 per cent in the local area) in the project.

Further spatial analysis reveals respondents toward the start and end of the route were most positive.

## 16.6.3 Evolving stakeholder perceptions

Over the three-year period since the announcement of WestConnex, stakeholder perceptions have improved and acceptance of the project by key stakeholders and the community has increased. For example, a number of Opposition Members of Parliament have made public statements of support for the project.

Information sharing on WestConnex has included presentations and briefings to key local groups including business chambers and Rotary clubs and at major industry events including Engineers Australia functions, Infrastructure Partners Australia, Tourism and Transport Forum and many others. Feedback received from participants has been positive with participants expressing a change in their perceptions of WestConnex when they became aware of the broad benefits and opportunities for club and industry members including increased jobs, better community connections and reduced travel times.

The research report shows that community perceptions towards WestConnex became significantly more positive after respondents were provided with information.

A summary of how opinion shifted during the course of the research is listed in **Table 16.5**.

Of the 41 per cent of participants who became more positive (the majority of participants) the main reasons were:

- Something was actually being done about traffic congestion and they could see the potential for personal benefits meaning quicker trips and reduced stress
- WestConnex is part of a broader plan for Sydney
- The prospect of more jobs and a boost for western Sydney.

Many also commented that simply getting more information about the project made them feel more positive.

Of those whose opinion remained neutral or unchanged, positives were off-set by concerns related to:

- Whether or not WestConnex could handle the likely demand and deliver the promised time savings

1. Newgate Research 2015, *Community attitudes towards WestConnex, Benchmark Quantitative Research Report*

- Whether it would simply move traffic bottlenecks to new exit points and whether sufficient consideration had gone into upgrading these roads
- Impacts on local communities including ventilation outlets and traffic in the inner west before Stage 3 was complete
- Dislike of tunnels in general including concerns about how to get out of them if there was an incident.

The few individuals who became more negative had concerns about the impact of WestConnex on their property and the perceived impact of pollution on the local community.

This research highlights the importance of the communications and stakeholder engagement plan and delivering targeted and appropriate information to stakeholders and the community to dispel misinformation and keep the community informed.

## 16.6.4 Community feedback

Community and stakeholder engagement at the program and stage level and research into community attitudes revealed a number of key community concerns about WestConnex, including:

- A belief that investment in public transport is more important
- The cost of tolls
- The cost of the project
- Concerns that WestConnex alone will not solve Sydney's congestion issues
- Perceptions there has been a lack of transparency in the development of the project
- Potential impacts on residential areas including:
  - Unspecified environmental impacts
  - Air quality
  - The location of ventilation outlets
  - Potential impact on green spaces.

These concerns have given rise to a small number of community action groups and protest pages on social media. There has also been local media attention on key local community concerns.

Table 16.5 Perceptions about WestConnex in 2015

Perceptions about WestConnex	Before being provided information on WestConnex	After being provided information on WestConnex
Strongly positive	24%	41%
Mildly positive	31%	37%
Neither positive or negative	29%	18%
Mildly negative	12%	4%
Strongly negative	4%	0%

## 16.6.5 Upcoming WestConnex consultation

All major milestones at both stage and program level will be supported by targeted communication and stakeholder engagement activities. An indicative timeline of activities is outlined below in **Table 16.6**.

Table 16.6 Upcoming WestConnex milestones, indicative timing and overview of proposed activities

Date	WestConnex Milestone	Overview of stakeholder engagement and communications actions
Late 2015	Exhibition of the New M5 Environmental Impact Statement	<ul style="list-style-type: none"> <li>• Peak period of communications and stakeholder engagement with all stakeholders including taxpayers, all levels of government, media and local communities.</li> <li>• Communications and issues risk management as required.</li> <li>• Gather feedback and report the results of public consultation back into the design and decision making process.</li> </ul>
Late 2015 to early 2016	Early engagement on M4 – M5 Link	<ul style="list-style-type: none"> <li>• Peak period of communications and stakeholder engagement with all stakeholders including taxpayers, all levels of government, media and local communities.</li> <li>• Communications and issues risk management as required.</li> <li>• Gather feedback and report the results of public consultation back into the design and decision making process.</li> </ul>
Early 2016	Planning assessment decision for M4 East	<ul style="list-style-type: none"> <li>• Communications to all stakeholders announcing the decision and reinforcing the benefits to the general public.</li> <li>• Ongoing community and stakeholder engagement meetings.</li> </ul>
Early 2016	Planning assessment decision for New M5	<ul style="list-style-type: none"> <li>• Communications to all stakeholders announcing the decision and reinforcing the benefits to the general public.</li> <li>• Ongoing community and stakeholder engagement meetings.</li> </ul>
Mid 2016	Start of Construction for M4 East	<ul style="list-style-type: none"> <li>• Communications and stakeholder engagement to all stakeholders affected by construction, including local residents, businesses and community groups about operational and construction issues.</li> </ul>
Mid 2016	Start of major work for New M5	<ul style="list-style-type: none"> <li>• Communications and stakeholder engagement to all stakeholders affected by construction, including local residents, businesses and community groups about operational and construction issues.</li> </ul>
Early 2017	M4 Widening open to traffic	<ul style="list-style-type: none"> <li>• Communications to all stakeholders to announce the M4 Widening is open to traffic.</li> </ul>
2017	King Georges Road Intersection Upgrade completed	<ul style="list-style-type: none"> <li>• Communications to all stakeholders to announce the opening to traffic of King Georges Road Intersection Upgrade.</li> </ul>
2017	Request tenders for Stage 3, M4 – M5 Link	<ul style="list-style-type: none"> <li>• Ongoing stakeholder engagement meetings with top tier business and stakeholders.</li> <li>• Ongoing engagement with government stakeholders and agencies to optimise design.</li> </ul>

Date	WestConnex Milestone	Overview of stakeholder engagement and communications actions
Late 2017 (indicative only)	Property acquisition for Stage 3, M4 – M5 Link	<ul style="list-style-type: none"> <li>• Support the property acquisition team communications. Letters to property owners distributed, ongoing stakeholder engagement and support to impacted property owners and neighbours. Stakeholder engagement with LGAs, the general public and various business groups.</li> <li>• Media relations and issues risk management as required.</li> <li>• Ongoing stakeholder engagement meetings with top tier business and user stakeholders.</li> </ul>
Mid 2018 (indicative only)	Lodge Planning Application and Environmental Impact Statement exhibition for Stage 3	<ul style="list-style-type: none"> <li>• Engagement with agencies and councils regarding the requirements for environmental impact statement.</li> <li>• Peak period of communications and stakeholder engagement with all stakeholders including taxpayers, all levels of Government, media and local communities.</li> <li>• Communications and issues/ risk management as required.</li> <li>• Gather feedback and report the results of public consultation back into the design and decision making process.</li> </ul>
Mid 2018	Select preferred tenderer for Stage 3, M4 – M5 Link	<ul style="list-style-type: none"> <li>• Communications and stakeholder engagement with stakeholders including media, the construction industry, local residents, businesses and community groups within the alignment area regarding design, local impact of construction and dates of commencement.</li> <li>• Ongoing stakeholder engagement meetings with top tier business and user stakeholders.</li> </ul>
Late 2018 (indicative only)	Planning assessment decision for Stage 3	<ul style="list-style-type: none"> <li>• Communications to all stakeholders announcing the decision and when WestConnex will be completed, reinforcing the messages of the economic benefits to the general public.</li> <li>• Ongoing stakeholder engagement meetings with top tier business and user stakeholders.</li> </ul>
Early 2019	M4 East open to traffic	<ul style="list-style-type: none"> <li>• Communications to all stakeholders to announce M4 East is open to traffic.</li> </ul>
Mid 2019 (indicative only)	Construction to start on Stage 3	<ul style="list-style-type: none"> <li>• Communications and stakeholder engagement to all stakeholders affected by construction, including local residents, businesses and community groups about operational and construction issues. Ongoing stakeholder engagement meetings with business and other stakeholders.</li> </ul>
Late 2019	New M5 open to traffic	<ul style="list-style-type: none"> <li>• Communications to all stakeholders to announce New M5 is open to traffic.</li> </ul>
Late 2023	WestConnex open to traffic with the completion of Stage 3	<ul style="list-style-type: none"> <li>• Communications to all stakeholders officially launching the motorway.</li> </ul>

## 16.7 Summary

Strategic stakeholder engagement and communication activities are required to support key objectives and ensure the community and key stakeholders are informed, engaged and understand the full economic benefits WestConnex will bring to NSW and the Australian economy. WestConnex is committed to ensuring communication and stakeholder engagement will remain clear, consistent and timely; and continue to focus on keeping stakeholders informed and actively engaged in the evolution of the planning process.

The communications strategy is a working document that continues to evolve to best meet the needs of the community and stakeholders and ensures that future communications and stakeholder engagement activities to be developed support project milestones, construction and the operation of WestConnex motorway.

Sydney Motorway Corporation will continue to work with the NSW and Australian governments and their respective agencies in consultation with our other stakeholders to optimise the urban, economic and environmental outcomes of the project.

17

# RISK IDENTIFICATION AND MANAGEMENT

This chapter outlines the risk management framework and accountabilities, the cultural approach to risk and how risks are categorised.

It also outlines the key risks identified for WestConnex and summarises the mitigation strategies in place.

## 17.1 Working to Australian standards

Risks and opportunities identified for WestConnex are managed in accordance with Australian Standards - *AS/NZ ISO 31000:2009 Risk Management – Principles and Guidelines*. This ensures robust risk management in the delivery of the WestConnex program of works.

A Risk Management Policy has been implemented, which outlines a commitment to risk management and the obligations of staff and contractors working on WestConnex. The overriding purpose of the policy is to ensure that opportunities are fully exploited and risks identified and mitigated.

In delivering WestConnex, there is a commitment to:

- Embed a strong, proactive and risk-aware culture throughout the project, including with service providers and contractors
- Implement systems and processes for risk management which provide assurance to key stakeholders
- Manage risks in accordance with best practice principles.



## 17.2 Risk principles

In managing risk for WestConnex, the following principles apply:

- Systems are in place to identify and record risks
- Risks will be identified and recorded continuously and throughout project development and delivery
- Risk identification will be integrated across all disciplines
- Risks will be assessed, managed, mitigated and reassessed regularly
- Risk management will follow a tiered approach to remove, control, mitigate or transfer the risk (to a business area or contractor best equipped to mitigate it)
- Accountability for risks is attributed appropriately, with escalation processes in place
- The status of risks is reported regularly at the appropriate level
- Risk management processes are continually updated and improved.

## 17.3 Risk management and assurance

Risks and opportunities identified for WestConnex are managed in accordance with Australian Standards - AS/NZ ISO 31000:2009 Risk Management – Principles and Guidelines. This ensures robust risk management in the delivery of the WestConnex program of works.

The project structure has been developed to ensure that each risk sits with the party best able to manage it.

WestConnex is being procured under a Build, Own, Operate and Transfer (BOOT) concessionaire model.

Typically the State, through Roads and Maritime Services, sets the parameters for the concession as the client through the Project Deed and the concessionaire responds through a special purpose vehicle that procures finance, design and construction, operations, tolling services.

Risk is ultimately managed on the client side deed through the WestConnex Interdepartmental Steering Committee (WISC) and on the concessionaire side of the deed through the Sydney Motorway Corporation Board. An overview of the governance arrangements for WestConnex is provided in **Figure 17.1**.

As detailed in **Chapter 18**, under the Deed, Roads and Maritime is principally responsible for obtaining planning approvals, acquiring land for the project and integrating the WestConnex project into the road network.

As concessionaire, Sydney Motorway Corporation is responsible for managing the financing, toll collection, design, construction, operations and maintenance of the project.

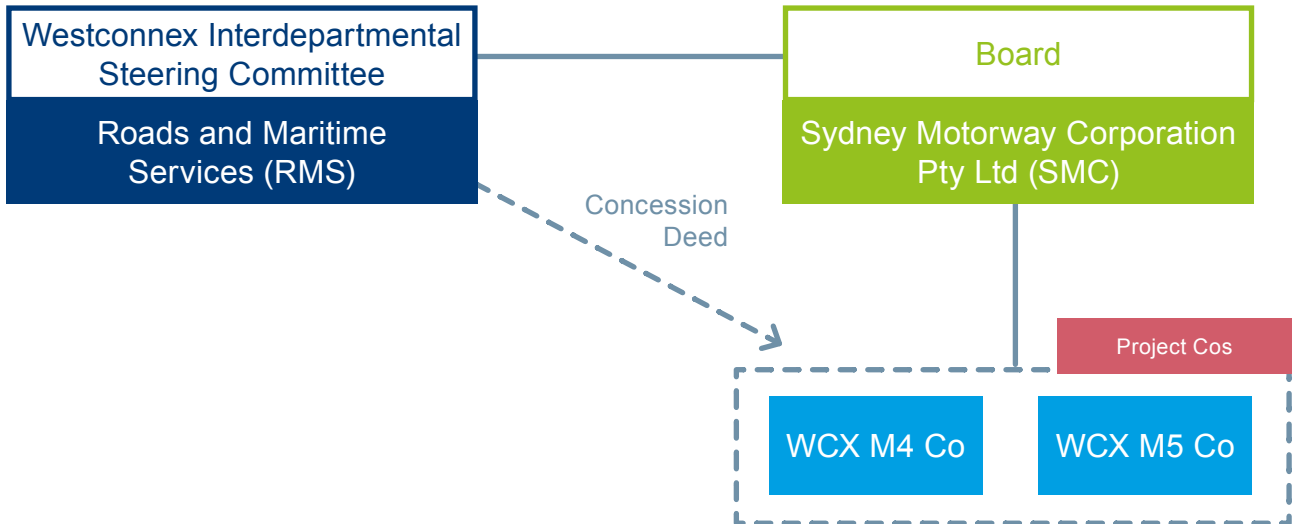
Both Roads and Maritime and Sydney Motorway Corporation have specialist teams with expertise and experience in managing and mitigating risk, including well-resourced governance and risk teams.

As a further level of assurance, the Project Deed requires the appointment of an 'Independent Certifier' to certify to the client and concessionaire that the project is being designed, constructed and operated in accordance with the Deed.

The Infrastructure NSW Infrastructure Investor Assurance Framework process also applies to WestConnex as explained in **Chapter 18**.

Roads and Maritime and Sydney Motorway Corporation have been working within this framework to appropriately manage and mitigate project risks.

Figure 17.1 Governance arrangements for the WestConnex project.



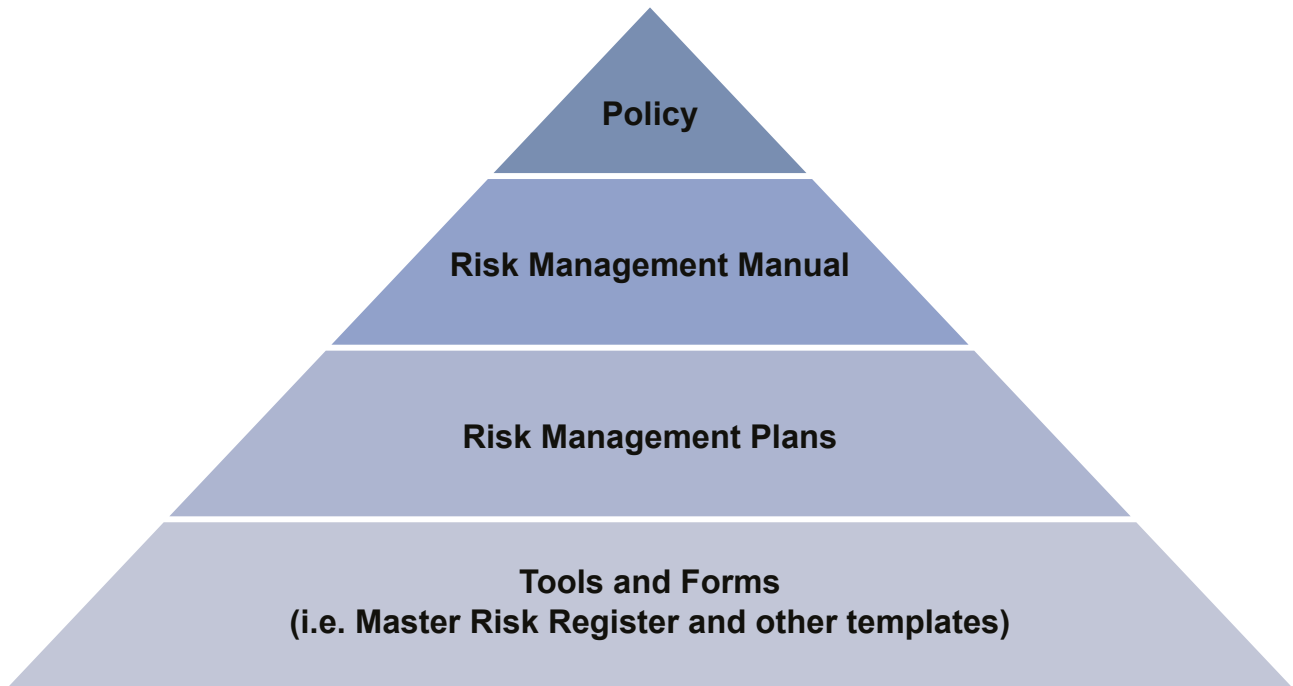
## 17.4 Risk allocation

WestConnex project risks are allocated to the party that is best placed to manage the risk. The procurement approach determines the risk allocation for each stage of WestConnex works, to deliver the best value-for-money outcome. Principal contractors will have their own systems, standards and procedures for risk management. They will be expected to ensure their risk management approach reflects WestConnex’s commitment to manage risk effectively and is consistent with the requirements established by WestConnex. Principal contractors are responsible for effectively managing risks allocated to them.

## 17.5 Risk management framework

A risk management framework has been implemented that enables WestConnex to manage risk in an effective, efficient and consistent way across all projects and corporate functions. To be effective, a risk management framework requires clear and consistent documentation of requirements supported by a strong and sustained commitment to its implementation. The hierarchy of documentation within the risk management framework is presented in **Figure 17.2**. Sydney Motorway Corporation reviews the Risk Management Framework annually.

Figure 17.2 WestConnex Risk Management Framework



## 17.5.1 Risk management roles and responsibilities

Risk management is supported by defined roles and responsibilities at the corporate, project and stage level.

Operationally, project teams and their risk managers are responsible for the risk data contained in project risk registers, ensuring that risks are monitored, communicated and reported in compliance with the risk management framework. Weekly team meetings, monthly project reviews and quarterly risk workshops are scheduled to review and discuss project risks, opportunities and treatment plans.

Project teams and their risk managers are supported by the corporate risk team, which is responsible for developing and maintaining an enterprise risk management framework, principles and approach. The corporate risk team ensures that the most critical risks and opportunities across the business are identified, recognised, assessed and effectively monitored, communicated and reported consistently across the business and all projects. Core to managing risk is a risk management system and provision of risk training to support the business.

## 17.5.2 Identifying and managing risk

The risk management process is embedded into routine project and corporate activities. Policies and procedures are in place to guide the risk management process. The key elements of the risk management process include:

- Identification
- Analysis
- Evaluation
- Treatment
- Communication
- Monitoring and reviewing.

Risk is assessed against defined categories relevant to WestConnex together with a description of the likelihood and consequences of these risks.

The evaluation determines whether risks should be accepted or whether additional actions are required to treat the risks.

The cost of treatment is considered and compared against the likely risk reduction.

For the purpose of ranking and reporting risks, the risk score is assessed using the following risk matrix in **Figure 17.3**.

Figure 17.3 Risk matrix

Likelihood	Almost certain	1	Serious	Serious	High	High	Medium
	Likely	2	Serious	High	High	Medium	Low
	Possible	3	High	High	Medium	Medium	Low
	Unlikely	4	High	Medium	Medium	Low	Low
	Rare	5	Medium	Low	Low	Low	Low
			1	2	3	4	5
			Extreme	Major	Moderate	Minor	Insignificant
Consequences							

## 17.5.3 Risk escalation reporting

Structured processes are in place for the measurement and reporting of risk management activities. Escalation of risks is based on a risk escalation hierarchy table, as outlined at **Table 17.1**. This table provides the trigger points for reporting risks to the right level.

Risk reports and registers are reviewed monthly by the Executive Team. Reports are provided to the Audit and Risk Committee (Quarterly) and Board (Monthly).

Table 17.1 Risk escalation reporting hierarchy

Risk Score	Reporting Level	Reporting Cycle
Serious	Below + Chief Executive Officer	Monthly
High	Below + Chief Operating Officer	Monthly
Medium	Below + Manager, Project Controls	Bi-monthly
Low	Project Team Directors	On-going

## 17.6 Risk registers

Risk registers are in place for each WestConnex stage and key activity, program and corporate area. Each risk in the risk register is allocated a risk owner who is responsible for developing and implementing treatment plans. The risk register is used to document all risk events, analyses, evaluations and treatment actions.

Regular risk reviews with the risk owners are undertaken to maintain and update risk registers and risk management plans.

Identified risks are documented in the Master Risk Register, to support subsequent risk evaluation and risk management.

The registers contain the following information for each identified risk:

- Unique risk identification number
- Title/description of the risk
- Root causes of the risk
- Potential and primary consequence
- Existing controls
- Risk assessment – likelihood and consequence
- Risk treatments – action, cost, risk owner
- Residual risk assessment – likelihood and consequence.

## 17.7 Summary

Risk management is critical to the successful delivery of WestConnex. Sydney Motorway Corporation has implemented a risk management approach based on Australian Standards. Risks are allocated to the entity best placed to manage them, and risk management is embedded into routine project and corporate activities and the organisational culture.

Risk registers are in place for each major component of WestConnex, to document all risk events, analyses, evaluations and treatment actions. The Chief Audit and Risk Executive reports directly to the Chief Executive, and an Annual Audit Program approved by the Audit and Risk Committee is being implemented. A Master Risk Register is also kept to ensure risks are being effectively evaluated and managed.



18



# DELIVERY ENTITY, GOVERNANCE AND APPROVALS

This Chapter describes the governance model and the entities directly involved in the delivery of WestConnex:

- WestConnex Delivery Authority
- Sydney Motorway Corporation
- Roads and Maritime Services.

It also examines the formal process to ensure effective interagency communication as well as the approvals and assurance processes for significant project decisions.

## 18.1 Background

WestConnex was a key recommendation of the 2012 *State Infrastructure Strategy*. At that time, the Sydney Motorways Project Office within Roads and Maritime Services was tasked with developing a business case for the project.

Following the approval of the 2013 Business Case, the NSW Government established WestConnex Delivery Authority to develop and deliver the project, and Sydney Motorway Corporation as the financing entity.

This provided a dedicated and well-resourced delivery team, focused specifically on the project.

Now that WestConnex has moved into contracting and delivery, the functions of WestConnex Delivery Authority have been transitioned to Sydney Motorway Corporation and Roads and Maritime Services.

## 18.1.1 WestConnex Delivery Authority

As outlined in the *Transport Administration (General) Amendment (WestConnex Delivery Authority) Regulation 2013*, WestConnex Delivery Authority was established to: “*facilitate, develop, plan, procure, supervise, manage or carry out the whole or any part of the WestConnex program of works*”.<sup>1</sup>

During its operation, WestConnex Delivery Authority:

- Developed WestConnex after approval of the 2013 Business Case, including:
  - Confirming Stage 1A and Stage 1B reference designs
  - Finalising the Stage 2 reference design, and completing the Project Definition and Delivery Report
  - Finalising the Stage 3 reference design (incorporating realignment to Rozelle), and completing the Project Definition and Delivery Report.
- Undertook major procurement activities (expression of interest and tendering) and Environmental Impact Statement development for:
  - M4 Widening
  - M4 East
  - King Georges Road Interchange Upgrade
  - New M5.
- Continued a comprehensive stakeholder and community engagement program (**Chapter 16**)
- Prepared the WestConnex Updated Strategic Business Case (this document).

## 18.2 Project delivery – Sydney Motorway Corporation and Roads and Maritime Services

Sydney Motorway Corporation was originally established in 2014 by the Government to act as the financing entity for WestConnex. It is a *Corporations Act 2001 (Cth)* entity – a private company that is not guaranteed by the State. Sydney Motorway Corporation has been established and structured to facilitate the non-recourse debt financing arrangements, as described in **Chapter 14**.

Sydney Motorway Corporation is owned by the NSW Government, with the Treasurer and Minister for Roads, Maritime and Freight, as shareholders.

In October 2015, the client functions of WestConnex Delivery Authority transferred to Roads and Maritime Services and the procurement and delivery functions transferred to Sydney Motorway Corporation. From an implementation perspective, Sydney Motorway Corporation is now responsible for the financing, construction and delivery of WestConnex.

Roads and Maritime remains the NSW Government roads agency. It acts on behalf of the Government as the agency commissioning WestConnex.

The breakdown of responsibility recommended by Infrastructure NSW and adopted by the government between Sydney Motorway Corporation and Roads and Maritime is explained in **Table 18.1**.

1. *Transport Administration (General) Amendment (WestConnex Delivery Authority) Regulation 2013*

Table 18.1 Split of responsibilities between deliverer and client

Sydney Motorway Corporation	Roads and Maritime Services
<p><b>Deliverer</b></p> <ul style="list-style-type: none"> <li>• Project management of the delivery of WestConnex.</li> <li>• Contract engagement and management of the design and construction contractors.</li> <li>• Funding and financing of WestConnex, including non-recourse financing requirements.</li> <li>• Strategic direction for communication and stakeholder engagement in liaison with Roads and Maritime.</li> <li>• Management of day-to-day communication and customer inquiries, under the direction of the Government.</li> </ul>	<p><b>Client</b></p> <ul style="list-style-type: none"> <li>• Acts on behalf of the Government, as the client.</li> <li>• Commissioning agency for the motorway.</li> <li>• Property acquisition on behalf of the Government.</li> <li>• Management of concession arrangement from NSW Government side of contract.</li> <li>• Proponent for Environmental Impact Statements/planning approvals.</li> <li>• Any further project development work (with Transport for NSW).</li> </ul>

Sydney Motorway Corporation will establish subsidiary corporations for each of the major stages of WestConnex. These subsidiaries will enter into concession deeds with Roads and Maritime, contract design and construction providers, and function as the entities through which private sector debt and equity is brought into WestConnex. The model described here from a financing perspective is illustrated in **Figure 18.1**. The Stage 1 subsidiary, known as 'WCX M4 Pty Ltd', has already been established.

## 18.2.1 Sydney Motorway Corporation

### Board of Directors

As a private company, Sydney Motorway Corporation has a Board of Directors responsible to the shareholders (the Treasurer and Minister for Roads, Maritime and Freight). The Board is comprised of directors who each have a duty to act in the best interests of its shareholders.

The Board of Directors has been appointed through NSW Cabinet processes, and includes Board members from the WestConnex Delivery Authority Board.

The Sydney Motorway Corporation Board of Directors is made up of:

- Chair and Non-Executive Director
- Deputy-Chair and Non-Executive Director
- Four Non-Executive Directors
- Executive Director – Sydney Motorway Corporation Chief Executive Officer
- Executive Director – Sydney Motorway Corporation Deputy Chief Executive Officer and Chief Financial Officer
- Shareholder representative – NSW Treasury Executive Director.

### Management arrangements

The structure of Sydney Motorway Corporation is evolving following the amalgamation with WestConnex Delivery Authority.

Reporting to the Chief Executive Officer, Sydney Motorway Corporation, are the following key functional responsibilities:

- **Deputy Chief Executive Officer and Chief Financial Officer:** responsible for implementing the funding and financing strategy for the motorway, including debt and equity raising

- **Chief Operating Officer:** responsible for project management, motorway delivery for each stage of the project, and coordination between the project stages. The project directors for each project stage report to the Chief Operating Officer
- **Support functions:** functions necessary for the delivery and operation of the project, including communications and stakeholder engagement, accounting and finance controls, commercial and procurement, risk, information technology and legal.

As client and the principal Government agency that will have long-term carriage of WestConnex after its delivery, Roads and Maritime Services is involved in the development and implementation of the project to ensure network integration and overall project outcomes are optimised. This includes property acquisition, environmental and planning review, and government commercial and legal advice to enable Sydney Motorway Corporation to finalise concession arrangements. Roads and Maritime Services has established an internal project team, reporting to its Chief Operating Officer with accountability for client-related activities for WestConnex.

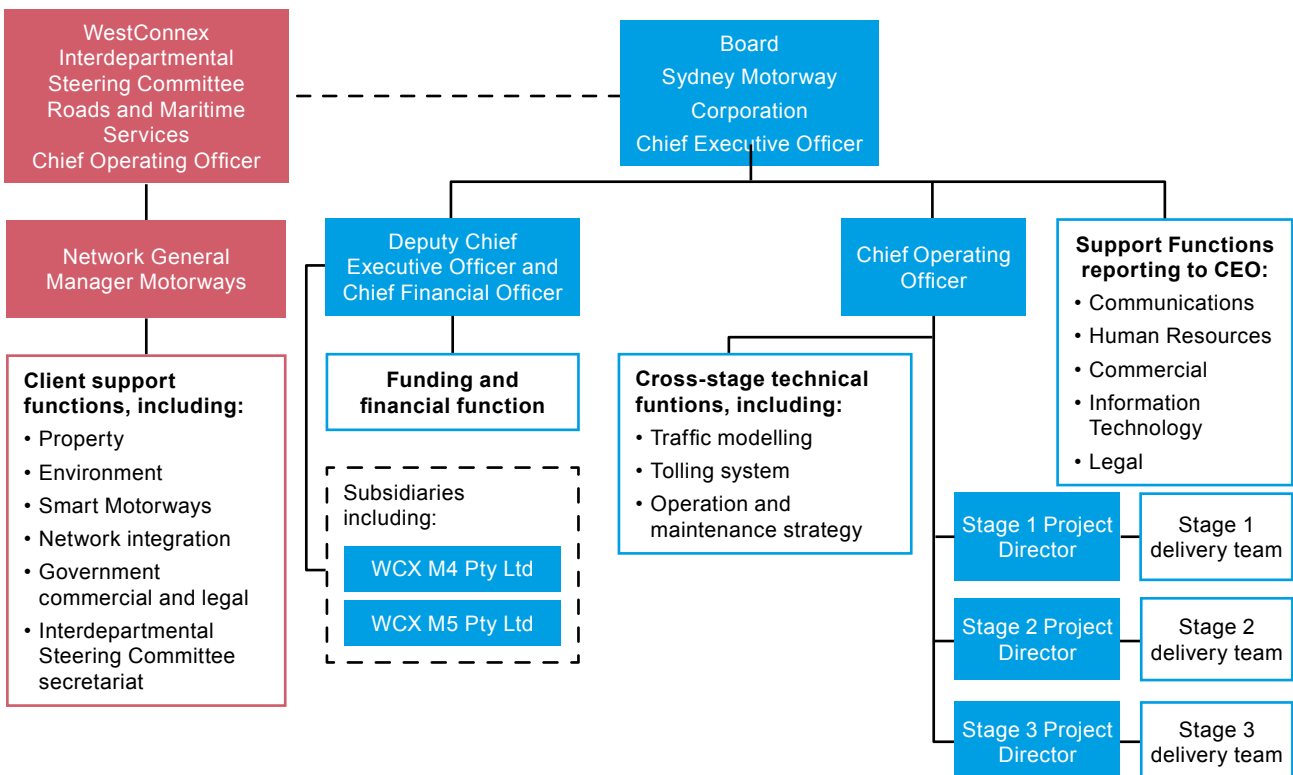
## 18.2.2 Roads and Maritime Services

Roads and Maritime Services is the NSW Government client for the project. On completion of each element of the project, the motorway will be integrated into the overall road network.

## 18.2.3 Project delivery structure

Conceptually, the project delivery structure for WestConnex, bringing together the Sydney Motorway Corporation and Roads and Maritime Services is illustrated in **Figure 18.1**.

Figure 18.1: Project delivery structure



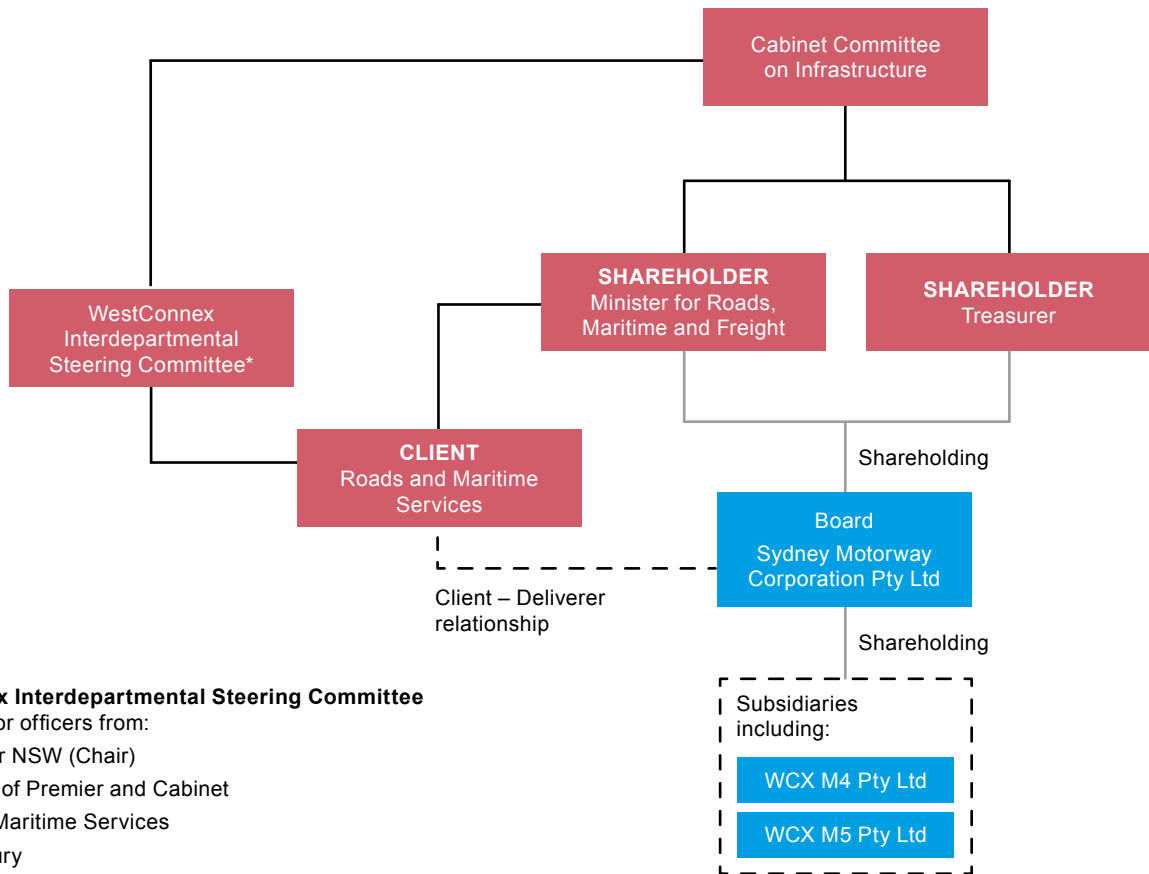
# 18.3 External governance and oversight

The Board of Directors for Sydney Motorway Corporation provides an immediate level of oversight for the delivery and financing of WestConnex internally and to the responsible shareholder ministers. Given the importance

and scale of WestConnex, and its cross-portfolio implications, it is appropriate for broader cross government oversight.

This is facilitated through the WestConnex Interdepartmental Steering Committee (including Federal Government representation), regular project monitoring by Infrastructure NSW, and quarterly project reporting to the NSW Cabinet Committee on Infrastructure.

Figure 18.2: External governance



- \*WestConnex Interdepartmental Steering Committee** includes senior officers from:
- Transport for NSW (Chair)
  - Department of Premier and Cabinet
  - Roads and Maritime Services
  - NSW Treasury
  - Department of Planning and Environment
  - Sydney Motorway Corporation (as observer)
  - Federal Government representative.

## 18.3.1 WestConnex Interdepartmental Steering Committee

The Government has established the WestConnex Interdepartmental Steering Committee to provide governance and support to Roads and Maritime Services in its role as client for WestConnex. The Steering Committee is required to deal with a broad range of matters including ensuring the alignment of WestConnex to broader transport network and urban planning needs.

Its specific functions include:

- Providing oversight and assurance to government that WestConnex is being delivered effectively and in accordance with State and Federal government expectations and timeframes
- Providing operational support and partnerships for the WestConnex project through cooperation and alignment of agency activities (for example environmental approvals, public transport priorities etc.)
- Administering written (but dynamic) 'mandate definition' documents when Ministerial or Cabinet approval is required
- Providing support for the Roads and Maritime Services client function, including monitoring and advising on the client-side project budget management, risk allocation and commercial arrangements
- Serving as the channel through which the Cabinet Committee on Infrastructure receives advice about the progress of WestConnex.

The membership of the Interdepartmental Steering Committee is:

- Transport for NSW (Secretary) (chair)
- Department of Premier and Cabinet (Deputy Secretary, Economic Policy)
- Roads and Maritime Services (Chief Executive)
- NSW Treasury (Associate Secretary, Agency Budget and Policy Group)

- Department of Planning and Environment (Deputy Secretary, Planning Services)
- Sydney Motorway Corporation as observer (Chief Executive Officer)
- Commonwealth Department of Infrastructure and Regional Development (Secretary).

The Interdepartmental Steering Committee meets on a monthly basis, or more frequently if required.

## 18.3.2 Regular reporting to the NSW Government

WestConnex follows normal NSW Government reporting processes for significant capital projects. These processes are prescribed by the Cabinet Committee on Infrastructure and ensure the Committee has visibility of the progress of the largest capital projects being undertaken by the NSW Government.

### Infrastructure NSW Cabinet Committee reporting

Reporting is undertaken by Infrastructure NSW monthly on the progress of project implementation and delivery. This is done as part of its role under the *Infrastructure Investor Advisory Framework*.

These reports are prepared by Infrastructure NSW and provide independent advice on WestConnex to the NSW Cabinet Committee on Infrastructure. This ensures the Government receives independent advice on the status of the project.

## 18.4 Cross-agency project delivery

### 18.4.1 Whole-of-Government approach

Sydney Motorway Corporation is working with a number of government agencies to deliver WestConnex. Different agencies are responsible for various project components directly related to the motorway.

### 18.4.2 Transport for NSW

Transport for NSW is the cluster agency responsible for the transport and roads portfolios. It has ownership of the *NSW Long Term Transport Master Plan* and the cluster policy objectives. Sydney Motorway Corporation will continue to work in close collaboration with Transport for NSW on the following initiatives:

- Parramatta Road and Sydney Airport public transport – Transport for NSW is delivering public transport improvements across the Parramatta Road corridor and in the Sydney Airport precinct, both of which are closely related to the delivery of WestConnex (see **Chapter 7**)
- Western Harbour Tunnel and Beaches Link and Gateway to the South – these strategic road projects connect directly to WestConnex Stage 3 and Stage 2 respectively. Transport for NSW is currently progressing business cases for each
- Tolling policy and strategy – Transport for NSW sets the overall tolling strategy for the Sydney Motorway Network, within which WestConnex operates
- Other major transport projects – WestConnex has direct points of interaction with both the Sydney Metro CBD & Southwest project and the Sydney CBD and South East Light Rail project.

### 18.4.3 Urban growth NSW

UrbanGrowth NSW delivers major urban renewal projects on behalf of the NSW Government. It is part of the Planning and Environment cluster. As outlined in **Chapter 7**, urban renewal projects related to WestConnex include:

- Parramatta Road Urban Transformation, which is directly enabled by the delivery of WestConnex
- The Bays Precinct Urban Transformation, which interacts with WestConnex at Rozelle
- Cooks Cove Urban Renewal, which interacts with WestConnex at Arncliffe.

Sydney Motorway Corporation and UrbanGrowth NSW operate under a Memorandum of Understanding to facilitate cooperation and coordination between the various projects.

### 18.4.4 Infrastructure NSW

Infrastructure NSW is responsible for independent project oversight, assurance and reporting. The agency reports directly to the Premier, the Cabinet Committee on Infrastructure, and the Minister for Transport and Infrastructure.

Infrastructure NSW has responsibility for the gateway assurance process (the *Infrastructure Investor Assurance Framework*) and independent project health check reporting (**Section 18.6**). By directly reporting to the Cabinet Committee on Infrastructure, it provides independent advice to government on the status of WestConnex.



## 18.4.5 Other major NSW Government agencies

There are a number of agencies regularly interacting with WestConnex:

- **Department of Planning and Environment:** the Department has a statutory role in the planning approval process. It also has ownership of *A Plan for Growing Sydney*
- **NSW Treasury:** Treasury has oversight of the NSW Budget process and the fiscal standing of NSW. It provides independent advice to the Cabinet Committee on Expenditure Review on whether funding proposals or contracts are sufficiently mature to proceed. It has ownership of the *NSW Budget* and annual *State Infrastructure Plan* (delivered based on advice from Infrastructure NSW)
- **Department of Premier and Cabinet:** the Department provides oversight of the approach to policy and strategy delivery across government to ensure consistency and optimal outcomes. It manages the Cabinet process and provides independent advice to the Premier on all matters before Cabinet. The Department has ownership of the *NSW State Infrastructure Strategy* (based on advice from Infrastructure NSW)
- **Audit Office of NSW:** the Auditor-General is responsible for the independent auditing of NSW Government-owned entities, including Sydney Motorway Corporation. The Office undertakes both financial and performance audits.

## 18.4.6 Project Control Group

The Interdepartmental Steering Committee and Cabinet Committee on Infrastructure oversight will help ensure coordinated delivery at an executive and ministerial level.

Cooperation between officers of the related agencies and Sydney Motorway Corporation continues to play an important role in ensuring the success of WestConnex. To this end a 'Project Control Group' was established to facilitate internal project and officer level discussions across all stages of WestConnex and with other significant delivery agencies.

The Project Control Group meets on a weekly basis, chaired by the Chief Executive of Sydney Motorway Corporation, and includes:

- Sydney Motorway Corporation Executive:
  - Chief Executive Officer
  - Deputy Chief Executive Officer and Chief Financial Officer
  - Chief Operating Officer
  - Stage 1, 2 and 3 project directors
  - Commercial Procurement, Communications and Stakeholder Engagement, Finance, Human Resources, and Information Technology leads.
- Roads and Maritime Services client representative
- UrbanGrowth NSW project lead
- Transport for NSW representative
- Federal Department of Infrastructure and Regional Development representative.

## 18.5 Working with the Federal Government

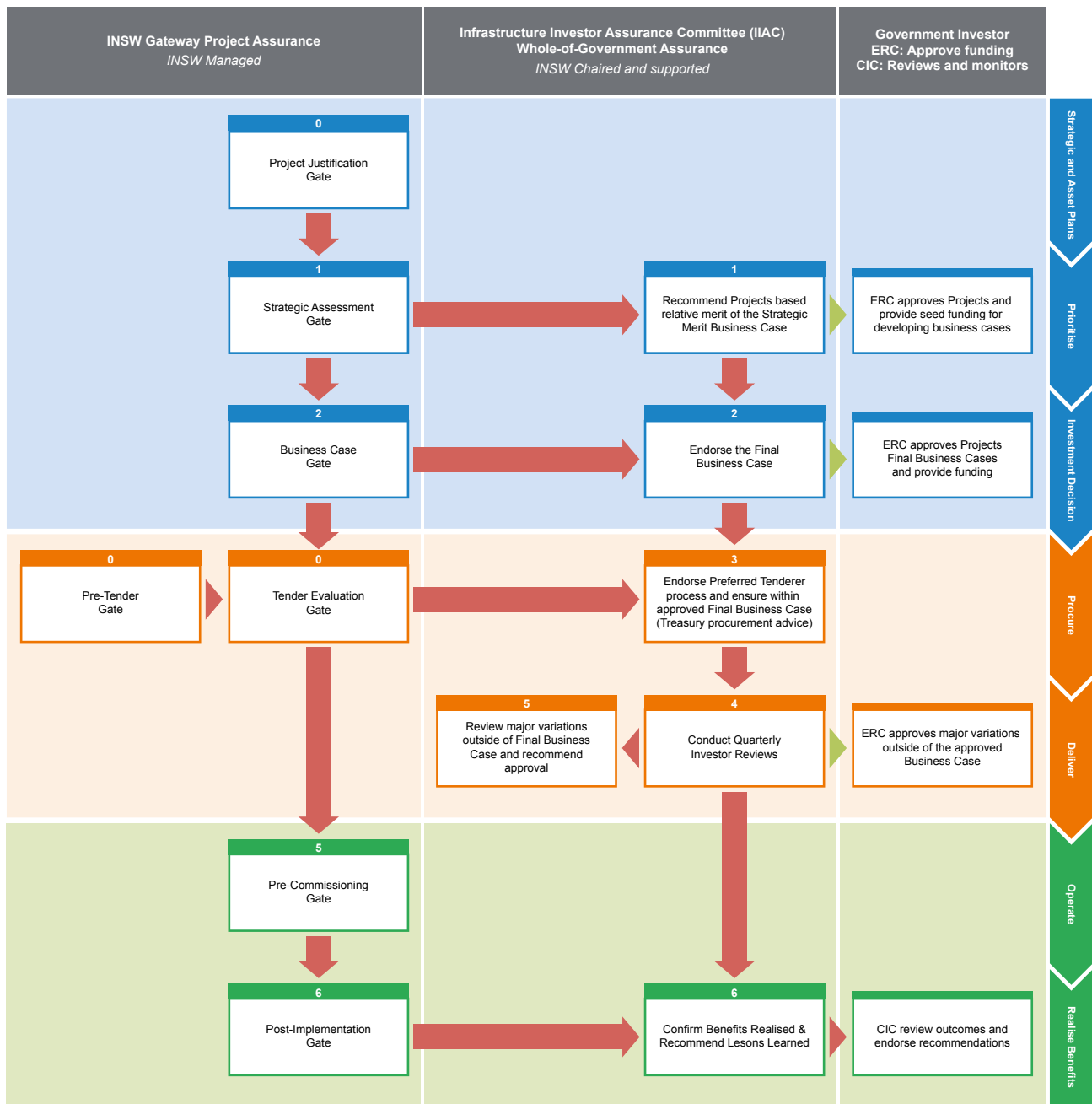
The Federal Government is providing over \$3.5 billion in funding for WestConnex, including a \$1.5 billion grant and a \$2 billion concessional loan.

The Federal Government also has policy responsibility for Sydney Airport, one of the major trip generators for WestConnex.

Since the inception of the 2013 Business Case, the Federal Department of Infrastructure and Regional Development (or its predecessors) has been involved in the development of the project. This includes involvement in the original committee overseeing development of the 2013 Business Case, as a part of the current Project Control Group, and as a member of the Interdepartmental Steering Committee.

In mid-2014 the NSW and Federal governments signed a Memorandum of Understanding, which has formed the basis for Federal funding of WestConnex.

Figure 18.3: Infrastructure NSW Major Project Assurance Framework  
 Source: Infrastructure NSW 2014, 2014 State Infrastructure Strategy Update



## 18.6 Infrastructure Investor Assurance Framework and approvals process

The *Infrastructure Investor Assurance Framework* was developed by Infrastructure NSW for the *State Infrastructure Strategy* in 2012, and was reaffirmed in 2014. The framework is an evolution of the previous gateway review process, which applied to major infrastructure projects in NSW.

The *Infrastructure Investor Assurance Framework* aims to:

- “Prevent projects failing or not realising their stated objectives/benefits”
- “Improve clarity in feasibility phase of projects”
- “Drive better governance”
- “Inform [Cabinet Infrastructure Committee] intervention.”<sup>2</sup>

The NSW Government has adopted the *Infrastructure Investor Assurance Framework* (**Figure 18.2**).

Under the *Infrastructure NSW Act 2011*, one of the functions of Infrastructure NSW is: “to review and evaluate proposed major infrastructure projects by government agencies ... [and to] assess the risks involved in planning, funding, delivering and maintaining infrastructure, and the management of those risks.”<sup>3</sup>

As such, and in the context of recent Auditor-General reports, the Government has centralised the independent gateway assurance review process for projects over \$10 million, including WestConnex, to Infrastructure NSW.

All major decisions regarding WestConnex are subject to a Cabinet-approval process. These decision points are aligned to the *Infrastructure Investor Assurance Framework*.

As components of WestConnex move through the project lifecycle, they are subject to an independent gateway assurance review process organised by Infrastructure NSW. The Cabinet or the appropriate Cabinet Committee must provide approval to proceed (**Section 18.6.2**).

### 18.6.1 How the assurance process is applied

As explained above, a gateway review is undertaken as each part of the project lifecycle is completed. The review is organised by Infrastructure NSW and consists of a panel of independent experts that reviews the relevant project documentation and interviews the project team. The review occurs before approval to progress to the next project stage is permitted.

A standardised review book is used for each review stage. These are currently based on NSW Treasury Gateway Review processes. The review book evaluates the project against seven factors, in the context of the lifecycle stage the project has reached.<sup>4</sup>

- Service delivery
- Affordability and value-for-money
- Sustainability
- Governance
- Risk management
- Stakeholder management
- Change management.

Each of these factors are rated as either:

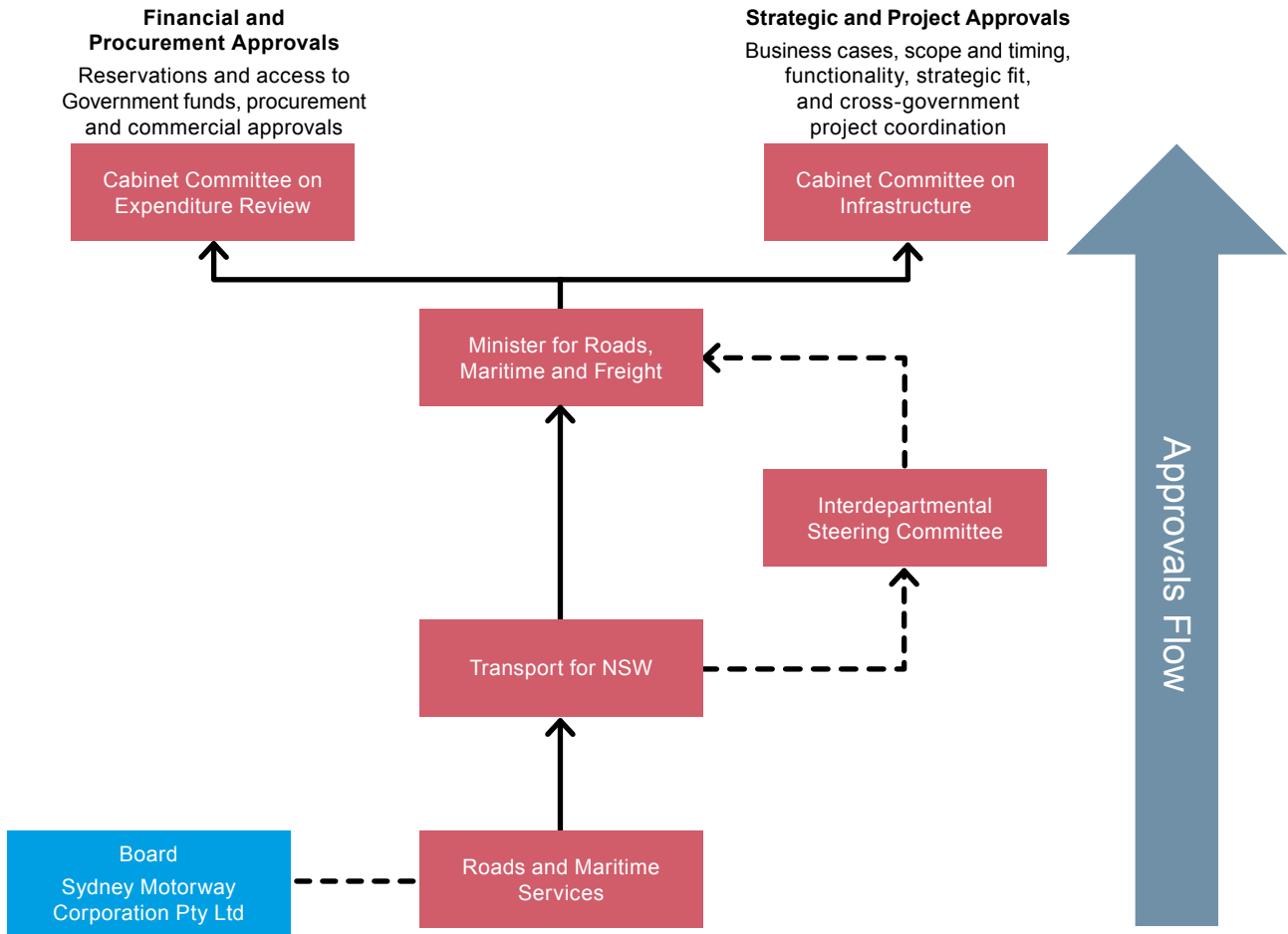
- Green (adequate consideration has been given and the project is on target to succeed)
- Amber (critical but not urgent – minor risk to the project, which should go forward with recommendations carried out before further key decisions are made) or
- Red (critical and urgent – significant risk to the project with recommendations to be acted on immediately).

The review provides guidance to the project team on areas requiring further development. For a project the scale of WestConnex, when approval to move to the next project stage is sought, the outcomes of the review are communicated through the approval chain to Cabinet.

3. *Infrastructure NSW Act 2011*

4. NSW Treasury 2014 (TSY), *Gateway Review Toolkit*, TSY, Sydney

Figure 18.4: Cabinet approvals flow



## 18.6.2 Approvals processes

Material changes to the WestConnex budget, funding, scope, or timeframe are subject to Cabinet-approval processes.

Although Sydney Motorway Corporation is formed under the *Corporation Act*, it is still subject to regular NSW Government decision-making processes. Roads and Maritime Services, as client, as well as all other Government agencies involved, are also subject to Cabinet processes.

In seeking an approval, the Minister for Roads, Maritime and Freight, as responsible portfolio Minister, will make a submission to the relevant Cabinet Committee as appropriate:

- Project documentation, which seeks to define the scope, function or timeframe of the project (including Business Cases); as well as changes in project scope or timeframe, require the approval of the **Cabinet Committee on Infrastructure**
- All funding, financing, and major procurement requests (including allocation or changes to project budget and financing, commencement of expression of interest and tendering for major contracts, and award of major contracts) require the approval of the **Cabinet Committee on Expenditure Review**.

Prior to putting forward a recommendation to the Minister, any Cabinet Submission needs to be agreed by Roads and Maritime and the Board of Sydney Motorway Corporation, progressed by Transport for NSW and should be endorsed by the Interdepartmental Steering Committee. This is illustrated in **Figure 18.4**. Where relevant, such an approval will need to have already been subject to the *Infrastructure Investor Assurance Framework* (**Figure 18.3**).

## 18.7 Summary

Sydney Motorway Corporation has been structured to provide specialist project resources – including project management, commercial, legal, engineering, financing, and subject matter expertise – to ensure the successful delivery of WestConnex.

Roads and Maritime acts as client for WestConnex, strengthening the focus on network integration and providing access to government's most senior delivery expertise.

Project oversight and governance arrangements are robust, with:

- Specific Cabinet-level reporting
- Regular senior cross-government oversight
- Formal project coordination meetings
- Regular internal governance and reporting in place to support decision-making.

Infrastructure NSW, reporting to the Premier and Cabinet Committee on Infrastructure, provides independent advice to government on the status of the project.

All major approvals are subject to multiple levels of governance and assurance. This includes the *Infrastructure Investor Assurance Framework*, the Sydney Motorway Corporation Board, Interdepartmental Steering Committee, and Ministerial and Cabinet approvals.

19

# CONCLUSION

This Chapter summarises the key benefits of WestConnex identifying the challenges it will address for Tomorrow's Sydney and the strategic goals it will deliver on for Sydney, the State and Australia.

# 19.1 Benefiting Sydney, NSW and Australia

The preceding chapters have outlined the strategic need for WestConnex and how this critical infrastructure will deliver on the needs of the community and economy.

This Chapter provides a summary of how WestConnex will contribute to the State's strategic goals and long-term vision. In particular, the links with the State Priorities. WestConnex will also deliver against:

- *2012 State Infrastructure Strategy*: which recommended government progress WestConnex within the next 10 years to:
  - Relieve congestion on the existing M4/ Parramatta Road and M5 East
  - Support freight movements between Sydney's gateways and the logistics hubs in western and south western Sydney
  - Support people movements to Sydney Airport
  - Act as a catalyst for urban regeneration along key corridors, particularly Parramatta Road
  - Enhance orbital road connectivity south and west of the CBD
  - Facilitate improvements in public transport, particularly on the Parramatta Road corridor.
- *NSW Long Term Transport Master Plan*: which identifies WestConnex as Sydney's 'next motorway priority' to address critical constraints on strategic transport corridors including the M4 and M5 motorways
- *2014 State Infrastructure Strategy*: which recommended a northern extension of WestConnex, which has now been incorporated into the Stage 3 – M4 – M5 Link alignment, providing a cost-effective solution and a future connection to the Western Harbour Tunnel and Beaches Link. The *2014 State Infrastructure Strategy* also recommended a southern extension (known as the Southern Connector and part of the Gateway to the South Project). WestConnex will provide for a future connection to this new motorway at Arncliffe.

WestConnex will enable an integrated transport and urban transformation solution to be delivered for Sydney, directly influencing or enabling elements of a number of other key State strategies including:

- Sydney's bus, walking, cycling and light rail futures
- *A Plan for Growing Sydney*
- *Draft Parramatta Road Urban Transformation Strategy*
- *Transformation Plan: The Bays Precinct, Sydney*
- *Sydney CBD to Parramatta – Strategic Transport Plan*.

The benefits associated with WestConnex principally comprise:

- User benefits – benefits to private and public transport users as a result of the introduction of WestConnex. User benefits include the travel time savings, vehicle operating cost savings, and reliability benefits
- Other benefits – benefits accruing to society as a whole as a result of changes to travel behaviour following the introduction of WestConnex. This includes changes in road crash costs, environmental externalities and road maintenance savings
- Wider Economic Impacts – Including improving the ability of business to access other businesses (agglomeration economies) and increased labour supply benefits.
- The project has a Benefit Cost Ratio of 1.71 without wider economic benefits and 1.88 with wider economic benefits. This takes into account the enhanced scope and the associated increase in value as well as the inclusion of induced demand within the traffic model.
- The Benefit Cost Ratio takes into consideration the benefits and capital costs associated with the revised alignment of the M4 – M5 Link to facilitate connectivity with the future Western Harbour Tunnel. This excludes the 'stubs'.



# The challenges facing Tomorrow's Sydney

The following section outlines each of the major challenges facing the State and how WestConnex will assist in achieving the State Priorities goals related to each.

## State Priorities

- Building infrastructure
- Improving road travel reliability

## Challenges

**Serving Sydney's growth – the need for the transport network to meet the demands of a growing city, support improved productivity, and connect key housing and employment areas.**

- Sydney is home to over 4.5 million people.
- Sydney's population will grow by 1.6 million people between 2011 and 2031.
- Sydney's road networks are a critical part of the transport mix, directly supporting around 75 per cent of the 17.6 million trips made every weekday.
- In 2031, without WestConnex, Parramatta Road just east of Norton Street, is forecast to carry up to 80,000 vehicles per day and the M5 East 112,000 vehicles per day. This is compared with 65,000 and 98,000 vehicles per day in 2012, representing growth of 24 per cent and 14 per cent respectively.

## Solution

**Providing for Sydney's growing population.**

WestConnex will:

- Complete one of the major missing links in the motorway network. It will see the M4 completed by connecting it to the Sydney CBD, Sydney Airport and Port Botany.
- Duplicate capacity on the significantly congested M5 corridor, providing improved connectivity for growth areas in south west Sydney.
- Give people more quality time, improving quality of life, improving the environment.
- Save NSW motorists and businesses around \$1 million per day on vehicle maintenance.
- Help foster prosperity, security and investment, helping to meet the challenges of population growth.

## State Priorities

- Improving road travel reliability
- Encouraging business investment

## Challenges

### **Supporting freight and businesses – the need to support forecast growth in freight and international gateway traffic – significant enablers of our economy.**

- Large articulated trucks move over 25 billion tonne kilometres per annum, and rigid trucks around 10 billion tonne kilometres per annum across the State.
- Light commercial vehicles, supporting people performing services or making deliveries, make up to four times as many trips as larger trucks, and travel a substantial number of extra kilometres. Delays to these vehicles impact businesses, their costs and the productivity of those workers.
- The NSW road network carried 63 per cent of the total freight task in 2011, or around 256 million tonnes of freight.
- By 2020, container freight volumes are forecast to grow to between 3 and 3.6 million units (measured in 'twenty-foot equivalent units' of containers) per annum; reaching between 4.9 and 7 million by 2030.
- In 2013, around 14 per cent of containerised freight from the major ports was carried by rail; while the NSW Government has set a target of 28 per cent.
- By 2031, the freight task in NSW is projected to nearly double to 794 million tonnes compared to 2011. Road freight is also increasingly subject to capacity constraints and peak hour congestion throughout Sydney.
- Given the predicted population growth and increase in total freight volumes, even if a significant percentage mode shift from road to rail was achieved, there would still be increases in road freight volumes.
- By 2031, without intervention, there would be a significant worsening of congestion impacting heavy vehicles on the M5 East and M4. There is also forecast congestion in the airport and Port Precinct along the A3 and M7 corridors.
- Vehicle numbers for Sydney Airport (encompassing passengers, workers, and other visitors) are anticipated to rise from 92,000 per average weekday in 2012 to 163,000 in 2031.
- Given Sydney's urban structure, and despite significant planning effort and continuing Government investment in expanding public transport, the road network will need to continue to support a significant and growing number of cars.

## Solution

### **Meeting the needs of the freight industry and our international gateways.**

WestConnex will:

- Improve the road network, directly benefitting light commercial and freight road users and providing direct economic benefits to these businesses and businesses reliant on freight.
- Improve travel times to and from the Port Botany and Sydney Airport precinct from the west and south west. In the morning peak in 2031, WestConnex will improve travel times from the west to the Sydney CBD by up to 15 to 20 minutes.
- Deliver benefits to freight and commercial vehicle users (in discounted terms), including:
  - Reliability benefits valued at over \$633 million
  - Vehicle operating cost benefits valued at over \$2.9 billion
  - Travel time savings valued at over \$5.9 billion.

## State Priorities

- Improving road travel reliability
- Ensure on-time running for public transport
- Encouraging business investment

## Challenges

### **Reducing congestion – the need to provide additional capacity and manage traffic effectively to improve travel times and reliability of Sydney’s road network.**

- The M4 Motorway ends at Strathfield on Parramatta Road. This is well short of other key Global Economic Corridor centres including Sydney CBD, Sydney Airport and Port Botany; and represents a substantial gap in the motorway network. The result is significant traffic congestion on the arterial road network forced to handle this traffic from Strathfield onward.
- In comparative terms, Sydney’s congestion is only slightly better than that of Los Angeles, and at a similar level to London and Shanghai, despite those cities housing significantly larger populations.
- Given projected population increases, without corrective action, congestion will continue to worsen, resulting in:
  - A less reliable transport network, with more redundant, dead time needed to be built into logistical tasks
  - Greater delays for businesses, motorists and bus commuters
  - Higher costs to operate a vehicle
  - Reduction in air quality and amenity.
- Sydney’s congestion costs around \$5 billion per year – equivalent to an annual cost of \$1,100 per Sydneysider. Without action, these costs are forecast to rise to \$8.8 billion per year by 2020.
- These results are broadly in line with the recent Infrastructure Australia audit of national infrastructure. This identified a cost of congestion for the Greater Sydney region (including Newcastle and Wollongong) of almost \$5.6 billion per annum (in 2011). Infrastructure Australia forecasts these costs will rise to \$14.7 billion by 2031.
- Today, sections of Parramatta Road carry over 90,000 vehicles per day, with the most heavily utilised points between the end of the M4 and the CBD being on the portion west of the City West Link. By 2031 without action, this figure is expected to exceed 100,000 vehicles per day. Included in these vehicle numbers are up to 8,000 heavy vehicles per day in 2012. If no alternative is provided, this will rise to over 10,000 by 2031.
- Virtually all of the key roads along the Parramatta to Sydney CBD, Sydney CBD to Airport, and Airport to Liverpool corridors already exceed capacity in the morning peak. As time progresses, congestion on these roads is forecast to worsen.
- The modelled average morning peak hour speed on the 2012 network is 32 kilometres per hour, well below the average posted speed limit of 50 kilometres per hour.

### **Easing congestion and providing network resilience.**

WestConnex will:

- Bypass up to 52 sets of traffic lights.
- Remove up to 10,000 trucks a day from Parramatta Road.
- Save motorists 40 minutes on a typical journey from Parramatta to Sydney Airport.
- Improve the city's road network, enabling ongoing improvement in services for bus customers.
- Improve the Parramatta to the Sydney CBD via Strathfield corridor, providing:
  - Additional capacity between Parramatta and Concord through the widening of the existing M4
  - Significant reductions in traffic on Parramatta Road from Strathfield/Concord, through the inner west, all the way to Camperdown
  - Reductions in traffic volumes on some sections of Parramatta Road of up to 50,000 vehicles on an average weekday in 2031, this represents around half of the volume expected if WestConnex is not built
  - Reductions in forecast traffic on the City West Link (Dobroyd Parade) of around eight per cent or almost 6,000 vehicles on an average weekday by 2031 compared to without WestConnex.
- Improve the Sydney CBD to Sydney Airport corridor, providing:
  - Substantial traffic reductions on Southern Cross Drive of around 24,000 vehicles and almost 12 per cent or around 15,000 fewer vehicles on General Holmes Drive on an average weekday in 2031.
- Improve the Liverpool to Sydney Airport corridor, providing:
  - Major relief to the M5 East, reducing traffic in the existing tunnels by more than 60,000 vehicles or 56 per cent on an average weekday.

## State Priorities

- Creating jobs
- Making it easier to start a business
- Boosting apprenticeships
- Encouraging business investment

## Challenges

**Linking people to places of work – the need to connect the growing residential areas in western Sydney to the Global Economic Corridor and jobs growth in the east.**

**Supporting job creation – the need to facilitate job growth in Sydney.**

- Over a quarter of all jobs in Sydney are based in the Global Economic Corridor
- Population in Sydney's western half is forecast to surpass that of the eastern half of the city in the coming decades. Although jobs growth in western Sydney will continue to be strong, it is not anticipated to match the job numbers of the city's eastern half. This means people will continue to travel from the western half of the city to the east for work
- Parramatta's location in western Sydney, provides a multi-skilled jobs precinct that is well connected to housing areas in Sydney's west by rail and the M4 Motorway.

## Solution

**Creating jobs and connecting people to places of work.**

WestConnex will:

- Create up to 10,000 jobs directly and indirectly during construction and delivery
- Employ and train 500 apprentices over the life of the project
- Deliver the state a highly-skilled workforce with on-the-job training, having worked on some of the largest infrastructure projects in Australia
- Provide high quality transport connections between homes and jobs; linking growing western and south western Sydney and the job opportunities in the Global Economic Corridor and eastern Sydney. This is critical to the successful development and growth of our city
- Will facilitate ongoing growth of Parramatta as Sydney's second CBD by:
  - Leveraging the strength of Parramatta's location and existing connectivity
  - Providing greater access to customers and workers
  - Delivering improvements to access across the Global Economic Corridor
  - Increasing the desirability of Parramatta for businesses
- Deliver similar jobs growth benefits in other centres and specialised precincts, including Burwood, Strathfield, Rhodes, Sydney Olympic Park, Westmead Health Precinct and Bankstown.

## State Priorities

- Increasing housing supply
- Ensure on-time running for public transport

## Challenges

### **Urban renewal and housing supply – addressing areas of urban decay and meeting needs of a growing population.**

- Parramatta Road's traffic volumes are approaching those of some of Sydney's busiest dedicated motorways:
  - Parramatta Road is forecast to carry over 100,000 vehicles including more than 10,000 heavy vehicles by 2031
  - In 2012, the M4 at Homebush had average weekday traffic volumes of 96,100 vehicles.
- Motorway-level traffic volumes on an urban road make for an unpleasant local environment. On Parramatta Road this has manifested in street-level activity declining, pedestrian activities being pushed to the edges, and a once-thriving business precinct eroding to the point where, in many areas, it is devoid of vibrancy and activation.
- With high traffic levels, Parramatta Road is at risk of:
  - Continued degradation of existing building stock
  - Limited turnover of land to other uses and limited redevelopment of sites adjacent to Parramatta Road
  - Continued decline in the productivity of the Parramatta Road corridor with flow-on effects for other parts of the city.

## Solution

### **Connecting communities, and enabling opportunities for new housing and urban transformation.**

WestConnex will:

- Will give the people of Sydney more time to do the things they want to do, rather than sitting in traffic.
- Reduce traffic along the Parramatta Road Corridor, enabling UrbanGrowth NSW to progress the urban renewal of eight target precincts at Granville, Auburn, Homebush, Burwood, Kings Bay, Taverners Hill, Leichardt, and Camperdown.
- Reduce traffic on surface roads, enabling Transport for NSW to:
  - Progress the investigations into high frequency bus services, rapid transit and light rail, along the Parramatta Road corridor
  - Look at options for improving bus services to Sydney Airport.

## State Priorities

- Keeping our environment clean.

## Challenges

### **Environmental and sustainability outcomes – capitalising on opportunities to improve the environment and minimise the impact to the environment during construction and operation.**

- Surface traffic volumes continue to grow, as the population of Sydney increases by 1.6 million between 2011 and 2031.
- Congestion on the existing road networks worsens, and vehicles operate in stop-start traffic.
- Congestion results in local environmental impacts including to air quality, amenity and noise.
- Social impacts are also felt, as travel times get longer, and people across Sydney spend more time in cars, buses and taxis and less time with their families.

## Solution

### **Protecting natural and cultural resources and enhancing the environment.**

WestConnex will:

- Reduction in CO2 emissions by 2031 equivalent to 1.4 million tonnes, which equates to a saving of \$3.58 billion (undiscounted)
- Allow people to spend more time doing the things they want to do, and less time travelling on roads.
- Reduce congestion delivering air quality benefits
- Shift traffic from surface roads to tunnels, providing amenity and noise improvements
- Deliver a sustainable, high quality and transformational project for the people of Sydney and NSW. Exhibiting innovative design excellence, it will be sensitively integrated into the natural and built environment, help build communities and contribute to the future liveability of Sydney
- Deliver sustainable outcomes by:
  - Demonstrating sustainability leadership and continual improvement
  - Protecting and enhancing the natural environment and local heritage
  - Contributing to liveable communities (ease congestion, connect communities, integrate land use and transport planning and facilitate urban revitalisation)
  - Optimising resource efficiency (materials, energy, water, land) and waste management
  - Increasing resilience to future climate
  - Allowing for future transport needs (transport modes, extensions, access points)
  - Implementing sustainable procurement - considering whole-of-life environmental, social and economic factors
  - Maximising equitable training and employment opportunities.
- Receive a rating of 'Excellent' on the Infrastructure Sustainability Council of Australia's (ISCA) Infrastructure Sustainability Rating Tool Scorecard for the M4 Widening, M4 East, New M5 and M4 – M5 Link projects.



**For more information**

✉ Email [info@westconnex.com.au](mailto:info@westconnex.com.au)

☎ Call 1300 660 248

🌐 Visit [www.westconnex.com.au](http://www.westconnex.com.au)

🏠 Locked Bag 928, North Sydney NSW 2059

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