

**WestConnex –**

# **Sydney's next motorway priority**

**October 2012**



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# Executive summary

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The purpose of this document is to advise the Premier of NSW on the next motorway priority to commence in Sydney. It has been prepared by an integrated project team from Infrastructure NSW, Transport for NSW (TfNSW) and Roads & Maritime Services (RMS).

Infrastructure NSW recommends *WestConnex* as Sydney's next motorway priority. *WestConnex* has been developed to meet the immediate transport needs of Sydney and to form part of the future Sydney motorway network identified in the *State Infrastructure Strategy* (SIS) and the NSW Government's *Draft Long Term Transport Master Plan* (DLTTMP).

*WestConnex* is 33 kilometres in length. It includes capacity improvements on existing roads and new sections of motorway all combining to better link Sydney's west with its international gateways and key places of business. *WestConnex* will extend the M4 to Sydney Airport and duplicate the existing M5 East as an integrated scheme. It brings together a series of concepts canvassed with the community since 2004 in a way that is now considered achievable and best enhances Sydney's transport network.

*WestConnex* is more than a motorway. It is a scheme designed to act as a catalyst to renew and transform the parts of Sydney through which it passes. *WestConnex* creates opportunities for urban renewal and public transport improvements, especially along Parramatta Road. It will strengthen access to industry and commercial centres along the full corridor, improving growth opportunities for local businesses. *WestConnex* is intended to develop as an integrated land use and transport scheme delivering on road transport, urban renewal and public transport outcomes.

## Problems and objectives

*WestConnex* seeks to address the challenges that road users and the community encounter on a daily basis, including –

- The missing link in the Sydney motorway network's east-west spine created by the M4 terminating at North Strathfield – constraining movements between Sydney's west, its international gateways and key places of business.
- Congestion, low travel speeds and unreliable travel times on the M4, M5 East, Parramatta Road and in the Sydney Airport/Port Botany precinct that delay freight, public transport and add cost to business.
- Poor urban amenity along Parramatta Road due to heavy traffic volumes and congestion throughout weekdays and on weekends.

The impacts of these challenges are significant given around 30% of Sydney's population (1.2 million people) and around 30% of its employment (600,000 jobs) is located within the broader M4 and M5 corridors. These corridors comprise highly urbanised and complex communities with local concerns and issues which need to be incorporated into the detail of the transport solutions for the area.

*WestConnex* also responds to future strategic challenges pertinent to Sydney's economic productivity and liveability, including –

- Population growth of around 235,000 people and jobs growth of 160,000 by 2031 in the combined M4 and M5 corridors generating significant demand for travel on an already constrained network<sup>1</sup>. This represents almost one-quarter of Sydney's population growth and around one-third of new jobs.
- An additional 40.3 million passengers forecast at Sydney Airport by 2035, resulting in significant vehicle trip generation on a heavily constrained and complex part of the road

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<sup>1</sup> NSW Bureau of Transport Statistics (2012) Data: Population and Employment in M4 and M5 corridors. Based on 5km width (2.5m radius) spanning from Penrith through to Parramatta to Glebe, Sydney Airport, Port Botany, Bexley, Liverpool and Campbelltown. Excludes Sydney CBD. Growth is from a 2011 base.

network<sup>2</sup>. Traffic in the Sydney Airport precinct is a mixture of airport traffic and through traffic destined for Port Botany, Sydney CBD and Sydney's north.

- Trade at Port Botany is growing at a faster rate than previously forecast. Given available capacity at the port itself, it is assumed that Port Botany will remain the primary container facility for NSW if landside access is improved. There is the potential for Port Botany to cater for seven million TEU in the longer term. While freight rail will play an increasing role in future, the majority of this growth is expected to be accommodated by road.
- In line with population and employment growth, non-containerised freight and commercial trips are also forecast to grow across a wide range of sectors all of which will be road based trips.

These challenges are not new and have been the subject of many investigations and consultations by transport and urban planning experts over the past decade. If Sydney is to address this diverse range of problems and challenges, it will need an integrated transport solution that can deliver on a number of key objectives drawn from understanding these challenges. The objectives of WestConnex are to:

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

### **Description of the scheme**

A concept scheme has been prepared for WestConnex to define its scope and to inform its future development and staged delivery over the next 10 years should it be adopted by the NSW Government. WestConnex will include opportunities for future northerly and southerly extensions of the motorway network, and further enhancements around Sydney Airport. This is consistent with the SIS and the NSW Government's DLTTMP. WestConnex comprises a *Northern* and *Southern* Sector.

The *Northern Sector* includes:

1. Widening of the existing M4 from Parramatta to North Strathfield.
2. An M4 Extension connecting the existing M4 at North Strathfield to Taverners Hill in Petersham. The M4 Extension will be constructed with various sections in tunnel, cutting ("slot"), at grade or on elevated road so as to optimise urban renewal along Parramatta Road.
3. A tunnel from Taverners Hill to the St Peters area via the Camperdown area.

The *Southern Sector* includes:

1. 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.
2. Duplication of the M5 East.

The design is a concept at this time and would be subject to detailed design and assessment should the NSW Government wish to proceed with WestConnex. All of the core elements of the scope of the WestConnex concept are shown in Figure 1. Should WestConnex become a NSW Government commitment, further engagement with the community, industry and other key stakeholders will be needed to build on their input to previous schemes so that the concept is refined to its optimum configuration.

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<sup>2</sup> Australian and NSW Governments (2012) Joint Study on Aviation Capacity for Sydney Region, p.12. Growth is from a 2010 base. Assumes unconstrained growth at Sydney Airport.

## Costs and funding

The high-level target capital expenditure estimate for WestConnex, including property acquisition and construction is approximately \$10 billion (\$2012), assuming an optimised design configuration and a procurement and delivery approach that learns from the best of international experience. Should WestConnex be adopted by the NSW Government, further work is required to refine this estimate.

The project generates a benefit to cost ratio (BCR) of over 1.5, meaning economic benefits to users are over 1.5 times the costs. This analysis provides compelling support to prioritise the project from an economic perspective.

**Figure 1: WestConnex – Core elements and connections**



The cost of delivering WestConnex is beyond the capacity of the NSW Government. Consistent with other Sydney motorways users will need to contribute to the costs of building and maintaining these roads.

Tolling options in each corridor will need to be taken account of in any funding strategy, reflecting the flow on benefits that will result on the wider road network from the construction of WestConnex.

A number of tolling models are being proposed for WestConnex, including combinations of:

- Distance based tolling strategies.
- Use of a toll flagfall (or an access-based fee, alongside the distance based toll, at critical connection ramps).
- A tolling cap to limit the maximum toll fee charged for any one particular journey.
- Differential tolling for high value vehicles.

Initial modelling indicates that around 75% of the funding for WestConnex could be sourced from user charges. This would leave the requirement from other funding sources – including from the NSW and Commonwealth Governments – at around \$2-3 billion in total.

There are various combinations of funding options and tolling models under consideration at this stage. Should the WestConnex scheme be adopted by the NSW Government, further analysis will be required to determine how much of WestConnex is funded through user contributions, and how these charges are structured.

## Governance and delivery organisations

Should the NSW Government adopt the WestConnex scheme, it is recommended that it be progressed through a special purpose organisation. Such an organisation would provide the necessary governance for the whole of government and the private sector to work together to deliver WestConnex. This would include further scope development, environmental assessments, community, industry and stakeholder engagement, procurement strategies, funding solutions, tolling strategies and acquiring necessary land and obtaining necessary approvals.

This recommendation is consistent with recent commitments of the State and Commonwealth Governments. In the 2012-13 Federal Budget, the Commonwealth Government provisionally committed to provide up to \$25 million to the NSW Government to establish a Special Purpose Vehicle (SPV) to develop motorway projects for Sydney. In the 2012-13 State Budget, the NSW Government has committed \$30 million of match funding, in anticipation of the State Infrastructure Strategy.

The WestConnex scheme will be, by a large margin, the most expensive motorway development for Sydney to date and will require substantial financing and funding resources. With the varying success of recent public private partnerships (PPPs) in Australia and the post global financial crisis (GFC) environment, it is clear that new and innovative ways of delivering motorway projects will be required. It is likely that WestConnex will require a blend of private and public financing. WestConnex can be delivered within 10 years, dependant on a viable financing and funding model.

### Next steps

The SIS, the DLTTMP and the transport needs analysis together underpin the WestConnex concept and together highlight the key transport challenges confronting Sydney.

Sydney's economic productivity and liveability is seriously impacted by the M4 missing link and current conditions on and around Parramatta Road. Similarly, productivity and liveability is impacted by congestion on the M5 East and transport demands around the Sydney Airport/Port Botany precinct. The forecast growth in high value freight and commercial trips to and from the precinct will exacerbate these problems in future.

The scale and complexity of these problems requires a transformational solution. The solution must be conceived in a way that it can fit within and connect to the existing transport network. It must also enable and support urban renewal, local business growth and liveability. Not only must it be physically transformational, but it must also change the way in which projects of this nature are financed and funded so that it is realistically achievable.

WestConnex can achieve all this, and achieve the stated project objectives. Infrastructure NSW therefore recommends that WestConnex proceed as Sydney's next motorway priority. It is considered to be at the centre of the solution to Sydney's key transport challenges.

In order to take forward the WestConnex proposal and to see it in place over the next 10 years, the actions listed below are recommended.

Governance & Planning	Project Development
<ol style="list-style-type: none"><li>1. Establish a Government led Steering Committee for Sydney motorway projects to provide cross agency co-ordination and to provide a forum for high level, integrated and effective decision making.</li><li>2. Establish a dedicated special purpose organisation to develop Sydney motorway projects and funding solutions, building on the findings of the work that has already been undertaken over the past decade.</li><li>3. Complete transport planning work, including</li></ol>	<ol style="list-style-type: none"><li>1. Delivery strategy, including develop staging plans and procurement packages and considering the timing of each project and funding solutions.</li><li>2. Concept reference designs, including preliminary environmental assessment, options assessment, stakeholder analysis, initial community and industry engagement, cost estimation, economic analysis and benefit quantification, risk assessment and mitigation and funding solutions.</li></ol>

<p>future land use analysis and transport forecasts across all modes to confirm the transport needs.</p> <p>4. Refine the WestConnex transport objectives to maintain a focus on the priority issues in project definition, noting the need for a multifaceted solution.</p> <p>5. Define urban renewal objectives and principles with Urbangrowth NSW to inform an urban renewal strategy for the Parramatta Road corridor.</p> <p>6. Continue discussions with the Commonwealth Government to maintain alignment with Commonwealth infrastructure objectives.</p>	<p>3. Environmental assessment and procurement strategies, including the project need, justification and objectives, detailed reports on environmental impacts, community consultation and industry engagement.</p> <p>4. Staged project delivery.</p>
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# 1 Introduction

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The purpose of this document is to advise the Premier on the next motorway priority to commence in Sydney. It has been prepared by an integrated project team from Infrastructure NSW, Transport for NSW (TfNSW) and Roads & Maritime Services (RMS). Infrastructure NSW recommends *WestConnex* as Sydney's next motorway priority.

WestConnex addresses the most urgent and strategically important elements of the NSW Government's *Draft Long Term Transport Master Plan (DLTTMP)*. The Master Plan highlights the importance of improving integrated transport connections between Sydney's west, Sydney Airport and Port Botany. WestConnex has been identified as the first part of the long term vision for the Sydney motorway network to be delivered in Sydney as a priority.

The *NSW State Infrastructure Strategy (SIS)* further identifies the need for Sydney's next motorway priority to be part of a holistic network solution, not an isolated road project, and one that delivers on both liveability and productivity outcomes.

The vision for a Sydney Orbital was first articulated in the plan known as *Roads 2000* published in 1987. This orbital vision was delivered as eight incremental projects which was realised in 2007, with the opening of the Lane Cove Tunnel. The Sydney Orbital is now a vital part of Sydney's transport infrastructure, and is ultimately the result of more than 20 years of strategic effort in NSW. *WestConnex* is proposed as the next major evolution of the Sydney motorway network. It is proposed to be the strategic focus for motorways in NSW over the next 10 years.

WestConnex is a program of around 33km of interconnected works. WestConnex, if adopted, will extend the M4 to Sydney Airport and duplicate the existing M5 East in an integrated scheme. It brings together a series of concepts canvassed with the community since 2004 in a way that is now considered achievable and best enhances Sydney's transport network.

WestConnex is more than a motorway. It incorporates opportunities to transform the parts of Sydney through which it will pass. WestConnex is intended to develop as an integrated land use and transport proposal delivering on road transport, urban renewal and public transport outcomes.

## 1.1 Key ideas behind *WestConnex*

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WestConnex has been driven by a series of ideas that have sought to address issues constraining motorway development in Sydney. It has been five years since completion of Sydney's last motorway project, and schemes for the M4 Extension and M5 East Duplication have been under development for almost 10 years. Community and stakeholder engagement has been part of this development process, and local communities are well versed in the critical issues around motorway development in their local areas.

It has become clear that a single, integrated concept is required. Infrastructure NSW has been able to bring together the relevant agencies to critically review work to date and devise an achievable scheme, which integrates both motorway proposals, to recommend to the Premier of NSW as Sydney's next motorway priority. In summary, WestConnex advances previous thinking and practically resolves previous issues in that it –

- Offers a network solution for enhancing travel across the arc formed by the M4, Parramatta Road, Sydney Airport/Port Botany precinct and the M5 East.
- Enhances productivity and liveability outcomes for the people and businesses along the corridor.
- Has been subjected to an initial exercise in value-engineering to drive efficiency in concept design with the aim of making WestConnex affordable and deliverable.
- Proposes multiple entry and exist points that avoid overloading any single point on the existing road network.
- Better meets traffic needs than previous "long tunnel" concepts, by recognising that many potential users wish to access intermediate locations.



- Preserves options for future expansion of the Sydney motorway network consistent with the SIS and the DLTTMP.
- Opens opportunities for infrastructure development, urban renewal and public transport systems to be integrally planned through an innovative governance structure.
- Seeks to develop more sophisticated financing and funding strategies building on 20 years of learning from the Sydney experience, and elsewhere.

Fundamentally, WestConnex is driven by a longer term focus to support the growth of the NSW economy by connecting people, goods and ideas across the metropolitan area and beyond into regional NSW. At the same time, WestConnex recognises that any road investment must be sustainable in the context of NSW's development and take account of community and environmental considerations. In short, WestConnex must be more than a road.

#### **Responding to community values and concerns**

Several schemes have previously been developed for an M4 Extension and Parramatta Road. A solution is required to meet the needs of a wide variety of users of the M4 as Sydney's central spine. Similarly, schemes have been developed for enhancing capacity in the M5 East corridor, with a focus on servicing the Sydney Airport/Port Botany precinct.

Despite much effort to progress the development and delivery of the M4 Extension or the M5 East Duplication, neither scheme has been progressed, principally due to a range of concerns raised by the community, adverse traffic impacts and the high capital cost of the proposed scope.

In the development of the WestConnex concept, Infrastructure NSW, TfNSW and RMS have taken account of concerns identified from previous community and industry consultation. Not all issues have been resolved yet, but recognised concerns, include:

- Coordination of land use and transport planning, such that modal strategies for addressing Sydney Airport and Port Botany growth are integrated.
- Ensuring that road works complement rather than compete with freight rail and passenger rail, existing and proposed.
- Desires for significantly improved public transport in the Parramatta Road corridor, both along it and across it.
- Desires for significantly improved urban amenity along the Parramatta Road corridor.
- Protection of Tempe Reserve as a place for outdoor recreation.
- Minimising noise impacts of any new road infrastructure.
- Minimising air quality impacts and ensuring no adverse health impacts from ventilation buildings.
- Protecting items of heritage value.
- Desires for various ways to improve local businesses.

## **1.2 Delivering on the *Draft Long Term Transport Master Plan* and the *State Infrastructure Strategy***

The DLTTMP has been developed to provide a framework for addressing NSW's challenges over the next 20 years. It sets out the approach and the actions that the NSW Government will deliver to *integrate, modernise, grow* and *manage* the transport network so that it meets the long term needs of NSW. WestConnex has been conceptualised and developed within this context.

The DLTTMP identifies the M5 East Duplication, M4 Extension between Strathfield and Port Botany/Sydney Airport and the Inner West Bypass as priority proposals. The F3 to M2 Link, F6 Corridor, widening the M7 and enhanced north south links are identified as other projects forming

part of the long term program to complete the motorway network. Together, these form the long term strategy to complete the missing links on Sydney's motorway network, Figure 2.

Similarly, the SIS identifies the M4 and M5 corridors as the highest priority for Sydney in the context of a longer-term motorway network strategy.

**Figure 2: Potential connections to bridge gaps in the Sydney motorway network by 2031**



Source: Draft Long Term Transport Management Plan p.140.

WestConnex is part of the integrated transport solution for Sydney. It is part of a set of broader actions identified in the DLTMP and SIS, including –

- Pinchpoint improvements to deliver short term road initiatives around Sydney's international gateways
- Fostering development of Sydney's intermodal terminal network
- Developing rail freight capacity projects
- Public transport initiatives for relieving congestion around Sydney Airport
- Intelligent road management systems to better manage the motorway network
- Redesigning the city's bus network

## 1.3 Problem identification

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WestConnex has been developed as a response to a series of problems that are routinely experienced by road users, businesses and the community who live and work in Sydney, and future anticipated problems. These have been canvassed across NSW strategic plans for some years. Key problems include –

### *Missing links, congestion and unreliable travel times*

- The missing link in the Sydney motorway network's east-west spine where the M4 terminates at North Strathfield, leaving the highly congested Parramatta Road and heavily congested M5 East as inefficient corridors leading to Sydney's crucial gateways.
- Congestion and unreliable travel times in the M4 and M5 corridors with more than 100,000 vehicles per day using the motorways at several locations. Peak periods are spreading well beyond the traditional 2-hours of 7-9AM and 4-6PM, as more and more motorists seek to travel in less congested conditions when they can.
- In addition to delays caused by congestion the unreliability of travel time impacts the amount of contingency motorists need to build into their travel budgets. Both congestion and unreliability impact Sydney's local, regional and global economic productivity given the high volumes of business and freight trips on the M4 and M5.
- Average speeds on the M5 East, M5 and M4 are reduced to around 40-55km/h in the AM peak (eastbound) and 60-75km/h in the PM peak (westbound) compared to posted speeds of 80km/hr to 110km/hr<sup>3</sup>. Incidents frequently cause even slower trips and at times closure of the motorways forcing traffic onto parallel arterial roads.
- These adverse travel conditions impact the wellbeing and quality of life of a vast proportion of Sydney's residents, given around 30% of Sydney's population and jobs are located in the M4 and M5 corridors. This equates to around 1.2 million people and 600,000 jobs in the combined corridors.

### *Poor urban amenity*

- Parramatta Road is one of Sydney's main traffic arteries with over 80,000 vehicles per day at some locations. These traffic volumes have resulted in congested conditions affecting east-west and north-south movement, degraded built environment and an inefficient use of land in close proximity to the city along its key road and rail transport corridors.
- The current state of Parramatta Road creates a barrier to movement across and along the road for pedestrians, cyclists and local traffic. It is an unattractive area with little incentive for redevelopment. It is also a poor quality environment within Australia's only global city and a limiter in Sydney's standing on global liveability indices.

### *High levels of demand for commuter, business and freight travel by road*

- Around 50% of M4 and M5 users are commuting to work during the AM peak period<sup>4</sup>. Public transport is highly effective in serving commuter trips for people who work in major centres. For example, around 75% of commuters travel to and from Sydney CBD by public transport in peak periods<sup>5</sup>. Public transport is less effective in serving more dispersed employment patterns that occurs across Sydney. Around 35% of Sydney's jobs are located in centres with

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<sup>3</sup> Baulderstone Hornibrook Bilfinger Berger Joint Venture, *M5 East Traffic Loop Collection Data Reported to the Roads and Traffic Authority in 2004 and 2010* and NSW Roads and Traffic Authority (2011). *Traffic Information System: Travel Speed March 2011 Survey*.

<sup>4</sup> NSW Bureau of Transport Statistics (2011), *Household Travel Survey – 5 years 05/06 to 09/10*.

<sup>5</sup> NSW Government (2012), *NSW 2021 Performance Report 2012/13*, p.9-9.

the remaining 65% far more dispersed and located outside of centres<sup>6</sup>. These jobs are typically not well served by public transport and access to them is largely a road based task.

- Around 30% of traffic in the AM peak and 40% in business hours uses the M4 and M5 for the purpose of work related business<sup>7</sup>. Road travel is a suitable choice as often these trips involve multiple complex trips (eg. sales representative travelling from customer to customer) and/or involve travel with tools of trade (eg. tradesperson from site to site).
- There are currently high levels of industry demand to move shipping containers by road to and from Port Botany (86% by road<sup>8</sup>). Freight rail tends to be more competitive in the long haul market as evidenced by greater market share in the movement of regional and interstate freight. Time and reliability costs currently associated with double handing containers over relatively short distances – rail from Port Botany to terminal, road from terminal to destination – are key factors in the market preference for road.
- High levels of demand to travel by road to/from Sydney Airport (currently 85% by private vehicle, taxi or mini bus<sup>9</sup>). There are a number of reasons, including: (a) the relative cost of rail fares due to the Airport station access fees; (b) business travellers being insensitive to travel costs; (c) difficulties in travelling with luggage and (d) the security and convenience of travel by workers at night and on shifts.

#### *Growth in population and employment*

- Sydney is Australia's largest city, and contains 20% of Australia's population. The population in the combined M4 and M5 corridors is forecast to grow by around 235,000 people and jobs by 160,000 by 2031. This represents almost one-third of all of Sydney's forecast new jobs and around one-quarter of forecast population growth.
- Given the strategic role that these two corridors play in the Sydney road network they will draw demand well beyond their 5km corridor catchments. For example, Western Sydney, which is served by both the M5 and M4 corridors, is forecast to accommodate half of Sydney's population and half of its jobs in 2036<sup>10</sup>.
- Between 2011 and 2031 an additional 2.3 million vehicle driver trips, 665,000 vehicle passenger trips, 121,000 bus trips and 23,000 taxi trips per average workday are forecast on the Sydney road network as a result of Sydney's forecast population and employment growth. This represents a combined additional 3.1 million trips per day on the already constrained Sydney road network<sup>11</sup>.
- In line with population and employment growth, non-containerised freight trips are forecast to grow and virtually all will be road based. This comprises a wide range of essential services including the delivery of food and beverages, fuel, building materials, trade deliveries, health supplies, waste and recycling, parcels and mail.
- Between 2006 and 2036 the number of trips made by rigid trucks on an average weekday is expected to grow from 227,000 to 430,000, articulated truck movements from 61,000 to 117,000, and most significantly light commercial trips from 1,190,000 to 1,651,000. The current missing links and existing congestion will become greater adding costs and impacting on Sydney's productivity<sup>12</sup>.

#### *International gateways growth*

- The quantum of growth at Sydney Airport is very significant and in terms of trip generation will significantly exceed the trip generation as a result of growth at Port Botany. An additional

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<sup>6</sup> NSW Bureau of Transport Statistics, (2012) Employment and Estimated Resident Population by Centres, using Department of Planning definition of Centres. Refers to 2011. Unpublished Data.

<sup>7</sup> NSW Bureau of Transport Statistics (2011), *Household Travel Survey – 5 years 05/06 to 09/10*.

<sup>8</sup> Sydney Ports Corporation (2011), *Annual Report 2010/11*, p.22

<sup>9</sup> Sydney Airport Corporation Ltd (SACL) (2009). *Sydney Airport Masterplan 2009* p.89.

<sup>10</sup> NSW Department of Planning (2010) *Metropolitan Plan for Sydney 2036* p.14.

<sup>11</sup> NSW Bureau of Transport Statistics (2012), *Transfigures February 2012*, p.4.

<sup>12</sup> NSW Bureau of Transport Statistics, (2010), *Freight Movements in Sydney* p.1.

40.3 million passengers forecast at Sydney Airport by 2035<sup>13</sup>. This means on average an additional 110,000 passengers per day will need to access the airport. Landside access is a key issue given the co-location of Sydney Airport with other intense developments in the Port Botany/Sydney Airport to CBD corridor.

- Trade at Port Botany is growing at a faster rate than previously forecast. The primary market for goods imported through Port Botany is Sydney. With the third terminal at the port, there is capacity to handle the port-side growth. The demands of Sydney's growing population for consumer goods and inputs for commercial and industrial business will continue to drive the expansion of trade at Port Botany.
- The population's demands for imported goods means that Sydney's container freight task extends well beyond the basic task of moving containers between Port Botany and the location where the container is packed or unpacked. The M4 and M5 corridors already play and will continue to play a significant role in facilitating these trips as they serve the majority of Sydney's manufacturing, warehousing and logistics industries.

#### *Limitations on public sector financing*

- While these problems require major investment in new and upgraded infrastructure, both the NSW and Commonwealth Governments have limited capacity to provide funding or long term financing for such major infrastructure projects. The Commonwealth Government has substantially tightened expenditures to draw the budget back into balance by 2012-13.

## 1.4 Objectives of WestConnex

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For Sydney to address this diverse range of problems and challenges, it will need a transport solution that can deliver on a number of key objectives. Drawing from the problems identified above, the objectives of WestConnex are to:

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

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<sup>13</sup> Australian and NSW Governments (2012) Joint Study on Aviation Capacity for Sydney Region, p.12 Growth is from a 2010 base.. Assumes unconstrained growth at Sydney Airport.

## 2 WestConnex – A 10-year program

A 33 km strategic concept has been scoped and analysed for WestConnex. It is conceived as two main sections – the Northern Section and Southern Section as shown in Figure 3. The strategic concept will serve to inform the future development and staged delivery over the next 10 years. Detailed layouts and designs for these elements are not yet developed, and will be refined should the proposal proceed. Stakeholder engagement and community consultation will be undertaken as the detail of the proposal evolves. In summary, the WestConnex scheme comprises:

The *Northern Sector* includes:

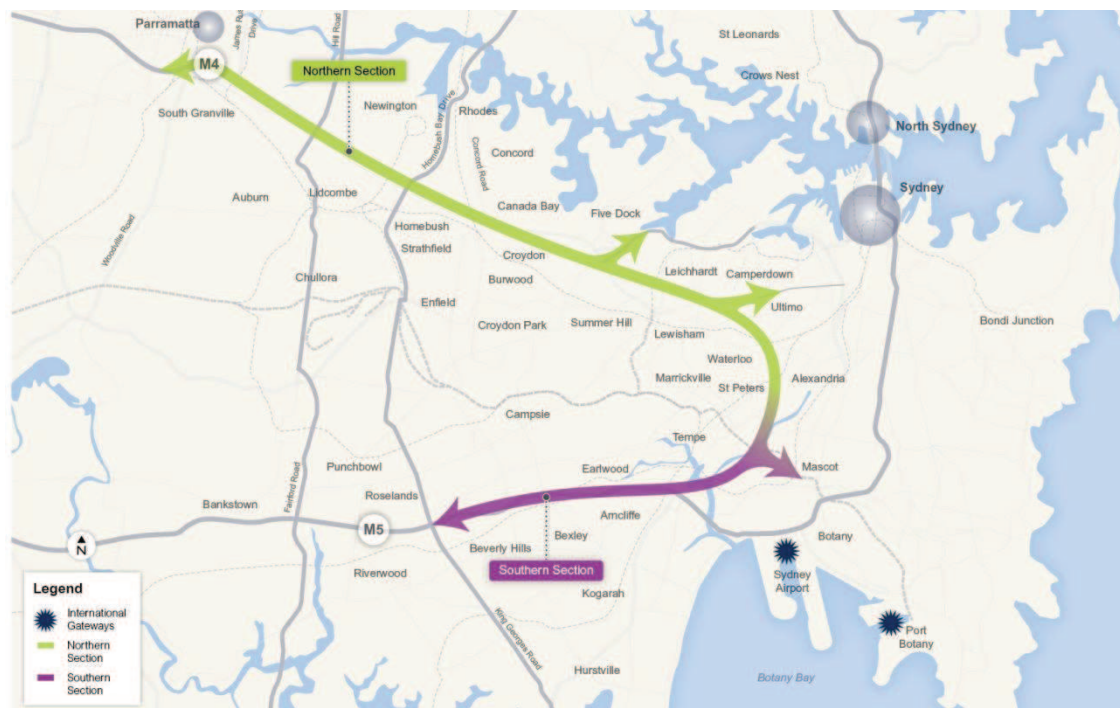
1. Widening of the existing M4 from Parramatta to North Strathfield.
2. An M4 Extension connecting the existing M4 at North Strathfield to Taverners Hill in Petersham. The M4 Extension will be constructed with various sections in tunnel, cutting (“slot”), at grade or on elevated road so as to optimise urban renewal along Parramatta Road.
3. A tunnel from Taverners Hill to the St Peters area via the Camperdown area.

The *Southern Sector* includes:

1. 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.
2. Duplication of the M5 East.

WestConnex preserves options for future northerly and southerly extensions of the Sydney motorway network, and future enhancements around the north of Sydney Airport to connect to Port Botany. This is consistent with the vision set out for Sydney motorways in the DLTTMP and SIS as shown in Figure 2.

**Figure 3: WestConnex – Northern and Southern Sections**



## **INNOVATION AND VALUE ENGINEERING**

Infrastructure NSW, TfNSW and RMS have worked to reassess previously considered concepts for the M5 East Expansion and M4 Extension. While functionally sound, these previous schemes have proved unaffordable to NSW Government.

The schemes have been subjected to an initial value engineering review that will continue in the next stages of development, should WestConnex be adopted by the NSW Government. The initial review was designed to seek out optimum value for both short and long-term investment.

The benefits of a road in cutting or “slot” arrangement below ground level for up to 5km of Parramatta Road instead of in a tunnel were reassessed. The section of WestConnex between Taverners Hill, Leichhardt and Concord would include a combination of sections of an open, sunken motorway with Parramatta Road remaining at surface level, akin to the Eastern Distributor and South Dowling Street.

Motorway slots offer benefits when they are designed to fully integrate into existing urban and transport systems. They can be built under traffic through very careful planning so as to minimise disruption to traffic flows and the surrounding communities. Parramatta Road would remain operational with temporary lanes and traffic switches during construction works.

The connections between WestConnex and the existing road network, and the types of connections were also reviewed to consider trade-offs between traffic functionality and cost. There has been particular focus on access to the very complex Sydney Airport precinct, which is a major destination.

Given the significant volumes of traffic that will use WestConnex, multiple entry/exit points will be required to effectively distribute traffic off and onto the existing network to avoid bottlenecks and queuing into the tunnel.

There are still opportunities for further innovation, particularly around Sydney Airport. Work will continue to seek out better value for the Government, road users and the community should WestConnex be adopted by the NSW Government.

## **2.1 Core elements of WestConnex**

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The core elements of WestConnex define the scope for the proposal in a way that is considered affordable to government and road users.

In developing the scope of WestConnex, significant attention has been paid to balancing the required transport, community and environmental outcomes against affordability and deliverability requirements. There is still work required to define these elements specifically. Work will build on previous understandings of the local business, environment and community characteristics.

There are five core elements in the scope of WestConnex, which include multiple connection points. The core elements are summarised in Table 1 and shown in Figure 4.

**Table 1: Summary of the core elements of WestConnex**

Sector	Core element	Approximate length	Treatment
Northern	1. M4 Widening – Concord to Parramatta	9.5km	Surface and elevated road
Northern	2. M4 Extension Taverners Hill area (Petersham) to Strathfield	6.2km	Mixture of tunnel, slot and surface road
Northern	3. Tunnel – Taverners Hill to St Peters area via Camperdown area	5.3km	Tunnel
Southern	4. Sydney Airport Access Link	4.6km	Surface and elevated road
Southern	5. M5 East Duplication	7.2km	Mixture of surface road and tunnel
	Approximate total	32.8km	
	Rounded total	33km	

### 2.1.1 M4 Widening – North Strathfield to Parramatta

The existing M4 is generally two to three lanes in each direction between Church Street at Parramatta and Concord Road/Parramatta Road at North Strathfield. The widening works will generally be within the existing boundaries. They will represent a substantial capacity improvement to an existing asset where extended congestion is commonplace. The widening of the M4 would include:

- Providing four lanes in each direction between Church Street, Parramatta and Concord Road, North Strathfield consistent with the width of M4 further west.
- Maintaining the grade separated interchanges at James Ruse Drive, Silverwater Road, Hill Road and Homebush Bay Drive.

The design layouts of the adjusted connections are not yet resolved and are subject to detailed traffic analysis.

### 2.1.2 M4 Extension – Strathfield to Camperdown Area

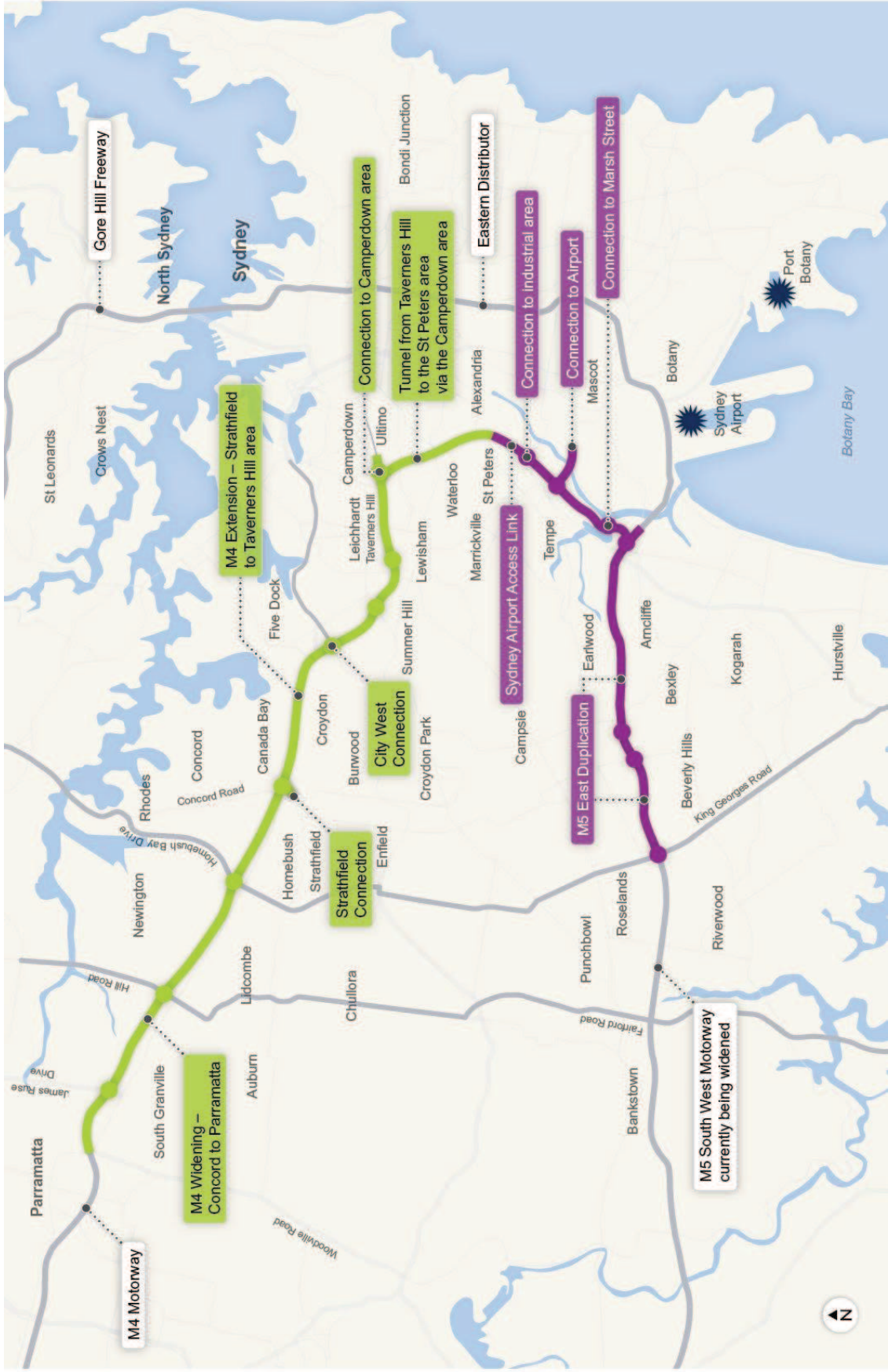
The M4 Extension will link the existing M4 at Concord Road, North Strathfield with a tunnel entrance at Taverners Hill in Petersham. The M4 Extension would complete a missing link in the motorway network between growing population, employment and industrial centres of Sydney's west and the Port Botany/Sydney Airport precinct. The M4 Extension would be a new motorway comprising a combination of deep tunnels, shallow tunnels, road in cutting ("slot" sections), at grade and elevated roads, with on and off ramps connecting to various locations on Parramatta Road.

Although early indications are that the easterly section might be two to three motorway lanes in each direction and the westerly section might be three motorway lanes in each direction, these details are subject to determination through further study. A major connection would be required at Wattle Street, Ashfield, where traffic from the City West Link will join the M4 Extension.

The ability to cross Parramatta Road from north to south would be substantially improved for both local vehicles and pedestrians. The extent to which through capacity is improved and efficient connection is made with other primary and local roads would determine the ability of M4 Extension to facilitate urban renewal and public transport improvements.



Figure 4: WestConnex – Core elements and connections



### 2.1.3 Tunnel from Taverners Hill to the St Peters Area via the Camperdown Area

The tunnel from Taverners Hill in Petersham to the St Peters area would connect the new M4 Extension to the Sydney Airport Access Link.

A connection to Parramatta Road in the Camperdown area is required to serve demand to the south and east of the CBD. The exact location and configuration of this connection has not yet been determined and requires more study.

Combined with the M4 Extension, this link would provide a step change improvement to connectivity from Sydney's west to the Port Botany and Sydney Airport precinct, as well as improving local liveability. Currently vehicles are required to travel through older, narrow and poorly aligned roads not well suited to high traffic volumes and heavy vehicles.

Construction of this link in tunnel aims to reduce the volume of traffic on the surrounding surface road network, particularly heavy vehicles. This would allow these surface roads to return to a function of connectivity and access to local centres in the inner-west.

This tunnel may be up to three lanes in each direction, but details are subject to further demand analysis. The tunnel has the potential to play a key role in the development of the long term Motorway strategy as detailed in the DLTTMP and the SIS.

### 2.1.4 Sydney Airport Access Link

This element would connect the M5 East tunnel portals in the St Peters area and the M5 East tunnel portals east of Princes Highway. The link would generally be on the surface and will include:

- High quality access to both airport terminals
- Access from industrial areas in the inner west and inner southern suburbs along the Canal Road/Gardeners Road axis.

### 2.1.5 M5 East Duplication

The M5 East Duplication would result in four lanes in each direction between King Georges Road and the Sydney Airport area by widening the existing surface road west of Bexley Road and constructing two new two lane tunnels to the east. The expansion of the M5 East would be compatible with the M5 West Widening works currently under construction.

The additional lanes in tunnel would separate traffic travelling to (i) Sydney Airport, the Inner West and Inner South; and (ii) Port Botany, Sydney's east and north via the Eastern Distributor.

This would benefit freight access to the port and surrounds as well as reduce the conflict between heavy vehicle and general traffic. The precise layout of the tunnels and connections are subject to further design and industry and community engagement.

### **Motorway “slot” concept**

The WestConnex scheme includes sections of road in cutting or a “slot” arrangement below ground level for up to 5km of Parramatta Road instead of in a tunnel. The section between Taverners Hill in Petersham and Concord would involve an open, sunken motorway with Parramatta Road remaining at surface level, akin to the Eastern Distributor and South Dowling Street.

Existing roads crossing Parramatta Road would be retained with bridges over the sunken motorway. Some property on Parramatta Road would be acquired to accommodate the new roadway and for future development under a master planning process.

The slot arrangement will allow for the creation of an attractive and revitalised transit boulevard along Parramatta Road – a tree lined, high quality public transport corridor – within a reshaped built environment. Figure 5 shows a concept for the location.

The same concept has been successfully delivered in Sydney with the Eastern Distributor and South Dowling Street, Figure 6. It is a world class example of what can be achieved with a commitment to excellence in integrated planning, engineering, engagement and urban design.

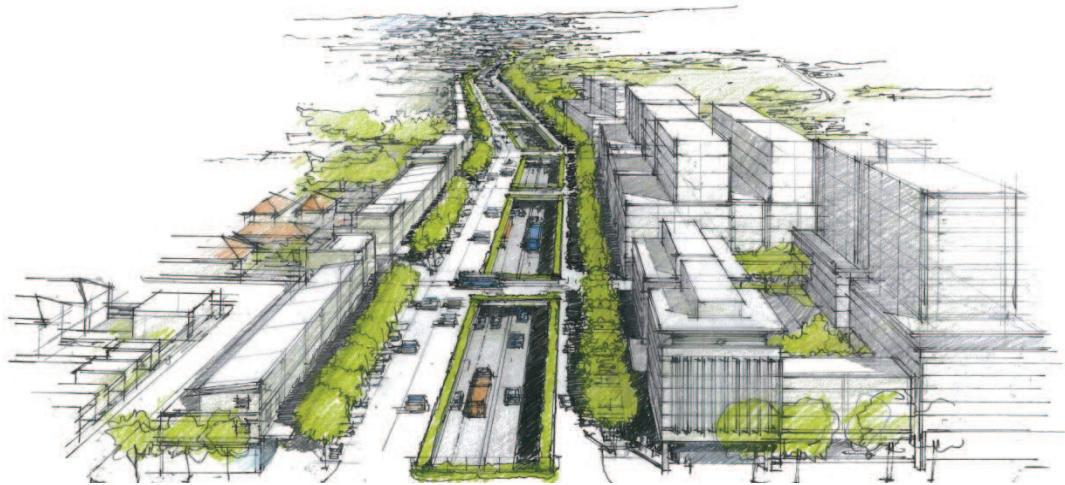
The sunken Eastern Distributor allows through traffic to move at high speed in a safe environment. South Dowling Street, and the parallel Crown and Bourke Streets, were subsequently reengineered into more local roads with on street parking, lower travel speeds, dedicated cycle lanes, pedestrian facilities and landscaping. This approach has helped underpin the redevelopment of Surry Hills and surrounding areas.

As in the case of South Dowling Street, the redesign of Parramatta Road would require significant planning and design effort and commitment. It would be critical for local communities that high quality connections cross the new roadway. These would serve buses, vehicles, cyclists and pedestrians.

The quality of urban design along Parramatta Road has for many years been a focus for local communities and businesses. The design of the proposal would need to deliver a fully functional urban space where people can park to shop, gain access to public transport, commute to work and enjoy urban life.

Should WestConnex progress to the construction phase it will be important to minimise disruption to the local community, businesses, buses and traffic on Parramatta Road. An early activity in planning the construction of the motorway slot and surface works will be developing practical strategies for moving traffic around the various construction sites to maintain capacity and access whilst construction work progresses safely and efficiently.

**Figure 5: Concept for WestConnex along Parramatta Road**



**Figure 6: Motorway “slot” concept – Eastern Distributor, Sydney**



*View of the four lane South Dowling Street which operates on either side of the sunken Eastern Distributor*



*View of the four lane sunken Eastern Distributor with South Dowling Street operating up above*

## 3 Benefits

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While there are still decisions to be made about the scope of WestConnex it is clear that infrastructure investment in WestConnex would offer major strategic benefits for transport, productivity and liveability in Sydney. The overall benefits of WestConnex include:

- Increased road capacity and reduced traffic congestion along both the M4 and M5 corridors.
- Improved travel time and vehicle running cost savings for cars and trucks.
- More reliable travel times, particularly during peak periods.
- Completion of the 'missing link' spanning the 14km between the end of the existing M4 at North Strathfield and the Port Botany and Sydney Airport precinct.
- Additional road capacity and north–south connectivity to relieve surface congestion in Sydney's inner west.
- Improved capacity and access for freight movements to and from the Port Botany and Sydney Airport precinct, providing a major boost to the productivity of NSW and the Australian economy more broadly.
- Improved road access to Sydney Airport for passengers, freight and employees.
- New opportunities for urban renewal in the inner west, including along Parramatta Road, especially east of North Strathfield.
- Improved liveability for residents and business in the corridor.
- Improved road safety on both the new WestConnex infrastructure and surface roads.
- New opportunities for land development and wider land use planning changes.
- Opportunities for public transport improvements.
- WestConnex can be implemented as part of a Sydney-wide network strategy and can be delivered in stages.

It is clear that WestConnex is not just a road project. A number of the key benefits it offers to the urban fabric, the economy of Sydney and public transport are discussed in more detail in the following sections.

### 3.1 Transformation of Parramatta Road

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The WestConnex scheme would transform Parramatta Road. The separation of high volume through traffic into a mixture of deep tunnel and road cutting or "slot" would allow the creation of a transit boulevard – a lesser trafficked, high quality public transport corridor – within a revitalised and reshaped built environment.

This transformation would take time. New development next to the transit boulevard would combine residential, business, civic and shopping land uses, capitalising on the improved public transport opportunities and the lower noise and congestion from the removal of through traffic and freight.

A coordinated approach to redeveloping the Parramatta Road corridor supports Sydney's recent development patterns, with around 80 per cent of development taking place through urban in-fill. It also supports the preference Sydneysiders have shown for mixed use development.

The reshaping of the corridor would have a significant effect on the productivity, sustainability and liveability of this area and Sydney as a whole. It would help create the opportunity for a thriving urban environment and a residential growth area close to the city and existing key transport linkages.

In time communities alongside the corridor would benefit and a high quality and permeable public domain along the Parramatta Rd precinct promoting social and economic activity would be established.

Design principles for this transit boulevard vision would address:

- A high quality built form with a diverse mix of housing and business land uses so that opportunities for economic growth are captured and a vibrant living and working environment created day and night.
- The accessibility and connectivity along and across the new Parramatta Road boulevard, for all public transport modes and local traffic, with shared paths, frequent crossings, parking, bus stops and bridging over the slot motorway at key intersections and desire lines.
- The greening of the corridor with trees and open space to provide shade, air quality improvements, recreation opportunities and a green backdrop.
- The safety of the corridor so that pedestrians and traffic are safely organised and that security and surveillance is maximised and crime prevented.
- The integration and design quality of the slot motorway so that a high quality motorway environment is created for road users that minimises disruption and traffic impacts on the surrounding built environment.
- Other issues and opportunities identified by the local community and stakeholder groups.

**Figure 7: Urban renewal along South Dowling Street and the Eastern Distributor, Sydney.**



### 3.2 Productivity gains for business and freight travel

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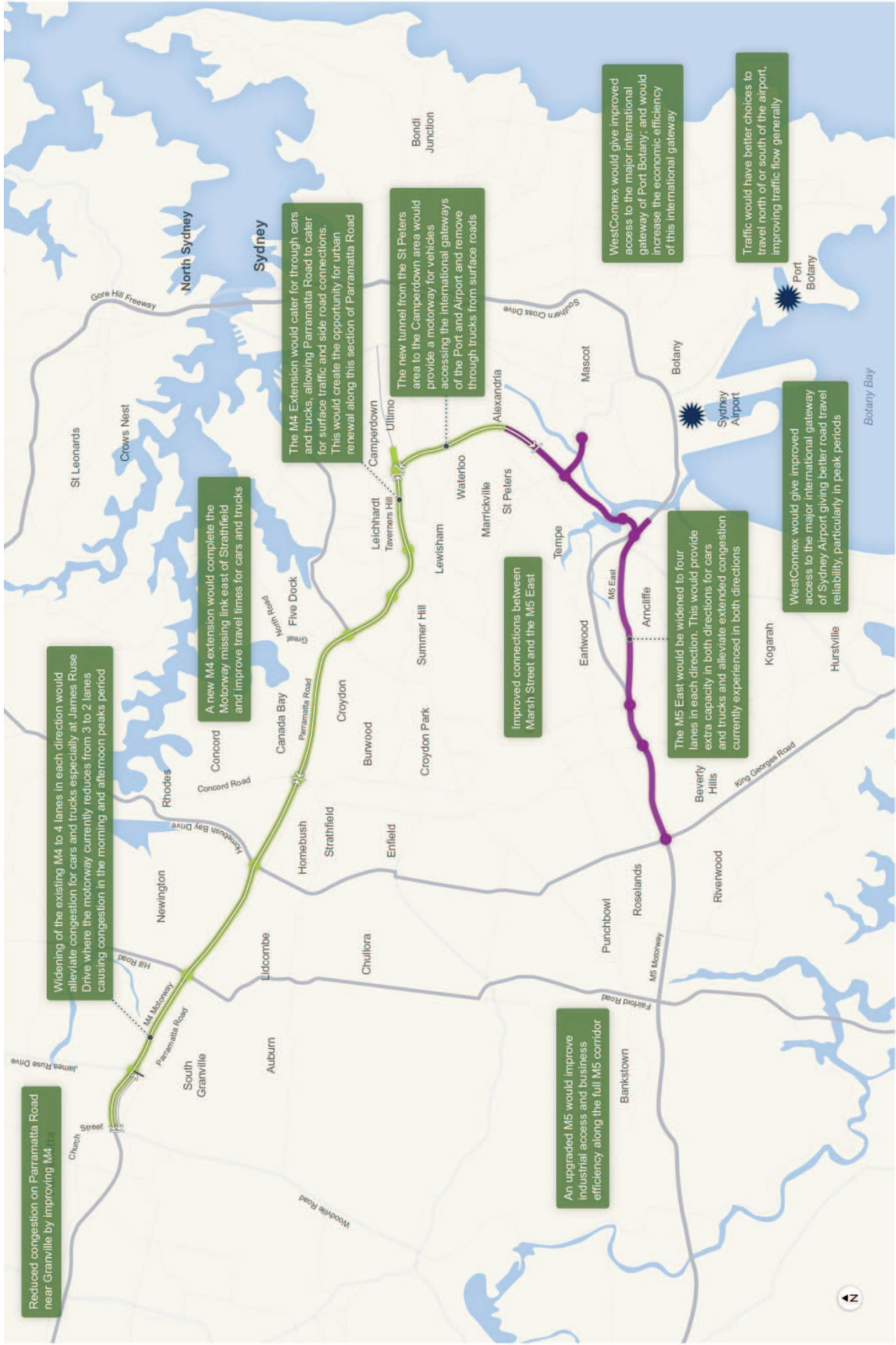
An expanded road network and more capacity created by WestConnex means travel will become quicker, more reliable and cheaper for business and freight. WestConnex will provide benefits for the diverse business and freight travel that occurs on Sydney motorways each day.

WestConnex is complementary to the NSW Government's target of doubling the proportion of container freight from Port Botany moved by rail by 2021. There will be rapid growth in the forecast number of import and empty containers which are moved over short distances.

Road transport typically best serves the short haul container market as it avoids the need to double handle containers when switching between rail and road. Additional road capacity will be needed to support this growth.

Freight and business movement are much more diverse than import-export journeys made by container freight trucks to and from Port Botany. Other freight vehicles – construction haulage trucks, waste and recycling trucks, postal and courier vans and trade utes – are also important, as are the less visible commercial trips – professional services, management services and sales representatives moving in cars.

Figure 8: Benefits of WestConnex



All of these vehicles are important in providing consumers with goods and services – from groceries to homewares to trade and accounting services – and infrastructure needs to be in place support these journeys.

Around 3 in 10 vehicles using the M4 and M5 in the morning peak are for work related business. During business hours this figure increases to 4 in 10 vehicles. Up to three quarters of an hour will be saved on trips between Sydney's west and east and up to 52 traffic lights avoided.

For the freight industry this means more pick ups and drop offs each day. Similarly, for business it means more time on the job and less time in a vehicle. This directly translates to more productive use of drivers as labour and vehicles as capital. The incremental benefits accrued for individuals using WestConnex add up to very significant productivity gains for Sydney, NSW and Australia.

This is critical to ensuring Sydney remains competitive and a desirable place to do business in both a national and international context. It also helps to contain the cost of living for residents in Sydney by containing the cost of goods and services. All this helps to improve the liveability of our city.

### 3.3 Enhanced facilities for buses, cyclists and pedestrians

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Improving public and active transport is a fundamental objective of WestConnex, which will be embedded in the project development process, should the Government adopt the scheme.

WestConnex creates opportunities to operate express bus services on the new motorway standard road and improved local services on surface routes where traffic is reduced. Some opportunities include:

- Extension of dedicated bus lanes and bus priority measures along Parramatta Road.
- Improvements to cross-regional bus services in an east-west direction with high frequency services, including a potential service to Green Square Railway Station.
- North south local bus services may be improved across Parramatta Road linking to the Main Western Rail Line.
- New bus facilities may be created as part of urban renewal works on Parramatta Road to serve customers using local and cross regional services operating on Parramatta Road.
- East west local bus services may be improved across the Princes Highway to Sydney Airport, with traffic reductions on the Princes Highway and could link into new connections to Sydney Airport.
- Local bus services in Sydenham, Marrickville and Tempe would benefit from traffic reductions.

Similarly, WestConnex creates opportunities to improve cycle and pedestrian facilities and urban amenity for these road users. Initial thinking suggests the following opportunities:

- Improved north-south linkages across the Parramatta Road corridor, and possibly others.
- New facilities may be developed in the Parramatta Road corridor where traffic has been reduced and road space allows.
- Improved facilities through Sydenham and Marrickville will be explored as a result of reduced traffic.
- New facilities may be developed in the Princes Highway/Alexandra Canal corridor either where traffic has been reduced, or as part of the new road link.
- A new connection from the Sydenham/Marrickville area across Princess Highway to the Sydney Airport area will be investigated.

The further design and development of WestConnex will provide the opportunity to work with local stakeholders and communities to explore and optimise benefits for those who travel by bus, bicycle and on foot in the area through which it passes.



## 4 Evaluation and outcomes

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The benefits of WestConnex were identified in Section 3. What follows is a preliminary high level quantitative and qualitative evaluation of the scheme and identification of the outcomes it may achieve. If WestConnex progresses through the development phase and environmental assessment, similar evaluation criteria will be used.

The following high level criteria were used to evaluate WestConnex options, identify a preferred scheme and define the scope:

- 1 Strategic transport need
- 2 Capacity, connectivity and level of service for forecast future transport needs
- 3 Travel time savings for cars, business vehicles and trucks
- 4 Number of traffic light intersections avoided
- 5 Enables public transport, cycle and pedestrian improvements
- 6 Catalyst for urban renewal
- 7 Minimises environmental and social impacts
- 8 Benefit cost ratio
- 9 Affordability
- 10 Constructability
- 11 Staging and contract packaging
- 12 Timeframe for delivery

A summary of this evaluation follows where traffic and transport, urban renewal, capital expenditure, economic analysis and finance and funding outcomes are grouped.

### 4.1 Traffic and transport

Preliminary traffic analysis has been undertaken for the WestConnex proposal using a Strategic Road Assignment Model. At this stage modelling tools have only been applied at a strategic level with many simplifying assumptions, and are yet to be refined.

Further modelling work is required to evaluate future transport network performance, both road and rail, with and without WestConnex. Further evaluation will include testing of scope and tolling options, impacts of induced traffic and mode shifting and impacts on the existing road network.

Preliminary modelling results indicate that the most significant travel time savings with a WestConnex in place in 2021 would be realised by users on the M4 corridor, Table 2.

On the trip from Parramatta to Sydney Airport there would be savings of up to 35 minutes with WestConnex, avoiding up to 52 sets of traffic signals. This would represent a significant benefit to businesses (and their customers) located in the growing economic centres in and around Parramatta.

Similarly, the trip from Eastern Creek to Port Botany would be up to a half hour faster with 44 traffic signals avoided. This would represent a significant benefit to the freight, logistics and warehousing operators located in the Western Sydney Employment Hub at the junction of the M4 and M7.

Preliminary modelling indicates there would be considerable congestion relief on some existing roads resulting from an M4 Extension. For example, at some locations on Parramatta Road traffic would be reduced by in the order of 25% to 40%. These reductions are expected to be significant enough to be a catalyst for the rejuvenation of urban life on Parramatta Road. It will also enable significant improvements to bus operations, cycling and walking on and across Parramatta Road.

On the M5 corridor, travel time savings would be up to 15 minutes on the trip from Revesby to Port Botany, as would be the case with the trip from Liverpool to Sydney Airport, Table 2. There would be no traffic signals avoided as the current route is motorway standard.

**Table 2: Travel time savings with WestConnex in 2021 compared to travel via existing routes**

Between	Existing route	Estimated time saving using WestConnex (minutes)	Traffic signals avoided
Parramatta and Sydney Airport	via City Rd, Regent St	35	52
Parramatta and Sydney Airport	via Sydenham Rd	30	44
Eastern Creek and Port Botany	via Sydenham Rd	30	44
Flemington to Sydney Airport	via KGR/M5	15	0
Revesby to Port Botany	via General Holmes Dr	15	0
Liverpool to Sydney Airport	via Marsh St	15	0

## 4.2 Urban renewal

The *Federal Urban Design Protocol* indicates that high quality urban development achieves benefits in productivity, sustainability and liveability. Investing in transport infrastructure in the Parramatta Road corridor supports these benefits by not only improving transport but by changing the role and environment of Parramatta Road. It does this through the separation of through traffic and freight from local traffic and the reorganisation of Parramatta Road itself.

In a similar way that the Eastern Distributor project facilitated change in the built environment through Surry Hills and Moore Park, a project of WestConnex's scale would provide the opportunity to reshape and revitalise the Parramatta Road corridor and open up development opportunities for new residential sites and businesses.

Similarly, a new high standard tunnel connecting the M4 Extension in the Camperdown area to the St Peters area would substantially improve the mix of local and through traffic on surface roads in the inner west and St Peters. This opportunity to restore local streets to the function of providing local access and connectivity will facilitate improved amenity and liveability through and along the adjoining areas.

## 4.3 Capital expenditure

The target WestConnex capital expenditure estimate for property acquisition and construction is approximately \$10 billion (\$2012).

This target cost is derived from a preliminary estimate for the program, which assessed project costs as being in a range from \$10 to \$13 billion, depending on the assumptions made about scope and contingency levels. At this stage in a project lifecycle, particularly one of this scale and complexity, there is uncertainty over this cost estimate – for example in relation to the exact design configuration, property acquisition costs, number of lanes on the new roads and standard of connections to the existing road network.

The capital expenditure estimate has been prepared by dissecting the scheme into separable staged projects, making assumptions on the connections and alignments, preparing strategic engineering designs, considering construction methods, measuring quantities, applying approximate rates and applying a contingency amount for risks. The costs per lane kilometre were benchmarked against existing projects of a similar nature.

Should WestConnex be adopted by the NSW Government, focus will be placed in the next stage in optimising costs and refining options to value engineer the proposed scheme, making best use of public and international private sector expertise. Attention will be placed on constraining costs where possible to meet the target capital expenditure estimate, balanced against the implications for transport flows and the wider benefits WestConnex is expected to provide.

## 4.4 Economic analysis

WestConnex would provide substantial capacity and connectivity improvements to the road infrastructure servicing the two biggest economic wealth generators in Sydney, namely Sydney Airport and Port Botany. This would provide significant benefits to both the direct users WestConnex and also to the many businesses which rely on an adequate long term transport solution to and from these sites.

A high level economic assessment has been undertaken on a number of scenarios, including tolled and untolled options and various project scopes. The assessment has used the target capital cost estimate outlined above of \$10 billion plus estimated operating costs which for comparison against the direct road user benefits from the project over a 30 year post construction operating life.

The calculated benefits are predominantly network-wide travel time savings which represent greater than 90% of the transport benefits, with the remaining benefit comprising reductions in distances travelled, fuel efficiencies and road safety improvements.

When these capital costs and direct user benefits are discounted back to 2012 dollars and then compared, the project generates a transport benefit to cost ratio (BCR) of over 1.5 times, implying economic benefits are approximately over 1.5 times costs. This analysis provides compelling rationale as to why the project should proceed from an economic perspective alone.

The economic assessment only includes direct transport user benefits and costs from the scheme and does not capture any positive externality benefits generated by the project. For example, it does not include any uplift in real estate values from the improved urban fabric or the general economic benefits from having well functioning port and airport facilities.

## 4.5 Financing and funding

The WestConnex scheme would be, by a large margin, the most expensive motorway development for Sydney to date and will require substantial financing and funding resources.

While often used interchangeably, the terms “financing” and “funding” are in fact distinctly different. *Financing* refers to the source of capital required to pay for the development of a project, whereas *funding* refers to the source used to repay the financing. Road financing is typically private sector debt or equity, or public sector debt. Road funding is typically the tolls a user pays or consolidated revenue for a government funded road.

There will need to be an evolution away from past models in the structure of the financing and funding model for WestConnex. This is due to the following factors:

- Many of the early motorways were built at “no net cost to Government” due to their high potential traffic and the low construction cost (being surface roads). The Westconnex scheme has high traffic utilisation forecasts but the construction costs per kilometre are high due to expensive tunnelling and elevated sections. This is the consequence of construction in a high-density urban environment. Therefore, revenue forecasts do not completely cover construction costs.
- Some of the recent toll roads in Australia have been poor investments for the private sector. This has resulted in losses to investors predominantly due to traffic demand forecast being overly optimistic. This has led to a situation where it is likely the private sector sponsors will be unwilling to take traffic demand risks without some form of Government support.

These issues may lead to a requirement for NSW Government to provide direct funding to Westconnex and also to act as an intermediary to take on all or part of the development and start up traffic risk.

## 4.5.1 Financing strategy

Financial affordability relies on the ability of the project sponsor to raise debt and equity to cover delivery costs. In the case of WestConnex the project sponsor might be either an arm of government or a private sector entity. The delivery costs will be incurred over an extended period, in the order of ten years.

Despite private sector finance constraints relating to the Global Financial Crisis (GFC) and other issues, some private sector infrastructure projects have recently been brought to market. Examples of recent large infrastructure transactions undertaken using private sector finance include the Sydney Desalination Plant, the Melbourne Desalination Plant, the M2 upgrade, the M5 upgrade and the Victorian Comprehensive Cancer Centre. These examples demonstrate that private sector finance is available for large infrastructure projects with the appropriate risk profile.

In a project such as WestConnex, costs would be relatively low in the early years when design development, stakeholder consultation, environmental assessment and some enabling works will be undertaken. The rate of expenditure will accelerate as property acquisition and construction gets underway in earnest. It is envisaged WestConnex would be delivered in stages which can be opened for business and start collecting tolls whilst new sections are built. This means that construction debt on early stages could start to be repaid. Near the end of the construction period project net cash flows would likely slow and flatten in the final years of construction.

Optimisation of the cost of capital would be critical to a successful financing strategy for WestConnex. In particular, the following factors are relevant:

- Following the GFC, the gap between the cost of private sector finance and Government sector finance has grown significantly. This “risk premium” is currently around 3-4% per annum.
- The NSW Government, by itself, would be likely to find it challenging to fully finance WestConnex on its own balance sheet.

Accordingly, the financing strategy, should WestConnex proceed, is expected to make use of both public and private finance, but designed so as to mitigate the cost of capital impact while managing the implications for the State’s balance sheet. At the heart of this will be a careful assessment of the value for money of transferring specific risks to the private sector.

In current market conditions, it is likely that government will need to provide financing support for WestConnex during the construction and ramp-up phase due to the absence, at present, of private financing at commercial rates. These governmental financial contributions would be expected to be repaid over time as traffic flows mature.

From the perspective of demand risk, it is notable that the majority of traffic on WestConnex comprises mature traffic flows from the existing M5 East and M4 corridors. Greater confidence could be provided to potential bidders by the NSW Government commissioning a reference case of traffic forecasts that were made available to all bidders under appropriate reliance conditions. There are reasonable grounds for expecting that private sector financiers would be able to take a view on the reference case traffic flows. For greenfields traffic on the central part of WestConnex, a cap and collar arrangement, or an alternative risk sharing approach, may be appropriate during a transitional period.

Should WestConnex be approved by the NSW Government, it is expected that the special purpose organisation that would be charged with delivering the program would engage the market regarding the appropriate mechanism for transferring patronage risk to the private sector, consistent with desired value for money outcomes.

## 4.5.2 Funding strategy

The viability of WestConnex is linked to the implementation of a toll regime which will go to meet the costs of construction and operation. It is likely there would be a shortfall which would need to be met by some form of government contribution.

Tolls have the effect of attracting users who value the motorway most highly. Too high a toll will deter users, pushing them onto adjacent local roads. Too low a toll will attract too many users and the motorway will become congested and the asset will not deliver travel time savings and the economic benefit will fall.

A suitable balance between tolls and costs will optimise the economic outcome and minimise the government contribution all within a budget that is supportable by the economy. The next stage of development of the project will seek to identify that balance.

## Funding sources

All else being equal, Government funding of major infrastructure results in a higher taxation level, asset sales or foregone investment of either the project or other Government infrastructure. In general, the broad funding options include combinations of:

- Toll revenue from the newly constructed motorways
- Toll revenue from existing motorways which are being upgraded
- Consolidated revenue from NSW and/or Commonwealth Government contributions
- New or increased taxes
- Value capture from improved real estate values
- Recycled capital from the sale of other Government assets

## Tolling

There are limited public revenue sources for funding, operating and maintaining major infrastructure upgrades in NSW. The early delivery of WestConnex, that is over the next 10 years, is dependent on some form of tolling to raise revenue to support the capital and operating costs of the proposal. Tolling will need to be set at a reasonable level for road users.

Considerable work has been undertaken to understand what toll framework for WestConnex would best respond to lessons learned on other projects and takes advantage of modern electronic tolling systems. Desirable tolling features have been identified, but these are early findings and much work is still needed to give specific guidance on actual tolls and tolling arrangements.

The desirable features of the proposed tolling of WestConnex are as follows:

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 or commercial vehicles	Most Sydney toll roads charge heavy vehicles a multiple of 2 to 3 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.

Tolling would be introduced on each stage of WestConnex as it is developed. On new sections of the road, an initial toll free period may be trialled to enable travellers to become familiar with the route.

More development work is needed to establish the configuration of WestConnex, such as numbers of lanes at particular points. These factors, as well as tolling regimes, will also affect traffic

volumes, and so toll levels will be defined as part of the subsequent steps in developing WestConnex.

Initial modelling indicates that around 75% of the funding for WestConnex could be sourced from user charges over time. This would leave the requirement from other funding sources – including from the NSW and Commonwealth Governments – at around \$2-3 billion in total.

## 5 Outline procurement and delivery plan

### 5.1 Governance

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In the 2012-13 Commonwealth Budget the Commonwealth Government provisionally committed to provide up to \$25 million to the NSW Government to establish a special purpose vehicle or organisation (SPV) to develop motorway projects for Sydney. In the 2012-13 State Budget the NSW Government has committed \$30 million in matching funding, in anticipation of the State Infrastructure Strategy.

A special purpose organisation will be formed to provide the necessary governance for government and the private sector to work together to deliver a pipeline of market ready proposals.

Early activities will include further development of the motorway network vision, development of route strategies, development of urban renewal concepts and definition of individual projects.

Once priorities have been established, activities will include the development and implementation of procurement strategies, funding solutions, tolling strategies, property acquisition and obtaining the necessary approvals.

Implementation of the WestConnex scheme will move through the following stages:

- Establishment of the special purpose organisation.
- Planning and development, including environmental assessment.
- Procurement and delivery.
- Operation including revenue collection.

### 5.2 Planning and development

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During the planning and development stage, further work will be carried out to ensure that WestConnex meets the stated objectives (see Section 1.4) for the project.

Based on recent learning from other motorway projects in Australia it is critical that WestConnex provides best value as a transport solution and as an investment, whilst providing significant community benefits. The preliminary development work by Infrastructure NSW, TfNSW and RMS on WestConnex has established that the concept scheme appears to strike an appropriate balance.

Further development work is required to optimise the transport, economic, environmental, community and financial outcomes of WestConnex. Various detailed options for route alignment and connections to the existing arterial road network will be tested to ensure that the physical characteristics provide the most effective transport solution, with a positive economic benefit and within a cost that is affordable.

Further development work and studies will include transport modelling, scope refinement, environmental impacts and value management. The activities in the planning and development phase will include:

1. Development of a reference design, including:
  - Preliminary environmental assessment
  - Options assessment
  - Land requirements
  - Stakeholder analysis and initial engagement
  - Industry engagement
  - Cost estimation

- Economic analysis and benefit quantification
- Funding solutions (including tolling options and government contribution)
- Risk assessment, mitigation and allocation
- Implementation plan (including procurement strategy and staging)
- Business Case and Project Implementation Plan for Government approval to proceed (including Project Definition Reports, Strategic Options Reports and Delivery Strategy Reports)

## 2. Environmental assessment, including:

- Detailed reports on the project need, justification and objectives
- Detailed reports on environmental impacts
- Community consultation and stakeholder engagement, including public displays and project presentations
- Assessment of tolling options

## 5.3 Environmental assessment and consultation

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The activities outlined above for the planning and development phase will include detailed studies on the traffic, environmental, urban renewal, social and economic impacts. This work will include definition of the project packages which will be necessary to inform and enable a detailed assessment of environmental impacts.

The scope definition, staging and commercial aspects of WestConnex will inform the assessment of environmental impacts. The studies will be used to inform engagement with the community, stakeholders, government agencies and the Department of Planning and Infrastructure. Engagement will include various forms of consultation including public exhibitions of the proposal, public meetings and time for discussion. Public submissions will be sought and responses to the issues raised will be developed and documented.

The environmental assessment of projects of this scale and complexity takes time and must be responsive to the issues and opportunities identified by all stakeholders. To ensure proper consideration has been given to social and environmental impacts, sufficient time is required for technical studies, consultation with stakeholders and the community and measures to modify project scope to mitigate identified impacts.

Planning approval will only be granted if the Department of Planning and Infrastructure is satisfied that all issues and environmental concerns have been adequately addressed. It is expected that the planning approval will include conditions imposed by the Department of Planning to ensure that mitigation measures will be enacted during construction and operation of the project packages.

## 5.4 Urban renewal

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WestConnex will be an urban renewal project as well as a transport project. It is intended that public and private sector investments in WestConnex will support urban renewal objectives as part of the delivery of the motorway program.

The organisation responsible for the planning and delivery of WestConnex will work with the newly established Urbangrowth NSW to develop a master plan for urban renewal along the Parramatta Road corridor and strategies for its achievement.

The master plan will be developed through extensive consultation and collaboration with key stakeholders, relevant authorities, potential developers and landowners in the corridors. Planning and urban design objectives, principles and projects will flow from the consultative process.



### **A new authority – Urbangrowth NSW**

Urbangrowth NSW was established in 2012 to act as a key new driver of the Government's approach to housing delivery.

The new agency is tasked with planning and fast-tracking urban renewal projects to unlock private sector investment, providing more housing choice and affordability in Sydney.

Urbangrowth NSW will focus on targeted government intervention in the property market to achieve desired outcomes.

There is a real opportunity for Urbangrowth NSW to have a role in developing the WestConnex proposal to ensure it is delivered as a transformational project for Sydney.

A suitable process to ensure the best urban outcome would include:

- A clear urban design vision and objectives for the area and the projects.
- Wide and detailed stakeholder engagement from an early stage.
- Equitable sharing of benefits which will flow from the Government's investment.
- Early engagement with the private sector to identify opportunities and anchor developments.
- A clear and equitable process of property acquisition started early.

## **5.5 Procurement strategy**

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WestConnex is a scheme that will take around ten years to complete, if approved by the NSW Government. Development and planning can progress on the whole vision but construction will be done in stages, as they become feasible and affordable. The definition and timing of each stage will take into account the:

- Transport benefits accruing as each stage is opened.
- Capacity of financial and construction industries to finance and deliver the works.
- Allocation of construction, operational and revenue risks in appropriate forms of contract.
- Competitive bidding process to maximise value for money for government.
- Time required for community and stakeholder consultation.
- Time required for enabling activities such as property acquisition, planning consent, detail design, utility relocations, third party agreements, traffic management prior to construction and the like.
- Interaction between the road infrastructure delivery contracts and the achievement of urban renewal objectives.
- Private sector appetite for urban renewal development projects.

### **Creating a new model to partner with the private sector**

The WestConnex scheme would be, by a large margin, the most expensive and complex motorway development for Sydney to date. A disciplined procurement approach is essential if the project is to be delivered to time and budget. This procurement structure must have a focus on achieving core project outcomes while providing value for money.

Innovation will be critical to the successful delivery of WestConnex. It is intended that the private sector will be involved early in the process to develop the Westconnex scheme and drive innovation. Innovation in the design and delivery of the program would be enabled by defining the minimum mandatory criteria to achieve transport and urban renewal objectives rather than specifying detailed solutions.

The sizing of contract packages will be a function of a range of factors, including procurement efficiency, security package requirements and delivery timetable.

Some initial construction on WestConnex could occur within two to three years, particularly on the M4 widening, but most major construction is expected to occur in the second half of the decade.

Opening of the WestConnex scheme can occur progressively as sections are completed. Considerations relevant to each core component are set out below.

#### **M4 Widening**

The infrastructure works to expand the existing M4 between Parramatta and North Strathfield can be programmed at any time within the overall program, subject to environmental assessment and planning approval. This section of works covers a long distance and the impacts on existing traffic during construction will require careful management. In particular, traffic impacts in the North Strathfield area will require careful consideration.

#### **M4 Extension**

The M4 Extension will require a significant period of planning and consultation to optimise the desired outcomes. An early start to detailed development work is therefore desirable. To minimise disruption to Parramatta Road traffic and businesses, this stage may be delivered in smaller packages for construction purposes.

#### **Tunnel from Taverners Hill (Petersham) to the St Peters area**

As with the M4 Extension, significant planning and consultation is required. Surface impacts will be very limited, but careful consideration of the proposed connection in the Camperdown area will be required. The sequencing of this stage within the overall scheme is flexible.

#### **M5 East Duplication and Sydney Airport Access Link**

Together, the M5 East Duplication and Sydney Airport Access Link can be progressed using feedback from the feasibility assessment and options released for consultation with the community in 2009/10.

Further detailed work and consultation is required to determine a preferred route alignment between the M5 East tunnel and the St Peters area which would avoid Tempe Reserve as far as possible and provide separation from Tempe residents.

There is a strong functional link between M5 East Duplication and the Sydney Airport Access Link which means the two would need to be delivered and opened to traffic together.

## 6 Next steps

Sydney's economic productivity and liveability is seriously impacted by the M4 missing link and consequential blight on Parramatta Road, congestion on the M5 East and transport demands around the Sydney Airport/Port Botany precinct. The forecast growth in high value freight and commercial trips to and from the precinct will exacerbate these problems in the medium term future.

The sheer scale and complexity of these problems requires a transformational solution. The solution must be conceived in a way that it can fit within and connect to the existing transport system. It must also enable and support urban renewal and improve the liveability of the city. Not only must it be physically transformational, but it must also change the way in which projects of this nature are financed and funded so that it is truly achievable.

It is considered that WestConnex can achieve all this, and indeed the stated project objectives. Infrastructure NSW therefore recommends that WestConnex proceed as Sydney's next motorway priority as it is at the centre of addressing Sydney's key transport challenges.

Should the NSW Government decide to progress the WestConnex proposal with a view to it being in place over the next 10 years, the following actions are recommended.

Governance & Planning	Project Development
<ol style="list-style-type: none"> <li>1. Establish a Government led Steering Committee for Sydney motorway projects to provide cross agency co-ordination and to provide a forum for high level, integrated and effective decision making.</li> <li>2. Establish a dedicated special purpose organisation to develop Sydney motorway projects and funding solutions, building on the findings of the work that has already been undertaken over the past decade.</li> <li>3. Complete transport planning work including future land use analysis and transport forecasts across all modes to confirm the transport needs.</li> <li>4. Refine the WestConnex transport objectives to maintain a focus on the priority issues in project definition, noting the need for a multifaceted solution.</li> <li>5. Define urban renewal objectives and principles with Urbangrowth NSW to inform an urban renewal strategy for the Parramatta Road corridor.</li> <li>6. Continue discussions with the Commonwealth Government to maintain alignment with Commonwealth infrastructure objectives.</li> </ol>	<ol style="list-style-type: none"> <li>1. Delivery strategy, including               <ul style="list-style-type: none"> <li>• Develop staging plans and procurement packages.</li> <li>• Define the projects and their scope</li> <li>• Consider the timing of each project and funding solutions</li> <li>• Develop procurement strategies, including consultation with industry</li> </ul> </li> <li>2. Concept reference designs, including;               <ul style="list-style-type: none"> <li>• Preliminary environmental assessment</li> <li>• Options assessment</li> <li>• Land requirements</li> <li>• Stakeholder analysis and initial community and industry engagement</li> <li>• Cost estimation</li> <li>• Economic analysis and benefit quantification</li> <li>• Risk assessment and mitigation</li> <li>• Funding solutions (including tolling options and government contribution)</li> <li>• Business Case</li> <li>• Project Implementation Plan for Government approval to proceed (including Project Definition Reports, Strategic Options Reports and Delivery Strategy Reports)</li> </ul> </li> <li>3. Environmental assessment and procurement strategies, including:               <ul style="list-style-type: none"> <li>• Detailed reports on the project need, justification and objectives</li> <li>• Detailed reports on environmental impacts</li> <li>• Community engagement, including public displays and project presentations</li> <li>• Assessment of tolling options (in collaboration with Road Pricing &amp; Tolling project team)</li> </ul> </li> </ol>

Governance & Planning	Project Development
	<p data-bbox="783 253 1098 282">Planning approval to proceed</p> <ul data-bbox="735 282 1337 510" style="list-style-type: none"> <li data-bbox="735 282 1011 311">• Industry engagement</li> <li data-bbox="735 311 1337 394">• Identification of opportunities for private sector involvement in land acquisition, development and value capture</li> <li data-bbox="735 394 1337 454">• Assessment of risk appetite in construction industry, financial markets and motorway operators</li> <li data-bbox="735 454 1166 483">• Review of international PPP models</li> <li data-bbox="735 483 1193 510">• D&amp;C and PPP contract documentation</li> </ul> <p data-bbox="687 539 962 568">4. Staged project delivery</p>