Westconnex Business Case Review

Final Report

City of Sydney
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SGS Economics & Planning

Independent insight.

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EXECUTIVE SUMMARY

After little more than two years of project development, the business case for WestConnex, Australia's most expensive transport infrastructure project was approved by the New South Wales Government in August 2013. It was sold as a congestion busting project which would help to revitalise the Parramatta Road corridor and improve links to Sydney's Global Gateway with a benefit cost ratio (BCR) of 2.55. The full business case was not released publicly so the detailed thinking and modelling could not be independently assessed. The decision to invest in 33 kilometres of motorway at a cost of $16.8 billion was surprising given Sydney's global peers are using public transport investment and demand management tools such as road pricing to manage congestion and help their cities grow. The decision was also questioned due to the failures of the Cross City Tunnel, Lane Cove Tunnel and similar projects in Brisbane. The New South Wales auditor expressed a range of concerns in regards to the business case on which the decision to proceed with WestConnex was made. Infrastructure Australia also raised concerns and the project was not, and still is not, rated as 'ready to proceed'[1]. Despite this, the project is underway, with the widening of the M4 (part of Stage 1) under construction and major works on the M4 East (also part of Stage 1) and the New M5 (Stage 2) scheduled to commence in the very near future.

In November 2015, the *WestConnex Updated Strategic Business Case* was released publicly. The *Updated Strategic Business Case* is a confused document filled with contradictions which does little to address the wide ranging concerns about WestConnex. For example, on the basis of information presented in the *Updated Strategic Business Case*, it appears that the BCR has been incorrectly quoted as 1.71. The quoted net present value of benefits and costs actually result in a BCR of 1.64. The *Updated Strategic Business Case* describes the need to fill in the missing links in Sydney's motorway network, but it does not identify connecting the M4 and M5 as a priority despite Stage 3 of WestConnex connecting the M4 and M5.

Sydney's level of road congestion is ranked amongst other global cities to help justify WestConnex, but the *Updated Strategic Business Case* does not acknowledge that building major new motorways is not a solution that other similarly congested cities are implementing. The *Updated Strategic Business Case* describes how WestConnex will help renew Parramatta Road by reducing traffic on the surface, but then presents information showing that many parts of Parramatta Road will carry more traffic, not less, due to WestConnex. Access to Sydney's Global Gateway is touted as a key benefit of the project. However, the actual road link to Sydney Airport and Port Botany is not included in the scope of the *Updated Strategic Business Case*.

The transport modelling contains many unexplained and counterintuitive results. This raises some doubts about the effectiveness and accuracy of the transport demand forecasts and the economic benefits claimed for the WestConnex project. A number of examples of the concerns over the transport economics are:

- Infrastructure Australia requested that WestConnex assess the impact of induced demand. Induced demand accounts for people making new car trips, shifting from public transport or changing routes to make use of a new infrastructure project which in turn, reduces travel time savings. Despite the induced demand being reported as being significant, the overall transport benefits have only been reduced by 3 per cent. A figure ten times that amount would be more likely. A 30 per cent reduction in transport benefits resulting from induced demand would reduce the BCR from the recalculated 1.64 to 1.15.

[1] Infrastructure Australia 2014-15 Assessment Brief: WestConnex. http://infrastructureaustralia.gov.au/projects/files/NSW-WestConnex.pdf

- The removal of small travel time savings (of less than 5 minutes) from the transport modelling would reduce the BCR from the recalculated 1.64 to 1.12. These small travel time savings are often not realised and can be considered inframarginal (too small to measure or notice) in economic terms.
- A high expansion factor (345 days) is used to convert daily benefits to annual benefits, which would increase the benefits by around 7 per cent compared to a more realistic factor of 320 days. The use of the more realistic factor would reduce the project BCR would reduce from the recalculated 1.64 to 1.52.
- Failing to account for the impact of the traffic flowing from the Western Harbour Tunnel onto WestConnex would also over-inflate the travel time savings. The *Updated Strategic Business Case* makes clear that the opening of the Western Harbour Tunnel will push up traffic volumes and the motorway network will be close to capacity.
- No modelling is undertaken after 2031, so there is no information on how WestConnex will perform in the longer term. Despite the Western Harbour Tunnel creating capacity constraints for WestConnex, benefits of the road are assumed to continue to increase until 2052.
- The very high transport benefits for business and light commercial vehicles are not explained by the *Updated Strategic Business Case*. The origin and destination of these trips is not explained at all. Given these two vehicle classes account for half of the WestConnex user benefits this is a major concern.
- The construction cost of the project appears conservative. A 30 per cent increase in project construction costs could reduce the BCR from 1.64 to 1.10.
- Not all costs have been accounted for, or are only partly accounted for. Reduced amenity impacting on urban development, acquisition of land which could be used for other higher value activities, reduced health benefits from potentially reduced public transport patronage and the cost of more severe car crashes have not been fully accounted for.

All of these issues with the economic appraisal of WestConnex suggest that the project is likely to be marginal at best. When considering the number of benefits that are likely to be overestimated and costs that may have been underestimated, it is quite possible that the actual BCR for WestConnex is less than one. New South Wales taxpayers will be exposed to the risk of the project not succeeding in the short to medium term. Given this and the lack of strategic justification, the decision to proceed with WestConnex is questionable. However, the decision has been taken and construction has commenced.

The key challenges with WestConnex are now to maximise the benefits the project will generate, minimise costs and ensure that options areavailable to manage the future growth of Sydney. Access to the airport and port will help to unlock the benefits of the project. Traffic management mechanisms are required on local streets which will have increased traffic to maintain local amenity and road safety for pedestrians.

After the opening of WestConnex, Sydney will still be faced with traffic congestion. Following the example of other developed cities this will have to be dealt with via improved public transport and demand management. However, if the concessions made to toll road operators of WestConnex prevent public transport or demand management from being used, Sydney's ability to deal with future growth will be compromised.

1 INTRODUCTION

1.1 Project Context

Sydney generates almost a quarter of Australia's Gross Domestic Product (GDP)[2] and houses 20.6 per cent of the population[3]. It is home to much of the nation's key economic infrastructure and is critical to the prosperity of the economy and the residents of New South Wales and Australia. Given Sydney's paramount importance, the structure and functioning of the city has ramifications across all spheres of government, whether in relation to issues of productivity, social stability, environmental sustainability, or, ultimately taxation revenues.

There are many complicated interdependent dynamics at play in Sydney. Nowhere is this more evident than in the interplay between transport and urban development. Individual transport projects can have far reaching and, at times unintended, consequences on both the broader transport network and on the urban structure of the city.

Failing to apply a whole of city, whole of network, integrated transport and land use approach to transport project planning and funding decisions is likely to result in undesirable urban outcomes and be both extremely costly and timely to reverse. With such significant, far reaching and long-lasting impacts, it is critical that those in the realms of city planning, funding and management be across the most up-to-date research on how cities are changing, the drivers of this change, and the potential impacts of investments.

At 33 kilometres and a nearly $17 billion price tag, WestConnex will be the largest road project ever to be completed in Australia. It also sets the stage for an additional 30 plus kilometre of related road projects (Western Harbour Tunnel and Northern Beaches Link, and the Gateway to the South including the Southern Connector) which are designed to increase the transport benefits, but at a potential cost of a further $15 to $20 billion. At $30 to $35 billion this would be one of most expensive transport infrastructure projects ever undertaken in the world.

While the scale of WestConnex is undisputed, there are many questions around whether it is the right project for Sydney, what benefits it will generate and whether it will serve Sydney well over the coming century with a toll concession period ending in 2060. Many of these questions come from the failure of previous toll road projects. The Lane Cove Tunnel, Cross City Tunnel and the Clem 7 in Brisbane have overestimated travel time savings and drivers' propensity to use the toll road to the point where the toll roads have been financial disasters.

This reports reviews the *WestConnex Updated Strategic Business Case* (and associated supporting documents) released in November 2015 to understand the strategic purpose of the project, assess the assumptions and methodologies used and provide other useful insights.

[2] http://www.sgsep.com.au/assets/GDP-by-Major-Capital-City-1314.pdf
[3] http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/3218.0

1.2 Project brief

SGS Economics and Planning (SGS) has been tasked with reviewing the *WestConnex Updated Strategic Business Case* and associated supporting documents. The focus for this review is centred on answering three questions:

1. Why has this project been proposed and what is the justification for it?
2. Will the road make a difference to Sydney?
3. Will that difference be worth the cost of the project?

Particular issues which are examined in this review are:

- Assessment of alternatives to WestConnex
- The willingness to pay and the value of time for users of the toll road
- Who the users of the road are likely to be (the split between business and commuters) and various catchments it will serve
- Treatment of induced traffic demand
- The cost of the project
- The treatment of enabling / complementary projects (for example the Sydney Gateway and Western Harbour Tunnel)
- The sensitivity of the Benefit Cost Ratio to the factors listed above
- The concession period for the project
- The procurement of investors for the completed WestConnex.

1.3 Project history

Original route (2012)

WestConnex was first announced as part of Infrastructure NSW's *State Infrastructure Strategy* (SIS) in 2012. Infrastructure NSW promoted WestConnex as being a catalyst for the renewal and transformation of areas through which it passes. The SIS highlights that "WestConnex is intended to be 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 is intended to develop as an integrated land use and transport scheme delivering on road transport, urban renewal and public transport outcomes"[4].

The motorway was designed to link the existing M4 and M5 motorways and Sydney Airport through the inner west of Sydney. The key opportunities and benefits envisaged as part of the WestConnex are detailed in Figure 1.

[4] Infrastructure NSW 2012, State Infrastructure Strategy

FIGURE 1. WESTCONNEX ALIGNMENT 2012

Source: Infrastructure NSW, 2012

WestConnex was also promoted as supporting freight and people movements to Sydney Airport, relieving congestion and facilitating improvements in public transport. The strategic justification of the projects in the SIS included:

- 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.

However, the SIS stated that existing assets should be maximised before investing in new projects:

> *"NSW should also maximise the use of existing assets wherever possible before investing in new projects because it is both cost effective and it is capable of delivering quick improvements for the community that are sacrificed when there is too great a focus on big projects with long lead times".*[5]

The clear intention of this statement is that the existing M4 and M5 motorways should be tolled as a way of managing demand rather than embarking on a major construction project.

In October 2012, the State Government announced it would proceed with Infrastructure NSW's recommendation and develop a business case for WestConnex. This business case was approved by the New South Wales Government in August 2013, and the WestConnex Delivery Authority (WDA) was set up to run and manage the project in October 2013.

As shown in the text box below, the NSW Auditor General raised concerns around the development of the business case process and noted that "*the preliminary business case submitted for Gateway review*

[5] Infrastructure NSW 2012, *State Infrastructure Strategy*, p. 24

had many deficiencies and fell well short of the standard required for such a document. Further, on our analysis, the business case put to the Government still included some deficiencies that independent Gateway reviews and external assurance arrangements, if they had occurred, should have identified" (NSW Auditor-General 2014, p. 3).

WestConnex Assurance to the Government

In December 2014 the NSW Auditor-General issued a report into assurance processes associated with WestConnex. This highlighted that the process undertaken to date is not considered satisfactory. The focus of the audit was to determine whether WestConnex assurance processes are consistent with key principles underlying NSW Government major projects assurance frameworks and have been effectively implemented to provide sound, independent assurance to Government and project sponsors.

The audit did not examine the merit of the project or whether it represented value-for-money. The report found that additional independent gateway reviews should have been conducted. Only one review was conducted which found that the preliminary business case was deficient and fell well short of the standard required for such a document. Four additional gateway reviews should have been conducted.

A number of other conflicts of interest were raised in relation to governance arrangements and the board members of WDA. The final conclusion of the report was that "*There were a number of deficiencies in governance and independent assurance over the early stages of the WestConnex project. Going forward, these need to be rectified to ensure that WestConnex achieves the expected benefits at a reasonable cost". Further to this, the report notes that "The preliminary business cases submitted raise deficiencies in business cases on which decisions have been made*".

Updated WestConnex Route (2014)

In June 2014, the NSW Government announced that WDA would prepare a business case for two extensions to WestConnex. Northern and southern extensions were proposed, with the WDA to assess the feasibility and affordability of the change to scope. These extensions were both identified within Transport for NSW's 2012 *Long Term Transport Master Plan* as corridors for investigation and (in the south) to provide a connection to the F6. How this alignment is superior (for example, in terms of a cost benefit analysis) to the original alignment is not stated.

The northern extension will link the former Rozelle Goods Yards to Victoria Road to the north and ANZAC Bridge and Western Distributor to the east. The southern extension will connect the new M5 East to President Avenue in Rockdale.

According to the INSW 2014 Update, these extensions aim to offer a western bypass of Sydney's CBD to alleviate existing pressure on the existing north-south corridor of Sydney's orbital network and also to reduce journey times from the south. Stage 3 of WestConnex was rerouted towards the northern extension and away from Parramatta Road.

The updated alignment from December 2014 is shown in Figure 2, with Stage 3 illustrated in dark blue as the M4-M5 Link. The realignment has resulted in Parramatta Road no longer being duplicated from Haberfield to Petersham and has introduced a connection onto Parramatta Road at Camperdown. Hence the opportunity for urban renewal along Parramatta Road was all but lost.

2015 Updated Strategic Business Case

The *Updated Strategic Business Case* released in November 2015 consolidates the work undertaken in the original business case, with additional modelling, analysis and changes to the reference design enhancements. The remainder of this report will examine the *WestConnex Updated Strategic Business Case* in more detail but the key implications of the current project compared to the original project are:

- The various stages of WestConnex will be constructed more quickly allowing benefits to be unlocked more quickly.
- The Stage 1 section is closer to the CBD and will generate increased congestion for those travelling to and from the CBD and Eastern suburbs. The ANZAC Bridge will be particularly adversely impacted.

- Urban amenity and local traffic conditions will not be improved along Parramatta Road by WestConnex, and the opportunities for urban renewal will not be improved by the project. Hence one of the key strategic reasons for the project has been lost.
- The route which will allow access to Sydney Airport and Port Botany is not fully explained and will be delivered four years after the opening of Stage 2 of WestConnex. The *Updated Strategic Business Case* is also silent on the potential impact of the Western Sydney Airport on future traffic demand. It is unclear if the access to Sydney's global gateways will be improved with the new airport, hence bringing into question one of the key strategic reasons for the project.

FIGURE 2. WESTCONNEX ALIGNMENT (NOVEMBER 2015)

Source: WestConnex Delivery Authority, 2014

2 PROJECT JUSTIFICATION

2.1 Introduction

To examine the justification for WestConnex, the use of a Strategic Business Case was considered, and Sections 2 to 7 of the *Updated Strategic Business Case* were reviewed. These Sections present information on the project history, alignment to planning policy and to future transport and urban renewal projects.

2.2 The use of a Strategic Business Case at this stage of the project

It is unclear whether a Final Business Case is being prepared or has been prepared for WestConnex. Final Business Cases are required by Treasury for projects with a total cost of over $5 million (NSW Treasury 2012).

Given the construction of components of WestConnex have commenced, it would be assumed that a Final Business Case has been prepared. The key differences between a Preliminary Business Case and a Final Business Case are described by NSW Treasury, and are summarised in the following table.

A Strategic Business Case is higher level than a Preliminary Business Case. The National Guidelines for Transport System Management (NGTSM) produced by the Australia transport Council (ATC) recommend a 3-level appraisal process:

1) Strategic Merit Test (Strategic Business Case)
2) Rapid appraisal (Outline or Preliminary Business Case)
3) Detailed appraisal (Full Business Case).

The use of Strategic Business Cases is not mandated by Treasury. The *Updated Strategic Business Case* meets some requirements of the preliminary business case and the final business case, but not all (see Table 1). To this end, it is not clear what the exact intent of the *Updated Strategic Business Case* is, or whether a Final Business Case will be prepared and released to the public.

TABLE 1. DIFFERENCE BETWEEN PRELIMINARY AND FINAL BUSINESS CASE

Guideline & template requirement	Preliminary business case	Final business case	Updated Strategic Business Plan
Level of accuracy	Cost estimates preferably within 25%	Cost estimates preferably within 10%	Cost estimates shown within 50% (p50)
The case for change	Thoroughly documented	Revisit, updated and complete rationale	Substantially documented
Analysis of the proposal	– Provide a range of alternative service delivery options, comparing the costs and benefits, risks, sustainability issues, technical standards and legislative requirements of each option. – Identify whether Part 3A of the *Environmental Planning and Assessment Act 1979* will be trigged.	Full examination and evaluation of short-listed options, including costs and benefits, risks, sustainability issues, technical standards and legislative requirements.	– Costs and benefits, risks, sustainability issues, technical standards and legislative requirements identified but only for the preferred option. – Environmental Planning and

Guideline & template requirement	Preliminary business case	Final business case	Updated Strategic Business Plan
	– Consider prevention and early intervention options and demand management strategies.		assessment Act 1979 considered – Prevention / early intervention options and demand management not considered.
Implementation of the proposal	Outline the governance model planned to have the proposal successfully taken through to the final business case.	Full examination of the requirements to implement the project or project including the project plan, governance model, procurement strategy, change management strategy, benefits realisation strategy, stakeholder consultation strategy and resourcing issues.	Governance model is outlined
	Business case development plan – summary of the key elements, milestones and risks to achieve the final business case.		Somewhat addressed in Section 18.

Source: Adapted from NSW Treasury 2008, Table 2.

2.3 There is no consideration of alternatives or project options

Section 3 of the *Updated Strategic Business Case* purports to consider 'Solutions in a Strategic Context'. To this end, a range of NSW planning policies are described. The justification for WestConnex relies on its identification as an 'infrastructure solution' in the *2012 State Infrastructure Strategy.*

The *NSW State Priorities*, *NSW 2021* goals, *2012 State Infrastructure Strategy, NSW Long Term Transport Master Plan, 2014 State Infrastructure Strategy, NSW Freight and Ports Strategy, A Plan for Growing Sydney* and the 2014-15 *NSW Budget* are described in Section 3, with qualitative reasoning provided on how WestConnex will achieve select goals and priorities in each policy document. National infrastructure priorities are identified from Infrastructure Australia documentation with the alignment between these and NSW policies and WestConnex identified (Table 3.1 of the *Updated Strategic Business Case*), and a Productivity Commission enquiry into Public Infrastructure is also summarised, noting how a number of recommendations in the enquiry have already been reflected through planning for WestConnex.

It is clear that the intent of this section is to demonstrate the policy and planning alignment of WestConnex, rather than consider solutions in a strategic context. As is the case with previous WestConnex documentation that has been released, there is no consideration of Sydney's growth and transport challenges and what project(s) would be best placed to meet these challenges. This is a fundamental gap in the *Updated Strategic Business Case* and the documentation that has been released for WestConnex to date.

An example of consideration of strategic alternatives is the *East West Link Needs Assessment* undertaken by Sir Rod Eddington for the Victorian Government. The assessment examined four options which combined a range of road and public transport investments to improve east-west transport connectivity in Melbourne. The assessment provided an understanding of the different roles each project would play in solving an identified problem, and the various costs and benefits that each option would generate.

The *East West Link Needs Assessment* study provided a rigorous basis for the development of the Western Distributor Toll Road[6], the Regional Rail Link and Melbourne Metro.

Transport for New South Wales (TfNSW) *Principles and Guidelines for Economic Appraisal of Transport Initiatives (2013)* recommends the identification and analysis of solutions on the basis of physical circumstances and available technologies.

The *Guidelines* note that:

> *'The main risk of distorting the evaluation is the risk of neglecting relevant alternatives, in particular, low cost solutions such as managing and pricing solutions*.'
>
> TfNSW (2013, p. 27).

Indeed, for a project with the magnitude of WestConnex, it is highly concerning that an analytical study of potential alternatives is not considered in the *Updated Strategic Business Case*. The Strategic Alternatives presented are at a high level and quickly dismissed through an objectives-led analysis that is not clearly linked to land use and transport planning goals for Sydney.

2.4 There is a lack of data and analysis which supports strategic need

Chapter 2 of the *Updated Strategic Business Case* examines how WestConnex will address identified problems. Challenges identified in *NSW 2021* are listed and form the basis for the structure of the Chapter. In summary, these key challenges are:

- Serving Sydney's growth
- Addressing traffic congestion
- Serving freight and international gateway traffic
- Supporting job creation
- Supporting urban renewal and housing supply, and
- Minimising impact on State finances.

In 2015, a range of state priorities were released which supersede the *NSW 2021* document. These priorities are listed in the Updated Strategic Business Case (Section 3.1), along with how WestConnex will respond to these.

Section 2.2 of the *Updated Strategic Business Case* presents a range of data which demonstrates that Sydney's population, number of jobs and number of car trips will continue to grow. The presentation of this data is at a relatively high level. For example, Figure 2.3 presents the 'east – west' population and job forecast data for Sydney, without explaining what these areas are. Figure 2.4 presents a series of maps highlighting the location of Sydney's workforce and employment in 2011 and 2031. This data could have been used more effectively to clearly show actual journey to work trips.

In its presented format, forecasts are difficult to read due to the small size of maps and illegible legends. The implications of the analysis presented are also unclear. For example, it is not clear where Sydney's residents will be working in 2031, and whether the trips made to and from work would require the construction of WestConnex.

Examining the Bureau of Statistics and Analysis' (BSA[7]) data provides further insights. From 2011 to 2026, a total of 656,000 new jobs and 1,378,000 additional people will be located in Sydney, bringing total jobs to 3.46 million and total population to 6.99 million. With 722,000 more people than jobs by

[6] The southern option for the East West Link

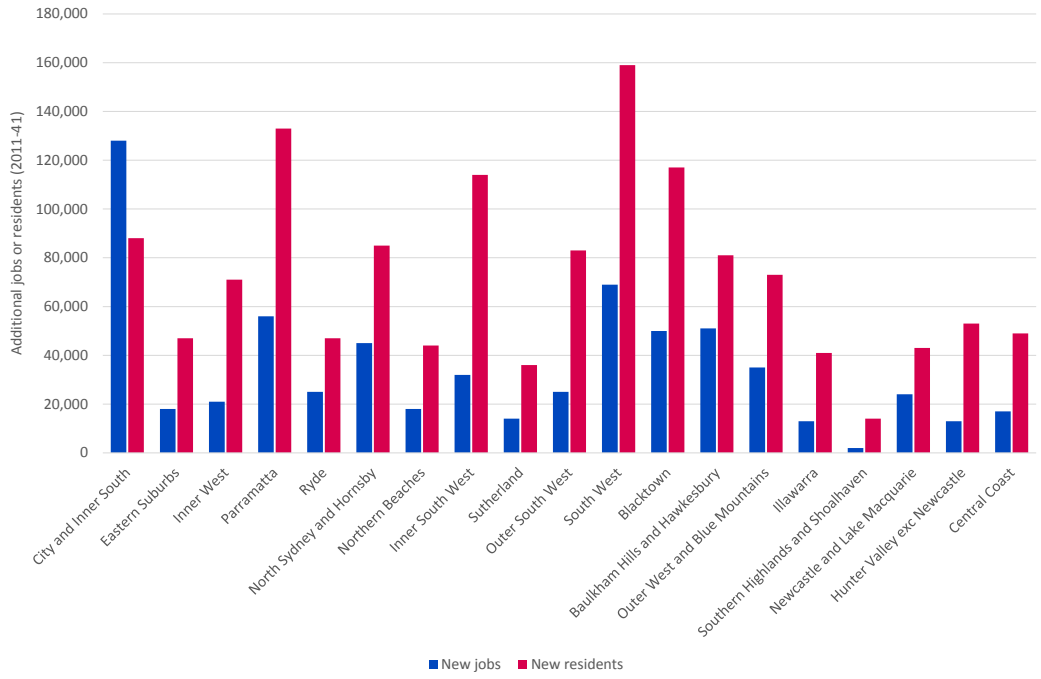
[7] Formerly the Bureau of Transport Statistics (BTS).

2026, it is inevitable that there will be more residents than jobs in the majority of locations as is the case at present. However, this level of population and employment growth does not mean that the mismatch between the location of jobs and of homes will be greater.

The following figure highlights that the only place where more jobs than residents are expected is the Inner City and South SA4 which is also expected to have strong residential growth (88,000 new residents). The gap between the number of new jobs versus new residents is apparent across Sydney.

The high level analysis presented in this review demonstrates the inadequate consideration by the *Updated Strategic Business Case* of how WestConnex will link the of workforce and employment growth in Sydney.

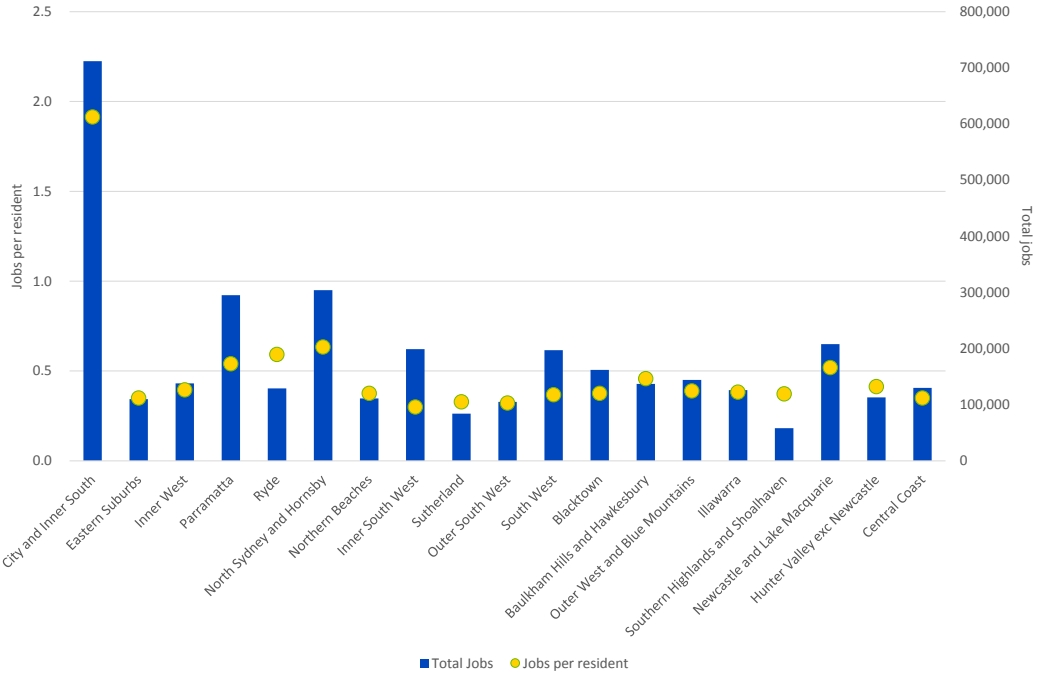
FIGURE 3. ADDITIONAL RESIDENTS AND JOBS BY SA4, 2011-26



Source: Bureau of Transport Statistics

To further understand the housing and jobs 'mismatch', the following figure highlights jobs per resident in each SA4 for 2026. On average, there will be 0.5 jobs per resident in Sydney to 2021, declining to 0.49 by 2026. The chart shows that excluding the City and Inner South, all SA4s of Sydney will have 0.3 to 0.6 jobs per resident.

FIGURE 4. TOTAL JOBS AND JOBS PER RESIDENT BY SA4, 2026



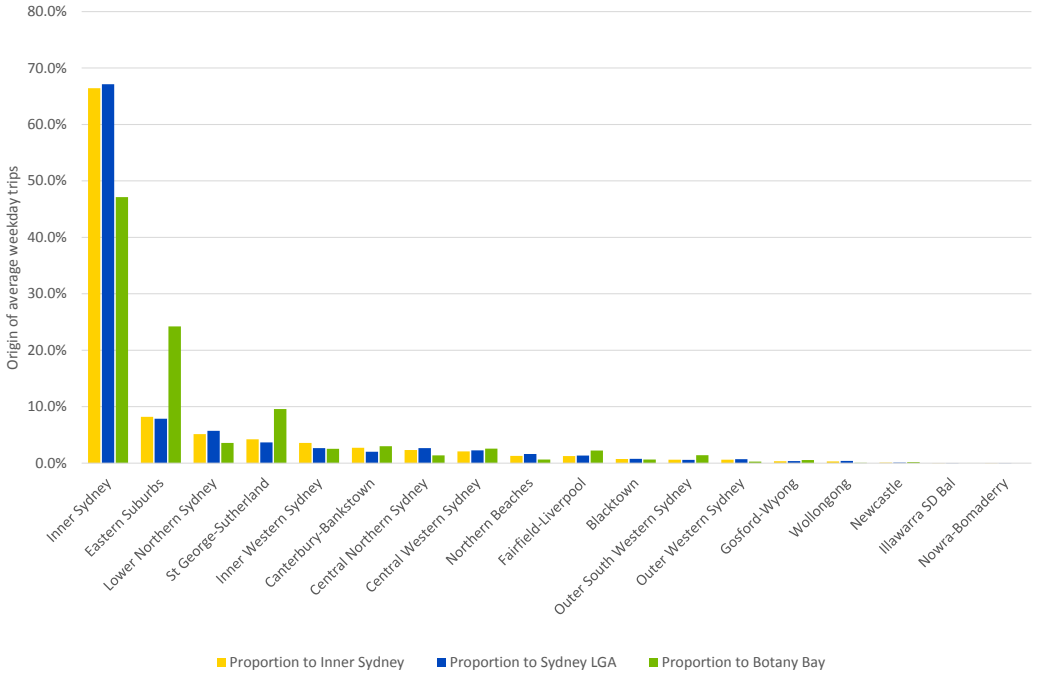
Source: Bureau of Transport Statistics

To further examine the extent of the east-west job and population divide that the *Updated Strategic Business Case* alludes to, high level analysis is presented here using the BSA Household Travel Survey (2011/12). This dataset provides insight into average weekday traffic movements across Sydney (Greater Metropolitan Area) and shows:

- 11.8 per cent of trips in Sydney are made to Inner Sydney (LGAs of Sydney, Marrickville, Botany Bay and Leichardt).
- Of the 11.8 per cent of total trips made to Inner Sydney, the majority are from within Inner Sydney (66 per cent), the Eastern Suburbs (8.2 per cent) and Lower Northern Sydney (5.1 per cent).
- 77 per cent of all trips made originate and end within the same statistical division.

The following figure shows the proportion of trips by origin that are made to Inner Sydney, and the LGAs of Sydney and Botany Bay. Connectivity to the Airport, Port and job-rich CBD and surrounds is a key argument presented in the business case. However, the origin of trips made to Inner Sydney, Sydney LGA and Botany Bay LGA show that the vast majority of trips made by households are local. In total, almost 75 per cent of trips made to Inner Sydney originate from Inner Sydney or the Eastern Suburbs.

FIGURE 5. RESIDENTIAL ORIGIN OF TRIPS TO INNER SYDNEY SD AND SYDNEY LGA



Source: Bureau of Transport Statistics, Transport for NSW Household Travel Survey 2011/12. Residents of occupied private dwellings in Greater Metropolitan Area.

The mode of trips made by travellers who would be located near to WestConnex is not considered in the *Updated Strategic Business Case*. Whilst forecast growth in car trips is illustrated (Figure 2.1 of the *Updated Strategic Business Case*), there is no information which:

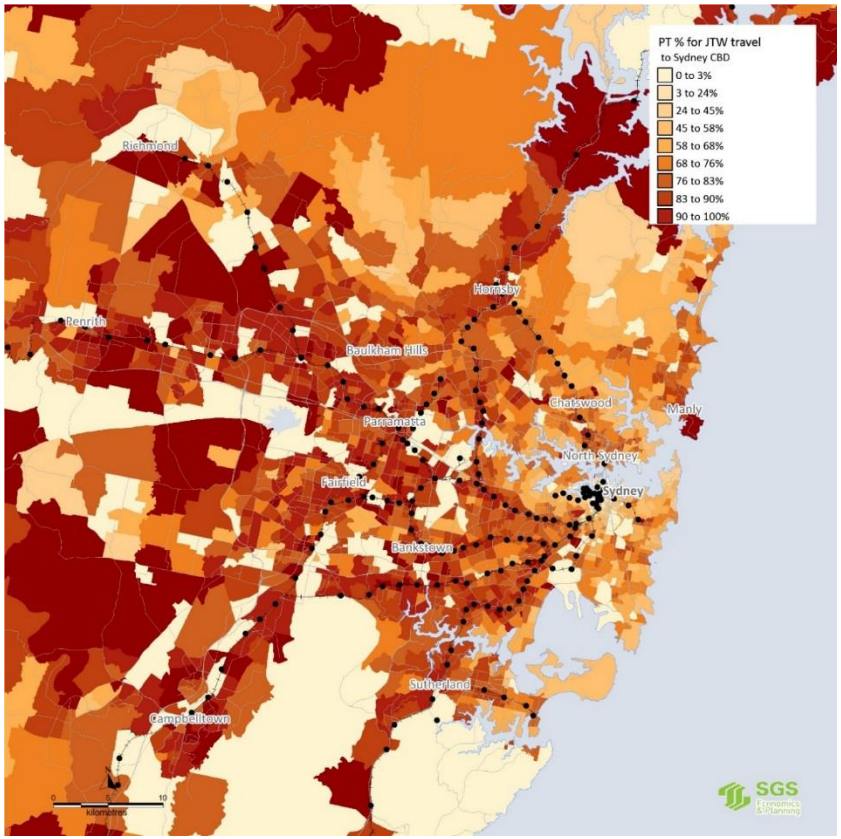
- Highlights current mode share between car and public transport, or
- Identifies where potential users of WestConnex would originate from and what mode of transport they currently use.

Figure 6 plots the proportion of journey to work trips made to Sydney CBD using Census 2011 data. Locations with access to a rail line have a higher proportion of workers commuting to the Sydney CBD, potentially pointing to location decisions made by these residents to live close to public transport. However, outside of Inner Sydney, the Eastern Suburbs and North Sydney, the proportion of journey to work trips to Sydney CBD is low.

Figure 7 shows the proportion of journey to work trips made by public transport to Sydney CBD. Public transport patronage is higher closer to railway lines. Interestingly, one area which stands out as having low public transport patronage to Sydney CBD is the Eastern Suburbs and North Shore.

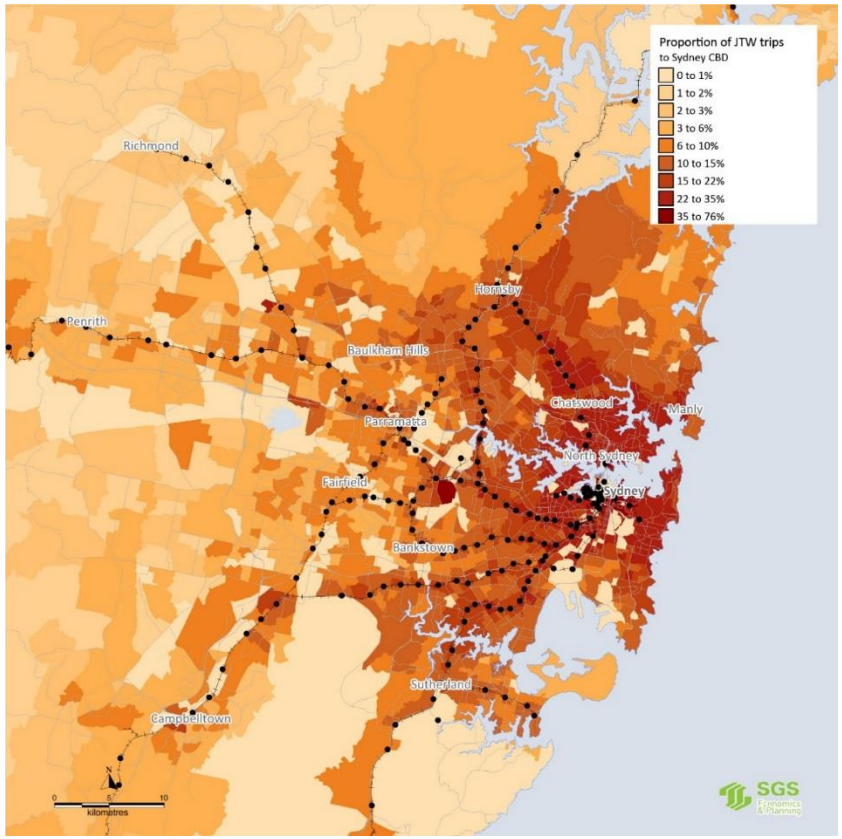
In justifying WestConnex at a strategic level, it would be expected that the *Updated Strategic Business Case* would clearly demonstrate that it takes people to where they need to be and that a public transport investment would not provide the same benefit. It fails to do this with an absence of analysis around strategic need or of potential alternatives.

FIGURE 6. PROPORTION OF PT TRIPS TO THE CBD



Source: Analysis of Australian Bureau of Statistics Census 2011

FIGURE 7. PROPORTION OF JOURNEY TO WORK TRIPS TO SYDNEY CBD



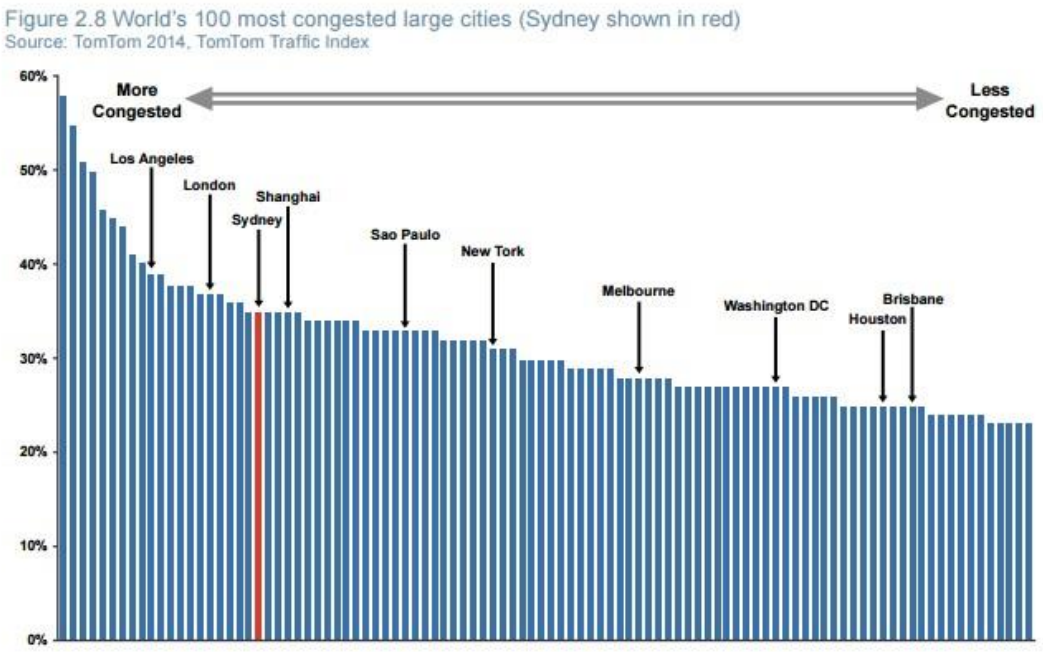
Source: Analysis of Australian Bureau of Statistics Census 2011

2.5 Roads do not solve congestion in the long term

Like many cities around the world, road congestion is a problem for Sydney. *The Updated Strategic Business Case* presents data from the TomTom Traffic Index which shows that Sydney is the 21st most congested city in the world (Figure 8). However, the issue of more roads not solving congestion woes is not addressed by the *Updated Strategic Business Case* as it does not consider any alternatives to building WestConnex.

Additional road capacity tends to generate additional traffic volumes. Other initiatives are required for growing transport movements.

FIGURE 8. WORLD'S 100 MOST CONGESTED LARGE CITIES



Source: Updated Strategic Business Case, Figure 2.8 Page 73.

The approach by other global cities facing high rates of congestion is summarised as follows. These examples demonstrate that the WestConnex proposal is in stark contrast to the types of projects that have been used to address congestion in other global cities.

Los Angeles, United States | Rank: 10th | Congestion level: 39%

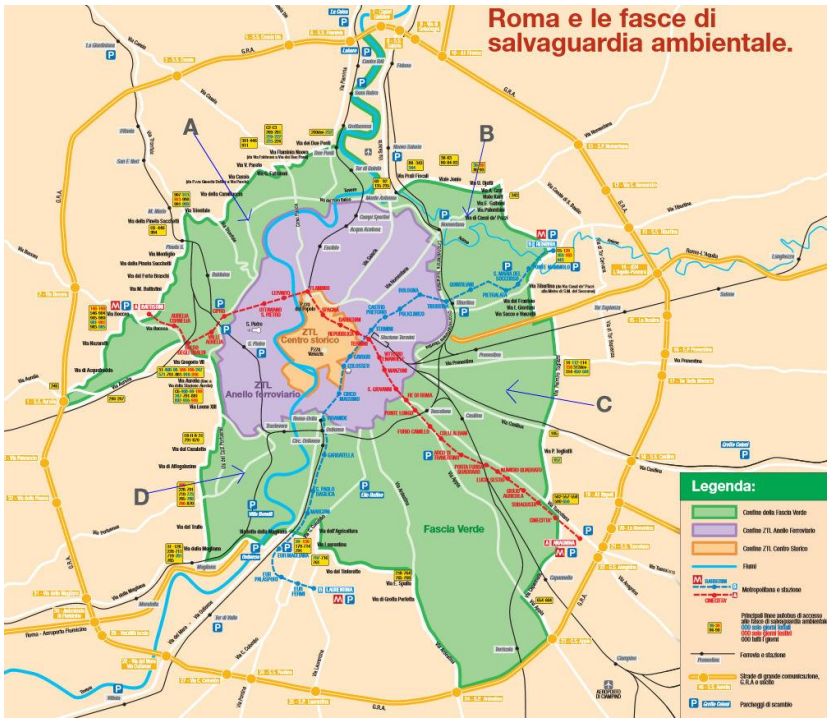
Since the early 1990s, significant investment into mass transit has been made through construction of Blue, Green, Red and Purple subway lines; extension to these lines and the construction of the Gold and Expo light rail lines and two bus rapid lines.

Measure R was introduced in 2008 which raised sales taxes to create a dedicated funding stream for new transit. This revenue source is expected to generate over $40 billion (US) over the next 20 years, with these funds dedicated to transit upgrades and new line extensions.

Rome, Italy | Rank: 13th | Congestion level: 38%

Rome's Sustainable Urban Mobility Plan 2010 places restrictions on traffic within specific zones of the city, with a limited traffic zone in the city centre which requires a paid permit (Zona a Traffico Limitato). Other measures to reduce congestion include measures to reduce emissions and alter parking restrictions. Public transport usage is encouraged through expansion of the cycling and public transport networks and promotion of car sharing.

FIGURE 9. ROME'S LIMITED TRAFFIC ZONE



London, United Kingdom | Rank: 16th | Congestion level: 37%

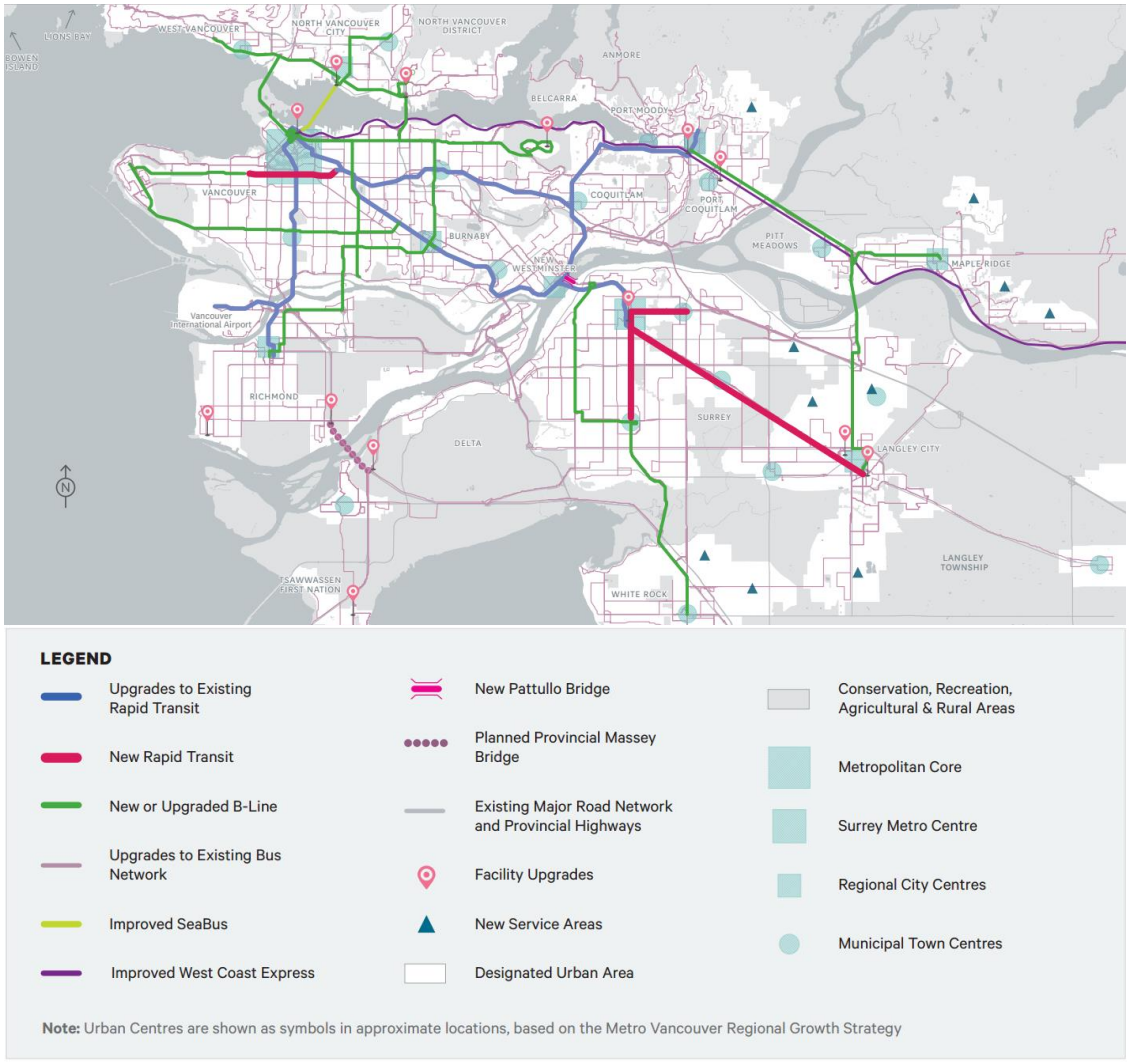
The London congestion charge was introduced in 2003 by Transport for London as a fee charged to vehicles operating in the Congestion Charge Zone. To date, 46 per cent of net revenue from the scheme has been reinvested into public transport, road infrastructure and walking and cycling schemes. TfL reports that the scheme reduced traffic volumes by 10 per cent (Transport for London, 2014).

Vancouver, Canada | Rank: 20th | Congestion level: 35%

Vancouver City Council's Transportation 2040 Plan aims to address congestion issues by:

- Increasing public transport usage through altering fare structures and a smartcard system that charges based on distance and time and off-peak discounts; targeting businesses to encourage workers to use public transport through increasing parking costs and using funds generated to provide transit passes
- Optimising road network through coordinating signal timing, monitoring traffic volumes, peak hour parking regulation
- Further investigating a congestion charge policy.

The following figure shows planned 10 year investments for Vancouver which do not include any major road investments.



Paris, France | Rank: 22nd | Congestion level: 35%

The sustainable mobility and anti-air pollution plan was introduced in Paris in 2015 and features:

- Measures to increase the share of public transport, walking and cycling
- Restrictions on cars when pollution reaches significant levels
- A parking management scheme that reduces the amount of free car, motorcycle and scooter parking, while introducing free parking for electric vehicles.

San Francisco, United States | Rank: 26th | Congestion level: 34%

The San Francisco Transportation Plan 2040 looks to reduce congestion by:

- Develop pricing approaches to congestion through a peak period congestion charge
- Direct regulation of journey to work vehicle trips through employer outreach and incentives and partnerships with the private sector and community based organisations.

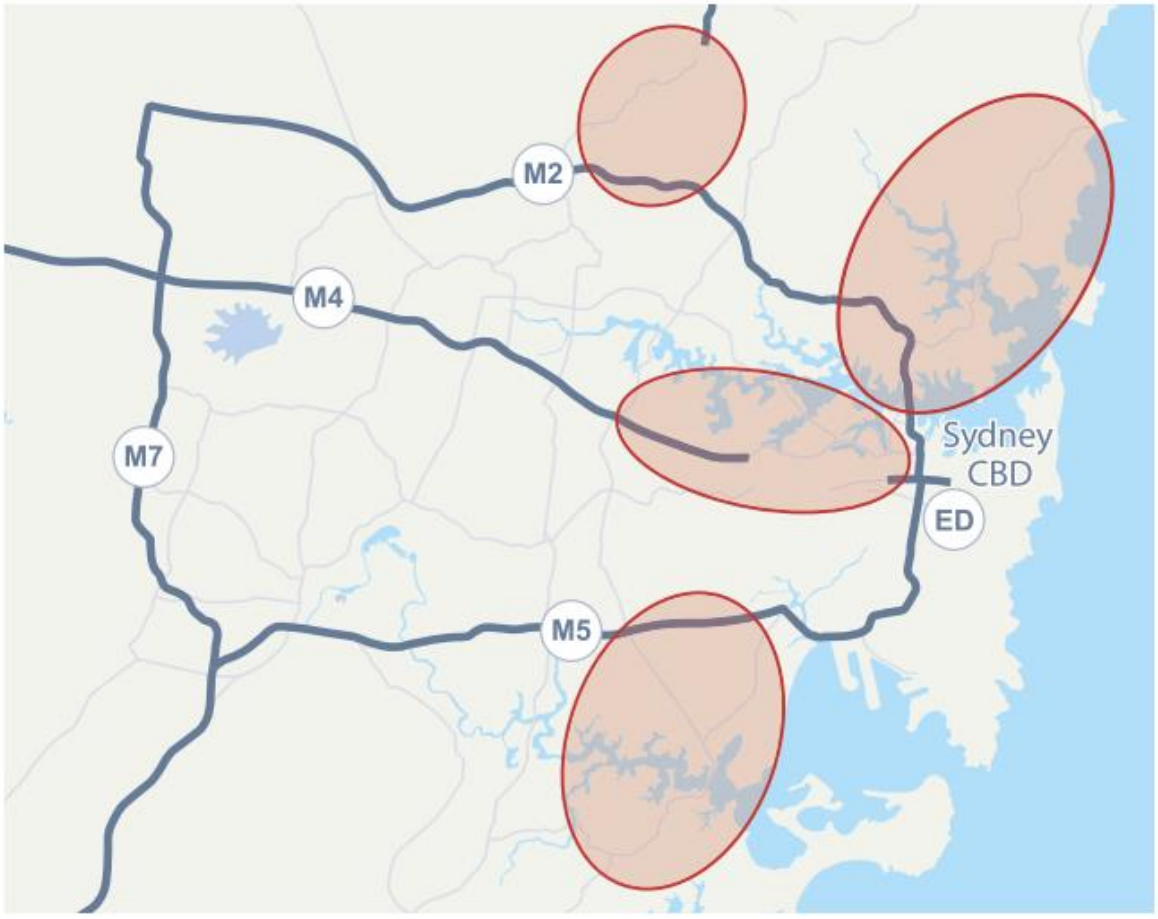
2.6 The strategic transport justification is problematic

The *Updated Strategic Business Case* makes the point that the M4 Motorway ends at Strathfield on Parramatta Road and does not reach Sydney CBD, Sydney Airport and Port Botany. This is indeed correct the M4 does currently end at Strathfield. It describes this as a missing link (Section 2.2.2) and uses this as a reason why WestConnex should be constructed.

However, the *Updated Strategic Business Case* blames this gap in the motorway network for the congestion in the inner west. There is no analysis or flow of logic which explains this statement. If anything, the following section (Section 2.2.3 of the *Updated Strategic Business Case*) contradicts this assertion by correctly stating that 75 per cent of commuters travel to Sydney CBD and 45 per cent to Parramatta CBD by public transport and not by car.

The missing link section in the *Updated Strategic Business Case* suggests that the M4 should be connected to the Cross City Tunnel (figure 2.5 of the *Updated Strategic Business Case*, shown here in Figure 10). The purpose this would serve is unclear and it is not part of the WestConnex project or subsequent road projects.

FIGURE 10. MISSING LINKS ON SYDNEY'S MOTORWAY NETWORK



Source: Updated Strategic Business Case, Figure 2.5 page 71

Notably, the missing links diagram does not identify a gap between the M4 and M5. This raises questions around Stage 3 of WestConnex.

The structure of Sydney is described as being heavily car dependant except for key centres such as Sydney CBD and Parramatta CBD (Section 2.2.3 of the *Updated Strategic Business Case*). However, this is

a generic statement which could be made in support of any road project. WestConnex does little to improve the road network during peak periods and has virtually no benefit during non-peak periods, hence providing little benefit to the road component of the transport network as a whole.

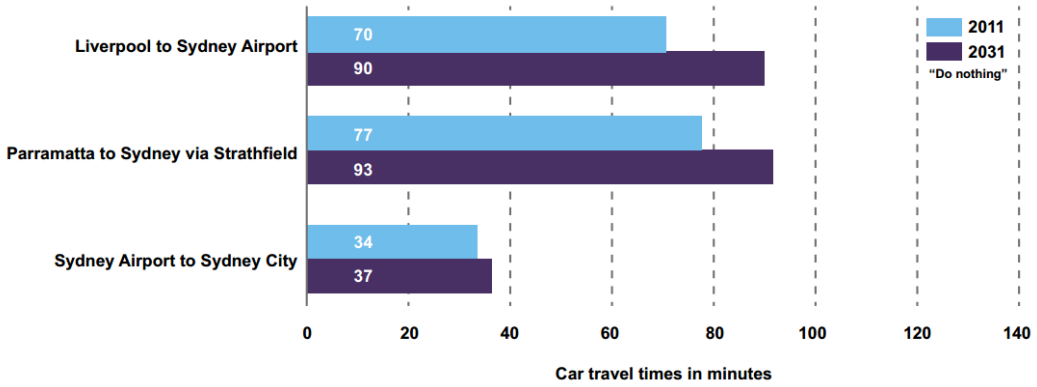
This section also points to WestConnex as being required to improve freight vehicle movements. Articulated and rigid trucks account for less than five per of all vehicle kilometres travelled (VKT) in Sydney (SGS Economics and Planning 2015). Hence if the other 95 per cent of VKTs gain little benefit from the WestConnex project it is unlikely this smaller sub-set of vehicles would gain special benefit from WestConnex.

The *Updated Strategic Business Case* points out that M4/Parramatta Road, M5/M5 East and Eastern Distributor/ Southern Cross Drive are constrained and without building WestConnex the travel times will worsen (Section 2.3.1 of the *Updated Strategic Business Case*).

The impact of not building WestConnex is demonstrated by peak travel times along these corridors (*Updated Strategic Business Case* Figure 2.11, shown in Figure 11, below). Sydney Airport to Sydney City is provide as an example for the Eastern Distributor/ Southern Cross Drive. Under a 'do nothing' scenario travel times will increase from 34 minutes to 37 minutes. A three minute increase, given the margin for error in transport modelling, means that the travel time in 2031 will be pretty much the same as today. The same trip by public transport will take 18 minutes in 2031. This does little to support the need for the WestConnex project.

To highlight the constraints along the M4/Parramatta Road, a trip from Parramatta to Sydney via Strathfield is used as an example. It is not clear why the example is via Strathfield. It perhaps suggests a trip along the M2 corridor and over the Harbour Bridge would provide a quicker route than Parramatta Road and the M4. The example shows that the current 77 minute journey worsens by 16 minutes under a do nothing scenario. The fact that a public transport journey from Parramatta to Sydney is currently only 35 minutes is not mentioned. While not all trips in Sydney can served by public transport the Parramatta to Sydney trip is one which public transport is a highly competitive, if not superior mode of transport.

FIGURE 11. PEAK TRAVEL TIMES ON SELECTED STRATEGIC TRANSPORT CORRIDORS



Source: Updated Strategic Business Case, Figure 2.11, page 75

The Liverpool to Sydney Airport trip is provided as a further example for the M5/M5 East transport constraint. Once again this is a trip which public transport travel time (40 minutes) is comparable to the car travel time and could decrease with the Sydney Metro project.

Under the 'do nothing' scenario travel times increase by 20 minutes from 70 minutes in 2011 to 90 minutes in 2031. Somewhat confusingly this travel time is contradicted by Figure 10.1 on page 204 of the *Updated Strategic Business Case* which has a Liverpool to the Airport trip in 2031 at around 45 minutes in the base case. The reason for this discrepancy may be partially explained by the source of

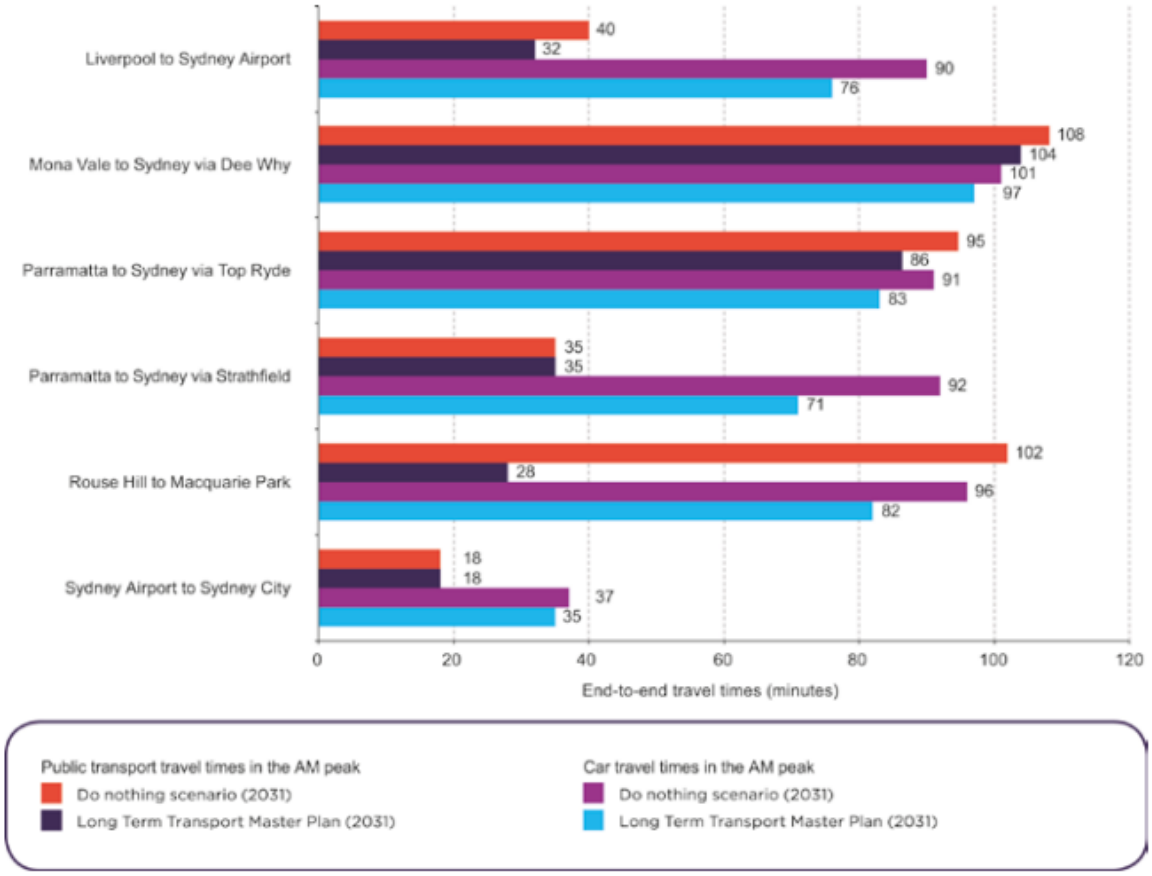
Figure 2.11 being the *NSW Long Term Transport Master Plan*, whereas Figure 10.1 shows travel time results using the WestConnex Road Traffic Model v2.1. However, the difference is quite significant and combined with other issues outlined in section 3 raises concerns around the validity of the traffic model results. In addition, it should be noted that the number of people who undertake this trip is relatively small. The BSA Household Travel Survey suggests that only 2,800 trips are made from Liverpool LGA to Botany Bay LGA on the average weekday, from a total of 208,900 trips to the Botany Bay LGA.

Travel times for cars and public transport along select corridors are also presented in Figure 3.4 of the *Updated Strategic Business Case* using *NSW Long Term Transport Master Plan* Scenarios (see Figure 12). This diagram highlights that public transport is a superior option to car travel for a number of corridors, even without implementation of the Master Plan by 2031.

The question is, does the decrease in travel time for such a relatively small number of people justify an investment of the scale of WestConnex?

FIGURE 12. TRAVEL SPEEDS – MORNING PEAK, SELECTED CORRIDORS

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*



Source: Updated Strategic Business Case, Figure 3.4, page 103

2.7 Sydney Gateway is a fundamental, yet separate project

A key justification of WestConnex is access to Sydney Airport and the Port. However, the Sydney Gateway which would provide access to Sydney Airport is not going to be built at the same time as Stages 2 or 3. While supporting works to enable Sydney Gateway will be constructed, the Gateway itself will not be constructed as part of WestConnex and the costs associated with it are excluded. To this end, it appears

counter-intuitive that data around travel time to the airport is presented at all in the Strategic Business Case.

2.8 The renewal impact on Parramatta Road is questionable

The importance of Parramatta Road is identified in the *Updated Strategic Business Case* in Section 2.6. Here, the current issues plaguing the corridor are correctly identified. However, the *Updated Strategic Business Case* appears to make a link between renewal of the corridor and the WestConnex project which is not supported through the data. The WestConnex M4 Widening Environmental Impact Statement (EIS) showed that under WestConnex, Parramatta Road will take more traffic in the future, not less (M4 Widening EIS, Appendix D, p. 144).

The EIS also found that tolls on the newly widened M4 would result in a 35 per cent increase in the number of weekday vehicles on Parramatta Road. The introduction of tolls on the M4 will see a higher number of vehicles use Parramatta Road as an alternative to the M4 due to toll avoidance. When tolls were removed on the M4 in 2010, traffic on Parramatta Road fell by 24 per cent in the morning peak. If tolls are reinstated on the M4, it is reasonable to assume traffic will avoid the tolled M4 and use the free Parramatta Road.

Increased traffic on Parramatta Road would not support urban renewal objectives. Section 2.6 of the *Updated Strategic Business Case* notes that high traffic volumes have eroded the pedestrian amenity of Parramatta Road and that land uses have changed over time in response to this degradation. Section 2.6.1 of the *Updated Strategic Business Case* identifies the role Parramatta Road is hoped to have in supporting future population growth in Sydney, and it notes that a significant catalyst is required to support renewal. No compelling evidence is presented which shows that WestConnex would support this renewal, and in fact, it appears that it could hinder renewal efforts.

Average weekday traffic volumes on Parramatta Road are presented in the *Updated Strategic Business Case* in Figures 5-5, 5-6 and 5-11. This analysis clearly shows that:

- Average weekday traffic volumes along Parramatta Road are higher for five of the 14 sections of the road under WestConnex
- AM peak traffic volumes are higher under WestConnex in 2031 for six of the 14 sections of the road, and only marginally lower than a 'do nothing' scenario for a further four sections
- Truck volumes are lower under WestConnex in 2031 for only five of the 14 sections of Parramatta Road.

Figures 5-5, 5-6 and 5-11 of the *Updated Strategic Business Case* are shown in Figure 13.

Section 7 of the *Updated Strategic Business Case* examines existing planning policy for Parramatta Road. There is little evidence in this section on how WestConnex will support urban renewal here. Section 7.11 suggests that the reduction of traffic volumes on Parramatta Road is key to its renewal, and that WestConnex supports this in part (page 169). It is noted that an *Urban Amenity Improvement Program*, funded as part of WestConnex, will deliver a $200 million package to improving the corridor (page 174) along its key growth precincts (see Figure 7.2 on page 173 of the *Updated Strategic Business Case*). However, the details of these improvements is not provided.

FIGURE 13. TRAFFIC VOLUMES ALONG PARRAMATTA ROAD IN 2031

Figure 5-5 Average weekday traffic volumes on Parramatta Road

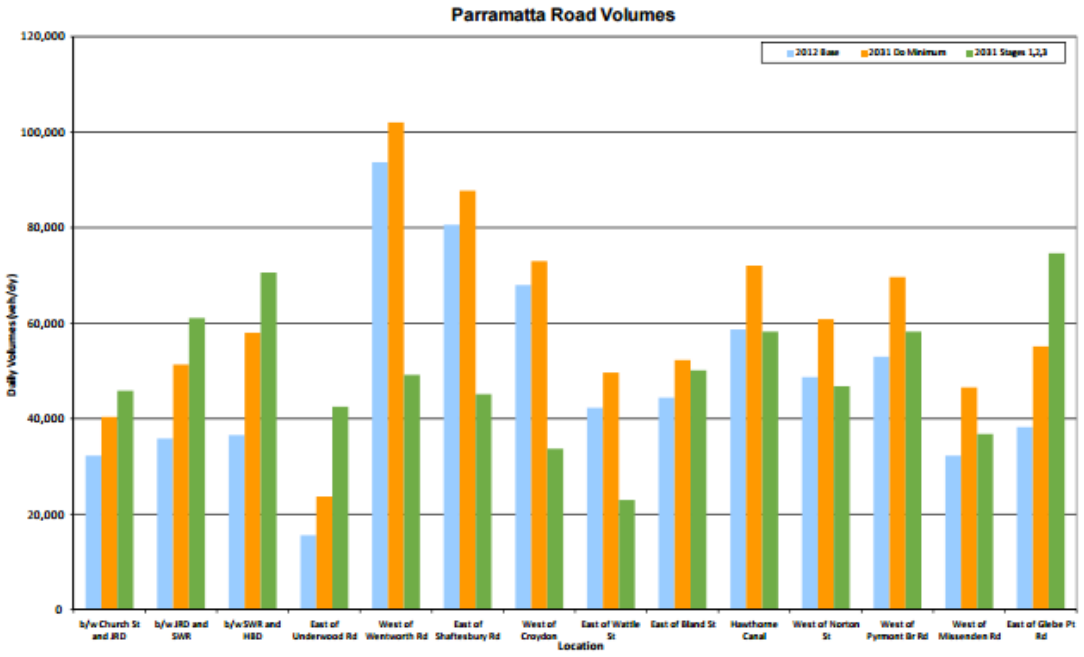


Figure 5-6 Morning peak eastbound traffic volumes on Parramatta Road

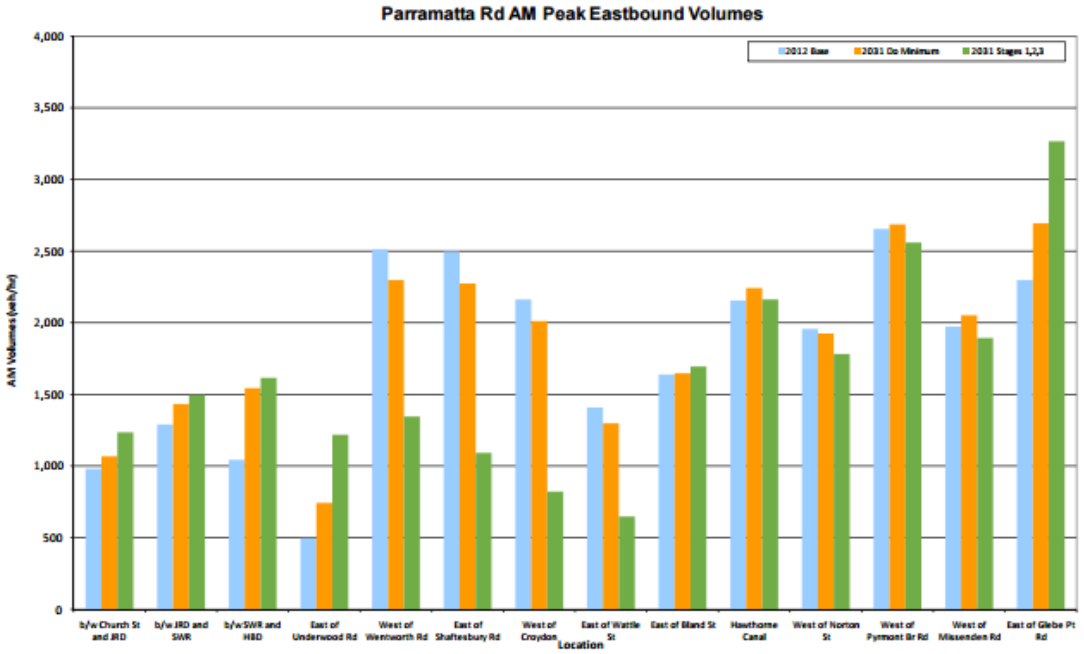
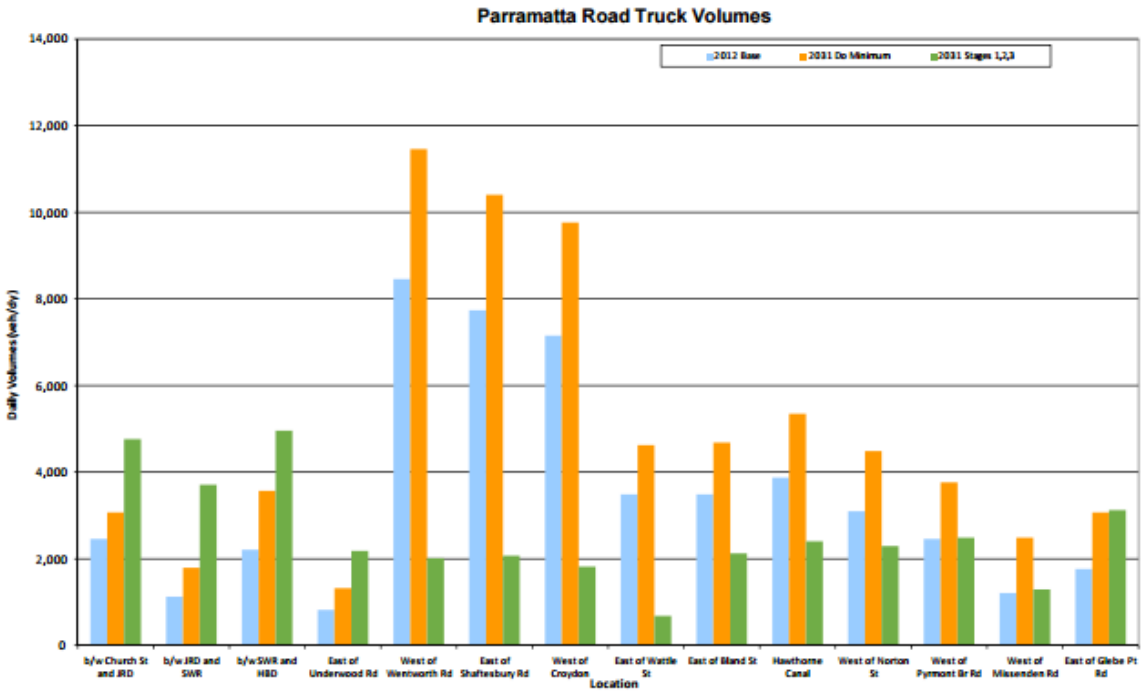


Figure 5-11 Average weekday heavy vehicle volumes along Parramatta Road



2.9 Project costs are uncertain and very high

For a $16.8 billion project, the Business Case Budget Cost Estimates section is six pages long (the total length of the *Updated Strategic Business Case* is 319 pages). The supporting KPMG report, *WestConnex Full Scheme Economic Appraisal,* has four of its fifty pages dedicated to project costs but provides no additional information. All the information presented is based on the P50. The P50 is seen as most likely cost for the project where there is a 50 per cent or less chance of this cost being exceeded.

For a project of this scale, it is normal practice to produce a P90 cost (that is there is only a 10 per cent chance cost will be exceeded). Despite an Infrastructure Australia request to provide this information, the *Updated Strategic Business Case* provides no information on what the P90 cost of the project could be. Page 56 of the *Updated Strategic Business Case* claims[8] that there is a P90 provided in the Business Case but there is no estimate labelled as such in the cost section.

The Infrastructure Australia assessment makes reference to a six per cent difference between the P50 and P90 on the Stage 2. Given the complexity of the project this would seem low. For example, the Western Distributor Project in Melbourne has a roughly 15 per cent difference between the P50 and P90. However, even a six per cent increase would add $1 billion to the project cost and a 15 per cent increase would add $2.5 billion to the project cost.

Furthermore, the *Updated Strategic Business Case* has the same cost for the comparable sections of WestConnex as the 2013 Business Case (Table 13.6 on page 240). While the cost has increased due to additional road links and supporting works, the cost of WestConnex remains at $14.8 billion. With two years of additional analysis and receipt of tenderer information there has not been any change in cost upwards or downwards. This appears a very odd outcome. At least a small increase to account for increases due to the price inflation would have been expected.

The magnitude of the project cost does not appear to be acknowledged in the *Updated Strategic Business Case*. This is concerning because comparisons to major international transport projects and

[8] Updated cost estimates for the project, informed by tenderer information received and a risk-based estimating approach.

even projects in Sydney over the past two decades show that WestConnex has an exceedingly high cost. Table 2 presents five international transport projects, their cost in 2015 AUD, overall length and estimated users. In comparison, at a cost of $16.8 billion, WestConnex will be 33 kilometres long and combined with the existing M4 and M5 have almost 800,000 users[9] per annum in 2031. Whilst there are many variables which influence the cost of transport projects, the data in the following table provides an indication of the very high cost of WestConnex.

TABLE 2. MAJOR INTERNATIONAL TRANSPORT PROJECTS

Project	Country	Type	Cost ($m) AUD	Length (km)	Cost per km ($m)	Users per annum
Wuhan–Guangzhou High-Speed Railway	China	High-speed rail	$23,288	968.00	$24	20.5 Million
Beijing–Shanghai High-Speed Railway	China	High-speed rail	$47,260	1318.00	$36	100 Million
Toei Ōedo Line	Japan	Rapid Transit	$15,616	40.70	$384	290 Million
Channel Tunnel	UK	Subsea railway tunnel	$21,507	50.45	$426	21 Million
WestConnex	*Australia*	*Road Tunnel/at grade extension*	*$16,800*	*33.00*	*$509*	*0.8 Million (estimate)*

The following table compares a range of Sydney based projects and their cost in 2015 dollars, on the basis of the cost provided for in their contracts. At a cost of $16.8 billion overall, WestConnex will cost approximately $509 million per kilometre. The only project with a higher cost per kilometre is the Sydney Harbour Tunnel, which is entirely under water, with a cost of $629 million in 2015 dollars per kilometre. In comparison, the Eastern Distributor was $222.71 million per kilometre; the M4 cost $49.6 million per kilometre; M5 cost $43.6 million per kilometre and the M2 cost $68.45 million per kilometre.

TABLE 3. COMPARISON OF WESTCONNEX TO HISTORIC SYDNEY ROAD PROJECTS

Project	Length (km)	Capital Cost as at contract signed date	Year of contract	Opened	Cost at open date ($m)	Cost per km ($m)	Cost 2015 ($m)
M4 Motorway	12.5	$246.0	December 1989	May 1992	$269.07	$49.60	$620.04
M5 Motorway	21	$380.0	February 1991	August 1992	$401.00	$43.61	$915.81
Sydney Harbour Tunnel	3.0	$685.0	June 1987	August 1992	$826.89	$629.49	$1,888.46
M2 Motorway	20	$644.0	August 1994	May 1997	$710.74	$68.45	$1,369.00
Eastern Distributor	6	$700.0	August 1997	December 1999	$741.83	$222.71	$1,336.28
WestConnex	*33*		*2016*	*2021*		*$509.09*	*$16,800.0*

Note: numbers escalated at approx. 3.6% per annum based on ABS Cat No 6427.0 Producer Price Indexes, Australia – Table 17. Output of the Construction industries, subdivision and class index numbers, Road and bridge construction, New South Wales Index.
Sources: http://www.audit.nsw.gov.au/ArticleDocuments/141/193_Handback_M4_Tollway.pdf.aspx
http://www.treasury.nsw.gov.au/ppp/nsw_projects/projects_which_have_been_awarded/roads/M5_South_West_Motorway_Widening
http://www.treasury.nsw.gov.au/ppp/nsw_projects/projects_which_have_been_awarded/roads/sydney_harbour_tunnel
http://www.treasury.nsw.gov.au/ppp/nsw_projects/projects_which_have_been_awarded/roads/M2_Motorway
http://www.treasury.nsw.gov.au/ppp/nsw_projects/projects_which_have_been_awarded/roads/eastern_distributor

Also of concern is the provision of a concessional loan from the Australian Government of $2 billion to support the acceleration of Stage 2 of WestConnex. There is a possible risk that expediting construction may also expedite the business case and approval process. For a project with a cost of at least $16.8 billion, it is concerning that components of the planning and approval process may be truncated to meet the revised project timeframes.

[9] Based on data presented in Table 10.1 in the Updated Strategic Business Case.

3 TRAFFIC MODELLING

3.1 Introduction

The comments in this section are based on the *Updated Strategic Business Case* and the supporting *Traffic Technical Paper* (Appendix 1).

Comments are aimed primarily at the Technical Paper. Selected results of the Technical Paper have been reproduced in Section 10 of the *Updated Strategic Business Case* and therefore comments also apply to Section 10 of the Business Case document.

3.2 The traffic modelling methodology is inconsistent

The modelling methodology is described in Appendix A, Strategic Traffic Modelling Approach. However, the description of the methodology is filled with irrelevant detail that includes a history of the WestConnex Road Traffic Model (WRTM) and a list of data sources that adds nothing to an understanding of the modelling process. In the end, the overall description of the modelling is opaque and confusing.

From the description it is understood that the methodology in brief is as follows:

1. Road travel trip matrices for 2012 (base year) were extracted from the Sydney Transport Model (STM);
2. The 2012 trip matrices were then modified using matrix estimation;
3. Trip matrices for future years were estimated using the base year matrices and "*future year traffic growth assumptions sourced from the STM (that takes account of data like demographics and transport networks)*" (Technical Paper 1, Appendix A, page 2, dot point 4);
4. Induced trips were added to the project case trip matrices using travel time elasticity;
5. Matrices were assigned to the road network using the toll choice model to separate trips into various categories of vehicle class and toll/non-toll use using the toll road choice assignment model.

There are several areas of concern and doubt regarding this methodology.

Appendix A page 1, Modelling Approach, states that:

> *"Base and future population and employment data was sourced from the Bureau of Transport Statistics (BTS) (September 2014 release)"*

The base year for matrix estimation is 2012. The mismatch between traffic counts for 2012 and demographic data for 2014 may be minimal, but has not been addressed in the text.

Page 2, second dot point of Appendix A states that:

> *"The WRTM project model was developed and calibrated to current observed travel behaviour, then validated against 2012 Sydney-wide travel behaviour established in a series of traffic count and travel time surveys. It was then adjusted to reflect driver behaviour on Sydney's toll roads observed in the VTTS[10] surveys. The model calibration and validation processes have maintained a specific focus and refinement in the WestConnex scheme study area."*

[10] Value of Travel Time Surveys

This description seems to be inconsistent with the matrix estimation procedure described above. However, it could be that matrix estimation is encompassed into the phrase "*calibrated to current observed travel behaviour*". Furthermore, the repeated references to driver behaviour assign an invalid level of representation to the model. Strategic models do not represent driver behaviour; they represent statistical characteristics of a transport network.

In addition, the reference to the "WestConnex scheme study area" is unclear, as the study area is not defined anywhere in the document.

The reason for not using STM matrices more fully has not been explained. It is puzzling why forecast matrices for 2021 and 2031 for base case and project case scenarios were not obtained from STM. The STM matrices would have accounted for induced trips more fully as well without needing to resort to elasticity-based calculations for induced trips.

The absence of a 2041 or 2046 model year is also concerning (See Section 4.6).

3.3 The treatment of induced demand raises significant questions

Infrastructure Australia highlighted that the original WestConnex Business Case had failed to account for induced demand. The *Updated Strategic Business Case* documents (Section 10.5 and Section 5.3.1 of the Technical Paper) state that induced trips make up only 0.4 per cent of the total WRTM network. This is a totally, and apparently calculatedly, misleading statement. It gives the mistaken impression that induced trips are negligible. The Auditor-General review of the initial WestConnex Business Case in fact noted that road improvements are likely to generate significant additional traffic where:

- Roads around the project are already congested in peak periods and further traffic growth is expected with or without the project going ahead
- The project is expected to significantly cut journey times
- An improvement is likely to stimulate residential and business development.

The statement of '0.4 per cent of the total WRTM network' downplays the overall number of induced trips generated by WestConnex, as total network trips pertain to Sydney as a whole, rather than the study area specifically.

The induced volumes presented in the *Updated Strategic Business Case* appear to be comprised of:
- Trips that change routes
- Trips that change mode
- Trips that have changed destination choice, and
- Trips that have been encouraged by reduced travel times.

It is unclear if the relocation of people and businesses to take advantage of travel time improvements is accounted for in the induced demand estimate.

The Technical Report defines a set of Screenlines, which are shown graphically in Figure 4-5 on page 30. Screenlines 2 and 3 are of particular interest, directly measuring the impact of Stage 1 of WestConnex.

We note that Screenlines defined in the report may not be closed or complete and that not all roads that cross the Screenlines may be included into the analysis. However, in the case of Screenlines 2 and 3, any roads that have been omitted or that may contribute to changes in the volumes are not apparent.

To estimate the scale of induced traffic, data provided in tables 5.2 and 5.3, which provide the volumes of traffic crossing a number of Screenlines, have been used. Interestingly, the volumes on each road are listed in these tables, but the totals crossing the Screenlines are not provided.

A comparison of morning peak traffic volumes is shown in Table 1 below. This comparison shows that induced trips make up nearly 80 per cent of the traffic crossing Screenline 2 in the morning peak. Table 2 shows daily traffic volumes. In this case, 53 per cent to 65 per cent of traffic crossing the Screenlines are induced trips.

TABLE 4. FORECAST MORNING PEAK TRAFFIC VOLUMES CROSSING SCREENLINES 2 AND 3 IN 2031

Screenline	Do- Minimum	WestConnex	Induced	Change
Screenline2	8,280	14,870	6,590	79.6%
Screenline3	10,860	17,430	6,570	60.5%

TABLE 5.FORECAST DAILY TRAFFIC VOLUMES CROSSING SCREENLINES 2 AND 3 IN 2031

Screenline	Do- Minimum	WestConnex	Induced	Change
Screenline2	130,040	213,360	83,320	64.1%
Screenline3	155,770	239,030	83,260	53.5%

This analysis can be extended to heavy vehicles. Table 5.3 of the Technical Paper presents the forecast daily volumes of heavy vehicles crossing the Screenlines in 2031. Table 3 summarises the forecasts of heavy vehicles crossing the Screenlines in 2031.

TABLE 6. FORECAST DAILY HEAVY VEHICLE VOLUMES CROSSING SCREENLINES 2 AND 3 IN 2031

Screenline	Do Minimum	WestConnex	Induced	Change
Screenline2	11,120	21,660	10,540	94.8%
Screenline3	11,490	25,870	14,380	125.2%

The concern about these forecasts is that it is difficult to envisage a project, even one as substantial as WestConnex, inducing such a high level of new trips. Figures 5.1 and 5.2 of the Technical Paper show the changes (with bandwidths) in total and heavy vehicle volumes respectively. However, these figures provide no indication of the source of the increased volumes crossing the Screenlines and the large increase is not explained anywhere else in the document. More broadly, the charts are not very informative. The legend for bandwidths is almost useless for gauging the size of volumes on roads, with bands often exceeding substantially the legend widths. No labelled volumes are provided in any of the charts.

Daily volumes crossing Screenline 8, which includes the M5 East, are forecast to reduce; total volumes by 5 per cent and heavy vehicle volumes by 22 per cent. The M5 East and New M5 Motorways together will lose around 25,000 vehicles per day. No explanation is given for this reduction in Screenline volume, which is counterintuitive. Other Screenlines have been examined to check whether the reduction is a result of diversion to free surface roads; the comparison of volumes suggests that it is not. Nnone of the projected volumes on the surface roads increases substantially and cannot account for the reduction in vehicles across the Screenline. As a result, it appears that the loss of traffic from the M5 East pair of motorways is the result of WestConnex Stages 1 and 2 and Sydney Gateway, and so the need for the New M5 questionable.

The treatment of induced demand in the economic appraisal is focused on in Section 4 of this report.

3.4 Inconsistent results are presented

Table 5.4 of the Technical Paper presents the change in average speed and vehicle capacity (V/C) ratio resulting from the introduction WestConnex. Many of the results are counterintuitive. For example:

- At Screenline 1, the M4 Motorway v/c ratio drops from 1.1 to 0.9 but the average travel speed increases by 82km/hour. At Screenline 8, the v/c ratio for the existing M5 East falls by a larger margin from 1.1 to 0.7, but average speed on the road increase by only 51km/hour, despite the two roads being reasonably similar.
- At Screenline 1, Parramatta Road has a relatively low v/c ratio of 0.5 increasing to 0.6, but the average speed of travel in both cases is less than 10 km/hour, even though the road is well under capacity. By comparison, at Screenline 6, Iron Cove Bridge is well above capacity at v/c = 1.4 to 1.3, with speeds of less than 10km/hour.
- At Screenline 7, the v/c ratio on Fairford Road/Joseph Street, it appears that the introduction of WestConnex will double travel speeds, from 24 to 50km/hour without any decrease in the v/c ratio, which would remain at 1.0.
- Similarly, the travel speed on Southern Cross Drive is forecast to increase substantially from 40 to 68 km/hour without any change in the v/c ratio.

The counterintuitive results may be the result of complex speed-flow calculations. However, these anomalies should be explained to preserve the credibility of the model's forecasts of traffic volumes.

3.5 Traffic forecasts are not adequately tested

Appendix A of Technical Paper 1 ends on page 4 with a warning that:

> *"Traffic forecast modelling is highly complex. Reasonable variations in input parameters, data and assumptions result in variations in forecast traffic demand. Forecast traffic from models should therefore be considered as a range as opposed to absolute numbers."*

All results in the document are provided as absolute numbers. Ranges are not provided, and no guidance is provided on how large these ranges should be.

The sensitivity of the model to "*reasonable variations in input parameters*" should have been tested and the results used to calculate ranges of results. Without the sensitivity tests, the project's business case is not complete and advice to treat the model's forecasts as ranges are meaningless.

For example, the Business Case for the East West Link – Eastern Section (which has some parallels to WestConnex) assessed the impact other potential road and public transport projects, alternative land use outcomes and differing tolling schemes to understand the implications for the traffic modelling (Victorian Government, 2013). The impact of different tolling schemes on WestConnex or the urban revitalisation being driven by UrbanGrowth NSW along in the Parramatta Road corridor would be on the traffic modelling and the benefit cost ratio is unknown.

3.6 The impact of toll regime is not fully explored

The toll regime used in the forecasts is not explained fully. While there is a description of the toll regime in section 9 of the Business Case document, it is incomplete. For example, it is not clear whether toll capping will apply to all toll roads or just WestConnex.

For scenario 4, which includes the Western Harbour Tunnel (WHT), the tolling regime on WHT is not defined but appears to imply that all toll roads would be tolled in both directions. If only the WHT is to be tolled in both directions, for example, then the demand for northbound travel on the Western Harbour Tunnel will be much lower than that for the southbound travel, because alternatives are

available on the Harbour Bridge and in the Harbour Tunnel. With bidirectional tolls on all toll roads, there would be potentially substantial impacts on the Sydney Harbour Bridge, Sydney Harbour Tunnel and Eastern Distributor. The impacts of the Western Harbour Tunnel would then be integrated into the impacts of the toll changes and it would be difficult to establish the economic benefits provided by the new infrastructure.

The link between the toll regime and economic appraisal is examined further in Section 4.2 of this report.

4 ECONOMIC APPRAISAL

4.1 Introduction

Previous toll road projects have overestimated the travel time savings and drivers propensity to use the toll road to the point where the toll roads have been financial disasters. These include the Lane Cove Tunnel and Cross City Tunnel. There are a number of areas of concerns with the economic appraisal of the WestConnex project which are discussed here, which reflect sections 12, 13 and 14 of the *Updated Strategic Business Case* and the *Economic Appraisal* (KPMG 2015).

4.1 There are errors in the benefits cost ratio

Table 12.10 of the *Updated Strategic Business Case* presents sensitivity analysis results (adapted below in Table 7). Here, the 'Central Scenario' (project option) is noted in the first row. However, dividing the present value of benefits ($22,204.9 million) by the present value of cost ($13,547 million) results in a benefit cost ratio (BCR) of 1.64, not the 1.71 presented in the business case. The difference is too great to be the result of rounding – it is equivalent to a reduction in costs by $562 million. The column 'BCR recalculated' in the table below presents the BCR that is the result of dividing the presented present value (PV) of benefits against costs. The BCR discrepancy column highlights the difference between the presented and recalculated BCR, with differences of 0.05 or greater highlighted.

TABLE 7. SENSITIVITY ANALYSIS RESULTS COMPARISON

	PV Costs ($m)	PV Benefits ($m)	NPV	BCR (no WEBS)	*BCR - recalculated*	*BCR discrepancy*
Central Scenario	$13,547.0	$22,204.9	$8,657.9	1.71	*1.64*	0.07
Discount Rate 4%	$15,528.8	$40,197.3	$24,668.6	2.9	*2.59*	0.31
Discount Rate 10%	$12,150.7	$13,187.8	$1,037.1	1.1	*1.09*	0.01
Capital and operating cost increase by 20%	*redacted*	*redacted*	*redacted*	1.3		
Capital costs increase by 10%	$14,768.7	$22,279.7	$7,511.1	1.6	*1.51*	0.09
Benefits increase by 10%	$13,547.0	$24,425.3	$10,878.3	1.9	*1.80*	0.10
Benefits decrease by 10%	$13,547.0	$19,984.4	$6,437.4	1.5	*1.48*	0.02
Linear trend extrapolation of all benefits beyond 2031 using 2026-2031 trend	$13,547.0	$25,965.9	$12,418.9	2.0	*1.92*	0.08
No growth in benefits beyond 2031	$13,547.0	$20,623.3	$7,076.3	1.6	*1.52*	0.08
Low annualisation factor (300)	$13,547.0	$19,406.3	$5,859.3	1.5	*1.43*	0.07
High annualisation factor (365.25)	$13,547.0	$23,464.2	$9,917.2	1.8	*1.73*	0.07

Source: adapted from Table 11, in KPMG (2015) WestConnex Full Scheme: Economic Appraisal

The number of discrepancies in BCRs presented in the *Updated Strategic Business Case* for the scenarios raises significant concerns. The way the information is presented throughout the *Updated Strategic Business Case* prevents the cost and benefit of specific stages of WestConnex from being understood – an issue, given that these have been packaged as separate projects through the Environmental Impact Statement process and are at varying stages of planning, approval and/or construction.

4.2 The link between induced demand and costs is unclear

Infrastructure Australia highlighted that the original WestConnex Business Case failed to account for induced demand.

In the *Updated Strategic Business Case*, induced demand resulting from WestConnex has been estimated using New Zealand economic evaluation guidelines despite a suggestion from Infrastructure Australia that the Victorian approach be used. The combined total number of estimated new car trips generated by the full WestConnex project is around 45,000 in an average weekday in 2031.

This is six per cent of the total forecast traffic on WestConnex. As discussed in Section 3.3, there are very large impacts (50-70 per cent) from induced demand across certain Screenlines. However, accounting for induced demand appears to have not impacted on the project benefits.

The $21.1 billion in transport benefits quoted in the 2013 *Business Case Executive Summary* (which did not account for induced demand) have fallen to $20.5 billion in the current business case – a 2.9 per cent decrease (Table 12.9, page 230). In contrast, when induced demand was accounted for in the Western Distributor business case in Melbourne, a project which has some similarities to WestConnex, the transport benefits were reduced by 30 per cent.

This raises real concerns around the treat of induced demand resulting from WestConnex. If the transport benefits are over stated by 30 per cent, then the project BCR would reduce from the recalculated 1.64 to 1.15.

4.1 Travel time saving benefits are not dependable

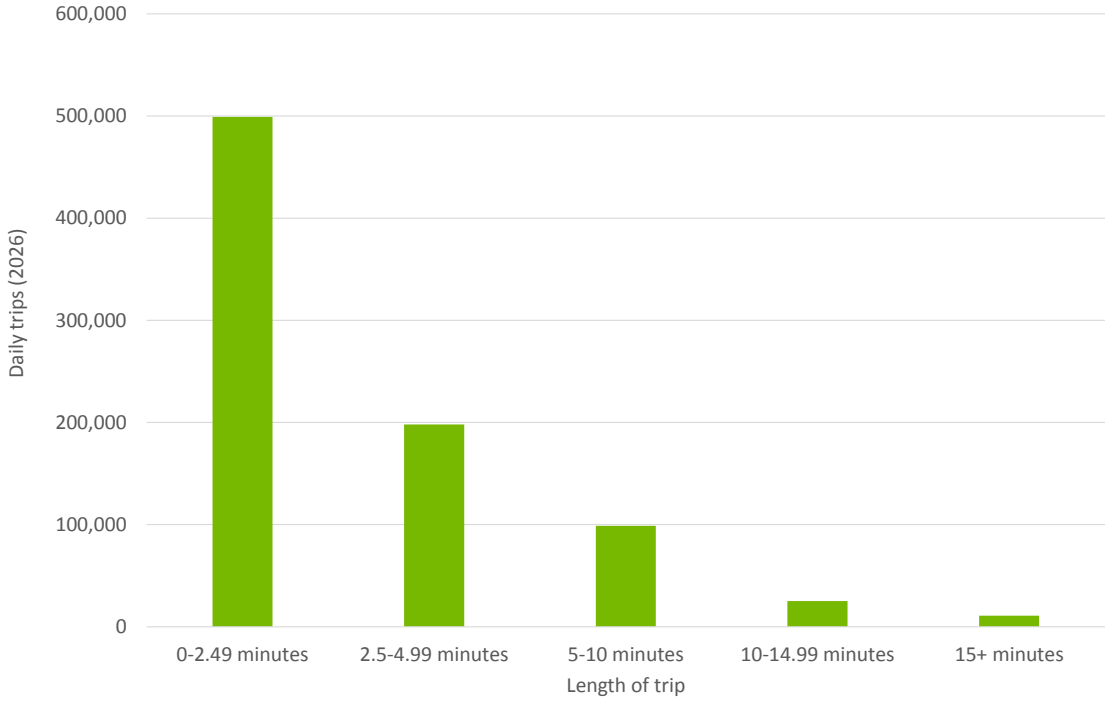
Travel time savings resulting from WestConnex are generated primarily during peak periods. Non-peak periods have very low travel time savings, throwing doubt over who would use the road during such periods.

In a review of the Lane Cove Tunnel and Cross City Tunnel, the Roads and Maritime Services (RMS) describes that "*the majority of travel time savings were less than five minutes (which are often not realised and can be considered inframarginal in economic terms)"* (RTA 2010). Inframarginal means that they are within the margin of error of the modelling or/and cannot be observed by road users. In the case of the Lane Cove Tunnel, when travel time savings of less than five minutes were removed from the analysis, this BCR decreased by approximately 50 per cent.

Using data from the Zenith Model (which produces results broadly consistent to the WRTM) the distribution of travel time savings from WestConnex was used to replicate this five minute inframarginal analysis suggested by the RMS. The data for 2026 shows that 832,000 trips gain travel time saving from WestConnex. Table 10.1 from the *Updated Strategic Business Case* has 788,100 trips along WestConnex and the existing M4 and M5 in 2031. In accounting for additional trips on surface roads which may gain a travel time benefit, the result from the WRTM and Zenith appear broadly consistent.

Figure 14 shows the number and length of daily trips on WestConnex in 2026. From a total of 831,000 trips on WestConnex in 2026, the majority (499,100 or 60 per cent) result in a travel time saving of less than 2.49 minutes. With such a short time saving for the majority of trips, there is a risk these time savings will not be discernible to motorists and in turn, that patronage forecasts will not be achieved.

FIGURE 14. AVERAGE TRAVEL TIME SAVINGS BY NUMBER OF TRIPS WITH WESTCONNEX (2026)



The midpoint of each time group was used to estimate the time saving and a $45 dollar cost of time was used to estimate the travel time saving benefit. $45 is the estimated weighted average of value of time for business, commuter, freight and other private trips in the *Updated Strategic Business Case.*

Excluding trips with a travel time saving of less than five minutes from the travel time savings would reduce the benefit from $12.9 billion to $5.9 billion (a 55 per cent reduction). The removal of these small travel time savings would reduce the project BCR from the recalculated 1.64 to 1.12.

If the same analysis is applied to only Stages 1 and 2 the travel time savings benefits are reduced by 70 per cent.

4.2 The large business trip benefits are dubious

WestConnex benefits are largely driven by travel time savings. Section 12.5.1 of the *Updated Strategic Business Case* (page 227) lists the discounted and undiscounted present value of user benefits by vehicle type. A total of $22.4 billion in benefits is identified for WestConnex, with $20.5 billion of user benefits identified, and of these, $12.9 billion are travel time savings. The following table adapts the results presented in Table 12.6 of the *Updated Strategic Business Case* and compares these to the total present value of benefits.

TABLE 8. WESTCONNEX USER BENEFITS

	Discounted (PV $m)	% of total present value of benefits
Travel time savings		
Cars - Privately registered, Business use	$4,306	19.4%
Cars - Privately registered, Commuter	$1,688	7.6%
Cars - Privately registered, Other	$992	4.5%
Light Commercial Vehicles	$3,389	15.3%
Heavy Commercial Vehicles	$2,528	11.4%
Sub-total	$12,903	58.1%
Vehicle operating cost savings		
Cars - Privately registered, Business use	$1,571	7.1%
Cars - Privately registered, Commuter	$1,065	4.8%
Cars - Privately registered, Other	$621	2.8%
Light Commercial Vehicles	$1,164	5.2%
Heavy Commercial Vehicles	$1,762	7.9%
Sub-total	$6,182	27.8%
Travel time reliability savings		
Cars - Privately registered, Business use	$337	1.5%
Cars - Privately registered, Commuter	$286	1.3%
Cars - Privately registered, Other	$210	0.9%
Light Commercial Vehicles	$439	2.0%
Heavy Commercial Vehicles	$195	0.9%
Sub-total	$1,465	6.6%
Total User-Benefits	**$20,550**	**92.5%**
Total benefits	**$22,204.9**	

What is concerning is that $4.3 billion in benefits (19.4 per cent of total) are related to 'cars – privately registered, business use'. Part of this is driven by the high cost of time assigned to business travellers ($53.60) compared with commuters ($21.32). This large difference in hourly value of time is in line with Austroads' advice. However, no justification is made for the number of business travellers relative to other types of vehicles using WestConnex. If the value of time for business travellers was adjusted downwards to the same as commuters, the present value of the benefit would fall to approximately 40 per cent of current levels – a reduction $2.6 billion in benefits. This would reduce the BCR from the recalculated 1.64 to 1.45.

The impact of business travellers is high for vehicle operating costs. For every two dollars of vehicle operating costs saved by WestConnex, 50 per cent is saved by a business traveller. It is unclear where all these business trips are originating from and where are they travelling to on WestConnex.

The travel time reliability estimates show that the greatest proportion of benefits generated by business trips take place outside of peak times. However, the travel time savings provided by WestConnex outside of peak periods are very small. This raises doubt over the number of business travellers who would be willing to pay tolls to use the road.

The size of the Wider Economic Impact (WEI) estimate raises more questions in regards to the business use trips. WEI's agglomeration benefit essentially comes from firms interacting with each other more due to improvements in accessibility. As business trips form the lion's share of user benefits, it would be expected that a sizeable agglomeration benefit would be calculated. A rule of thumb for projects of this scale is that the WEIs would be at least 20-30 per cent of the transport benefits.

However, the agglomeration benefit represents seven per cent[11] of the transport benefits, which does not align with very large benefits for business travellers.

The size of the Light Commercial Vehicle (LCV) benefits also appear strange. Light Commercial Vehicles (LCVs) account for roughly 1.2 million trips while car trips account for almost 9 million - approximately 10 per cent of car trips are by LCV. However, LCV benefits are 45 per cent of benefits generated by cars.

4.3 Not all costs have been considered

A review of the costs and benefits included in the cost benefit analysis (KPMG 2015) suggests that the majority of those identified in TfNSW *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives* are included.

However, the way crash cost savings, potentially reduced public transport and active transport usage and land acquisition are treated is concerning.

Crash cost savings (Table 6, KPMG 2015) are calculated using a change in VKT, applying crash rates derived from Austroads and applying willingness to pay values for crashes avoided from TfNSW.

This approach does not appear to account for the more severe accidents which could occur because of higher possible speeds on WestConnex compared to existing roads. It also has not accounted for any increase in pedestrian accidents as a result of WestConnex increasing traffic on surface roads, for example, in and around the St Peters Interchange, the Ashmore precinct and along Parramatta Road. These urban renewal areas will have increasing number of pedestrians and bike riders in coming years and WestConnex will increase traffic flows in these areas, thus increasing the chance for pedestrian and cycle accidents. This risk will be particularly pronounced where separate infrastructure is not provided.

Another cost which does not appear to be accounted for is the impact of WestConnex on public transport patronage or on active transport. These modes could be affected by induced traffic (people shifting from public transport or active transport to WestConnex), or by public or active transport becoming less attractive due to construction-period impacts. This is complicated by the fact that strategic alternatives to WestConnex or holistic project options which incorporate road improvements with public transport and active transport enhancements have not been considered in the *Updated Strategic Business Case* or in the Environmental Impact Statements for the M4 East or New M5.

Page 8 of the *Economic Appraisal* attachment notes that costs should include property, design, construction contracts, tolling equipment, retained works, contamination and remediation works, client costs and provision for urban renewal works.

However, land acquisition costs are excluded from WestConnex's capital cost. The footnote for Table 13.6, (page 240 of the *Updated Strategic Business Case*) states "*For the purpose of this analysis capital costs exclude land acquisition, network enhancements and development costs".* The cost of these excluded elements may be considerably high. A review of the *Updated Strategic Business Case* did not identify an estimate for land acquisition costs. This is contrary to advice in the economic appraisal guidelines (TfNSW 2015) which states: *"Buildings or houses that have to be demolished to make way for the project should be valued at market prices (net of selling costs), plus demolition costs minus scrap or residual value. Labour costs should generally reflect market rates with an allowance for labour on-costs (generally around 30 per cent)"* (TfNSW 2015, p.30).

At a bare minimum, the cost benefit analysis should account for the market value of the properties acquired for WestConnex. Section 4.4 explores this issue further.

[11] If labour market deepening is included as a wider economic benefit, the WEI ratio to transport benefits increase to 10%.

Given the level of interest in the WestConnex project, it would have been beneficial for the *Updated Strategic Business Case* to identify all costs and benefits not included in the economic appraisal and the rationale for not doing so.

4.4 The opportunity cost of using high value land is not considered

The *TfNSW Guidelines* note that land should be valued at its market price at the commencement of the project to adequately present opportunity cost (page 30).

The opportunity cost of alternative land use of sites purchased for WestConnex should be considered in the cost benefit analysis. This is particularly relevant to sites being acquired at St Peters (27 hectares) and Rozelle (15 hectares).

The *NSW Government Guidelines for Economic Appraisal*) provide a methodology for the Opportunity Cost Principle at Section 9.4.1.

> ***Underlying the valuation of inputs to a project or activity is the principle of opportunity cost.*** *The use of resources (manpower, finance or land) in one particular area will preclude their use in any other. Hence the basis for valuing the resources used is the "opportunity cost" of committing resources; i.e. the value those resources would have in the most attractive alternative use. The adoption of this principle reflects the fact that the economic evaluation of public sector projects should be conducted from the perspective of society as a whole and not from the point of view of a single agency.*
>
> *Commonly, the price paid for new capital, labour or other inputs will reflect the opportunity cost of the resources. The position may be less clear in the case of the use of existing land owned by the agency. In general it is considered that a cost equivalent to its maximum market value under current or likely realistic land-use zoning should be placed on such land.*
>
> *The general principle applies even where the public sector may have access to an input at a cost different from its market value. In certain cases, where a resource has a market price, that price may not reflect the marginal social cost of using the resource. Such cases are reasonably rare and are discussed in section 9.5.4 below.*

The site at St Peters comprises industrial and residential sites that are being compulsorily acquired. WestConnex notes that the St Peters Interchange is largely located on the Alexandria Landfill site. As a result, over "*two-thirds of the properties to be acquired in St Peters are currently used for commercial or industrial activities*." Approximately 80 residential properties are being compulsorily acquired. They are all located in existing, long-standing road reservations. On 31 August 2015, the CEO of the Sydney Motorway Corporation, Dennis Cliche, appeared at Budget Estimates and indicated that $140-150 million had been designated for land acquisition to facilitate the St Peters Interchange (General Purpose Standing Committee No. 2, 2015).

The site at Rozelle is located in the disused Rozelle Rail Yards. The Business Case states at Section 7.2 that the concept design for the Rozelle site will be developed with UrbanGrowth NSW. One objective of the concept design is to provide greater housing choice. However, it is considered unlikely that much of the 15 hectare site at Rozelle will be available or suitable for residential development after a major motorway interchange has been constructed.

These two sites are located close to the Sydney CBD with good access to public transport networks. Both sites are adjacent to major urban renewal areas – The Bays Precinct at Rozelle and Green Square near St Peters. The highest and best land use for these sites would be residential development to ease Sydney's housing supply and affordability problems.

The value of alternative land use for these WestConnex interchanges can be demonstrated by comparison with recent urban development.

Median sales for residential strata units in Inner Sydney are contained in the following Table with St Peters and Rozelle highlighted.

TABLE 9. MEDIAN SALES – RESIDENTIAL STRATA UNITS INNER SYDNEY

RESIDENTIAL STRATA UNITS	2010	2011	2012	2013	2014	2015
Haberfield	$450,000	$615,000	$502,500	$527,000	$550,000	$745,350
St Peters	$541,500	$496,250	$494,500	$532,500	$684,500	$656,000
Rozelle	$557,500	$686,500	$690,000	$820,000	$880,000	$1,090,000
Strathfield	$484,000	$480,000	$505,000	$560,000	$650,000	$700,000
Ashfield	$439,994	$473,000	$471,000	$501,000	$606,250	$667,500
North Strathfield	$500,000	$522,630	$525,000	$580,000	$630,000	$750,000
Burwood	$532,500	$591,000	$600,000	$593,000	$685,000	$800,000
Concord	$507,500	$517,500	$597,500	$588,500	$670,000	$800,000
Leichhardt	$570,000	$655,000	$615,000	$670,000	$705,000	$855,000

For Rozelle, a good comparison is the former horse racing track at Harold Park in Glebe – less than 1 km from the Rozelle site. Harold Park is being redeveloped with 1,200 apartments on a 10.54 hectare site. Approximately 5 hectares is being converted to parklands. On this basis, approximately 1,800 apartments could be developed on the Rozelle site with a median value of $1,090,000 per unit. The total market value at Rozelle could therefore be forecast at $1,962 million.

The site at St Peters is 27 hectares. This site is in close proximity to Green Square and Mascot where major urban development is occurring.

For St Peters, an acceptable comparison is Victoria Park, Zetland. This is a 24 hectare mixed-use development which will have approximately 2,500 dwellings as well as 25,000m2 of commercial uses and 10,000 m2 of retail uses.

Assuming that a similar development quantum is achievable at St Peters, it would generate 2,500 units at a median value of $690,000 per unit. The total market value at St Peters could therefore be forecast at $1,725 million.

In total, these two sites have a market value of approximately $3.7 billion. If this cost was taken into account in the cost benefit analysis, the net present value would fall from $8.66 billion to $4.96 billion, and the BCR would fall from the recalculated value of 1.64 to 1.23.

Whilst the cost of land acquisition is not included in the *Updated Strategic Business Case*, the M4 East EIS notes that full and partial acquisition of 182 properties and 10 road reserves would be required, in addition, 98 properties owned by Roads and Maritime would be acquired (M4 East EIS 2015, p. ix). The cost of the land acquisition is not identified in the EIS.

4.5 High expansion factors overstate benefits

An expansion factor is used to convert average weekday benefits into an annual figure. The expansion factor used by the *Updated Strategic Business Case* is 345. This assumes that the benefits generated on an average weekday by WestConnex would be generated for 345 days per year. However, there are 260 weekdays in a calendar year. Further to this, school holidays and public holidays make up 68 days of the year, and these typically have lower traffic levels. This leaves 192 days where the peak periods would be replicated by the transport model. Weekends only account for 70 per cent of the weekdays traffic flows (see Table 10).

TABLE 10. EXPANSION FACTORS

Item	Number*	Benefit ratio	Weighted
Normal work days	192	100%	192
Weekend days	104	70%	73
Public holidays	11	65%	7
School holidays	57	85%	48
Total	**365**		**320**

The high expansion factor that is used increases benefits by about seven per cent compared to a more realistic expansion factor of 320. With a factor of 320, the BCR would fall from the recalculated 1.64 to 1.52. Notably, the sensitivity analysis (KPMG 2015, Table 11) uses a low annualisation factor of 300 as one sensitivity scenario.

4.6 The longevity of the project is questionable

One of the most significant concerns around WestConnex is its longevity relative to its very high capital cost.

Traffic across ANZAC Bridge is estimated to increase by 20,000 vehicles for an average weekday due to the opening of on-ramps at Rozelle, providing westbound access from ANZAC Bridge to WestConnex. However, this will change once the Western Harbour Tunnel and Northern Beaches Link are in operation in the future. The Updated Strategic Business Case identifies that the opening of the Western Harbour Tunnel will result in WestConnex being close to capacity by 2031. This is a significant concern, given the project's capital cost.

At the same time, it is difficult to understand what the impact of this would be in economic terms, as no modelling is undertaken after 2031 in the *Updated Strategic Business Case* – benefits beyond this year are simply interpolated based on benefits generated in 2031 with a 'decay' function included to account for increased traffic over time (Table 12.2 of the *Updated Strategic Business Case*). The relationship of this decay function to future projects is unclear, and its value is not presented.

Given the project's scale, it would have been more appropriate for the transport modelling and economic appraisal to be modelled in 2041 or 2046 – not just 2012, 2021 and 2031.

The sensitivity testing includes no further growth in benefits post 2031 as a scenario. However, a high increase in traffic could see benefits fall over time.

4.7 The tolling regime is not adequately tested

The proposed tolling regime for WestConnex is aligned with other toll roads in Sydney as shown on pages 195-196 of the *Updated Strategic Business Case*. The WestConnex tolling regime is closest to M7.

The query with the WestConnex tolling regime is whether it can generate sufficient revenue to cover capital costs within a reasonable time frame. Otherwise, it will result in a negative capital return to government on an actual basis (as well as an even worse result on an NPV basis) when the concession is finally sold.

This conclusion can be reached on the basis of analysing metrics for other toll roads in Sydney in terms of capital costs set against tolling regime and forecast/actual traffic volumes. The eventual investor in WestConnex will also discount acquisition price to factor in a commercial rate of return on investment.

A qualification on this conclusion is the ultimate duration of the concession period determined by government. Current concessions in Sydney range from 29 years for the new NorthConnex to 51 years for the original M2. If the concession period for WestConnex is extremely long (i.e. much longer than 51 years) then it will generate a higher sale price and close the gap on likely government capital investment losses. The *Updated Strategic Business Case* suggests a concession period which expires in 2060.

A comparison with NorthConnex and M7 is instructive:

- M7 is a toll road with a similar tolling regime to that proposed for WestConnex. It provides actual data in terms of traffic volumes and revenue which can be used as a benchmark for WestConnex.
- NorthConnex is an unsolicited proposal from Transurban submitted in 2012. On this basis, it can be assumed that the transaction structure delivers a commercial rate of return to investors; which is typically in the 8-12 per cent Internal Rate of Return (IRR[12]) range. NorthConnex is a simple tunnel with a $6.36 toll each way.
- By contrast, WestConnex is complex due to its length and multiple on/off ramps.

The core metrics for NorthConnex, M7 and WestConnex are as follows:

TABLE 11. KEY METRICS – WESTCONNEX, M7 AND NORTHCONNEX

	M7	NorthConnex	WestConnex (Stages 1-3)
Length	40.0km	9.0 km (open 2019)	33.0 km
Cost (million)	1,850 million ($2005)	$3,000 million (including government contributions of $810 million)	$16,812 million
Toll Level ($2015)	Up to $7.71 (max) 38.5 c/km	$6.36	Various – up $7.95 (max) 42 c/km + flagfall
Indexation	CPI only	CPI or 4% (greater)	CPI or 4% (greater) for first 20 years then CPI
Heavy Vehicle Multiplier	3.0x (from 2017)	3.0x	3.0x
Concession Term	43 years	29 years	TBD
Forecast Traffic Volume (average per day)	165,000 (Actual 2015FY)	100,000	Various – from 37,000 (New M5) to 164,000 (M4).
Annual Revenue	$261 million	$203.5million*	TBD

** NorthConnex revenue is based on traffic/day x 320 x toll.*

The following points are noted:

- WestConnex capital cost is approximately 550 per cent greater than NorthConnex, which has a privately-conceived transaction structure. Therefore, it can be assumed in basic terms that WestConnex will have to generate 550 per cent higher revenue in order to deliver a commercial return to investors (This however, does not consider government contributions or project gearing).
- NorthConnex is forecast to generate $203.5 million per year. On this basis, WestConnex would have to generate approximately $1,119 million per year.
- Achieving any revenue forecast for WestConnex depends on tolling regime and traffic volume.
- The tolling regime for WestConnex must generate higher revenue than NorthConnex.
- WestConnex has an additional $1.12 flagfall per journey compared to NorthConnex. At $6.36 per trip, this represents 19 per cent additional revenue for Westconnex. This could generate approximately $40 million per year (based on NorthConnex forecast of 100,000 trips per day).
- Maximum toll is $7.95 on WestConnex compared to $6.36 for NorthConnex. This is 25 per cent higher.

[12] An Internal Rate of Return (IRR) is the interest rate at which the net present value of all cash flows associated with a project equals zero. It is a commonly used tool to identify the attractiveness of a project.

- However, WestConnex will not necessarily generate 25 per cent extra revenue compared to NorthConnex as it has different journey lengths via multiple on/off ramps. The maximum toll of $7.95 on WestConnex will be reached after approximately 16km. Of course, many trips will be much shorter than 16km.
- By way of comparison to WestConnex, M7 generated $261 million actual revenue in 2015FY with a similar tolling regime to WestConnex. However, WestConnex will have additional $1.12 flagfall per trip which could generate approximately $65-70 million in addition (based on M7 volume of 165,000 trips per day).

On the basis of high level metrics, it appears that WestConnex will not recoup the total upfront capital investment by government on the basis of the proposed tolling regime if a similar concession period to other toll roads in Sydney is applied. As much of the critical detail in the *Updated Strategic Business Case* is redacted, it is difficult to confirm this.

One issue that appears to not have been examined in the *Updated Strategic Business Case* is the link between toll prices and travel time savings. A 2015 study on the approach to forecasting toll road use suggests that common approaches ignore the concept of a 'toll budget constraint'. In Sydney where multiple toll roads exist, the inclusion of additional toll links can reduce car users' willingness to pay for toll roads (Hensher et al, 2015). The conclusion of this study is that estimates of toll road patronage are sensitive to the number of existing tolled links in place and may also have implications for the frequency of use of the existing tolled links. Sydney already has more metropolitan toll kilometres than any other city in the world. The study raises doubts on the ability for WestConnex to achieve sufficient revenue.

The sensitivity of traffic patronage on the toll rising above inflation is not considered in detail in the *Updated Strategic Business Case*. Further to this, the sensitivity of the project's feasibility on future mega-trends, such as climate change, economic shocks, autonomous vehicles and so on, is not explored. While this sensitivity testing is not required according to *TfNSW Guidelines on Economic Appraisal*, the high cost of the project would suggest these are issues worth exploring, particularly in terms of risk to NSW Government and taxpayers over the concession period and the level of risk borne by the public sector.

4.8 WestConnex presents risks to the NSW taxpayer

The concession period noted in the *Updated Strategic Business Case* is to 2060. However, it is unclear at this stage of the project and from the material released to the public to date what conditions would be in place during this period. This applies to both the date on which the concession period will commence and its duration. As noted elsewhere in this report, the length of the concession period will play a major part in the pricing of the concession for WestConnex.

Typically, this type of project would see a degree of risk shifted from Government to the private sector (toll road operator). However, this arrangement does not remove all risk from Government. Certain, project-specific guarantees and compensation agreements usually form part of toll road operation contracts. For example, a guarantee around minimum patronage may be in place.

Further to this, Government may be liable for compensation if a different project is delivered in the future which may affect patronage levels. An example may be improvements to alternative roads or public transport investment. For example, Transurban (operators of Melbourne's CityLink) launched legal proceedings in 2001 against the State of Victoria for construction of Wurundjeri Way. It was claimed that this new, free road, decreased the revenue of CityLink.

Infrastructure Australia identifies *Patronage Risk* as a key issue in toll road projects. A report commissioned by the Department of Infrastructure and Regional Development (Bain and Oxera Consulting, 2012) into over-optimising traffic forecasts for toll roads concluded that:

- *Key policy objectives should focus on forecasting realism rather than accuracy, with the elimination of clearly biased overinflated submissions;*
- *Procurement practice needs to ensure that the downside for submitting unrealistically high traffic and revenue forecasts are greater than any upside;*
- *Incentives for excessive risk taking should be avoided in concession design, yet concessionaires should not be insulated from traffic risk;*
- *Greater attention needs to be directed to capital structures of bids with potential focus on greater equity or 'skin in the game';*
- *Bidding processes need to be realigned to avoid aggressive price-based competitions and deal scarcity that often drive overbidding; and*
- *Greater use should be made of independent technical and commercial oversight of bidders' plan.*

Source: Infrastructure Finance Working Group, 2012

In essence, the procurement for WestConnex's operation would need to be carefully managed to limit the risk to the NSW State Government. If patronage levels do not reach forecasts, it needs to be ensured that Government's liability is limited. At the same time, it is critical that future planning and investment in transport initiatives across Sydney is not hindered by the arrangement between the State and the toll road operator.

Patronage risk on WestConnex is exacerbated by the potential risk of delay in the construction and opening of the contiguous stages of WestConnex as well as the Western Harbour Tunnel. In particular, patronage forecasts for WestConnex require the Western Harbour Tunnel to feed traffic to Stage 3. The Western Harbour Tunnel has a preliminary cost of $4.5 billion and it has been identified as "user pays" in the *State Infrastructure Plan Update* (2014). The *State Infrastructure Plan Update* aims for the Western Harbour Tunnel to be delivered with, or immediately after, Stage 3 of WestConnex. However, a final business case is yet to be released. The full patronage potential of WestConnex Stage 3 cannot be realised without the Western Harbour Tunnel. This means that the sale of concessions for WestConnex is likely to be delayed until the Western Harbour Tunnel comes online.

It is therefore likely that the concession period will commence post 2023. If it ends in 2060 as per the *Updated Strategic Business Case* then the maximum period of 37 years. In fact, it is likely to be less than 37 years due to the timing requirements of the tender and sale process. A concession period of approximately 35 years would be shorter than other concessions for toll roads in Sydney which range from 29 years (NorthConnex) to 51 years (M2). A concession period of 35 years would suppress the sale price of the WestConnex concession and reduce the repayment of capital costs to government. An overall loss on the concession sale is likely on this basis. It is therefore reasonable on this basis to assume that the concession period for WestConnex is likely to exceed the end of the Business Case period in 2060 by 10 to 15 years to optimise the sale price to government.

5 CONCLUSION

The review of the *Updated Strategic Business Case* has raised a number of significant concerns around the justification of WestConnex and whether the benefits it would generate are legitimate and worth its significant capital cost.

Despite the significant volume of material released through the *Updated Strategic Business Case* and its supporting documents, there are omissions in descriptions of the methodologies applied and in the rationale of including and / or calculating some benefits. Furthermore, some errors are evident in the work presented. These issues add further uncertainty to the process that has been carried out in planning and delivering WestConnex.

The construction of some components of WestConnex is already underway which is of concern, given the release of the *Updated Strategic Business Case* in November 2015. The provision of a $2 billion concessional loan from the Federal Government to accelerate the delivery of Stage 2 of WestConnex adds further uncertainty around the comprehensiveness and transparency of the planning and approval process carried out to date. The lack of an available Final Business Case is particularly concerning, given the project will cost at least $16.8 billion – more than many international and Sydney-based transport infrastructure examples, particularly on a per kilometre basis.

Setting aside discrepancies in the *Updated Strategic Business Case* and how WestConnex has been assessed to date, the most significant issue is that strategic alternatives to the road are not considered in the document or in the Environmental Impact Statements which have been made publicly available. This approach fails to consider Sydney's transport future beyond 2031 when WestConnex is likely to reach capacity.

As a global city, Sydney must look at the way transport issues have been managed internationally. The continued construction of roads has been shown to generate more traffic over time. The proliferation of toll roads in Sydney is of particular concern from a sustainability and social equity perspective. New, integrated transport initiatives are needed – not only in planning policy, but in practice.

REFERENCES

Bain and Oxera Consulting (2012) *Disincentivising Overbidding for Toll Road Concessions.* Available via: *https://infrastructure.gov.au/infrastructure/infrastructure_reforms/files/Disincentivising_Overbidding_Toll_Road_Concessions.pdf*

General Purpose Standing Committee No. 2 (2015) *Examination of proposed expenditure for the portfolio area Roads Maritime and Freight.* Monday 31 August 2015.

Hensher, D., Ho, C., Liu, W. (2015) *How much is too much for tolled road users: toll saturation and the implications for car commuting value of travel time savings?* Research paper. 10 November 2015. Institute of Transport and Logistics Studies, the University of Sydney Business School.

Infrastructure Finance Working Group (2012) *Infrastructure Finance and Funding Reform.* April 2012. Available via: http://infrastructureaustralia.gov.au/policy-publications/publications/files/IFWG_Report_FINAL.pdf

KPMG (2015) *WestConnex Full Scheme: Economic Appraisal*

New South Wales Auditor-General (2014) *WestConnex: Assurance to the Government.* Available via: https://www.audit.nsw.gov.au/ArticleDocuments/351/01_Westconnex_Full_Report.pdf.aspx?Embed=Y

New South Wales Treasury (2008) *Guidelines for Capital Business Cases* tpp 08-5. December 2008. Available via: http://www.treasury.nsw.gov.au/__data/assets/pdf_file/0015/23820/TC12-19_Submission_of_Business_Cases_dnd.pdf

New South Wales Treasury (2012) *Treasury Circular NSW TC12/19 11 October 2012 'Submission of Business Cases'.* Available via: http://www.treasury.nsw.gov.au/__data/assets/pdf_file/0015/23820/TC12-19_Submission_of_Business_Cases_dnd.pdf

RTA (2010) *M7 Motorway, Cross City Tunnel and Lane Cove Tunnel. Post Implementation Review.* Available via: http://www.rms.nsw.gov.au/documents/projects/sydney-north/lane-cove-tunnel/m7-motorway-cct-lct-post-implementation-review-report.pdf

SGS Economics and Planning (2015) *Strategic Review of the WestConnex Proposal*. Prepared for the City of Sydney. Available via: http://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0008/227690/140511-Final-Report_150409.pdf

Transport for London (2014) *Public and stakeholder consultation on a Variation Order to modify the Congestion Charging scheme. Impact Assessment.* January 2014. Available via: *https://consultations.tfl.gov.uk/roads/cc-changes-march-2014/user_uploads/cc-impact-assessment.pdf*

Transport for New South Wales (2013) *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives.* March 2013. Available via: http://www.transport.nsw.gov.au/sites/default/files/b2b/publications/tfnsw-principles-and-guidelines-for-economic-appraisal-of-transport-initiatives.pdf

Victorian Government (2013) *East West Link Business Case.* 30 June 2013. Available via: http://media.heraldsun.com.au/multimedia/2014/dec/eastwestlink_full/EastWestLinkCase.pdf

WestConnex Delivery Authority (2014) M4 East Environmental Impact Assessment.

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