



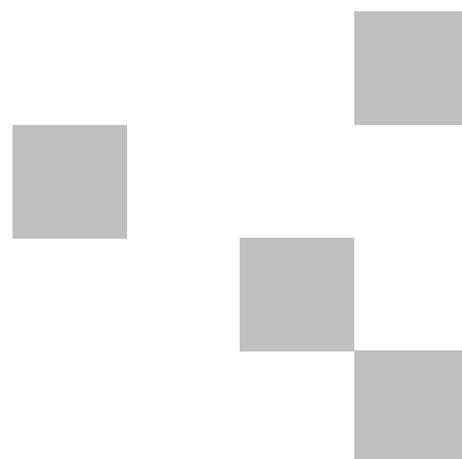
Post Implementation Review

M7 Motorway, Cross City Tunnel and Lane Cove Tunnel

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Motorway Projects Branch

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Executive summary

Overview

This report has been prepared to document the post implementation review completed for the M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel in accordance with the NSW Government's *Working with Government Guidelines*, December 2006 (WWG Guidelines). The review scope includes all three motorway projects as they are of a similar scale and were developed and delivered simultaneously, utilising the same environmental assessment, procurement and approval processes.

The subject motorway projects

The M7 Motorway, Cross City Tunnel and Lane Cove Tunnel completed the Sydney Orbital and provided an east-west bypass of Sydney's CBD.

The M7 Motorway is a 40 kilometre dual carriageway motorway linking the M2 Motorway at West Baulkham Hills, the M4 Motorway at Eastern Creek and the M5 and the Hume Highway at Prestons.

The Cross City Tunnel is a 2.1 kilometre two lane tunnel generally running east-west below parts of the Sydney CBD, connecting the Kings Cross Tunnel with the Western Distributor.

The Lane Cove Tunnel is 3.6 km, dual two to three lane tunnel generally running below the alignment of Epping and Longueville Roads and connecting the Gore Hill Freeway at the Pacific Highway with the M2 Motorway and Epping Road at Mowbray Road west. Two new north-facing tolled ramps connecting the Warringah Freeway to Falcon Street and Military Road in North Sydney also form part of this project.

About this review

The purpose of this review is to assist in refining the processes used in developing private sector motorway projects in the future. It is important to read this report in the context of the policy development timeframes associated with the subject three motorway projects. In particular, it is noted that the latest edition of the WWG Guidelines were published in 2006, whereas development of these motorway projects commenced in the mid 1990s. Compliance with the WWG Guidelines has therefore been assessed retrospectively.

This review has drawn on data from a number of internal and external process reviews, including independent reviews completed on the subject three motorway projects. In recognition of this work, an analysis of issues raised in these separate reviews has been completed as part of this review to assist in identifying key areas on which to focus.

The recommendations from this review will be adopted by the RTA as applicable in developing future private sector motorway projects.

Key findings and recommendations

This review has confirmed that the M7 Motorway, Cross City Tunnel and Lane Cove Tunnel were delivered in accordance with the WWG Guidelines. These three projects, with an estimated combined capital cost of over \$3 billion, provide for over 200,000 vehicle movements per day and were delivered concurrently and ahead of schedule. The Public Private Partnership procurement model developed to deliver these projects established best practice for Australian economic infrastructure and has become a benchmark for other jurisdictions both within Australia and internationally. The risk allocation and commercial model has been adopted as the base model for the *Commercial Principles for Economic Infrastructure Guidelines* currently being developed by Infrastructure Australia.

Notwithstanding, a number of emerging trends in the project development, procurement and assessment of motorway projects where improvements are possible were highlighted.

The key findings for each of the seven key focus areas covered in this report are:

- Identification of project objectives - Recognising that project objectives drive the selection of a preferred option, the objectives adopted for future motorway projects will need to be developed from rigorous analysis of transport deficiencies and predicted changes in employment and land use.
- Economic appraisal - Further research is required to develop a framework for assessing wider economic benefits and analyse the contribution of this assessment to project decision making.
- Programme alignment - Recent changes to the major project assessment and planning approval process have the potential to better align project development, environmental assessment and procurement processes and enable earlier involvement of the construction industry.
- Public interest evaluation - The development of a framework for public interest evaluation of motorway proposals will assist in selecting an appropriate procurement model for future motorway projects.
- Traffic modelling - Methodologies utilised to assess future motorway projects should utilise the latest techniques, include sensitivity analysis and consider the implications of 'ramp up'.
- Tolling - In procuring privately financed partnerships to deliver future motorway projects, the NSW Government should consider the benefits of a range of tolling and concession scenarios including, if appropriate, distance based tolling and time of day tolling.
- Network performance - Integration with the surrounding road network and incident management planning should commence early in developing a motorway project.

The experience gained and lessons learned through the implementation of the M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel projects will assist in improvements to the processes utilised to deliver future motorway projects.

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Glossary and abbreviations

BCR	Benefit Cost Ratio
CBD	Central Business District.
CCT	Cross City Tunnel
EIS	Environmental Impact Statement
LCT	Lane Cove Tunnel
MAE	Material Adverse Effect
Richmond Report	<i>Review of Future Provision of Motorways in NSW, Infrastructure Implementation Group, NSW Premier's Department, December 2005</i>
RTA	Roads and Traffic Authority
WWG Guidelines	NSW Government's <i>Working with Government Guidelines</i> , December 2006 (unless otherwise specified)

1 Introduction

1.1 Background and purpose

This report has been prepared to document the post implementation review completed for the M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel in accordance with the NSW Government's *Working with Government Guidelines*, December 2006 (WWG Guidelines). The review scope includes all three motorway projects as these projects are of a similar scale and were developed and delivered simultaneously, utilising the same environmental assessment, procurement and approval processes.

It is important to read this report in the context of the policy development timeframes associated with the subject three motorway projects. In particular, it is noted that the latest edition of the WWG Guidelines were published in 2006, whereas development of these motorway projects commenced in the mid 1990s. Compliance with the WWG Guidelines has therefore been assessed retrospectively.

The purpose of this review is to assist in refining the processes used in developing private sector motorway projects in the future. An overview of the lessons learned on previous privately financed motorway projects is included in this report in order to establish the current project context.

This review has drawn on data from a number of internal and external process reviews, including independent reviews completed on the subject three motorway projects. In recognition of this work, an analysis of issues raised in these separate reviews has been completed as part of this review to assist in identifying key areas on which to focus.

1.2 Methodology

A Steering Committee was established in June 2008 to oversee this post implementation review. The Committee comprised the following representatives:

- Paul Goldsmith, General Manager, Motorway Projects Branch, Roads and Traffic Authority.
- Danny Graham, Director, Privately Financed Projects Branch, NSW Treasury.
- Paul Gilbertson, CEO, NSW Nation Building and Jobs Plan Taskforce.

A copy of the Committee's Terms of Reference is provided in Appendix A. Meetings were chaired by Paul Goldsmith and the RTA provided ex officio services and a researcher to the Committee.

The review process utilised three distinct phases:

1. Analysis of available review data on the three motorway projects.
2. Identification of focus areas.
3. Analysis of focus areas in order to identify recommended improvement actions for future motorway projects.

The Committee met four times between June 2008 and June 2009. Further details of the methodology utilised for this review is provided in the Terms of Reference (see Appendix A) and the Committee Work Programme (see Appendix B).

1.3 Structure of this report

This report is structured as follows:

- A history of toll road procurement and delivery in NSW is provided in Section 2.
- Overviews of the three motorway projects and the project development and delivery processes utilised is provided in Section 3.
- A summary of issues identified from reviews completed to date is included in Section 4.
- An analysis of identified focus areas is provided in Section 5.
- Compliance of the three motorway projects with the WWG Guidelines 'ground rules' is reported in Section 6.
- Conclusions are presented in Section 7.
- A comprehensive list of recommendation is documented in Section 8.

2 History of toll road procurement and delivery in NSW¹

2.1 Background

NSW has a long history of privately financed road infrastructure dating back to the early days of settlement. One example is the pontoon bridge built across South Creek at Windsor built by Mr Andrew Thompson in 1802, on which he was given approval to collect tolls for the next fourteen years. The brochure *Toll Roads and Bridges* published by the National Association of Australian State Road Authorities in October 1981 describes how toll roads were developed in Australia up to that time.

Many projects were built in NSW in the twentieth century using tolls including the Sydney Harbour Bridge, Tom Ugly's Bridge, Ryde Bridge, Peats Ferry Bridge, and parts of the Sydney-Newcastle (F3) and Sydney-Wollongong (F6) Expressways. However, these projects were constructed using government funds or borrowings rather than private financing.

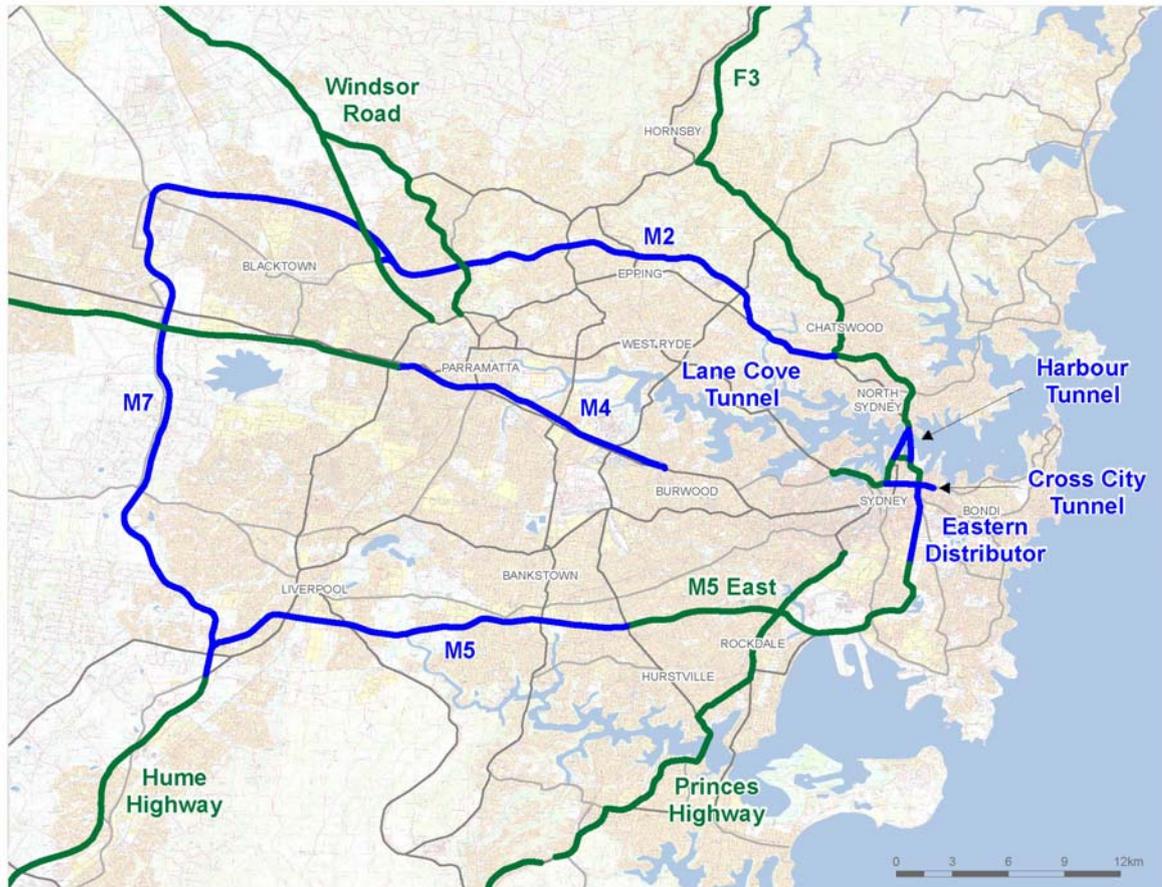
Apart from the Westlink M7, the Cross City Tunnel and the Lane Cove Tunnel, five major toll road projects have been delivered by the NSW Government utilising Build, Own, Operate and Transfer procurement models. This Section describes how the RTA procured these toll roads on behalf of the NSW Government and how and why the models have evolved over time.

Historically, roads and indeed transport links in Sydney were planned as radial networks spanning from the Central Business District (CBD) to the north, to the west and to the south. In 1987 a plan setting out a new vision for Sydney's road network was established in *Roads 2000*, prepared by the then Department of Main Roads. This vision changed the face of transport planning and articulated the first orbital route. The orbital recognised Sydney's evolving urban form and responded to emerging centres in the greater metropolitan region and has been a key focus of all subsequent planning strategies for the city. The Sydney Orbital and other key motorway and freeway links are illustrated in Figure 1.

The RTA commenced construction of the Sydney Orbital and other planned radial roads under the NSW Government's Capital Works Program. However, in order to accelerate delivery of this program a new era of toll road development began in 1986 with the commencement of the planning for the Sydney Harbour Tunnel. Financing and delivery by the private sector meant that projects could be opened many years ahead of that possible if government funding was relied upon. Instead, borrowings were made by the private sector, which did not affect the NSW Government's financial position, and the projects were delivered in a timely manner with a high level of financial certainty for the NSW Government.

¹ This Chapter has largely been drawn from a presentation entitled *Toll Road Procurement in NSW* given by Garry Humphrey, Director, Infrastructure Insights (formerly the General Manager, Motorway Projects, Roads and Traffic Authority) at the National Electronic Tolling Committee Industry Forum in Melbourne from 21st - 23rd April 2008 and his input is gratefully acknowledged.

Figure 1 Sydney motorway and freeway network



A summary of the previous five NSW privately funded toll roads is provided in Table 1 below.

Table 1 - Toll roads delivered utilising public private sector partnerships

Project	Length	Capital Cost*	Opened
M4 Motorway	12.5 km	A\$246 m	May 1992
M5 Motorway	21.0 km	A\$380 m	Aug 1992
Sydney Harbour Tunnel	3.0 km	A\$685 m	Aug 1992
M2 Motorway	20.0 km	A\$644 m	May 1997
Eastern Distributor	6.0 km	A\$700 m	Dec 1999

*Capital cost at the time of contract award.

The approach taken by the NSW Government in procuring these toll roads over the last twenty years has varied significantly as circumstances changed and experience was gained.

2.2 Implications for the M7 Motorway, Cross City Tunnel and Lane Cove Tunnel

From the experience gained in previous privately funded toll roads, the following changes were made to the development and procurement processes utilised to deliver the M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel:

- Conforming proposals based on an RTA concept design were invited with the opportunity to submit optional differences.
- Registrations of interest were invited instead of preliminary proposals, as the RTA was quite specific in detailing its concept designs and this would be less costly to the private sector.
- Financial parameters (for example; toll charges, rate of toll rise, and term for conforming proposals) were defined.
- The Scope of Works and Technical criteria documents were enhanced compared to previous projects to ensure that the NSW Government's project requirements were met and that the private sector delivered all that was offered in the proposals.
- The confidentiality and probity of the RTA's assessment processes were tightened.
- The proposals were exhaustively reviewed by RTA staff, and technical, financial and legal advisors to ensure that proposals were acceptable to the NSW Government, future users and the community.
- A 'comparative value' assessment was undertaken against a 'public sector comparator' – a hypothetical, risk-adjusted estimate of the net present cost of delivering the projects, to the same level and standard of service, using the most efficient likely form of delivery able to be financed by the public sector.
- The Minister for Planning's approval for the projects was obtained prior to the submission of detailed proposals.
- Competition was maintained deep into the invitation and negotiation phases.

The Cross City and Lane Cove Tunnel projects were delivered at no financial cost to NSW Government, with proponents contributing funds for land acquisition, approvals and project management. The Federal Government contributed \$360 million to the M7 Motorway, with the remaining funds coming from the private sector.

In addition to conforming proposals, the RTA received a non-conforming long tunnel proposal for the Cross City Tunnel that provided greater value for money and reduced environmental impact. The non-conforming proposal was selected for progression by the RTA and required the preparation of a supplementary EIS. A project that better met stated objectives was delivered, but the project took longer to deliver and the cost of the project was increased because of changes arising from the environmental assessment process.

Over time it has been possible to better quantify project risk profiles and to allocate risks in Public Private Sector Partnerships to the party most capable of managing that risk. This has resulted in a progressive increase in the risks allocated to the private sector.

Indeed, on the most recent toll roads delivered by the RTA patronage, finance and funding and the vast majority of construction and operational risks have been passed to the private sector, with the NSW Government retaining risks associated with land acquisition and integration with the road network.

3 Project overviews

3.1 Background

The M7 Motorway, Cross City Tunnel and Lane Cove Tunnel were developed in parallel, with strategic route development commencing in the late 1980s. These three projects completed the Sydney Orbital and provided an east-west bypass of Sydney's CBD. All three projects utilised the same development and approval processes. In particular, they were all assessed under Division 4, Part 5 of the EP&A Act and delivered under a Build, Own, Operate and Transfer contract. An overview of the processes utilised to develop and deliver each project is provided below.

3.2 M7 Motorway²

3.2.1 Project overview

The project objectives of the M7 Motorway as stated in its EIS are as follows:

- Provide a high standard National Highway link through Sydney.
- Support the NSW Government's metropolitan strategies for land use, transport and environment.
- Support the developing integrated transport strategy by creating one part of the emerging strategic transport network for Sydney.
- Improve the efficiency of freight movement and commercial travel.
- Improve access to employment and other opportunities (by private and public transport).
- Support economic development in western Sydney.
- Achieve the above-mentioned development in an environmentally and socially sensitive manner.

The scope of the project includes:

- 40 kilometre dual carriageway motorway linking the M2 Motorway at West Baulkham Hills, the M4 Motorway at Eastern Creek and the M5 and Hume Highway at Prestons, with the following features:
 - Four traffic lanes (two in each direction), a wide central median, shoulders, cuttings and embankments.
 - Built to motorway standard including provision for safe travel at variable speeds of up to 100km/h.
 - 17 interchanges.
 - 38 overpasses and underpasses to maintain local access for pedestrians, cyclists and motorists.

² The text for this sub-section is largely drawn from the RTA's *Westlink M7 Motorway: Summary of contracts*, dated August 2003 and available from <http://www.treasury.nsw.gov.au/wwg>

- An off-road pedestrian and cycle path of almost 40 km.
- 20 kilometres of local road works to integrate the project into the surrounding road network.

3.2.2 History of the project

The concept of a north–south freeway standard link in western Sydney was first mooted by the then NSW Department of Main Roads in the 1960s, and was revived in the mid 1980s, as part of a possible route for a ‘Sydney Orbital Motorway’. At that time the western portion of the Sydney Orbital route, linking the F5 (Hume Highway) with the then-proposed Castlereagh Freeway (which later became the M2), was envisaged as passing along a corridor reserved for a ‘Prospect Arterial’ and the Prospect Highway, through the developing suburbs of Busby, Bonnyrigg, St Johns Park and Prairiewood and the quarry land to the east of Prospect Reservoir.

In the early 1990s a *Liverpool to Hornsby Highway Strategy Study* of options for a new National Highway connection between Liverpool and Hornsby favoured a different route, further to the west, along Wallgrove Road. This study, publicly released in 1994, also recommended a new expressway between Elizabeth Drive and the F5, the use of a section of the M4 between Wallgrove Road and the Prospect Highway and upgrading of the Prospect Highway to the M2 Motorway. It was expected that eventually Wallgrove Road would be replaced by an expressway and a new northern link would be developed from the M4 Motorway, either to a westward extension of the M2 Motorway along a long-reserved corridor or to the Sydney–Newcastle Freeway.

It was recognised that a link between the M5, the M4 and the M2 Motorways would provide an improved National Highway freight route. Route concepts for the new ‘Western Sydney Orbital’ National Highway were further developed in 1994 and 1995. Late in 1994 the Commonwealth Minister for Transport announced the start of a feasibility study into three route options between Prestons and Cecil Park. An Overview Report on the results of this study, publicly released in late 1995, depicted a route for the Western Sydney Orbital broadly similar to the route now adopted.

In November 1996 the Commonwealth Minister for Transport announced funding of \$109 million over the following five years for pre-construction activities and the preparation of two EISs, one for a southern section between the M5 Motorway at Prestons and Cecil Park and the other for a northern section from Cecil Park to the M2 Motorway at West Baulkham Hills.

In 1998 there were extensive community consultations in Liverpool, Fairfield, Blacktown and Baulkham Hills on the Western Sydney Orbital’s preliminary designs and features. A new, shorter Overview Report was released, together with an Initial Design Proposal and a brochure. A major change in the proposals at this stage, compared with earlier concepts, was a preference for a more easterly route option through Cecil Hills.

Further changes to the route were made in the light of feedback from the community. Although the easterly route at Cecil Hills was confirmed, the alignment at Prestons was moved to the east and northeast, substantially reducing the impact of the project on endangered ecological communities between Camden Valley Way and Bernera Road and eliminating its impact on Sule College north of Kurrajong Road.

The possibility that the Western Sydney Orbital might be a toll road was first raised by the Commonwealth Minister for Transport and Regional Services in 1999, with the Commonwealth advising that it could not provide the funds required to build the road in the short to medium term. The RTA commenced an investigation of tolling options and the likely effects of tolls on traffic on the Western Sydney Orbital and alternative toll-free roads.

3.2.3 Design development and environmental assessment

An EIS for the Western Sydney Orbital was publicly exhibited by the RTA from 8 January 2001 to 5 March 2001. Two hundred and sixty-seven submissions in response to this EIS were received by the RTA. After considering these submissions, the RTA made a series of 23 modifications to the proposal, including:

- A realignment of the route 400 metres further to the west at Cecil Hills, to reduce noise and visual impacts in this residential area.
- Revisions to the Western Sydney Orbital/M4 interchange, designed to improve the performance and safety of this interchange.
- A realignment of the Western Sydney Orbital over Woodstock Avenue in Rooty Hill and associated changes to ramps to and from the motorway at this location, reducing impacts on nearby private properties.

These modifications were presented in a Preferred Activity Report within a Western Sydney Orbital Representations Report submitted by the RTA to the Department of Urban Affairs and Planning (now known as the Department of Planning) on 17 September 2001.

These modifications were publicly announced by the then Minister for Roads, Mr Carl Scully, on 14 November 2001, along with an announcement of a high-standard off-motorway cycleway along the Western Sydney Orbital route. The RTA's Preferred Activity Report was publicly released on 21 December 2001.

In accordance with section 115C of the EP&A Act, a report by the Director-General of the Department of Planning on the modified project proposal, *Proposed Western Sydney Orbital: Director General's Report*, was completed in February 2002. Among other things, this report concluded that the modifications proposed by the RTA would not necessitate the preparation of another EIS.

On 28 February 2002 the then Minister for Planning, Dr Andrew Refshauge, granted planning approval for the project, as described in the EIS and as modified by the Representations Report, under Section 115B(2) of the EP&A Act. This approval was subject to 223 conditions.

The 'Western Sydney Orbital' is now known as the M7 Motorway or the 'WestLink M7.'

3.2.4 Procurement process

On 25 July 2001 the RTA invited Registrations of Interest from private sector parties for the financing, design, construction, operation and maintenance of the Western Sydney Orbital. Registrations of Interest were received from three consortia by the closing date of 29 August 2001:

- The WestLink Motorway consortium, sponsored by Leighton Contractors, Abigroup, Transurban and Macquarie Bank.

- The Orbital Park Alliance consortium, sponsored by Thiess, Baulderstone Hornibrook, CKI and Deutsche Bank.
- The Western Link Joint Venture consortium, sponsored by Transfield and Bouygues Travaux.

After evaluating these Registrations of Interest, the RTA issued a formal Request for Proposals to all three consortia on 1 November 2001, asking them to submit detailed proposals. Before receiving this Request for Proposals these proponents warranted, in Deeds of Disclaimer, that they would rely on their own investigations in preparing their proposals, and also executed Process (Probity) Deeds setting out procedures to address any conflicts of interests arising from the common ownership of some of the participants in the different consortia.

The RTA's Request for Proposals included drafts of a Project Deed, Scope of Works and Technical Criteria documentation, an RTA Consent Deed and a Site Access Schedule. All three consortia submitted detailed proposals on the closing date, 19 March 2002.

The proposals were evaluated by an Evaluation Committee comprising representatives from the RTA, NSW Treasury Corporation and a procurement consultant. The Evaluation Committee was assisted by legal, commercial, technical and financial advisors and other specialist advisers on specific issues, including other RTA staff. Its activities were overseen by a Review Panel, comprising of senior representatives from the RTA, NSW Treasury, the Commonwealth Department of Transport and Regional Services and a probity auditor.

The assessment of the proposals involved:

- A 'comparative value' assessment against a 'public sector comparator'—a hypothetical, risk-adjusted estimate of the net present cost of delivering the project, to the same level and standard of service, using the most efficient likely form of delivery able to be financed by the public sector—in accordance with the requirements of the WWG Guidelines.

This 'public sector comparator' was initially prepared by the RTA, before it received the proposals, with the assistance of Arthur Andersen, Ernst and Young, Evans and Peck, NSW Treasury and NSW Treasury Corporation. It was subsequently amended, prior to its use in assessing the proposals, to take account of the likely design and construction cost impacts of the planning approval conditions of 28 February 2002, and other adjustments were made. For example, the timings of project costings and the nominal interest rates were amended so that the 'public sector comparator' could be directly compared with each proposal.

The 'comparative value' of each proposal was expressed in terms of the net present value to the RTA of the proposed financial transaction between the proponent and the RTA, adjusted for (among other things) differences in each proposal's risk allocations and whole-of-life costs.

- A 'non-price assessment', against other pre-determined criteria, weighted as follows:
 - Project structure, participants and organisation: 25%.

- Design and construction (architectural and landscape design, geometric, drainage, structural, pavement, geotechnical, tunnel, environmental, services, toll collection system and operational management and control system concept designs, design specifications, construction phase traffic arrangements, design and construction program, quality plan requirements, project strategies, quality management, independent verifier and signage): 35%.
- Initial traffic management and safety plan: 10%.
- Initial project plans for quality assurance, project management, environmental management, design, construction, operation and maintenance, community involvement, incident responses, occupational health, safety and rehabilitation management and project training: 20%.
- Operation and maintenance (indicative replacement and refurbishment schedule, routine maintenance schedule, specified design lives of asset items and sub-items, maintenance standards and quality manager): 10%.

These assessments, and the combining of each proposal's 'comparative value' and its weighted score under the 'non-price assessment' into an overall 'adjusted comparative value', were carried out in accordance with guidelines and methodologies established and documented by the RTA, with the probity auditor's concurrence, before the proposals were received.

On 27 June 2002, following an interim report by the Evaluation Committee and a report by the probity auditor on the selection processes carried out to that stage, the RTA advised the Western Link Joint Venture that its proposal had been unsuccessful. This narrowing of the shortlist to two proponents was publicly announced on 28 June 2002.

Following further, more detailed evaluations, involving a series of additional requests to the remaining proponents and evaluations of their responses, the assessments concluded that:

- The proposal submitted by the WestLink Motorway consortium would represent better value for money than the 'public sector comparator' and the proposal submitted by the Orbital Parkway Alliance.
- The WestLink Motorway consortium should therefore be selected as the preferred proponent.
- The RTA should enter into detailed negotiations with this consortium.
- The Orbital Parkway Alliance should be appointed as a 'reserve proponent', and that the preferred proponent should be advised that the RTA reserved the right to negotiate with this reserve proponent if there were a 'material change to the expected financial transaction, risk profile, technical requirements and/or ranking of proposals'.

On 28 October 2002 the then NSW Minister for Roads, Mr Carl Scully, and the then Acting Prime Minister and Federal Minister for Transport and Regional Services, Mr John Anderson, announced the selection of the WestLink Motorway consortium as the preferred proponent and the commencement of contract negotiations with this consortium.

These negotiations were satisfactorily concluded with the execution of the principal contracts for the project on 13 February 2003, the satisfaction of all their remaining conditions precedent on 14 February 2003 and the public announcement of this on 17 February 2003.

Major construction started on the M7 Motorway in July 2003. A number of change orders were utilised by the RTA to make changes to the design and construction of the project in accordance with relevant provisions in the Project Deed. The project was opened to traffic in December 2005 eight months ahead of schedule.

The Federal Government contributed \$360 million towards this Motorway with the remainder of the estimated \$1.54 billion capital cost being met by the private sector. The toll is currently capped at \$6.63 and traffic volumes are approximately 108,700 per day (average for May 2009).

3.3 Cross City Tunnel³

3.3.1 Project overview

The project objectives of the Cross City Tunnel, as detailed in its EIS are as follows:

- To improve the environmental quality of public space within Central Sydney.
- To improve ease of access and reliability of travel within Central Sydney.
- To improve the reliability and efficiency of travel between areas east and west of Central Sydney.
- To identify and enhance the potential beneficial effects and to identify and manage potential adverse environmental impacts by:
 - Conserving biological diversity and ecological integrity.
 - Eliminating the threat of serious or irreversible environmental damage.
 - Improving air quality and reducing greenhouse gas emissions.
 - Minimising use of energy and non-renewable resources.

The scope of the project includes:

- 2.1 kilometre tunnels generally running east-west below parts of the Sydney CBD, connecting the Kings Cross Tunnel with the Western Distributor.
- Separate ventilation tunnel and one ventilation stack located in Darling Harbour.
- Connections to the Eastern Distributor (southbound) and Sir John Young Crescent (northbound).
- Surface works to address traffic distribution and access issues including widening and upgrading of footpaths in Park and William Streets and the provision of bus lanes, transit lanes and cycle lanes along selected streets.

³ The text for this sub-section is largely drawn from the RTA's *Cross City Tunnel: Updated summary of contracts incorporating summaries of all contract changes to 30 June 2008*, and available from <http://www.treasury.nsw.gov.au/wwg>

3.3.2 History of the project

Over the years there have been numerous proposals for east-west road tunnels under the Sydney CBD to relieve traffic congestion in the city, utilising a wide variety of alignments, including routes under Market and Park Streets.

The basic concepts behind the project were developed by the RTA from the mid-1990s, and were first publicly aired in a 16 page public consultation report, *The Cross City Tunnel: Improving the Heart of the City*, released by the then Premier, Mr Bob Carr, and the then Minister for Roads, Mr Carl Scully, on 22 October 1998. These concepts were also displayed at a public exhibition and on the RTA's website.

The preliminary concepts developed by the RTA at this stage involved much shorter two-lane tunnels than the final design, both of them passing under Druiitt and Park Streets.

3.3.3 Design development and environmental assessment

Following community and stakeholder feedback and consultations, detailed environmental investigations and progressive refinement of the RTA's design concepts, an EIS was prepared. The design concepts addressed in the EIS involved longer tunnels than those envisaged in 1998, extending further east, under William Street, to the Kings Cross Tunnel under Darlinghurst Street and generally utilising alignments much closer to those now constructed, with separate routes for the two tunnels under the CBD.

The EIS for the Cross City Tunnel was prepared in accordance with the provisions of the EP&A Act, the *Environmental Planning and Assessment Regulation 2000*, and the requirements of the Director-General of the then Department of Urban Affairs and Planning (DUAP). This initial EIS was publicly exhibited between 2 August 2000 and 6 October 2000, a Representations Report and Addendum were prepared following public exhibition of the initial EIS, and these documents were submitted to the then Minister for Urban Affairs and Planning for approval.

An initial planning approval for the project was issued by the then Minister for Urban Affairs and Planning, Dr Andrew Refshauge, under section 115B(2) of the EP&A Act, on 3 October 2001. This approval was subject to 240 conditions.

Three weeks after this planning approval was granted, detailed proposals for implementation of the project were submitted to the RTA, on 24 October 2001, by three short listed private sector consortia, in accordance with processes described in Section 3.3.4 below. In addition to providing 'conforming' proposals, these consortia suggested a range of possible design modifications. After analysing these suggestions, the RTA identified one of the modified alternatives, suggested by the ultimately successful consortium, as offering better value than the design concept for which planning approval had been granted.

The RTA sought to modify the Project as approved in 2001. The RTA prepared a Supplementary EIS, which was publicly exhibited between 31 July 2002 and 31 August 2002. The RTA then prepared a Supplementary Representations Report and submitted these documents to the Department of Planning. Following an assessment, the Minister for Planning approved the modifications to the Project in December 2002. This modified planning approval was subject to 265 conditions.

Since then, further modifications to the planning approval were made:

- Under Section 115BA(6) of the EP&A Act by the then Minister for Infrastructure and Planning, Mr Craig Knowles, on 26 February 2004 (concerning a relocation of the tunnels' control centre) and 24 September 2004 (correcting a description in a condition concerning ambient air quality standards).
- On 7 July 2006, the then Minister for Planning, Mr Frank Sartor, modified the planning approval again, this time under Section 75W of the EP&A Act, so as to permit specified changes to the project's surface roadworks, in response to criticisms of the traffic impacts of the surface roadworks previously required by and implemented in accordance with the project's planning approval.

The roadworks permitted by the 7 July 2006 modification of the project's planning approval were carried out by the RTA, at the RTA's expense, and were completed in September 2006. These works were quite separate from, and not part of, the design and construction works carried out under the privately financed Cross City Tunnel project contracts.

3.3.4 Procurement process

On 15 September 2000 the RTA invited Registrations of Interest from private sector parties for the financing, design, construction, operation and maintenance of the Cross City Tunnel project. Registrations of Interest were received from eight consortia by the closing date of 23 October 2000. These Registrations of Interest were assessed against pre-determined criteria, weighted as follows:

- Organisation (applicant's roles and structure, toll road management roles and relationships, design and construction roles and relationships, operation and maintenance roles and relationships and project finance roles and relationships): 5%.
- Toll road management (management experience and key personnel, ability, commitment and management systems): 9%.
- Design and construction (management experience and key personnel, available capacity, design management, design capabilities, construction management and construction capabilities): 27%.
- Operation and maintenance (operations management, maintenance management and continuous improvement commitment and strategy): 8%.
- Project features (approvals, traffic management, utilities, environmental impacts, geotechnical conditions, spoil disposal, community liaison, key stakeholders, satisfaction of project issues, issues management and risk management): 17%.
- Project finance (experience, delivery record and strategy for equity, debt funding, structure and risk allocations): 12%.
- Financial capacity: 22%.

These Registrations of Interest were evaluated by an Evaluation Committee comprising representatives from the RTA, NSW Treasury and a procurement consultant. The Evaluation Committee was assisted by legal, technical and financial advisors. Its activities were overseen by a Review Panel, comprising senior RTA and NSW Treasury representatives and a probity advisor.

In February 2001 the RTA advised the eight registrants that it had selected three of them to submit proposals for the project:

- The CrossCity Motorway consortium, sponsored by Bilfinger Berger AG, Baulderstone Hornibrook Pty Limited and Deutsche Bank AG.
- The E-TUBE consortium, sponsored by Leighton Contractors Pty Limited and Macquarie Bank.
- Sydney City Tunnel Company, sponsored by Transfield Holdings Pty Limited and Multiplex Constructions Pty Limited.

On 8 June 2001 the RTA issued a formal Request for Proposals to the three shortlisted consortia, each of which had warranted, in Deeds of Disclaimer executed on 22 March 2001, that it would rely on its own investigations in preparing its proposal.

All three consortia submitted proposals on the closing date, 24 October 2001. The RTA's assessment of these proposals involved:

- A 'comparative value' assessment against a 'public sector comparator' prepared in accordance with the WWG Guidelines.
- A 'non-price assessment', against other pre-determined criteria, weighted as follows:
 - Project structure, participants and organisation: 25%.
 - Design and construction (architectural and landscape design, geometric, drainage, structural, pavement, geotechnical, tunnel, environmental, services, toll collection system and operational management and control system concept designs, design specifications, construction phase traffic arrangements, design and construction program, quality plan requirements, project strategies, quality management, independent verifier and signage): 30%.
 - Initial traffic management and safety plan: 10%.
 - Initial project plans for quality assurance, project management, environmental management, design, construction, operation and maintenance, community involvement, incident responses, occupational health, safety and rehabilitation management and project training: 25%
 - Operation and maintenance (indicative replacement and refurbishment schedule, routine maintenance schedule, specified design lives of asset items and sub-items, maintenance standards and quality manager): 10%.

These assessments, and the combining of each proposal's 'comparative value' and its weighted score under the 'non-price assessment' into an overall 'adjusted comparative value', were carried out in accordance with guidelines and methodologies established and documented by the RTA, with the probity auditor's concurrence, before the proposals were received.

In combining the two types of assessments, the 'non-price assessment' results of all three proponents were expressed as fractions of the best of the three non-price assessment results, the difference between 1.0 and this fraction was then multiplied by a 'nominal value of the non-price assessment in dollar terms' of \$20 million – a figure set by the RTA before the proposals had been received – and the result for each proponent was

subtracted from its proposal's 'comparative value' to produce an 'adjusted comparative value'. This meant that for the proponent with the best 'non-price assessment' result, the 'adjusted comparative value' was the same as its 'comparative value', while for the other two proponents it was reduced.

On 7 February 2002 the probity auditor formally advised the RTA that no concerns about the conduct or probity of the evaluation process had been expressed by any of the proponents or any members of the evaluation team, and that his own observations, the observations of the other two members of the probity audit team and the evidence of supporting records had all led him to conclude that the evaluation process had been planned and conducted 'with the highest level of probity applied to all aspects'.

The assessments concluded that:

- The proposals submitted by the CrossCity Motorway consortium would represent better value for money than the 'public sector comparator' and the proposals submitted by the other two proponents.
- The CrossCity Motorway consortium should therefore be selected as the preferred proponent.
- The RTA should enter into detailed negotiations with this consortium both for its preferred proposal, with tunnels extending to portals east of the existing Kings Cross Tunnel, and for a 'conforming' proposal consistent with the planning approval of 3 October 2001, in case planning approval were not obtained for the preferred proposal.

On 27 February 2002 the Minister for Roads, Mr Carl Scully, announced the selection of the CrossCity Motorway consortium as the preferred proponent and the commencement of contract negotiations with this consortium.

As already indicated, the RTA's negotiations with the CrossCity Motorway consortium were conducted in parallel with a series of changes to the proposed project, leading to the conditions attached to the modified planning approval of 12 December 2002. The negotiations were satisfactorily concluded, shortly after the amended project received planning approval on 12 December 2002, with the execution of the principal contracts for the project on 18 December 2002.

Construction commenced in February 2003. A number of change orders were utilised by the RTA to make changes to the design and construction of the project in accordance with relevant provisions in the Project Deed.

On 23 December 2004 the RTA and the principal CrossCity Motorway consortium parties to the project's contracts executed an amendment contract under which the CrossCity Motorway parties undertook to fund up to \$35 million of changes to the project's works directed by the RTA, in return for specified increases in the maximum permissible tolls on tunnel users. These amendments took effect on 17 January 2005.

Construction of the tunnel was completed in mid 2005 and the tunnel opened to traffic on 28 August 2005, two months ahead of schedule. Most of the remaining surface works were essentially completed in May 2006. Some surface traffic arrangements were altered in late 2006, following approval from Minister for Planning as outlined in Section 3.3.3.

Following opening of the tunnel the actual traffic patronage was significantly below volumes forecast by CrossCity Motorway. On 27 December 2006 receivers and managers

were appointed to the CrossCity Motorway. Following a competitive tender process, ownership of the principal private sector parties to the project contracts was subsequently transferred from the CrossCity Motorway consortium to a new consortium formed by ABN AMRO and Leighton Contractors, under sale contracts which were executed on 19 June 2007 and completed on 27 September 2007.

On the same date, 27 September 2007, the RTA:

- Formally consented to this sale, plus an associated refinancing of the project and an associated change in the project's operation and maintenance contractor, by executing a consent deed.
- Executed a series of other agreements, with parties from the old and new consortia, to make consequential minor amendments to five of the project contracts to which the RTA was and is a party.

These agreements all took effect immediately, on 27 September 2007.

The capital cost of the project was estimated to be more than \$700 million. Current tolls for utilising the tunnel are \$4.16(car) and \$8.31 (truck). Vehicles using the Sir John Young Crescent - \$1.96 (car), \$3.92 (truck) Current traffic volumes are approximately 35,400 per day (average for May 2009).

3.4 Lane Cove Tunnel⁴

3.4.1 Project overview

The project objectives of the Lane Cove Tunnel detailed in its EIS are as follows:

- Improve the efficiency of east-west travel along the corridor for road-based transport modes through a reduction in congestion and improved travel times.
- Improve air quality and reduce traffic noise, particularly along the arterial road network through a reduction in surface traffic volumes and congestion.
- Improve the amenity of the local community and businesses through:
 - Improving safety, connectivity and access for pedestrians and cyclists on Epping Road.
 - Improving air quality and reducing traffic noise along the arterial road network.
 - A reduction in traffic and congestion on Epping and other roads.
 - Improving local access by reducing restrictions on traffic turning movements on Epping Road.
 - Enhancing the urban fabric of the lower North Shore.
- Improve the operation of road-based public transport for people in north-western Sydney and along the corridor through an improvement in bus priority through the corridor.

⁴ The text for this sub-section is largely drawn from the RTA's *Lane Cove Tunnel: Updated summary of contracts incorporating summaries of all contract changes to 25 March 2007*, dated March 2007 and available from <http://www.treasury.nsw.gov.au/wwg>

- Minimise impacts on the natural environment during both the construction and operation phases of the Project.
- Provide for cyclists along the corridor.
- Provide the benefits of the Project to the community at least cost to the NSW Government.

The scope of the project includes:

- A 3.6 km, dual two to three lane tunnels generally running below the alignment of Epping and Longueville Roads and connecting the Gore Hill Freeway at the Pacific Highway with the M2 Motorway and Epping Road at Mowbray Road west.
- Separate ventilation tunnels and two ventilation stacks located in industrial areas in Lane Cove West and Artarmon.
- Two new north-facing (tolled) ramps connecting the Warringah Freeway to Falcon Street and Military Road in North Sydney.
- A 24 hour T2 transit lane, in addition to the existing two lanes, in each direction on the Gore Hill Freeway between the Pacific Highway and Merrenburn Avenue.
- Reduction of Epping Road from a five through-lane tidal flow arrangement to generally four lanes, including a dedicated 24-hour bus lane and general traffic lane in each direction.
- Implementation of a morning peak T3 transit lane on Epping Road eastbound between Pittwater Road and Mowbray Road.
- The introduction of two right turning movements on Epping Road.
- Provision of a bus interchange and pedestrian overpass at Longueville Road.
- A shared pedestrian/cycleway from Naremburn to North Ryde.

3.4.2 History of the project

The idea of building a Lane Cove Tunnel was first raised in the early 1990s when the Gore Hill Freeway opened. Several feasibility studies and rounds of public consultations followed, including a February 1997 invitation to the community to comment on options for improving Epping Road identified in studies commissioned by the RTA, which had suggested a tunnel under Epping Road between the Pacific Highway and a point just west of Centennial Avenue. Community feedback was strongly in favour of a longer tunnel.

Later in 1997 an M2-Epping Road Task Force, comprising the mayors of Lane Cove, Willoughby, North Sydney and Ryde and the Parliamentary Secretary for Roads, was formed to lead community discussions on the options.

Six tunnel route options, involving both 'long' and 'short' tunnels under Mowbray Road West or Epping Road, were placed on public display between 30 March and 15 May 1998, and community feedback on these options was obtained through discussions with the task force, public meetings and a questionnaire.

On 17 December 1999 the NSW Government invited public comments on a Lane Cove Tunnel Overview Report which summarised the findings of these initial investigations and identified a preferred tunnel option with twin two-lane tunnels, generally under

Epping Road and broadly based on one of the six options identified in 1998. This Overview Report also proposed the widening of the Gore Hill Freeway to six lanes, the construction of north-facing ramps to and from the Warringah Freeway at Falcon Street in North Sydney and the funding of the project by tolls.

3.4.3 Design development and environmental assessment

More detailed investigations and community consultations continued throughout 2000 and 2001, culminating in the exhibition of an EIS for the project between 8 November 2001 and 1 February 2002. The RTA received 340 submissions in response to this EIS. After considering these submissions, the RTA made nine modifications to the proposal, including:

- Relocation of the western ventilation stack.
- A new bus interchange at the Epping Road/Longueville Road/Parklands Avenue intersection, with a new pedestrian bridge over this intersection.
- Conversion of the existing transit lanes on the Pacific Highway, between Longueville Road and North Sydney, to dedicated bus lanes.
- An additional lane for the southbound off-ramp from the Warringah Freeway to Falcon Street/Military Road.
- Changes to the shared cycleway and pedestrian path along the Gore Hill Freeway.

These proposed modifications were presented in a Preferred Activity Report within a Lane Cove Tunnel and Associated Road Improvements Representations Report submitted by the RTA to the Department of Planning in June 2002. The Preferred Activity Report was publicly exhibited between 15 July and 16 August 2002.

The RTA subsequently submitted two further modifications to its proposals:

- A revised tunnel ventilation system with a separate ventilation tunnel below the road tunnels, improving tunnel air quality and avoiding emissions from the tunnel portals.
- Revisions to the Gore Hill Freeway underpass at Willoughby Road, removing the need for a separate new road tunnel at this location but requiring a relocation of the off-road cycleway in the Naremburn area.

In accordance with section 115C of the EP&A Act, a report by the Director-General of the Department of Planning on the modified project proposal, *Proposed Lane Cove Tunnel and Associated Road Improvements: Director General's Report*, was completed in November 2002. Among other things, this report concluded that the modifications proposed by the RTA would not necessitate the preparation of another EIS.

On 3 December 2002 the then Minister for Planning, Dr Andrew Refshauge, granted planning approval for the project, as described in the EIS and as modified by the Representations Report and the Director-General's Report, under section 115B(2) of the EP&A Act. This approval was subject to 259 conditions.

On 3 December 2003 the Director-General of the then Department of Infrastructure, Planning and Natural Resources, acting in accordance with one of these conditions of approval, approved the use of an RTA-nominated mid-tunnel construction access site at

130–132 Epping Road, instead of a previously proposed site in Moore Street south of Epping Road. As a result, conditions 245 to 259 of the original planning approval no longer apply.

Since then there have been four sets of amendments to the project's planning approval:

- On 10 March 2004 the then Minister for Infrastructure and Planning, Mr Craig Knowles, made minor amendments to 24 of the conditions of approval under Section 115BAA of the EP&A Act, mostly to correct typographical and similar errors and clarify the timing of planning requirements that had to be completed before the commencement of substantial construction.
- On 3 June 2006 the then Minister for Planning, Mr Frank Sartor, made further minor technical amendments to 14 of the conditions of approval, under Section 115BAA of the EP&A Act.
- On 21 November 2006 the then Minister for Planning, Mr Frank Sartor, amended two of the conditions of approval, concerning the storage and handling of dangerous goods and two community-based air quality monitoring stations, under Section 75W of the EP&A Act.
- On 21 February 2007 the then Minister for Planning, Mr Frank Sartor, amended 20 of the conditions of approval and added three new conditions of approval under Section 75W of the *Environmental Planning and Assessment Act 1979*. Most of these changes concerned the timing of the project's surface works along Epping and Longueville Roads following the opening of the project's tunnel and ramp works.

3.4.4 Procurement process

On 20 March 2002 the RTA invited Registrations of Interest from private sector parties for the financing, design, construction, operation and maintenance of the Lane Cove Tunnel project. Registrations of Interest were received from four consortia by the closing date of 24 April 2002:

- The Lane Cove Tunnel Consortium, sponsored by Thiess, Transfield Holdings and ABN AMRO.
- Lane Cove Motorway, sponsored by Leighton Contractors and Deutsche Bank.
- Lane Cove Expressway, sponsored by Baulderstone Hornibrook, Bilfinger Berger and Transurban Infrastructure Development.
- TunnelLink, sponsored by Abigroup, Ferrovial Infraestructuras and Macquarie Bank.

After evaluating these Registrations of Interest, the RTA issued a formal Request for Proposals to all four consortia on 26 July 2002, asking them to submit detailed proposals. Before receiving this Request for Proposals these proponents warranted, in Deeds of Disclaimer, that they would rely on their own investigations in preparing their proposals. They also executed Process (Probity) Deeds setting out procedures to address any conflicts of interests arising from the common ownership of some of the participants in the different consortia or the engagement of common advisers by two or more proponents.

The RTA's Request for Proposals included drafts of a Project Deed, Scope of Works and Technical Criteria documentation (including a draft Site Access Schedule), a Deed of Appointment of Independent Verifier, a Rail Agreement, a Contractor's Side Deed, an RTA Consent Deed and an Agreement to Lease (including a draft Motorway Stratum Lease).

All four consortia submitted detailed proposals on the closing date, 21 January 2003.

The proposals were evaluated by an Evaluation Committee comprising representatives from the RTA, NSW Treasury and a procurement consultant. The Evaluation Committee was assisted by legal, financial and technical and commercial advisors. Its activities were overseen by a Review Panel, comprising senior representatives from the RTA, NSW Treasury, the Department of Public Works and Services and a probity auditor.

The assessment of the proposals involved:

- A 'comparative value' assessment against a 'public sector comparator' prepared in accordance with the WWG Guidelines.

This 'public sector comparator' was initially prepared by the RTA, before it received the proposals, with the assistance of NSW Treasury, NSW Treasury Corporation, Evans and Peck and PricewaterhouseCoopers. It was subsequently adjusted to reflect market movements in interest rates, with the benchmark rates, initially set on 23 July 2002, being reset on 1 April 2003 for the interim evaluation of all proposals and again on 10 September 2003 for the final evaluation of short listed proposals (discussed below).

The 'comparative value' of each proposal was expressed in terms of the net present value to the RTA of the proposed financial transaction between the proponent and the RTA, adjusted for (among other things) differences in each proposal's risk allocations and whole-of-life costs.

- A 'non-price assessment', against other pre-determined criteria, weighted as follows:
 - Project structure, participants and organisation: 25%.
 - Design and construction (architectural and landscape design, geometric, drainage, structural, pavement, geotechnical, tunnel, environmental, services, toll collection system and operational management and control system concept designs, design specifications, construction phase traffic arrangements, design and construction program, quality plan requirements, project strategies, quality management, independent verifier and signage): 35%.
 - Initial traffic management and safety plan: 8.5%.
 - Initial project plans for quality assurance, project management, environmental management, design, construction, operation and maintenance, community involvement, incident responses, occupational health, safety and rehabilitation management and project training: 21.5%.
 - Operation and maintenance (indicative replacement and refurbishment schedule, routine maintenance schedule, specified design lives of asset items and sub-items, maintenance standards and quality manager): 10%.

These assessments, and the combining of each proposal's 'comparative value' and its weighted score under the 'non-price assessment' into an overall 'adjusted comparative value', were carried out in accordance with guidelines and methodologies established and documented by the RTA, with the probity auditor's concurrence, before the proposals were received.

In combining the two types of assessments, the 'non-price assessment' results of all of the proponents were expressed as fractions of the best of the non-price assessment results, the difference between 1.0 and this fraction was then multiplied by a 'nominal value of the non-price assessment in dollar terms' of \$23.0 million – a figure set by the RTA before the proposals had been received – and the result for each proponent was subtracted from its proposal's 'comparative value' to produce an 'adjusted comparative value'. This meant that for the proponent with the best 'non-price assessment' result, the 'adjusted comparative value' was the same as its 'comparative value', while for the other three proponents it was reduced.

On 24 June 2003, following an interim report by the Evaluation Committee and a report by the probity auditor on the selection processes carried out to that stage, the RTA advised the Lane Cove Expressway and TunnelLink consortia that their proposals had been unsuccessful. This narrowing of the shortlist to two proponents was publicly announced on 26 June 2003.

Following further, more detailed evaluations, involving a series of additional requests to the remaining proponents and evaluations of their responses, the assessments concluded that:

- The proposal submitted by the Lane Cove Tunnel Consortium would represent better value for money than the 'public sector comparator' and the proposal submitted by Lane Cove Motorway.
- The Lane Cove Tunnel Consortium should therefore be selected as the preferred proponent.
- The RTA should enter into detailed negotiations with this consortium.
- Lane Cove Motorway should be appointed as a 'reserve proponent', and that the preferred proponent should be advised that the RTA reserved the right to negotiate with this reserve proponent if there were a 'material change to the expected financial transaction, risk profile, technical requirements and/or ranking of proposals'.

On 1 October 2003 the then Minister for Roads, Mr Carl Scully, announced the selection of the Lane Cove Tunnel Consortium as the preferred proponent and the commencement of contract negotiations with this consortium.

These negotiations were satisfactorily concluded with the execution of the principal contracts for the project on 4 December 2003, the satisfaction of all their remaining conditions precedent on 9 December 2003 and the announcement of this on 9 December 2003.

On 4 December 2003 the RTA formally proposed two changes in the scope of the design and construction works by issuing two 'pre-agreed' 'change orders':

- Deletion of a requirement to transplant a large, mature fig tree on the southern side of Epping Road about 60 metres east of the Lane Cove River and the

inclusion of a requirement simply to remove this tree. The RTA proceeded with this change order in January 2004.

- Modifications to the design of the Falcon Street ramps and intersections, including relocations of the tolled north-facing ramps and a new untolled south-facing off-ramp to make it easier for northbound traffic on the Warringah Freeway to access Military Road. The RTA proceeded with this change order in March 2004.

Construction commenced in April 2004. A number of additional change orders were utilised by the RTA to make changes to the design and construction of the project in accordance with relevant provisions in the Project Deed.

Following a name change in April 2006 the Lane Cove Tunnel Consortium is now known as the 'Connector Motorways' group.

Prior to the opening of the project, an Integration Group comprising representatives from the Premier's Department, the RTA, Ministry of Transport and Connector Motorways was established by the Minister for Roads in June 2006 to make the project's transition into the existing road network as smooth as possible. The Integration Group recommended a two stage transition strategy to be implemented over an 11 month period from tunnel opening. In December 2006 the RTA issued another change order proposing changes to the timing of the surface works. As outlined in Section 3.4.3, a modification was submitted to the Department of Planning in December 2006 and subsequently approved in February 2007. Following a response from Connector Motorways the RTA paid \$25 million towards costs of implementing the transition strategy.

The tunnel opened to traffic in March 2007, two months ahead of schedule. Associated surface works were substantially completed in April 2008.

Following opening of the tunnel, and eighteen months later, after initial ramp-up, the actual traffic patronage was significantly below volumes forecast by Connector Motorways.

The capital cost of the project was estimated to be over \$831.5 million. Current tolls for using the tunnels are \$2.72 for cars and \$5.45 for trucks. Current tolls for using the Falcon Street ramps are \$1.36 for cars and \$2.72 for trucks. Traffic volumes are currently approximately 64,100 per day (average for May 2009).

4 Project reviews and identification of focus areas

4.1 Overview

Controversy surrounding the opening of the Cross City Tunnel resulted in the NSW Government initiating a review of motorway provision in 2005, documented in the *Review of Future Provision of Motorways in NSW*, Infrastructure Implementation Group, December 2005 (the Richmond Report). The recommendations of the Richmond Report steer future toll road development, planning and environmental assessment and procurement.

In addition, a NSW Legislative Council Joint Select Committee Inquiry was formed in 2005 to review the procurement of the Cross City Tunnel. This Inquiry ultimately produced three reports, two on the Cross City Tunnel and a third report on the Lane Cove Tunnel.

The Audit Office of NSW released its performance audit into the Cross City Tunnel in May 2006. Also of note, a NSW Public Accounts Committee Inquiry into public private sector partnerships was completed in June 2006 and focused on cost estimation, financing and project budgeting.

While these reviews and audits are largely project specific, there are some common issues that warrant further analysis. This post implementation review uses the platform of detailed motorway project reviews completed since construction of the three projects commenced as a basis from which to examine strengths, weaknesses and suggested improvements and identify common focus areas. To this end, thematic analysis of the reviews and other project specific documents outlined in Table 2 has been undertaken.

Table 2 - Review data

Nature of Information	Methodology
General Motorway Projects	
Review of Future Provision of Motorways in NSW, Infrastructure Implementation Group, December 2005 (the Richmond Report)	Review of infrastructure development processes utilised in NSW and other Australian States including case studies on CCT and Eastern Distributor.
Cross City Tunnel Joint Select Committee Inquiry	Standard inquiry process resulting in three reports, February 2006, May 2006 and August 2006. The first two reports largely focused on the Cross City Tunnel, while the third report focused on the Lane Cove Tunnel.
NSW Public Accounts Committee inquiry into PPPs, June 2006	Review of cost estimation, financing and project budgeting.
M7	
Contract Summary	Summary of contract documentation prepared by the RTA and made publicly available on the NSW Treasury website.
Independent Environmental Impact Audit	Impact verification comparing the findings of the EIS with actual operational monitoring results in accordance with Condition 27 by Hyder Consulting in

Nature of Information	Methodology
	December 2007.
CCT	
Contract Summary	Summary of contract documentation prepared by the RTA and made publicly available on the NSW Treasury website.
RailCorp Review Report	Identification of issues focusing on the interface with rail projects following an independently facilitated workshop held in September 2006.
Auditor General's Report - Cross City Tunnel Performance Audit (May 2006)	Conducted in compliance with relevant Australian standards for performance auditing and focusing on procurement, contract variations and changes to surface roads
Independent Environmental Impact Audit	Impact verification comparing the findings of the EIS with actual operational monitoring results in accordance with Condition 22 by GHD in November 2007.
LCT	
Contract Summary	Summary of contract documentation prepared by the RTA and made publicly available on the NSW Treasury website.
Agency workshop	Identification of issues by exception with representatives from key government agencies including Department of Planning and Department of Environment and Climate Change focusing around assessment and planning, approval and environmental management following an independently facilitated workshop held in August 2007

4.2 Review methodology

The analysis of available review data focused on the following areas:

- Project development, including project initiation and the formulation of project objectives.
- Procurement, including brief appropriateness, risk exposure/risk sharing and the WWG approvals process.
- Project governance throughout the project phases.
- Project management, including delivery timeframes and budget performance.
- Project delivery, including compliance with procedures in the WWG Guidelines, design performance, functional competence of infrastructure including networking and interfacing and project operations including service delivery and financing.
- Industry participation, including industrial relations management and industry development.
- Environmental assessment and planning approval, including assessment and planning approval and environmental management.
- Community, including consultation, notification and complaints management.

The following steps were utilised to identify key strengths, weaknesses and suggested improvements from the available review reports:

1. The subject reports were read and areas where specific topics were discussed were highlighted.
2. Key recurring issues were extracted from the reports.
3. General statements about strengths, weaknesses and suggested improvements were developed based on these key recurring issues.
4. These statements were then modified, revised and expanded into propositions as the data was reviewed once again.
5. Each report was then reviewed in light of the propositions.

4.3 Identification of focus areas

Issues identified from the review reports are summarised in Table 3 below in three categories; strengths, weaknesses and opportunities for improvement. There are many common issues raised in these reviews. Clear strengths include the expertise of both the RTA and the private sector in developing and delivering these projects. The need for continual improvement and documentation of lessons learned is a recurring theme. While some of the identified weaknesses such as the time taken to develop and implement a major road project are unavoidable, many of the opportunities for improvement work to mitigate weaknesses and build on strengths.

Based on this analysis, the following focus areas were identified by the Steering Committee for further review:

- Defining project objectives.
- Economic appraisal.
- Programme alignment.
- Public interest evaluation.
- Traffic modelling.
- Tolling.
- Network performance.

Each of these focus areas is discussed in the next Section.

Table 3 - Issues identified from project review data

Proposition		General	M7	CCT	LCT*
Overview of Key Findings					
Strengths	The use of PPPs enabling early delivery of major road projects	✓			
	RTA's increasing expertise in road and tunnel design development and delivery	✓		✓	
	Clear definition of roles and responsibilities for the RTA and other stakeholders including the regulatory agencies and the company		✓		✓
	Detailed project specific Scope of Works and Technical Criteria for technical outcomes		✓	✓	✓
Weaknesses	Poor alignment of design development, procurement and environmental impact assessment processes	✓	✓	✓	✓
	Limited flexibility to modify key project elements as design develops		✓		✓
	Long lead time between initial consultation, project approval, finalisation of the contract and completion of the project, which can span a number of years	✓			
Opportunities for Improvement	Regular review of modelling methodologies, in particular, traffic and financial modelling	✓		✓	
	Better align design development, procurement and environmental impact assessment processes	✓	✓	✓	✓
	Consideration of options for government funding contributions where 'value for money' tolls are not adequate to fully fund major road projects	✓			
	Ongoing communication of the results of previous consultation during project development and delivery to reinforce the process and outcomes	✓			
Project Development					
Strengths	Alignment with NSW Government strategies, in particular, the orbital motorway concept	✓			
	Integrated issues identification and management in close consultation with key regulatory stakeholders and the community		✓	✓	✓
	RTA's increasing expertise in road and tunnel design development		✓	✓	✓
Weaknesses	Poor alignment of the design development process with procurement and environmental impact assessment processes		✓	✓	✓
	Reduction in general traffic capacity on existing arterial routes during construction and following commissioning of the motorway	✓			
	Limited available traffic data and modelling inputs including land use data for traffic assessment	✓		✓	
Opportunities for	Regular review of modelling methodologies, in particular, traffic and financial modelling	✓		✓	
	Staged integration of major road changes into the exiting road network	✓		✓	✓

Proposition		General	M7	CCT	LCT*
Improvement	Increased sensitivity analysis of the affordability, equity, patronage sensitivity and public acceptability of any proposed tolls	✓		✓	
Procurement					
Strengths	The use of public private sector partnerships enables accelerated delivery of major road projects	✓			
	RTA's increasing expertise in procuring projects under public private sector partnerships	✓			
	Contractual documents designed to limit the NSW Government's exposure to commercial and market risks	✓			
Weaknesses	Poor alignment of procurement processes with other processes, in particular, environmental impact assessment	✓		✓	
	Inclusion of local road works and other amenity improvements outside the scope of traditional major road project impose high additional costs	✓			
Opportunities for Improvement	Consideration of options for government funding contributions where 'value for money' tolls are not adequate to fully fund major road projects	✓			
	Greater focus on whole-of-life innovation benefits rather than just transfer of financial risk, including consideration of procurement options (full government ownership, full private equity and combinations thereof)	✓			
	NSW Treasury to provide additional guidance on the development of the public sector comparator	✓			
	Develop and implement a methodology to undertake public interest evaluation	✓		✓	
	Provide for structured face-to-face interaction between the RTA and proponents during the request for proposals and assessment phases	✓			
	Adoption of a one month toll free period on opening future motorways	✓			
	Regularly review international best practice for public private sector partnerships	✓			
Governance					
Strengths	Clear definition of roles and responsibilities for the RTA and other stakeholders including regulatory agencies and the company		✓		✓
	Comprehensive governance structure including representatives from Treasury, Ministry of Transport and Department of Premiers and Cabinet which enabled timely and efficient resolution of issues	✓			
Weaknesses	Conflicting objectives between the role of the RTA as a road authority and the Department of Environment and Climate Change in licencing night works				✓

Proposition		General	M7	CCT	LCT*
	Limited input from some stakeholders (i.e. NSW Government regulators)	✓			
Opportunities for Improvement	Formal governance arrangements to enable assessment and determination of any proposed changes to Project Deeds	✓	✓		
	Carry over governance structure from development to delivery	✓			
	Clearly define and strengthen governance arrangements for public private sector partnerships	✓			
	Clarify processes for post implementation reviews of projects to ensure capture of lessons learned	✓			
Project Management					
Strengths	Early delivery of projects	✓	✓		✓
	Outcomes focus on risk identification and management	✓			✓
	Teams appropriately resourced with qualified and experienced personnel		✓	✓	✓
Weaknesses	Utilisation of different teams to develop and deliver projects resulting in limited carry over of knowledge		✓		✓
	Systems based approach adopted by the Independent Verifier which did not guarantee quality	✓	✓		
	Limited integration of RTA traffic management and communications approvals during construction				✓
	Limited sharing of lessons learned across project teams during construction		✓		✓
Opportunities for Improvement	Utilise the development/procurement team to oversee delivery of the project	✓			
	Consider mechanisms to carry over lessons learned during concurrent project development and delivery and document outcomes		✓		✓
Project Delivery					
Strengths	RTA's increasing expertise in road and tunnel delivery	✓		✓	
	Detailed project specific Scope of Works and Technical Criteria for technical outcomes		✓	✓	✓
	Efficient land acquisition processes ensuring availability of required land	✓	✓	✓	
	Early and co-ordinated approach to operational management planning during design and construction				✓
Weaknesses	Limited interface between different design disciplines resulting in a lack of clarity around some aspects (i.e. urban design and regulatory and guidance signage requirements)		✓		✓
	Limited role played by the Independent Verifier in construction surveillance		✓	✓	✓

Proposition		General	M7	CCT	LCT*
	Limited programme reporting requirements which impacted on RTA monitoring of construction and, in particular, commissioning progress			✓	✓
Opportunities for Improvement	Clearer definition of the role and responsibilities of the Independent Verifier		✓	✓	✓
	Ensure Scope of Work and Technical Criteria are updated to cover any changes in policy and include project specific requirements	✓			✓
Industry Participation					
Strengths	Focus on safety during design and construction		✓	✓	
	Early involvement of the Operation and Maintenance Contractor in detailed design and construction monitoring	✓			
	Collaborative project management approach				✓
Weaknesses	Fixed industry capacity across Australia limiting available resources across all disciplines and resulting in cost escalation		✓	✓	
	Allocation of risks by the Company between the Design and Construction and the Operation and Maintenance Contractors				✓
Opportunities for Improvement	Need for more emphasis on whole of life costs during design and construction (energy efficiency, waste management)	✓			✓
	Consider early involvement of the construction industry in project development	✓			
Environmental Assessment and Planning Approvals					
Strengths	Comprehensive identification of potential environmental impacts during construction and operation		✓	✓	✓
	Independent assessment role of the Department of Planning			✓	✓
	Use of plan based construction method statements				✓
	Use of data from previous projects to refine assessments (i.e. regenerated noise modelling and monitoring from CCT assisting in the assessment of the LCT)				✓
Weaknesses	Limited flexibility to modify key project elements as design develops	✓	✓		✓
	Limited alignment of environmental impact assessment processes with design development and procurement processes	✓	✓		✓
	Overlap between regulatory roles (particularly the Department of Environment and Climate Change and the Department of Planning)				✓
	Focus on prescribing processes rather than clearly defining desired environmental outcomes in conditions	✓	✓	✓	✓

Proposition		General	M7	CCT	LCT*
	Conditions which empower agencies beyond their actual statutory responsibilities	✓			✓
Opportunities for Improvement	Early involvement of key regulators, in particular, Department of Planning	✓			
	Greater alignment of project objectives with the objectives of the planning process	✓			
	Consider implications of tolls, induced traffic and traffic ramp up as part of the environmental impact assessment	✓			
	Any change to environmental management requirements with a substantial cost implication should be approved by the Budget Committee of Cabinet	✓		✓	
	A focus on desired environmental management outcomes in conditions		✓	✓	✓
Community					
Strengths	Significant community consultation undertaken in parallel with environmental impact assessment	✓			
	Use of targeted mediums for communications (i.e. internet, advertisements, door knocking, letters, street corner meetings)	✓			
	Engagement of an Independent Community Liaison Representative		✓	✓	✓
Weaknesses	Long lead time between initial consultation, project approval, finalisation of the contract and completion of the project, which can span a number of years	✓			
	Limited consultation between release of EIS and finalisation of contract	✓			
	Limited communications focusing on project objectives	✓	✓		
	Limited notification of modifications to the approved design found to be consistent with the project planning approval	✓			
Opportunities for Improvement	Timely and regular public disclosure of all future project deed and other agreements including amendments and material variations to project deeds	✓	✓		
	Greater disclosure of the Public Sector Comparator methodology as part of contract summaries	✓			
	Public information updates including simple explanation of any changes made during design and construction	✓			✓
	Develop and implement a consultation process that considers the views of directly affected residents and businesses, the local community and the broader community			✓	✓

* See Table 2 for details of review reports addressed in each category.

5 Analysis of focus areas

5.1 Overview

Based on the analysis document in Section 4, this Section addresses the following seven focus areas:

- Defining project objectives.
- Economic appraisal.
- Programme alignment.
- Public interest evaluation.
- Traffic modelling.
- Tolling.
- Network performance.

5.2 Project objectives

5.2.1 Overview

The objectives of each project define its strategic need and function and provide a framework for considering alternative transport modes and route alignments. As they guide the selection of a preferred option, project objectives need to be defined considering strategic transport needs and current development context established in relevant government plans and policies.

The need for more integrated strategic transport planning was an issue raised by the Audit Office of NSW in a number of the project audits referenced in Section 2 of this Report. While the specific objectives for the three subject projects were developed in the late 1990s and centred around *Action for Transport 2010*, it is noted that since this time the NSW Government has release a number of plans and strategies to guide the growth and development of Sydney including the *State Plan* (November 2006), which identifies a number of priorities and targets to measure progress and the *Metropolitan Strategy* (December 2005), which sets out plans and strategies for sustainable growth and development of Sydney over the next 25 years. These plans and strategies seek to respond to the existing and emerging demands of Sydney and build on earlier planning efforts.

Project objectives for each of the three subject motorway projects where defined considering the need and justification for the subject projects from a multi-modal transportation perspective (road and rail) and the implications of the 'do nothing' case. The Cross City Tunnel aimed to reduce congestion and improve urban amenity within Sydney's CBD. The M7 Motorway and the Lane Cove Tunnel form essential links in the Sydney Orbital, concepts for which existed as early as the late 1940s as part of the Cumberland Planning Scheme and were clearly articulated in *Roads 2000*, prepared by the then Department of Main Roads and published in 1987 and subsequent plans and strategies including the Metropolitan Strategy referenced above.

The need to clearly define the target road users alongside project objectives was an issue raised in a number of the reviews analysed in Section 4. In particular, the Richmond Report, the Auditor General's Cross City Tunnel performance audit and the reports prepared by the Cross City Tunnel Joint Select Committee highlighted the need to focus on value for money for the road user when a road toll is to be charged. The scope of projects can increase during the environmental assessment phase to include broader urban amenity improvements that have not traditionally been part of road projects. Changes in the scope of the Cross City Tunnel made to address the separate objectives of the City of Sydney Council and other stakeholders changed the focus from road users to the surrounding community as urban improvements including granite footpath paving and substantial landscaping works were incorporated into the project.

The need for better and continued communication of project objectives was also a particular recommendation of the Cross City Tunnel Joint Select Committee Inquiry and the Richmond Report. The broadest extent of community consultation on major road projects is around the environmental assessment process. Noting that development and delivery of the three subject motorways took place over a decade, there is a need to clearly articulate project objectives and communicate how and why decisions regarding project alternatives and design development were made, not just at the time decisions are made, but as the project progresses. This public communication need to be regularly updated during and following the completion of the environmental assessment and planning approval process.

5.2.2 Assessment of the extent to which project objectives were achieved

The extent to which the three motorway projects achieved the project objectives identified in the respective EISs is assessed below. It is noted that some of the key benefits of motorway projects are derived from reduction in traffic on surrounding roads and that traffic levels on these relatively new motorways may not necessarily represent long term trends. The assessment rating levels utilised for the consideration of project objectives are drawn from the Strategic Merit Test assessment ratings levels adopted by Infrastructure Australia (September, 2008) and outlined in Table 4.

This analysis illustrates that, while all three projects have met their stated objectives, the M7 Motorway has performed best in achieving its objectives. Of note, the objectives of each project are very diverse; however, all include desired economic, social and environmental outcomes.

5.2.3 Recommendations

- Ensure project objectives are developed to take into consideration the relevant NSW Government plans and strategies and target users.
- Ensure project objectives are specific and measurable.
- Ensure project objectives are a focus of community consultation throughout the project development and delivery phases.

Table 4 Strategic merit test assessment rating levels

Rating Level	Description
Highly beneficial	Major positive impacts resulting in substantial and long term improvements or enhancements of the existing environment.
Moderately beneficial	Moderate positive impact, possibly of short-, medium- or long-term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement.
Slightly beneficial	Minimal positive impact, possibly only lasting over the short-term. May be confined to a limited area.
Neutral	No discernable or predicted positive or negative impacts.
Slightly detrimental	Minimal negative impact, probably short-term, able to be managed or mitigated, and will not cause substantial detrimental effects. May be confined to a small area.
Moderately detrimental	Moderate negative impact. Impacts may be short-, medium- or long term and impacts will most likely respond to management actions.
Highly detrimental	Major negative impacts with serious, long-term and possibly irreversible effects leading to serious damage, degradation or deterioration of the physical, economic or social environment. Requires a major re-scope of concept, design, location, justification or requires major commitment to extensive management strategies to mitigate the effect.

Table 5 M7 Motorway - assessment of satisfaction of project objectives

Project objective		Impact type	Qualitative description	Quantitative description	Rating*
1	Provide a high standard National Highway link through Sydney	Economic	Built to motorway standard, the M7 Motorway provides for travel at variable speeds up to 100 km/h.	Bypasses 48 sets of traffic lights	Highly beneficial
2	Support the NSW Government's metropolitan strategies for land use, transport and environment	Economic Environment Social	Provides an essential transport link between the M5, M4 and M2 Motorways	N/A	Highly beneficial
3	Support the developing integrated transport strategy by creating one part of the emerging strategic transport network for Sydney	Economic	Forms part of the Sydney Orbital network	N/A	Highly beneficial
4	Improve the efficiency of freight movement and commercial travel	Economic	Greatly improved capacity and reliability of travel times	Over 20% of weekday traffic on some sections of the Motorway are heavy vehicles	Highly beneficial
5	Improve access to employment and other opportunities (by private and public transport)	Economic Social	Greatly improved access to key employment areas such as the Western Sydney Employment Hub. Improved travel times for buses on surrounding roads Designed to not to preclude the possible future development of public transport in the corridor.	N/A	Highly beneficial
6	Support economic development in western Sydney	Economic	Sydney's serviced based economy is heavily reliant on an efficient road transport network	N/A	Highly beneficial
7	Achieve the above-mentioned development in an environmentally and socially sensitive manner	Environment Social	Construction stage impacts were short term. Road traffic noise impacts have been mitigated with a range of treatment including noise walls. Impacts on biodiversity have been offset through landscaping and compensatory planting.	N/A	Slightly detrimental

* see Table 4 for details

Table 6 Cross City Tunnel - assessment of satisfaction of project objectives

Project objective		Impact type	Qualitative description	Quantitative description	Rating*
1	To improve the environmental quality of public space within Central Sydney	Social Environment	Project included the provision of widened footpaths and extensive landscaping along William and Park Streets and within Darling Harbour.	Over 45,000 vehicles per day removed from streets in Sydney's CBD.	Moderately beneficial
2	To improve ease of access and reliability of travel within Central Sydney	Social Economic	Travel time surveys show that congestion in Sydney's CBD is slightly reduced.	N/A	Slightly beneficial
3	To improve the reliability and efficiency of travel between areas east and west of Central Sydney	Economic	Project has greatly enhanced connectivity from Sydney's east to areas west of the CBD.	Tunnel users bypass 17 sets of traffic lights.	Moderately beneficial
4	To identify and enhance the potential beneficial effects and to identify and manage potential adverse environmental impacts by: <ul style="list-style-type: none"> - Conserving biological diversity and ecological integrity. - Eliminating the threat of serious or irreversible environmental damage. - Improving air quality and reducing greenhouse gas emissions. - Minimising use of energy and non-renewable resources. 	Environment	<ul style="list-style-type: none"> - Project involved minimal vegetation clearance. - No major environmental incidents during construction - No discernable change in ambient air quality monitoring around the ventilation stack - All Virgin Excavated Natural Material produced during tunnel excavation was reused or recycled. 	N/A	Neutral

* see Table 4 for details

Table 7 Lane Cove Tunnel - assessment of satisfaction of project objectives

Project objective		Impact type	Qualitative description	Quantitative description	Rating*
1	Improve the efficiency of east-west travel along the corridor for road-based transport modes through a reduction in congestion and improved travel times	Economic	Significant reductions in congestion has greatly improved the efficiency of east-west travel along the corridor	Travel time savings of up to 8 minutes for tunnel traffic.	Highly beneficial
2	Improve air quality and reduce traffic noise, particularly along the arterial road network through a reduction in surface traffic volumes and congestion	Environment Social	Reductions in traffic on Epping Road have reduced road traffic noise. Air quality monitoring around the ventilation stacks shows no discernable change in air quality.	Before and after air quality monitoring undertaken at the corner of Epping and Longueville Road indicate reductions in pollutants of up to 40%	Moderately beneficial
3	Improve the amenity of the local community and businesses through: <ul style="list-style-type: none"> - Improving safety, connectivity and access for pedestrians and cyclists on Epping Road. - Improving air quality and reducing traffic noise along the arterial road network. - A reduction in traffic and congestion on Epping and other roads. - Improving local access by reducing restrictions on traffic turning movements on Epping Road. - Enhancing the urban fabric of the lower North Shore. 	Economic Environment Social	Local accessibility has been improved through provision of pedestrian and cyclist facilities and introduction of right turning movements at the intersections Longueville Road (westbound) and Epping Road and Epping Road (westbound) into Centennial Avenue. In addition, significant reductions in traffic congestion along Epping Road has meant that more 'green time' can be given to local traffic movements in traffic light phasing.	Traffic volumes on Epping Road have reduced from approximately 90 000 to approximately 40 000 vehicles per week day.	Highly beneficial
4	Improve the operation of road-based public transport for people in north-western Sydney and along the corridor through an improvement in bus priority through the corridor.	Economic Social	bus priority measures were investigated in developing the design and incorporated into the project	The project included provision of 5.65 kilometres of bus lanes and 8 kilometres of transit lanes. Bus travel times reduced by up to 10 minutes on opening of the project.	Highly beneficial
5	Minimise impacts on the natural environment during both the construction and operation phases of the Project.	Environment	Impacts on the natural environment were avoided during design development and minimised during delivery of the project	Use of the Epping Road corridor in place of the vegetated Moore Street site avoided the need to clear 2700 m ² of vegetation.	Slightly detrimental
6	Provide for cyclists along the corridor.	Social		Continuous pedestrian cycleway approximately 8 kilometres from Naremburn to North Ryde provided as part of the project.	Highly beneficial
7	Provide the benefits of the Project to the community at least cost to the Government	Economic	Project delivered at no cost to government	N/A	Highly beneficial

* see Table 4 for details

5.3 Economic appraisal

5.3.1 Cost benefit analysis undertaken

The EISs and the business cases for the Cross City Tunnel, the Lane Cove Tunnel and M7 Motorway included consideration of the likely economic impacts of the proposal options and the preferred projects utilising:

- A road user cost benefit analysis based on the RTA *Economic Analysis Manual* (1999) which generally considered:
 - Project capital costs including mitigation measures.
 - Changes in road infrastructure recurrent costs.
 - Changes in vehicle operating costs.
 - Changes in traffic demand estimates including vehicle kilometres travelled and vehicle hours travelled.
 - Changes in travel times for users.
 - Changes in crash rates.
 - Valuation of vehicle pollution impacts.
- An impact assessment framework which generally assessed all impacts utilising a qualitative significance ranking to assess:
 - Air quality (excluding emission impacts valued above).
 - Noise and vibration.
 - Water quality and flooding risks.
 - Biodiversity impacts.
 - Indigenous and non-indigenous heritage values.
 - Community impacts including severance, local amenity, accessibility and property impacts.
 - Strategic transport outcome achievement not covered by other categories.

The monetarised cost benefit ratio (BCR)s for the projects documented in the EISs and through additional evaluation required by the Department of Planning as part of its assessment (utilising a discount rate of 7%) are as follows:

- M7 Motorway: 5.4:1
- Cross City Tunnel:
 - Original proposal: 3.1:1
 - Modified proposal: 3.4:1
- Lane Cove Tunnel: 4.3:1

While the costs taken into consideration include capital costs, operating costs and maintenance costs, the economic benefits of the three subject projects is largely derived from predicted travel time savings. In the case of the Cross City Tunnel assessment these accounted for over 90% of the benefit and the majority of travel time savings were less than five minutes (which are often not realised and can be considered inframarginal in

economic terms). It is also noted that the findings of this assessment are highly reliant on traffic modelling which is discussed further in Section 5.6 of this Report. While modifications to the project slightly increased the Cross City Tunnel BCR, when predicted travel time savings of less than 5 minutes were removed from the analysis, this BCR decreased by approximately 50%.

5.3.2 Consideration of wider economic benefits

The economic assessment completed during the environmental assessment process for the subject three projects focusing on the direct impact of the projects and included some assessment of the indirect or flow-on effects of the project. This approach excluded some wider economic benefits including the economics of increased agglomeration, some labour supply impacts and urban enhancement effects of improvements to surface roads because these wider benefits are derived from reducing the perceived distance between localities, which is not analysed in traditional modelling approaches.

A number of more recent studies, notably those led by Sir Rod Eddington into the transport network in the United Kingdom and the assessment conducted for the Victorian Government to identify east-west transport needs in Melbourne, have identified a number of external benefits which have not been taken into account in assessing the subject motorways. This is in large part due to the difficulty in quantifying these wider economic benefits. Such benefits include:

- Facilitation of new residential and employment areas through enhanced capacity and connectivity.
- Increased urban density and unlocking the development potential of 'brown field' sites.
- Urban amenity improvements including urban design enhancements.
- Enhanced agglomeration benefits.
- Greater competition in labour markets.
- Impacts on property prices for existing residential and commercial areas.
- Increased reliability of deliveries for businesses with improved productivity from reduced travel times.
- Reduced costs of goods and services.
- Greater access to services such as educational facilities and hospitals.

An Ernst and Young report, *The economic contribution of Sydney's toll roads to NSW and Australia* prepared in July 2008 for Transurban, documents an updated economic evaluation for Sydney's toll roads. The implications of overall higher than forecast traffic flows, environmental benefits and capital costs and increased congestion costs into the future led Ernest and Young to conclude that the economic contribution of Sydney's toll roads had been underestimated by approximately 15%. This report also found that only limited external benefits had been taken into consideration and calls for further research into methodologies to accurately quantify wider economic benefits.

As Sydney's economy is largely services based, economic growth is heavily reliant on the efficiency of the transport network. Economic appraisal has increasingly become a key factor considered in project decision making. It is increasingly obvious that additional

assessment beyond traditional economic modelling is required. The assumption of perfect competition implicit in traditional economic modelling is perhaps too stringent and while travel time and costs savings are important, there is also a need to analyse the effects of increased accessibility and urban renewal on productivity and employment. According to Meyrick and Associates⁵, the inclusion of wider economic benefits can add up 40% to the benefits identified through traditional economic modelling. Considering wider economic benefits in determining which projects to progress acknowledges the direct nexus between transport and land use patterns. However, more research is required to develop and update base data sets and to ensure that the assessment of wider economic benefits contributes to decision making and does not 'double count' benefits already included in traditional BCR economic modelling.

5.3.3 Recommendation

- Development of a framework to assess wider economic benefits on a pilot project to analyse the contribution of this assessment to project decision making as part of the economic appraisal completed at each of the WWG phases.

5.4 Programme alignment

5.4.1 Overview

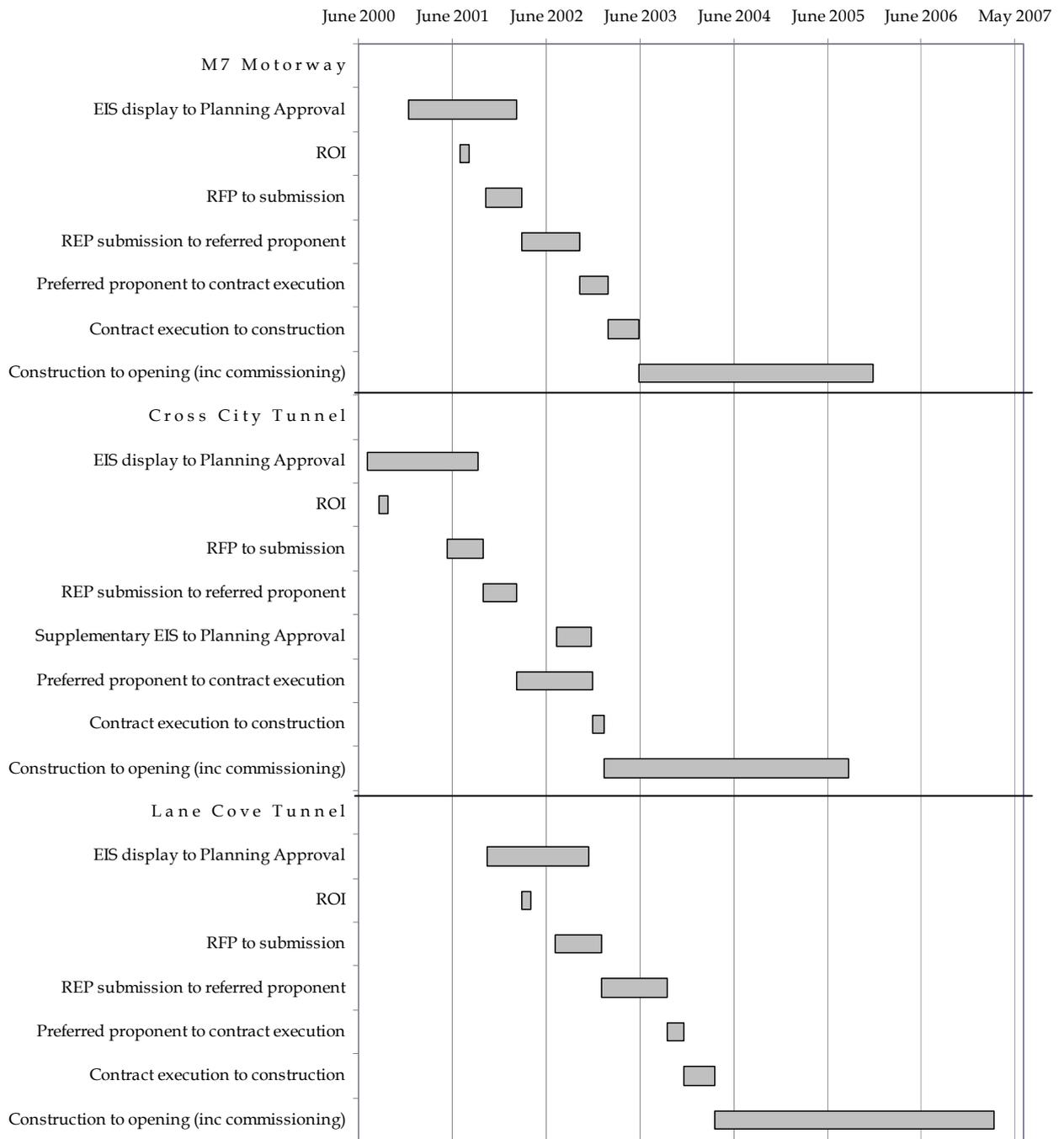
From a government perspective, in developing and delivering motorways there are three key streams of work; project development, procurement, and environmental assessment. Utilising a traditional procurement model there are limited opportunities to align these processes and many key development, procurement and environmental assessment steps have been performed sequentially.

The actual time taken for the procurement of each of these projects is illustrated in Figure 2. It is noted that:

- The time taken from Registration of Interest to execution of a contract was on average, just under two years.
- Registration of Interest was undertaken only after an EIS has been placed on exhibition.
- Detailed proposals were not submitted until after a planning approval had been issued to the proponents.
- Competition was maintained deep into the invitation and negotiation phases and a reserve proponent was appointed on announcement of the preferred proponent.
- The time taken from execution of a contract to commencement of construction was, on average, three months.
- Construction activities for all three projects overlapped, causing industry capacity pressures and potentially forcing construction costs up.

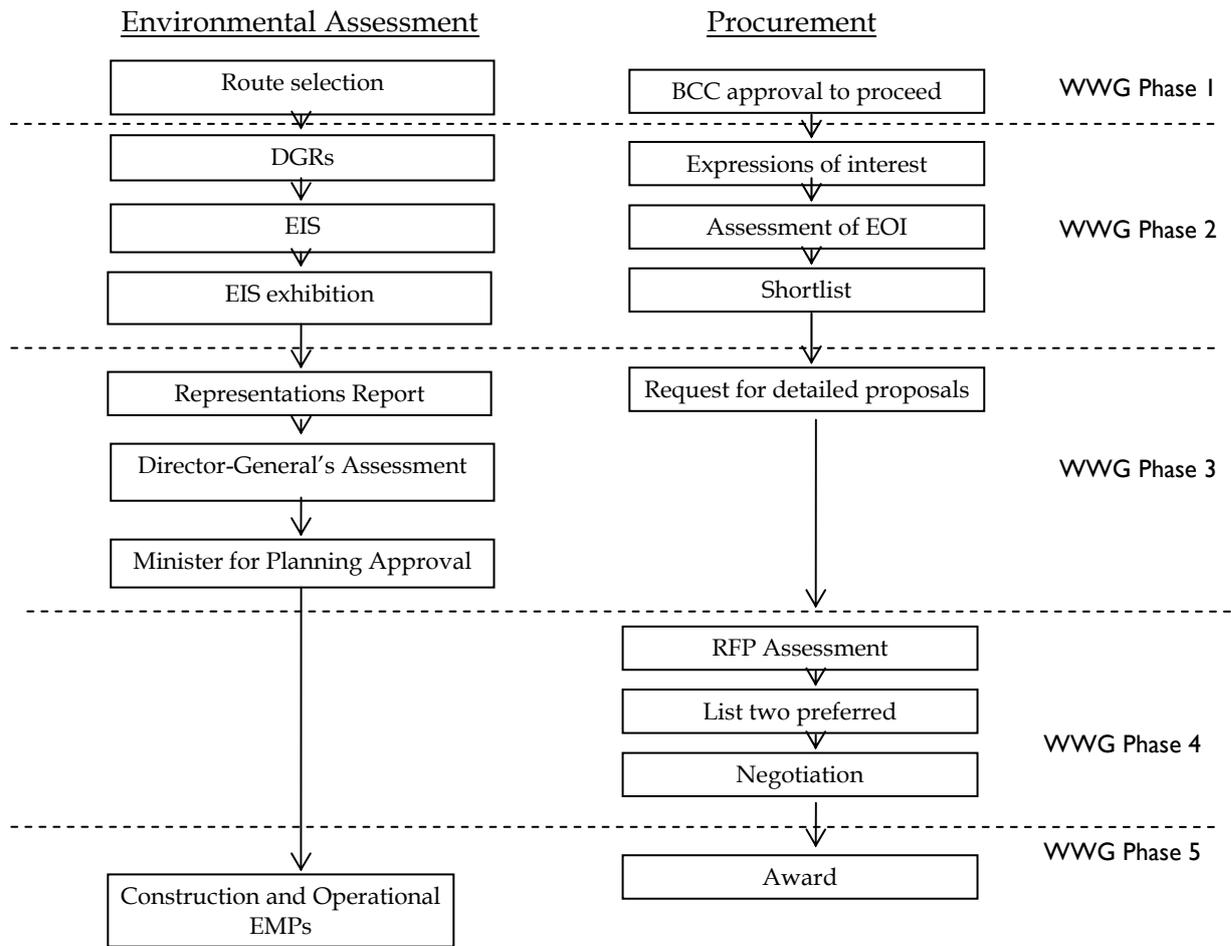
⁵ Meyrick and Associates, *Transport and Economy*, March 2008 prepared as part of *Investing in transport East West Needs Assessment, A Study by Sir Rod Eddington*, March 2008.

Figure 2 – Actual procurement timeframes



The extent to which the procurement and environmental assessment processes typically align is illustrated in Figure 3. The time lags in WWG Phases 3 and 4 necessitated by the need to gain Planning Approval prior to engaging a private consortium to deliver a motorway are obvious.

Figure 3 - Interrelationship between environmental assessment and procurement processes



The process for the Cross City Tunnel was made more complex by the acceptance of a non-conforming design which necessitated the preparation and public exhibition of a Supplementary EIS and a modification to the approved project, as outlined in Section 3.3.3 of this Report, which added approximately six months to the procurement process. Notwithstanding the requirement to submit proposals conforming to a concept design enabled efficient comparison of proposals, with the option to submit non-conforming elements providing for design innovation. This model is therefore recommended for future use.

5.4.2 Alternative processes

Key drivers determining the efficiency of alignment between project development, environmental assessment and procurement processes include value for money and uncertainty surrounding project scope. Alternative processes which do not compromise these drivers but allow for greater integration of processes and, in particular, capture the benefits to be gained from the earlier involvement of the construction industry need to be considered.

Environmental assessment needs to be undertaken in parallel with design development to enable environmental impacts to be avoided or mitigated through design enhancement. It is noted that the avoidance and minimisation of environmental impacts and, in particular,

property impacts was a fundamental consideration in the decision to build tunnels instead of surface roads in the case of the Cross City Tunnel and Lane Cove Tunnel.

The importance of independent assessment is highlighted by the requirement for the RTA to both develop and assess its projects. To this end, the Department of Planning and the Minister for Planning play an essential role in the independent review of major infrastructure projects in NSW. Notwithstanding, there is a need to ensure that independent assessment and planning approval add value to each project and do not work to hinder innovation and cause unnecessary delay. This is particularly relevant when assessing large linear projects which present distinct assessment challenges. It is also noted that tunnel design is inherently complex and even seemingly slight changes to design criteria can have significant technical, economic, social and environmental cost implications, which require comprehensive whole of government evaluation. For example, the additional project specific air quality requirements imposed on the Cross City Tunnel by the Minister for Planning outside of existing policy frameworks necessitated the construction of a separate ventilation tunnel, the capital costs of which was approximately \$51 million. Notwithstanding, it is noted that the Richmond Report recommendation requiring Cabinet Approval for significant changes in project scope will resolve this issue for future projects.

Examination of environmental assessment practice on major infrastructure projects in both Victoria and Queensland has indicated a focus on earlier, higher level independent environmental assessment of a preferred project. Detailed environmental assessment is then continued by the government proponent within an outcome focused framework established by the early project approval. This approach allows for the environmental impacts of design developments to be avoided or minimised through appropriate management strategies while still allowing for design innovation.

The introduction of the Part 3A environmental assessment process under the EP&A Act in 2005 provides for two levels of assessment where previously only one was available:

- Concept Plan Environmental Assessment.
- Project Environmental Assessment.

A Concept Plan Environmental Assessment may be utilised to assess route options for linear projects and major developments which are to be staged. Importantly, in approving a Concept Plan, the Minister for Planning may provide conditions allowing the commencement of construction, to scope the further Project Environmental Assessment required or allow the RTA to complete further environmental assessment. The adoption of a two stage independent approval process (through utilisation of both a Concept Plan and Project Environmental Assessment) is not recommended due to the additional time implications this would add to an already lengthy process and the potential for prescription to stifle opportunity for innovation.

Notwithstanding, there is potential for Concept Plan Environmental Assessment to replace the current prescriptive Project Approval and further streamline the environmental assessment process. The potential utility of Concept Plans in assisting earlier, more strategic environmental assessment and community involvement and allowing for greater alignment of design development, procurement and environmental assessment processes requires further consideration. This strategy would enable environmental assessment and planning approval at an earlier stage than that undertaken

for the three subject projects and provides the potential for the adoption of procurement models which facilitate the early involvement of the construction industry.

The procurement process utilised for the three projects included stringent confidentiality and probity controls and allowed few opportunities for interaction between the RTA and proponents. Acknowledging the stringent probity controls in place, RTA project assessment methodologies need to, where possible, provide opportunities for planned and structured face-to-face meetings for private proponents and the RTA to clarify and understand issues which may assist the parties to submit, and the RTA to receive, more informed proposals. This interaction between private proponents and government has been successfully implemented on recent projects in Queensland.

5.4.3 Recommendations

- A procurement process which continues to require submission of proposals based on a concept design developed by the RTA, with the option to submit non-conforming design innovations.
- The potential for earlier involvement of the construction industry in projects through Concept Plan Environmental Assessment under Part 3A, to be further investigated.
- RTA tender assessment methodologies should provide opportunities for planned and structured face-to-face meetings for proponents and the RTA to clarify and understand issues which may assist the parties to submit, and the RTA to receive, more informed proposals.

5.5 Public interest evaluation⁶

5.5.1 Overview

The requirement for an evaluation of broader public interests to be undertaken before a project is considered as a privately financed project was first introduced in the November 2001 update to the WWG Guidelines. Public interest evaluation was defined in this edition of the WWG Guidelines as “an evaluation of the likely impact of the project on public interest, including: effectiveness, impact on key stakeholders, accountability and transparency, public access and equity, consumer rights, security and privacy.” Although not a formal requirement at the time, consideration of whether or not delivering the projects through private financing was in the public interest was undertaken as part of the project definition phase for M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel. Overall, it was concluded that the delivery of the three projects through public private sector financing was in the public interest as this would enable the early delivery of strategic transport projects at no or minimal cost to government.

As discussed in Section 4.1, over three reports released in May, June and August 2006 the NSW Parliamentary Joint Selection Committee on the Cross City Tunnel made recommendations to improve public private partnership policy and process. The Second Report stated that “[i]t is crucial that the Government address the public mistrust of private

⁶ This Section summarises the findings of research conducted by Natalie Camilleri, Manager Network and Corridor Planning, Roads and Traffic Authority and her input is gratefully acknowledged.

involvement in the provision of public infrastructure and services” (p. ix). Further, the Committee stated that it believed that “public interest in and mistrust of the involvement of the private sector in the provision of public infrastructure and services means that the need for transparency and accountability in the process is paramount” (p.xiii).

Shortly after the release of the final release of the Joint Selection Committee’s third (and final) Report the NSW Government in December 2006 released an updated version of WWG Guidelines. A key component of these new guidelines is the need for proponent agencies to undertake more rigorous public interest evaluation to better inform the decision of whether the NSW Government should procure a project as a public private sector partnership.

5.5.2 Developing a broader public interest evaluation framework

Under the updated WWG Guidelines the public interest evaluation forms part of the project definition phase, necessary to gain approval from the Budget Committee of Cabinet to invite expressions of interest from the private sector. The updated WWG Guidelines have elevated the profile of the public interest evaluation and have better defined the purpose and scope of the evaluation. Initially, the public interest must satisfy the Budget Committee of Cabinet that it is in the public interest to procure the project as a privately financed project. After Government has made the decision to procure the project as a privately financed project the public interest evaluation must be updated at the expression of interest, detailed proposals assessment and negotiation and contracts phases to ensure that the project continues to be in the public interest.

To address the public perception of diminished confidence in privately financed projects the WWG Guidelines also now require a summary of the public interest evaluation to be publicly disclosed concurrently with the call for expressions of interest from the private sector, with the issue of the call for detailed proposals and as part of the contract summary.

The WWG Guidelines provide eight criteria to focus public interest evaluation:

- Effectiveness in meeting government objectives.
- Value for money.
- Community consultation.
- Consumer rights.
- Accountability.
- Public access.
- Health and safety.
- Privacy.

Of note the ‘value for money’ and ‘health and safety’ are new additions to the criteria first documented in the 2001 update to the WWG Guidelines. Within these eight criteria, Appendix 2 of the WWG Guidelines outlines a total of 33 questions for consideration in preparing a public interest evaluation. These criteria are inherently generic as they apply to a large range of potential privately financed projects; from motorways to train carriages, prisons and schools. The challenge for all government proponents is to develop a framework that enables these criteria to be applied in a way that produces an effective

and meaningful public interest evaluation that will assist in guiding project decision making and stand up to public scrutiny.

In developing a framework for the public interest evaluation of a motorway proposal consideration should be given to:

- Broad evaluation of the public interest before the decision is made to procure the project as a privately financed project and continuing evaluation of the public interest over the life of the project.
- Value for money for toll paying users, particularly by ensuring that motorists are only paying for benefits directly received.
- Ensuring that the asset is constructed and operated to high standards consistent with public agency standards.
- Maintaining the public interest over the life of the project including, in particular, government control of road and public transport networks.
- Evaluation of the proposed project from the community's perspective given the community effectively defines the public interest.
- Including financial mechanisms that enable the government to share in revenue where traffic volumes substantially exceed forecast volumes generating private super profits.

A recent Victorian inquiry found that any public interest assessment methodology that reduces the evaluation to a superficial tick-a-box or technical calculation approach should be avoided. Methods to improve the scope of public interest evaluation so that the criteria better reflects public concerns regarding motorway projects, especially in relation to the calculation of tolls and any changes to surface roads, also need to be considered.

5.5.3 Recommendation

- Develop a framework for public interest evaluation of future motorway proposals as privately financed projects.

5.6 Traffic modelling

5.6.1 Overview

Traffic modelling is generally undertaken by the RTA on road proposals to forecast morning peak hour traffic volumes so that worst case capacity requirements can be identified and provided for in design development (as the evening peaks tend to be spread over a greater time period). The development of toll road projects requires a focus on total daily travel for revenue forecasts, which is difficult to predict.

Traffic forecasting was undertaken as part of the projects EISs and used as an input to financial modelling to predict impacts in terms of volumes, speeds and delays on roads. This was completed using a standard set of computer based macro and micro models focused on the morning peak and not originally developed for toll modelling. The models forecast traffic volumes taking into account predicted future land use changes (population, workforce and employment) and used trip generation, distribution and mode choice characteristics ascertained from detailed quantitative surveys of travel behaviour in Sydney.

These traffic assessments were prepared using traffic and land use predictions which, by the time the projects were opened, were over a decade old. Additionally, traffic modelling and land use forecasting techniques have evolved considerably during the same period. For example, trip table development relied heavily on Australian Bureau of Statistics Census journey to work data. However, other data sources such as Household Travel Survey are now available.

While traffic modelling undertaken for the M7 Motorway using NETANAL was found to be reasonably accurate, traffic modelling undertaken for the Lane Cove Tunnel and Cross City Tunnel (using this same methodology) over predicted the actual patronage, probably due to the difficulty in predicting total daily travel volumes and inaccurate land use forecast inputs and toll behaviour assumptions.

Although considered in the financial modelling, the traffic modelling undertaken as part of the EISs did not consider the likely impacts of 'ramp-up'. This is a term used to describe the process of traffic demand to a tolled facility building up to an equilibrium state at which point the travelling public are familiar with the facility and making rational trade-offs between the cost of the toll and travel time savings. It is a process that can extend for years after opening and requires more detailed consideration in developing future projects.

A newer traffic modelling approach utilises EMME/2 software that is recognised world-wide. It allows for complex volume delay functions and provides a platform for the modelling of complex toll behaviour. Traffic modelling undertaken for more recent RTA projects has utilised updated modelling techniques and, on opening, the traffic predictions have been well reflected. For this reason, it is recommended that the traffic modelling should incorporate a process of updating and continual improvement during the project development and assessment, rather than hold constant as has been past practice. It may also be useful to consider the merits of undertaking discrete modelling for environmental assessment, project design development and revenue prediction.

Finally, it is appropriate to end on a cautionary note. Base inputs and assumptions implicit in all traffic modelling include:

- Forecast population and employment growth.
- Forecast land use changes.
- Toll behavioural response.
- Petrol pricing.
- Travel time savings.

Traffic forecasting relies heavily on predicting patronage on a long term horizon (of approximately 30 to 35 years) and accuracy of results is dependent on these inputs and assumptions, many of which are challenging to predict in the longer term.

5.6.2 Recommendations

- The traffic modelling undertaken in assessing future motorway projects should utilise latest and up to date modelling techniques and consider the implications of 'ramp up' in detail.

- Undertake more rigorous sensitivity analysis on traffic modelling inputs such as forecast population and employment growth, land use changes and tolling strategies to assess the potential impacts of variations.
- Consideration of the merits of undertaking discrete traffic modelling approaches for each of the following:
 - Environmental assessment (which needs to focus on worst case maximum growth scenarios).
 - Project design (which needs to focus on required morning peak hour capacity).
 - Revenue prediction (which needs to focus on total daily traffic).
- Undertake more rigorous stress testing on financial model assumptions in assessing bids.

5.7 Tolling

5.7.1 Overview

The capital costs of the M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel were substantial. This was due to the magnitude of these projects and the significant cost of tunnelling, relative to surface road construction. The imposition of a toll has enabled the delivery these projects to be accelerated. The tolls not only generate revenue to fund the motorways but also ensure there is some balance between public and private transport by making car usage relatively more expensive than public transport for some trips.

The toll level for each of the subject motorways was set based on financial modelling, which utilised a public sector comparator model assuming minimal or no cost to government. The toll level considered capital costs and operating costs over the concession period, with due regard to public willingness to pay and a reasonable return on investment to the private consortia during the concession period.

The imposition of a toll tends to discourage use of a road facility by some potential users who do not perceive that travel time savings equal or exceed the cost of the toll. The extent of toll avoidance is directly related to the cost and convenience of alternative routes. Traffic modelling completed for each project therefore included modelling of the “no toll” case along side various tolling scenarios to assess patronage sensitivity.

The private sector bids for the three projects utilised optimistic traffic forecasts and financing with market based debt and equity return rates. This was achieved due to the significant competition from within the private sector to invest in infrastructure and access to readily available debt and equity financing. However, these conditions no longer exist and will probably not return in short to medium term. To this end, there is a need to reconsider options for the procurement of future motorway projects, ranging from projects with exclusive government funding, to full private funding, and combinations thereof. In tendering a privately financed partnership for a toll road, the NSW Government should consider the benefits of a range of funding, tolling and concession period scenarios. In addition, the RTA tender assessment should also include value for money (i.e. the toll) for the user as a specific evaluation criterion.

Historically, the toll level has not been based on prevailing tolls on other roads or maximising the usage of the new toll road. As a network of toll roads has developed around Sydney, there is a growing need to consider the cumulative impact of tolls for longer trips. There is also an emerging area of travel behaviour research which is centred on willingness to pay. While traditionally the RTA has not completed detailed analysis on tolled travel behaviour, the private sector, who hold patronage risk, have utilised extensive travel time surveys and market research to support travel mode choice modelling and forecast competing travel times. The merits of conducting further analysis to predict behavioural response for future tolled motorway projects needs to be considered. These studies should also consider the effects of distance based tolling, time of day tolling and congestion charging.

An analysis of current tolling on the Sydney Orbital motorway network highlights a number of issues. The highest tolls per kilometre have been applied to tunnels which have the highest cost of construction, operation and maintenance per kilometre. Toll roads closer to the CBD have historically had higher toll rates, where road users' value of time is greater. Of the tolling strategies in place around Sydney and other NSW States, a distance based toll has been identified as the preferred tolling strategy for consideration in developing and delivering future motorway projects, given the various trip options likely to be enabled by multiple motorway access and exit ramps and equity and value for money provided by this more flexible payment strategy. The emerging trend towards adoption of time of day tolling also warrants further consideration.

5.7.2 Recommendations

- Reconsider funding options for the procurement of future motorway projects, ranging from projects with exclusively government funding, to full private funding, and combinations thereof.
- In procuring privately financed partnerships to deliver future motorway projects, the NSW Government should consider the benefits of a range of tolling and concession scenarios.
- If the imposition of a toll is proposed, the RTA tender assessment should also include value for money (i.e. the toll) for the user as a specific evaluation criterion.
- Ensure traffic modelling undertaken to assist in forecasting revenue includes consideration of other tolls on the network and the likely impacts of traffic ramp up.
- Consider the merits of research into willingness to pay for tolls.
- Consider the use of distance based tolling for future motorway projects and or time of day tolling, if appropriate.

5.8 Network performance

5.8.1 Overview

Network performance is one of the few project risks retained by the RTA for these projects. The retention of this risk is essential to the RTA fulfilling its obligations as a road authority. Strategies to minimise and manage this risk were therefore implemented on all three motorway projects.

Of note, the completion of the M7 Motorway and Lane Cove Tunnel completed the Sydney Orbital, a motorway standard ring road connecting key residential and employment centres around Sydney. Integration into the surrounding road network was a key focus during design development and resulted in additional roadworks being integrated into the projects. For example, the local road works included in the M7 Motorway and the widening of the Gore Hill Freeway included in the Lane Cove Tunnel.

The management approach applied to ensure adequate network performance on the opening of the Lane Cove Tunnel, which built on the lessons learned in opening the M7 Motorway and Cross City Tunnel, is presented as a case study below.

Network performance for the Lane Cove Tunnel was managed by:

- Incident management planning.
- Development and implementation of a transition strategy to better integrate surface roadworks into the surrounding road network on tunnel opening.
- Wider road network management planning.

5.8.2 Incident management planning

Extensive preplanning and development of detailed operating procedures specific to the tunnel, in particular, procedures to be put in place in the event of an incident, is a key requirement of the three Project Deeds. On the Lane Cove Tunnel, this planning was undertaken by the operator, Transfield Services and addressed:

- Protocols and procedures to be followed during emergency situations associated with the operation of the project including vehicle collisions and fires.
- Details of traffic management measures to be implemented during emergencies, where appropriate to minimise the potential for escalation of the emergency.
- Integration and coordination of protocols and management plans with the Roads and Traffic Authority, and adjoining motorway operators.
- A training and testing program to ensure that all operational staff are familiar with the plan and coordination protocols with relevant authorities.

A stakeholder group was formed including representatives from:

- Roads and Traffic Authority.
- NSW Fire Brigades.
- NSW Police
- NSW Ambulance Service.
- Hills Motorway (the operators of the M2 Motorway).
- Sydney Harbour Tunnel Company (the operators of that project).
- District Emergency Management Officer.

Members of this group attended a series of consultative workshops to discuss and agree upon planning procedures and individual Incident Response Plans which covered the complex multi-agency response to various foreseeable and un-planned incident types. The planning process commenced early and was essential to developing procedures to address interrelated issues such as traffic management, operation of the ventilation system and fire and life safety procedures.

5.8.3 Development and implementation of a transition strategy

An Integration Group comprising representatives from the Premier's Department, the RTA, Ministry of Transport and Connector Motorways was established by the Minister for Roads in June 2006 to make the Lane Cove Tunnel's transition into the existing road network as smooth as possible upon completion.

Whilst recognising that staging the implementation of surface roadworks would better achieve some of the key project objectives in the short term, such as relieving congestion on Epping Road, the Implementation Group acknowledged that the ultimate public transport and amenity benefits of the Lane Cove Tunnel could only be achieved on full implementation of the approved surface roadworks. Following consideration of a number of options, the Integration Group therefore recommended a two stage transition strategy to be implemented over an 11 month period from tunnel opening. In the first five months following tunnel opening construction of the bus interchange and pedestrian overbridge would commence, the widened Gore Hill Freeway would be opened to general traffic and the five lane tidal flow configuration of Epping Road would be retained. The T2 Transit lanes on the Gore Hill Freeway and the remaining Epping Road works would commence at the end of this five month period and be completed 11 months after tunnel opening. The bus lanes on Epping Road would be operational from 10 months after tunnel opening. This transition strategy did not alter the project to be ultimately implemented, but provided a staged approach to gradually implement the approved surface traffic changes to Epping Road and the Gore Hill Freeway.

As outlined in Section 3.4.3 of this report, a modification was submitted to the Department of Planning in December 2006 and subsequently approved in February 2007. This strategy was implemented on tunnel opening in March 2007. The delay in implementing surface works gave motorists time to adjust to the new project and ensured that confusion, traffic delays and the potential for traffic incidents were minimised.

The recommendations in Section 5.7.2 above, which cover the need to consider the impacts of traffic ramp up in more detail in developing projects, would also avoid the need to consider integration planning during the delivery phase for future projects.

5.8.4 Wider road network management planning

While integration into the surrounding road network was a focus during design development, as discussed in Section 5.6 of this Report, the detailed traffic modelling which was undertaken in developing the transition strategy utilised more sophisticated techniques and more detailed input data. This modelling identified the need for wider network management including:

- The need for the addition of an interim third westbound lane on the M2 Motorway from Lane Cove Road on-ramp to 200 metres west of Beecroft Road.
- Proactive management of those sections of the road network within close proximity to the project and the wider road network that may experience increased congestion and changes in travel patterns, immediately following the opening, in particular, the approaches to the Harbour Bridge.
- Community education on changes to access arrangements.

The need for an interim third westbound lane on the M2 Motorway was identified due to the potential for congestion in the afternoon peak. It was provided via reline-marking the subject motorway section prior to the opening of the Lane Cove Tunnel following completion environmental assessment completed by the RTA under Part 5 of the EP&A Act.

Traffic modelling of a number of scenarios including a toll free period, identified changes in travel flow, demand and patterns within close proximity to the project and the wider network. This allowed for the identification of areas of possible congestion and its cause, and the implementation of treatments to manage or minimise the issues where appropriate. Information collected in this phase was used to focus monitoring and network management operations following the opening.

Utilising operational experience and outputs from the traffic modelling, a comprehensive network monitoring and management plan was developed to manage the integration of key milestones of the project into the operation of the wider road network. The plan detailed specifics of how the proactive monitoring and management of the network would be undertaken, including the use of dedicated incident management and traffic monitoring field resources and their roles, liaison with key stakeholders including public transport service providers, and coordination and reporting structures.

In addition, a comprehensive communications strategy was developed to assist in educating road users and the broader community regarding changes implemented as part of the project. The strategy incorporated comprehensive information packages including maps, animations and graphical schematics on specific changes being brought about by the project and how they impacted on road users. This information was advertised and placed on the RTA website, with a number of tools used to encourage road users to seek the information on the project and associated road changes from the RTA website. The specific aim of the strategy was to familiarise road users with changes prior to implementation, minimise confusion and concern relating to them, and assist road users with trip planning to arrive at their destination with the least amount of inconvenience.

5.8.5 Recommendations

- Comprehensive incident management planning to be undertaken as early as possible in both the development and delivery phases of all tunnel projects in close consultation with relevant authorities.
- A network integration plan to be developed prior to project opening including consideration of results from updated traffic modelling and development of education and monitoring strategies as required.

6 Compliance with Working with Government Guidelines

The December 2001 WWG Guidelines provided a set of 'ground rules' for any privately financed project. These ground rules cover all stages of the procurement process and summarise and emphasise requirements that appear throughout the WWG Guidelines. Compliance of the three motorway projects with these ground rules is assessed in Table 8. Notwithstanding, since development of these motorway projects commenced in the mid 1990s and procurement of the M7 Motorway and Cross City Tunnel commenced prior to the publication of the 2001 WWG Guidelines compliance has been assessed retrospectively.

Table 8 WWG Guidelines – Compliance with ground rules.

Ground rule	M7 Motorway	Cross City Tunnel	Lane Cove Tunnel
Government will maintain a competitive and transparent process	Complied. Competitive process utilised, with strict probity controls.	Complied. Competitive process utilised, with strict probity controls.	Complied. Competitive process utilised, with strict probity controls.
No direct negotiations unless approved by Budget Committee	Complied. Selection of preferred proponent endorsed by Budget Committee prior to direct negotiation taking place.	Complied. Selection of preferred proponent endorsed by Budget Committee prior to direct negotiation taking place.	Complied. Selection of preferred proponent endorsed by Budget Committee prior to direct negotiation taking place.
Government will not guarantee private sector borrowing and will not take an equity share-holdings	Complied.	Complied.	Complied.
The Government may contribute land, capital works or some form of revenue	Complied. Federal Government contributed \$360 to the project.	Complied. Delivered at no cost to government.	Complied. Delivered at no cost to government.
Compliance with the <i>Environmental Planning and Assessment Act, 1979</i>	Complied. Minister for Planning granted approval to the project on	Complied. Minister for Planning granted approval to the modified	Complied. Minister for Planning granted approval to the project on

Ground rule	M7 Motorway	Cross City Tunnel	Lane Cove Tunnel
	28 February 2002.	project on 12 December 2002	3 December 2002
Compliance with National Competition Policy and the Competition Principles Agreement	Complied.	Complied.	Complied.
Compliance with the Premier's Memoranda on the disclosure of private sector contracts.	Complied. Contract summary available on NSW Treasury website.	Complied. Contract summary available on NSW Treasury website.	Complied. Contract summary available on NSW Treasury website.
Fair and equitable treatment of public employees who may transfer to a private employee	Not applicable. No public employees were transferred to the private sector as a result of the project.	Not applicable. No public employees were transferred to the private sector as a result of the project.	Not applicable. No public employees were transferred to the private sector as a result of the project.
Maximum Australian and New Zealand industry participation	Short listed consortia were constituted largely from Australian construction companies and investment banks.	Short listed consortia were constituted largely from Australian construction companies and investment banks.	Short listed consortia were constituted largely from Australian construction companies and investment banks.
Government may reimburse bidding costs if a project is terminated after the request for detailed proposals stage	Not applicable. The project was not terminated.	Not applicable. The project was not terminated.	Not applicable. The project was not terminated.
Contract summaries to be tabled in parliament 120 days after the contract becomes effective	Contract summary was assessed by the Auditor-General and tabled in Parliament prior to being made available on NSW Treasury website in August 2003.	Contract summary was assessed by the Auditor-General and tabled in Parliament prior to being made available on NSW Treasury website in June 2003.	Contract summary was assessed by the Auditor-General and tabled in Parliament prior to being made available on NSW Treasury website in July 2004.

Ground rule	M7 Motorway	Cross City Tunnel	Lane Cove Tunnel
Guidelines to be implemented in a professional, fair, equitable and open manner, ensuring probity and minimising tendering costs.	Use of Registrations of Interest in place of preliminary proposals reduced participation costs. Probity auditor engaged to oversee tender assessment.	Use of Registrations of Interest in place of preliminary proposals reduced participation costs. Probity auditor engaged to oversee tender assessment.	Use of Registrations of Interest in place of preliminary proposals reduced participation costs. Probity auditor engaged to oversee tender assessment.

7 Conclusions

NSW has a long and successful history of toll roads delivered through public private sector partnerships. Contracts have evolved over time as the RTA better quantified project risk profiles and built on lessons learned from previous projects. Various reviews and audits of past projects have identified issues and improvements for future public private sector partnerships.

The experience gained during the twenty year period of delivery of these projects has resulted in the refinement of processes that have ensured value for money for NSW taxpayers and motorway users, whilst ensuring that community and environmental impacts remain acceptable. This review has confirmed that the M7 Motorway, Cross City Tunnel and Lane Cove Tunnel were delivered in accordance with the WWG Guidelines.

These three projects, with an estimated combined capital cost of over \$3 billion, provide for over 200,000 vehicle movements per day and were delivered concurrently and ahead of schedule. The Public Private Partnership procurement model developed to deliver these projects established best practice for Australian economic infrastructure and has become a benchmark for other jurisdictions both within Australia and internationally. The risk allocation and commercial model has been adopted as the base model for the *Commercial Principles for Economic Infrastructure Guidelines* currently being developed by Infrastructure Australia.

Notwithstanding, a number of emerging trends in the project development, procurement and assessment of motorway projects where improvements are possible were highlighted.

Recognising that project objectives drive the selection of a preferred option, the objectives adopted for future motorway projects will need to be developed from rigorous analysis of transport deficiencies and predicted changes in employment and land use. In addition, economic appraisal is an increasingly important tool in project decision making. Further research is required to develop a framework for economic assessment including consideration of wider economic benefits.

There has been criticism of the time taken to develop, assess and procure large motorway projects. The potential for the recently introduced Part 3A major project assessment process to enable better alignment of project development, environmental assessment and procurement processes and enable earlier involvement of the construction industry requires further consideration.

Lastly, the private sector bids for the Cross City Tunnel and Lane Cove Tunnel used optimistic traffic forecasts and finance with market based costs for debt and equity. This was achieved due to the significant competition from within the private sector at that time to invest in infrastructure and the ability to access to readily available low interest financing. The global financial crisis has drastically altered market liquidity. To this end, there is a need to consider options for the procurement and financing of future motorway projects, ranging from projects with exclusively government funding, to full private equity, and combinations thereof. The development of a framework for public interest evaluation of motorway proposals will assist in selecting an appropriate procurement model for future motorway projects.

The NSW government continues to be committed to delivering better services to the community and this is a key part of the NSW State Plan. The use of public private sector partnerships continues to have a role in motorway development and delivery in NSW. However, the NSW government must look at improved ways of engaging with the private sector to provide essential capacity enhancements and missing links in our motorway system, for the economic benefits of NSW and the nation. The experience gained and lessons learned through the implementation of the M7 Motorway, the Cross City Tunnel and the Lane Cove Tunnel projects will assist in improving the processes utilised to deliver future motorway projects.

8 Recommendations

A list of consolidated recommendations from this review is provided below. The recommendations from this review will be adopted by the RTA as applicable in developing future private sector motorway projects.

8.1 Project objectives

- Ensure project objectives are developed to take into consideration the relevant NSW government plans and strategies and target users.
- Ensure project objectives are specific and measurable.
- Ensure project objectives are a focus of community consultation throughout the project development and delivery phases.

8.2 Economic appraisal

- Development of a framework to assess wider economic benefits on a pilot project to analyse the contribution of this assessment to project decision making as part of the economic appraisal completed at each of the WWG phases.

8.3 Programme alignment

- A procurement process which continues to require submission of proposals based on a concept design developed by the RTA, with the option to submit non-conforming design innovations.
- The potential for earlier involvement of the construction industry in projects through Concept Plan Environmental Assessment under Part 3A, to be further investigated.
- RTA tender assessment methodologies should provide opportunities for planned and structured face-to-face meetings for proponents and the RTA to clarify and understand issues which may assist the parties to submit, and the RTA to receive, more informed proposals.

8.4 Public interest evaluation

- Develop a framework for public interest evaluation of future motorway proposals as privately financed projects.

8.5 Traffic modelling

- The traffic modelling undertaken in assessing future motorway projects should utilise latest and up to date modelling techniques and consider the implications of 'ramp up' in detail.
- Undertake more rigorous sensitivity analysis on traffic modelling inputs such as forecast population and employment growth, land use changes and tolling strategies to assess the potential impacts of variations.

- Consideration of the merits of undertaking discrete traffic modelling approaches for each of the following:
 - Environmental assessment (which needs to focus on worst case maximum growth scenarios).
 - Project design (which needs to focus on required morning peak hour capacity).
 - Revenue prediction (which needs to focus on total daily traffic).
- Undertake more rigorous stress testing on financial model assumptions in assessing bids.

8.6 Tolling

- Reconsider funding options for the procurement of future motorway projects, ranging from projects with exclusively government funding, to full private funding, and combinations thereof.
- In procuring privately financed partnerships to deliver future motorway projects, the NSW Government should consider the benefits of a range of tolling and concession scenarios.
- If the imposition of a toll is proposed, the RTA tender assessment should also include value for money (i.e. the toll) for the user as a specific evaluation criterion.
- Ensure traffic modelling undertaken to assist in forecasting revenue includes consideration of other tolls on the network and the likely impacts of traffic ramp up.
- Consider the merits of research into willingness to pay for tolls.
- Consider the use of distance based tolling for future motorway projects and or time of day tolling, if appropriate.

8.7 Network performance

- Comprehensive incident management planning to be undertaken as early as possible in both the development and delivery phases of all tunnel projects in close consultation with relevant authorities.
- A network integration plan to be developed prior to project opening including consideration of results from updated traffic modelling and development of education and monitoring strategies as required.

Appendix A – Committee terms of reference

Motorways Post Implementation Review Committee

Terms of Reference – June 2008

1. Purpose

The purpose of the Motorway Post Implementation Review Committee (the Committee) is to complete a post implementation review of the Cross City Tunnel (CCT), Westlink Motorway (M7) and Lane Cove Tunnel (LCT) in accordance with the Working with Government *Guidelines for Privately Financed Projects*, December 2006 (WWGG).

2. Committee Membership

The Committee comprises the following representatives:

- ◆ Paul Goldsmith, General Manager, Motorway Projects Branch, Roads and Traffic Authority (Chair).
- ◆ Danny Graham, Director, Privately Financed Projects Branch, NSW Treasury.
- ◆ Paul Gilbertson, Executive Director Strategic Projects, Department of Housing.

3. Review Scope

Considering the focus subjects listed in the WWGG, and in light of the reviews of motorway projects completed to date, this review will focus on the following areas:

- ◆ Project development including:
 - Project formulation.
 - Project objectives.
- ◆ Procurement including:
 - Brief appropriateness.
 - Project delivery.
 - Risk exposure/risk sharing.
 - Approvals process covered by WWGG.
- ◆ Project management including
 - Delivery time.
 - Budget performance.
- ◆ Project delivery including:
 - Procedures in WWGG pre and post implementation.
 - Design performance
 - Functional competence of infrastructure, including networking and interfacing
 - Project operations, including service delivery and financing.
- ◆ Industry including:
 - Industrial relations management:
 - Industry development.
- ◆ Environment including:
 - Assessment and planning approval
 - Environmental management
- ◆ Community relations including
 - Community consultation.

- Community notification and complaints management

This scope addresses all the subjects listed in the WWGG, grouping interrelated issues into sub-categories under key topics.

4. Support

The RTA will provide ex officio services to the Committee including, but not limited to:

- ◆ Providing the venue for meetings.
- ◆ Secretarial and management services.
- ◆ Research and report drafting.

5. Review Methodology

From mid 2005 several reviews of the implementation of the M7, CCT and LCT were completed. These reviews included external independent reviews, internal workshops, workshops with the Company, the Independent Verifier (IV) and other contractors, and independent compliance audits. These reviews addressed all of the subject areas identified above.

Considering the available data and the review methodology employed on the two PFP post implementation reviews completed to date, a research process which focuses on conceptualising data into theory is to be adopted. This technique is objective as hypotheses are drawn from the data rather than tested against the data.

Data analysis of the subject review reports will be carried out by the RTA and reported to the Committee. The key focus of this data analysis process is the identification of themes, which will be completed using the main elements of the analytic induction method detailed in Minchiello et al (1995). The following steps are to be utilised to identify key strengths and weaknesses:

1. Data records are to be read over and areas where specific topics are discussed marked up.
2. Data records are to be read over again to draw key recurring issues from the text using actual wording transcribed in the records.
3. General statements about strengths and weaknesses are to be developed based on these key recurring issues.
4. These statements are then to be modified, revised and expanded into propositions as the data is reviewed once again.
5. The data from each project shall then be reviewed in light of the propositions.
6. The prioritised propositions shall then be tabulated in a matrix under the focus areas identified in Section.

It is noted that the three subject projects and, in particular the CCT, have been the subject of extensive independent review. This review will therefore focus on identifying key lessons learned to guide the development and implementation of similar future projects and will not be a forum for reporting compliance with recommendations from other reviews.

Should the need be identified by the Committee, further data may be collected via interviews with key stakeholders and/or seeking submissions with key stakeholders.

6. Committee Work Program

A Work Program for the Committee is to be provided. This Work Program to be identify required Committee meetings, key meeting agenda items for each of these meetings and outlines required actions to be undertaken between meetings.

Any amendments to this Work Program shall be made by agreement of the Committee. If amendments are made, the Work Program shall be reissued to the Committee.

7. Meeting Procedures

Meetings shall be chaired by the RTA Representative.

The RTA shall issue meeting agendas based on the Committee Work Program at least one week prior to the meeting. Committee members may nominate additional items to be added to the Agenda.

All meetings will be recorded in the form of minutes by a minute taker provided by the RTA. The minutes shall record a summary of each issue raised and agreed action(s) under are each agenda item and are not to be a verbatim record of discussions.

Appendix B – Committee Work Program

Committee Work Program

Meeting 1: 5 June 08

1. Introduction.
2. Overview of three projects.
3. Overview of proposed review methodology.

Meeting 2: 25 July 08

1. Discuss and adopt TORs.
2. Presentation on preliminary analysis of review data.
3. Present, discuss and adopt report format (table of contents).
4. Identify focus areas.

Meeting 3: 25 September 2008

1. Confirm focus areas.
2. Identify frameworks for addressing focus areas.
3. Confirm framework for assessing compliance with the WWG Guidelines.

Meeting 4: 22 June 2009

1. Confirm approvals and publications process.
2. Review draft report.