M4 Extension (Full Project and Preliminary Staging Analysis)

Summary of Initiative Appraisal - Appendix E

29 October 2008

Summary of Initiative Appraisal - Key Results and Assumptions (Appendix E)

Part A – Overview

Title of Initiative – M4 Extension (Full Project and Preliminary Staging Analysis)

The project includes 17km of new motorway standard road (mainly tunnels) to extend the M4 Motorway east of the Sydney suburb of Strathfield to Sydney CBD, to Sydney Airport with upgrading of Qantas Drive to improve access to General Holmes Drive which is the major access road to the freight terminals at Port Botany. The proposed route would connect the AusLink National Network between the M4/M7 interchange and General Holmes Drive (Sydney Airport) and Foreshore Drive (Port Botany).

Stakeholder –

Roads and Traffic Authority of New South Wales
ACN 64 480 155 255

Contact –

Brian Watters
Director Major Infrastructure
(tel) 02 9218 3553
(fax) 02 9218 6404
(email) brian_watters@rta.nsw.gov.au
Roads and Traffic Authority of NSW
Level 6, 260 Elizabeth Street, Surry Hills

Summary of submission

The M4 Extension delivers substantial economic benefits to the Sydney Metropolitan area by addressing key areas of network congestion and future travel demands from Port Botany and Sydney Airport.

The total project has a capital cost of $9.1billion if completed as one project. Given the large capital cost the project has also been analysed under two other scenarios. These are:

- Only completing a first stage is a link to the CBD (to Anzac Bridge/City West Link and Parramatta Road near Broadway) costing $5.7 billion (including an allowance for works to enable the second stage at a later date), and
- Initially completing the first stage of the project with a 5 year gap between the completion of stage 1 and the start of stage 2. Stage 2 would cost $4.0 billion comprising the link to the Airport/Port south of Parramatta Road and the link north of City West Link to Gladesville Bride). The total cost of this two stage project would therefore be $9.7 billion. The first stage is forecasted to commence construction in 2012 and takes 4 years with the second stage to

commence construction 5 years after the first stage opens to traffic and takes 3 years to build.

The BCR of the full project is the highest as the full economic benefits of the project are realised in earlier years. The main economic benefit is travel time saving with a net present value of $17.5 billion over the 30 year operating period. This demonstrates the benefit of reduced network congestion.

The stage 1 BCR is comparably lower due to the project bearing higher costs to enable the second stage to be completed at a later date.

Given the scale of the project the economic benefits are also forecast to be massive. In particular there are substantial travel time savings through a large area of inner Sydney network.

The RTA's BCR calculations are conservatively based due to the following reasons:

- The land use and demographics data used in the analysis does not incorporate the recent Australian Bureau of Statistics data which estimates a significantly higher Sydney Metropolitan population by 2036 which will result in significantly higher growth in transport demand than currently forecast, and
- The base case analysis does not take into account the impact of increased network volatility as capacity is reached which may reduce base case volumes as people change or defer trips.

Summary of Initiative Appraisal - Key Results and Assumptions - Appendix E

Part B – Cost Benefit Analysis (CBA) – Monetised Benefits and Costs

B.1 Key Assumptions

Item	Assumption
Key drivers	The key drivers are outlined in the M4 Extension Strategic Assessment Report (RTA, 2008) which notes: - a 25% increase in population of Sydney by the mid 2020s (with expected growth in travel), - the Port Botany expansion which, even with a significant increase in movement of containers by rail, would see a doubling of the road transport task to 1.8 million containers per year by around 2020 and - the growth of Sydney Airport (passenger numbers increase from 26 million to 68 million per year by the early 2020s and air freight increases from 430,000 tonnes to 1,400,000 tonnes per year). These findings are consistent with an earlier study, the RTA's M4 East Options Study Report 2003. The report identifies significant traffic issues with the existing corridor east of the M4, including: - peak period travel speeds on Parramatta Road are below 25km/h, and usually low throughout the day - disruptions to public transport services - high congestion in adjacent road links, causing significant safety and amenity problems for residents and adjoining land users - constrained access to key locations such as Sydney Airport, Port Botany and south Sydney growth centre. (RTA, 2003, pp.3-4) These transport deficiencies are identified by both the Federal and NSW State Governments through planning studies for the Sydney Region and connections between the expanding Port botany and Sydney Airport and the National Road Network. The AusLink Sydney Urban Corridor Strategy (2007, p.20) identifies east west connectivity as a short-term deficiency in Sydney with peak periods especially congested. To address this deficiency the Strategy identifies that "A parallel east-west connection that connects the M4 to the Airport-Port Precinct may be required to support future growth in traffic to and from the Airport-Port Botany and western Sydney and to help ease demand on the M5 and M5 east east-west link. This project satisfies this identified deficiency. Further, the AusLink Sydney Urban Corridor Strategy (2007, p.26) identifies as a short term priority (to 2016) the need to "improve road and rail links from Port Botany and Sydney

	Airport to western Sydney". This proposal addresses this priority. The identified strategic response to this priority is to "enhance the east-west road corridors to service the Airport/Port Precinct, for example, the M5 and M5 East corridor and extension of the M4 Motorway. The M4 Extension would implement this strategic response. The NSW Government's Metropolitan Strategy (2005, pp.172 & 192) indicated that the Government would consider options to improve road links between eastern freight generators such as the CBD, Port Botany and Sydney Airport and Western Sydney, including an eastern extension of M4 Motorway and/or increasing capacity on the M5/M5 East. The NSW Government's State Infrastructure Strategy (2008, p.34) indicated that an eastern extension of the M4 would be likely to be completed by 2016. The Urban Transport Statement (2006, p.73) indicated that in mid 2007 the Government would release a paper for community consultation on potential transport projects, including a preferred route strategy for a possible extension to the M4 Motorway. The NSW Government's recent review of the Freight Industry Advisory Board's Report and Recommendations (2006, p.14) agrees that planning for additional truck capacity in the M4 corridor should proceed.
Base case	The base case for this project is to retain the status quo of the existing M4 Motorway infrastructure. The base case assumes no Sydney Link Motorways. It includes future transport projects in the TDC strategic transport model for all model runs including: • Epping to Chatswood Rail Link • North West Rail Link • South West Rail Link. • Clearways Rail Timetable. • Northwest Transitways. • Unsworth Report Bus Services In addition to those rail projects there is a suite of road projects included in the base case. These projects are primarily targeted to meeting the forecast demands from the North West and South West growth areas and also to complete the links around Menai. The project has been modelled using the Sydney Metropolitan Strategic traffic model, maintained by the RTA's independent traffic modellers (Halcrow MWT). The model is developed in EMME/2 software which is an interactive multi-modal transport planning modelling package which provides information on Vehicle Kilometres Travelled (VKT) and Vehicle Hours Travelled (VKT) which are the drivers of the assessed economic benefits.

	The model takes land use planning information and modal share information prepared by NSW governments Transport Data Centre's (TDC) and included in its strategic transport model. This information is then calibrated against current actual traffic counts from RTA's network of Sydney Basin traffic count stations. Overlayed against this information is a forecast of the baseline network expansion projects currently planned. The same traffic model is used to output Annual Average Daily Traffic (AADT) used in the PPP financial viability. A continuation of the base case will result in major impacts to Port Botany container movement productivity, incapacity to support increased demand for Sydney Airport services. Further impacts include traffic noise, vehicle emissions, and severance on narrow roads with poor alignments (RTA, 2003, p.3). Future road projects were included based on RTA's list of likely future road projects without the Sydney Link Motorways.
First year of construction	2012 (Stage 1); 2021 (Stage 2)
Last year of construction	2016 (Stage 1); 2024 (Stage 2)
Discount rate	Base case discount rate is 7%. Sensitivity testing has been undertaken at 4% and 10%
Appraisal period	Appraisal period is from Stage 1 construction period (2012 to 2016) and 30-year operating timeline ie total 36 years. Appraisal period mirrors the period in the financial analysis used in the PPP scenario.
Remaining life	Tunnel structures are estimated to have useful lives of 100 years, therefore the project will have an estimated 65 years remaining life after the 30-year operating timeline. Elements of other components of the project will have similar remaining life at the end of the operating period.
Residual value	$3.64b; the residual value has been calculated using the methodology as set out in the RTA's Economic Analysis Manual which estimated the remaining useful life of the assets and applies this percentage against the original capital cost to determine a terminal value. The BCR calculation discounts the residual value at 7%, with sensitivities at 4% and 10%.
Benefit ramp up	Road fully opens to traffic after construction is complete.
Capital cost	The capital cost of the base case is a set of projects (refer attached). These projects are the same for both the base case and proposed case, and therefore isolated from the economic analysis. Based on a strategic cost estimate, the capital costs of the Sydney Link Motorways built in 2 stages is $9.7b (in 2008 dollars). The estimate includes property acquisition costs, roadwork on the existing M4 Motorway, the three tunnel links and roadworks on connecting roads. These costs include contingency factors for construction and property

	acquisition. The out-turn dollar cash flows are based on 2008 dollars which have been factored up by 2% per year to allow for escalation in construction costs above inflation.
Maintenance costs	Based on forecast costs of running a tunnel and routine maintenance activities, which have been compared against other tunnels in Sydney (including M5 East and Cross City Tunnel, and escalated and prorated based on construction cost. These costs are $34m every 5 years.
Operating costs	Based on forecast costs of running a tunnel and management of tolling systems, which have been compared against other tunnels in Sydney (including M5 East and Cross City Tunnel, and escalated and prorated based on construction cost. These costs are $50m p.a.
Benefit components	The majority of benefits are derived by commuters that receive travel time benefits resulting from the increased capacity. Benefit valuation is determined in accordance with RTA Economic Analysis Manual Appendix B: 2007 Parameter values, and described below: **Travel time benefits** – the calculation of travel time benefits is travel time savings by hourly rate. Travel time savings are calculated by the network model used to calculate traffic on the extension. The model references hours of travel at a base case AM peak for different types of roads and compares that against modelled vehicle hours. This calculated value is then expanded out to the annual amount of travel time hours saved, using an expansion factor of 3000, as advised by Halcrow MWT. The travel time hourly rate is calculated by taking into consideration: the types of vehicle using the roads (i.e. average vehicle compositions private cars 76%, business cars 11%, light commercial 9% and heavy commercial 4%), the number of occupants per vehicle and their relative value for travel time saved. (i.e. average assumed vehicle occupancy and average daily travel time values for private cars 1.53; $11.55 business cars 1.3; $25.29 light commercial 1.3; $18.54 (including freight) and heavy commercial 1.0; $45.53 (including freight), This analysis is supported by Austroads methodology. The methodology used results in an average hourly rate of $23.08 per hour. The result of this calculation is that approximately $17.5 billion (discounted at 7%) of travel time would be saved by the proposal over the 30 year operating period ($836m in the first year in 2016) which will provide a substantial reduction on the projected urban congestion costs in Sydney. The recent COAG Report on Urban Congestion in December 2006 forecast urban congestion cost in Sydney to be $7.5 billion per annum by 2020, an increase of 123% over the estimate for 2005. These benefits represent approximately 97% of the total economic benefits projected.

	Vehicle operating costs, safety and externalities – the benefits are due to lower vehicle operating costs from less stop start and better flow, lower crash rates on freeway conditions and lower air pollution and noise. These benefits represent approximately 3% of the total economic benefits.
Cost and benefit time streams	See attached
Other	
Related initiatives	West Metro- the NSW Government is also submitting a proposal for funding of a West Metro project which will enhance the public transport in the M4 Extension corridor. The impacts of this project have not yet been finalised by TDC and therefore the impacts have not been incorporated into this analysis. It is anticipated the projects will be relatively complementary. M5 East duplication- The NSW Government is also submitting a proposal for funding of the M5 East duplication. This project also services the port and airport but delivers benefits to an alternative corridor. Economic modelling has been undertaken of staging options which demonstrates that the economic benefits of the project are not significantly altered through the incorporation of this project.

Appendix E – Summary of Initiative Appraisal - Key Results and Assumptions

Part C – Non-Monetised Benefits and Costs

TABLE 4 – NON-MONETISED BENEFITS AND COSTS

Cost/Benefit	Description	Rating
	Visual Amenity	Highly beneficial
	Noise reduction from surface roads	Highly beneficial
	Improved road side air quality	Moderately beneficial
	Social amenity	Moderately beneficial
	Social cohesion	Highly beneficial
	Agglomeration	Highly beneficial

Part D – Appraisal Summary Table (AST)

Currently under review

Part E –Information Sources

Economic Analysis Manual. Version 2. July 1999 as amended NSW Roads and Traffic Authority

- Appendix B: Economic Parameters for 2007

AustRoads Report: Update of RUC Unit Values to June 2007
M4 Extension Strategic assessment Report 2008
M4 East Options Study December 2003
Project Traffic Models undertaken by Halcrow Masson Wilson Twiney
Capital Expenditure Estimates undertaken by Mark Raven
Sydney Urban Corridor Strategy Auslink
National Guidelines for Transport System Management in Australia. Australian Transport Council 2006
NSW Premier's State Plan, November 2006
NSW Government Metropolitan Strategy
NSW Government Urban Transport Statement, November 2006
NSW Government State Infrastructure Strategy, 2008-09 to 2017-18
COAG Review of Urban Congestion, Trends Impacts and Solutions, December 2006