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WORKING ASSESSMENT FOR BCR MODERATION (2010/11 Submissions)	
Project name	National Managed Motorways Note: Only Queensland, South Australia and NSW project submissions had been provided at the time of this review
Brief project description	Implementation of an integrated package of intelligent transport system (ITS) tools (including coordinated on-ramp signalling, variable speed tlimits, land control, incident detection.data loops, travel information and CCTV surveillance) within a national program approach, along priority sections of urban motorway corridors across Australia This initiative covers the geographical areas of South East Queensland, Sydney, Melbourne, Perth and Adelaide
Reported BCR @ 7%DR	• QLD: Bruce Highway (Beams Road-Caboolture): 2.97 • QLD: Ipswich Motorway (Rocklea-Darra): 6.35 • QLD: Pacific Motorway (Gateway Motorway to Logan River): 1.88 • QLD: Pacific Motorway (Logan River to Nerang): 3.05 • QLD: Pacific Motorway (Neragn to Tugan): 8.21 • QLD: Gateway Motorway (Nudgee to Bruce Highway): 12.07 • QLD: Western Freeway (Mt Coot-tha to Ipswich Motorway): 4.54 • QLD: Houghton Highway (Hornibrook Highway to Deagon Deviation): 11.76 • QLD: Bruce Highway (Caboolture-Sippy Downs): 5.67 • SA: South Eastern Freeway: 1.3 • M4 (Western Motorway) in Sydney: 1.3
Capital cost total – undiscounted, outturned	• QLD: Bruce Highway (Beams Road-Caboolture): $200.4 million • QLD: Ipswich Motorway (Rocklea-Darra): $136.9 million • QLD: Pacific Motorway (Gateway Motorway to Logan River): $271.45 million • QLD: Pacific Motorway (Logan River to Nerang): Not provided in Stage 7 templates • QLD: Pacific Motorway (Neragn to Tugan): Not provided in Stage 7 templates • QLD: Gateway Motorway (Nudgee to Bruce Highway): Not provided in Stage 7 templates • QLD: Western Freeway (Mt Coot-tha to Ipswich Motorway): Not provided in Stage 7 templates • QLD: Houghton Highway (Hornibrook Highway to Deagon Deviation): Not provided in Stage 7 templates • QLD: Bruce Highway (Caboolture-Sippy Downs): Not provided in Stage 7 templates • SA: South Eastern Freeway: $5 million • M4 (Western Motorway) in Sydney: $450.11 million
% costs bid for (where relevant)	Only specified for some projects in the Templates 1-6
Source documents for review	Infrastructure Australia Reform and Investment Framework Templates for use by Proponents, Summary Template and Templates for Stages 1-6, January 2011 Queensland Government, Stage 7 Templates for 'Ready to Proceed' Projects, National Managed Motorways 2011 Queensland Government, Stage 7 Templates for 'Threshold' Projects, National Managed Motorways 2011 PB 2011, *Final Report: National Managed Motorways Prioritisation Project*, prepared for Queensland Department of Transport and Main Roads for Infrastructure Australia, February 2011 (Appendix A – National Managed Motorways Discussion Paper) Government of South Australia (2011), *Submission to Infrastructure Australia, Managed Motorways South Eastern Freeway Proposal Summary and Stage 7 Template*, Ref #5204762, prepared by Department for Transport, Energy and Infrastructure Policy and Planning Division NSW Transport Roads and Traffic Authority (2011), *M4 Managed Motorway, Stage 7: Solution Appraisal and Delivery Assessment*, 28 January 2011
Date of review	2010/11
Key changes from previous submissions	Since 2009/10 the jurisdictions have developed a more common methodology and set of assumptions

Note: The 21 question-matrix below has been completed at a high level given the range of approaches applied by each jurisdiction and to each project

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OVERALL SUMMARY

Overall summary (2-3 paragraphs on overall robustness of analysis and major points raised)

In summary, projects have high estimated benefit cost ratios, generally ranging between 3.0 to 10.0. In instances where benefits could not be estimated principally from traffic model outputs, the submissions provide information supporting the underlying speed and other performance assumptions. A number of project cost estimates are at a high level only. There is sufficient information provided, however, to have confidence that the benefit cost ratio for projects in the program are generally comfortably above 1:1.

High level summary of approaches used in each jurisdiction:

A. Queensland (assuming that Pacific Motorway (Gateway-Logan River) is representatives of all Queensland project methodologies) – this is a ready to proceed project:

Overall, the Queensland methodology appears robust, though was not modelled in a traffic model as was the case for a similar project in NSW. This project was modelled in the Brisbane Strategic Transport model, and the 75km/hr assumption (driving the majority of benefits), was justified qualitatively in relation to the specific section of motorway and why these speeds were expected after the project. The Queensland projects are all assessed consistently in terms of approach, benefits measured and parameters. The only difference between the multiple Queensland projects appears to be the method to calculate capex, the level of contingency applied, and if it is P50, P90, or not based on probabilistic cost estimates.

a. Overview of methodology:

- Base case is modelled in a transport network model (using the Brisbane Strategic Transport Model – Multi Modal, which covers the Greater Brisbane area), assuming a 'do minimum' scenario for congestion including known and likely road infrastructure to 2026
- Project case assumes the same transport network, with the delivery of managed motorways achieving travel speeds of 75km/hr (or the posted speed if lower)
- 75km/hr assumption is reported to be based on: '*managed motorways ability to control motorway access and travel conditions to reduce flow breakdown. This assumption is appropriate given that the northern end is a motorway to motorway interchange with Gateway Motorway (South) which is a partial managed motorway, and continues on to become the South East Freeway which is being upgraded to a partial managed motorway; and the southern end is a continuation of the motorway with higher capacity*' (A description has been provided as to why the 75km/hr is expected on this particular motorway section)
- Demographic data from Queensland Department of Infrastructure and Planning forecasts
- Capital costs completed by Project Support Pty Ltd based on concept design undertaken by SMEC. Contingency comprised 66% of total costs (It is not clear if capital costs P90. A 66% contingency was applied)
- Appropriate appraisal period appears to have been used (30 years of benefits)

b. Benefits:

- No benefit ramp up, with benefits commencing at 100% in the first year after construction (It is not clear if this is in line with practice, i.e. if similar projects also see this same immediate affect)
- Travel time values of $29.41/hr for commuters, $33.59 for medium commercial vehicles and $66.71 for heavy commercial vehicles (adopted from Austroads)
- On-ramp delay was factored into the appraisal to reflect on-ramp signalling, by applying an additional travel time delay of 0.75 minutes (45 seconds) to all vehicles using on-ramps during am and pm peak periods
- Crash costs determined by assuming 10% reduction in all accident types per million vtk (crash rate reported to be derived from Brisbane crash data)
- Environmental benefits determined through estimation of fuel consumption as outlined in Austroads, which are converted to emissions based on Austroads Table C1 1, then converted to monetary terms based on Austroads RUC values
- Improved incident response benefits calculated based on time savings due to enhanced incident detection and response capability (Other jurisdictions also measure)

c. Sample check

- Sample check: a sample check of one of Queensland's threshold projects, Gateway Motorway (Nudgee to Bruce Highway) indicates that the methodology is the same (parameters, model, assumptions, etc). Only difference was in the construction costs, with this project having P50 costs and apply a 40% contingency to cover costs of civil design, ITS design costs, project management costs and civil works associated with ramp sigmalling. (While the costs are P50, the contingency has been added to include missing cost elements, not to consider risk of possible cost changes, so this may warrant further consideration)

B. South Australia (South Eastern Freeway)

Importantly, the South Australian project is fairly different from the Queensland projects. The managed motorway components proposed include hard shoulder running, lane use management systems (LUMS), further variable speed limit signs (VSL), enhanced automatic incident detection, and associated civil works. This is more easily adaptable into a transport model as a new lane can be added to represent the capacity increase. Some benefits including incident delay reduction and reduced accidents were added externally to the results (ie not obtained directly from MASTEM) for managed motorways components able to be captured as a change in capacity. It appears to be robust. Parameter values appear to align with the Queensland values and are sourced from Austroads.

a. Overview of methodology:

- Base case is modelled in a transport network model (the Metropolitan Adelaide Strategic Transport Evaluation Model), assuming no managed motorway improvements on the South Eastern

Freeway
- Project case assumes hard shoulder running on the South Eastern Freeway (i.e. predicted speeds from MASTEM were used rather than assuming a particular speed attained as in other jurisdictions)
- Demographic data approved by State Cabinet
- Capital costs include contingency allowance of 60% to represent an equivalent P90 estimate (Not clear if they are planning to develop P90 estimates)

b. Benefits:
- Mostly calculated from MASTEM demand outputs: travel time, VOC increase and environmental cost savings
- Some calculated externally to MASTEM: Some benefits (incident delay reduction and reduced accidents) were added externally to the results (ie not obtained directly from MASTEM) for managed motorways components not captured as a change in capacity. The approach to estimate these benefits appears to be in line with Queensland's approach

C. New South Wales (M4 Concord Road, Strathfield to Lapstone)

Overall, the NSW methodology appears robust, with the majority (60%) of benefits modelled directly in a Paramics SCATSIM model developed specifically for the project. It is not clear why NSW has been able to model this project in a specially developed model but Queensland has not, nor what the impact would be on the M4 results if the proxy-based approach of Queensland was applied (though the Queensland project BCRs are all consistently higher than both NSW and SA). Some benefits were applied externally to the traffic model, but using demand model outputs, namely: accident costs, incident management cost, environmental externalities and journey time reliability. It is not always clear why this was estimated outside of the model. In addition the reliability benefit is not commonly measured in Australian road CBAs and it is not clear if NSW Transport have assessed the applicability of the UK-derived approach and parameters to Australia.

a. Overview of methodology:
- Base case is modelled in a Paramics SCATSIM model developed specifically for the M4 Managed Motorway project. SCARSIM allows the traffic signals in Paramics to be controlled by Sydney Coordinated Adaptive Traffic System. Demand matricies were sourced from the Sydney Strategic Travel model, calibrated against RTA current actual traffic counts, and overlayed by a forecast of baseline road network expansion projects currently planned
- Project case a 2016 future year network model has been developed, with a base case and preferred option modelled. The preferred option includes: SCATS ramp metering, off-ramps employing queue management strategies, downstream. intersections and delineation through Toll Plaza area to be 3 continuous lanes. Does not allow for redistribution of trips and some model improvements are anticipated at a later date to capture aspects such as this that would improve the network operation
- Demographic data demand matricies sourced from the Sydney Strategic Travel Model therefore use STM land use, population and employment forecasts. STM is maintained and operated by NSW Transport's Bureau of Transport Statistics
- Capital costs prepared based on RTA's Estimating Manual based on 'Concept Stage' with modifications tailored to suits a more strategic approach in some areas (Strategic Concept Design did not include detailed site, geotech, etc surveys) therefore order of accuracy was increased. Estimate is baselined at P90: on this basis a 55% contingency for civil works and 35% for ITS works has been adopted. No residual value
- Operating costs estimated to comprise electricity, communications, TMC staff, preventative and corrective maintenance and end of life replacement. The annual maintenance component of opex was estimated as 10% of electrical costs plus 2% of non-electrical costs and multiplied by 1.4 to determine combined equipment and labour cost pa
- Appropriate appraisal period appears to have been used (30 years of benefits)

b. Benefits:
- No benefit ramp up, with benefits assumed to commence at 83% in year of completion and 100% thereafter (ie assumes benefits will start to be realised in the third month of 2013 once construction is completed
- Travel time estimated from Paramics model with values from Austroads (Travel time average value: $30.94/hr based on RTA Economic Analysis Manual)
- VOCs link speeds and fleet composition obtained from Paramics demand model
- Accident costs RTA examined historical cras profile then estimated accident cost savings from Managed Motorway Improvements. RTA has estimated a reduction of 42 accidents per annum
- Incident management costs based on an assumed 20% reduction in observed incident durations
- Environmental externalities RTA used emissions factors based on the assumption that the Managed Motorways proposals would increase journey speeds from 50-70kmph, with speeds in excess of 70kmph excluded
- Journey time reliability based on UK Department for Transport guidelines, but it is not clear how this was estimated specifically for the M4

D. Comparative table of all managed motorway project submitted

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	BCR	Outturn capex	Capex basis	Speed increase assumed	On ramp delay	Crash reduction assumed	Other notes
1. QLD: Bruce Highway (Beams Road-Caboolture)	2.97	$200.4 million	PB prepared probablistic P90 estimates based on the concept design. 35% contingency	Same as project #3	Same as project #3	Same as project #3	Same as project #3 PB has undertaken a Deliverability Assessment (provided in submission) PB has estimated operating and maintenance costs
2. QLD: Ipswich Motorway (Rocklea-Darra)	6.35	$136.9 million	Category 2 estimate produced in Expert Estimateion based on concept drawings & quantities, and owners costs agreed/supplied by TMR. 68% contingency: $153.5 P90 probablistic modelling & cost plan provided on p 17 & 4 of SMEC reports for this project	Same as project #3	Same as project #3	Same as project #3	Same as project #3
3. QLD: Pacific Motorway (Gateway Motorway to Logan River)	1.88	$271.45 million	Not clear if P90. 66% contingency applied	75km/hr (or the posted speed if lower)	Travel time delay of 0.75 mins (45 secs) to all vehicles using on-ramps (am and pm peak)	10% reduction in all accident types per million vtk	No benefit ramp up Travel time values: $29.41/hr commuters, $33.59 med commercial vehicles, $66.71heavy commercial vehicles (adopted from Austroads) Other benefits measured: Environmental benefits from higher speeds, and improved incident response benefits
4. QLD: Pacific Motorway (Logan River to Nerang)	3.05	Not provided in Stage 7 templates	P50, to be confirmed to P90 after project design. Developed by PB. 40% contingency	Same as project #3	Same as project #3	Same as project #3	Same as project #3
5. QLD: Pacific Motorway (Neragn to Tugan)	8.21	Not provided in Stage 7 templates	P50, to be confirmed to P90 after project design. Developed by PB. 40% contingency	Same as project #3	Same as project #3	Same as project #3	Same as project #3
6. QLD: Gateway Motorway (Nudgee to Bruce Highway)	12.07	Not provided in Stage 7 templates	P50 costs & 40% contingency to cover costs of civil design, ITS design costs, project management costs and civil works associated with ramp signalling	Same as project #3	Same as project #3	Same as project #3	Same as project #3
7. QLD: Western Freeway (Mt Coot-tha to Ipswich Motorway)	4.54	Not provided in Stage 7 templates	P50, to be confirmed to P90 after project design. Developed by PB & TMR. 40% contingency	Same as project #3	Same as project #3	Same as project #3	Same as project #3
8. QLD: Houghton Highway (Hornibrook Highway to Deagon Deviation)	11.76	Not provided in Stage 7 templates	P50, to be confirmed to P90 after project design. Developed by PB. 40% contingency	Same as project #3	Same as project #3	Same as project #3	Same as project #3
9. QLD: Bruce Highway (Caboolture-Sippy Downs)	5.67	Not provided in Stage 7 templates	P50, to be confirmed to P90 after project design. Developed by PB. 40% contingency	Same as project #3	Same as project #3	Same as project #3	Same as project #3
10. SA: South Eastern Freeway	1.3	$5 million	Include contingency allowance of 60% to represent an equivalent P90 estimate	Estimated in model as is capacity increase from hard shoulder runing	Estimated in model as is capacity increase from hard shoulder runing	10% reduction in crash rates	VOCs increase because speeds increase from current 70-80km/hr to above 100km/hr above obtimum travel time speeds Appears to be same benefit parameters (travel time, VOCs, crashes, etc) as the Queensland project #3 Incident delay savings also applied externally to the model
11. M4 (Western Motorway) in Sydney	1.3	$450.11million	Based on RTA's Estimating Manual based on 'Concept Stage' with modifications Estimate baselined at P90: on this basis a 55% contingency for civil works and 35% for ITS works has been adopted	From Paramics demand model	Not relevant for this project	RTA has estimated a reduction of 42 accidents per annum	330 expansion factor - reported to be used by Victoria and Queensland as well in their managed motorways appraisals NSW is planning to undertake more detailed modelling at a later date to accommodate aspects such as trip redistribution Assumed 20% reduction in observed incident durations Extra benefit included: journey time reliability Travel time average value: $30.94/hr based on RTA Economic Analysis Manual

Possible adjusted BCR

None proposed, unless responses to queries below support this

Possible follow up questions

Queensland

Note: given the high BCRs for these projects, IA may decide not to follow up with these questions given the projects are likely to remain viable. Key issue may be to understand why NSW and Queensland apply different approaches

- NSW Transport RTA has developed a Paramics SCATSIM model specifically for the M4 Managed Motorway project, which appears to have enabled modelling of the majority of benefits directly from the demand model. Could this approach have been employed to consider the Queensland projects and avoid applying proxies to base case demand modelling to represent the project case? Describe how this alternate approach may affect the Queensland managed motorway economic results
- Describe the status of the capex estimates for the projects, noting that different levels of estimates and contingencies have been applied to the different projects. Is there a plan to develop P90 estimates for all projects?
- Considering that the case studies in PB's Appendix A of *Final Report: National Managed Motorways Prioritisation Project*, cite case studies with the following results: speed increases of 16-35%, travel time reductions of 15-50%, and crash reduction of 23% (pages 6-7), it may be useful to understand the starting speeds assumed in the base case (to compare the assumption that every project will achieve 75km.hr or the sign posted limit if it is below 75kmhr against these case studies)
- How were operating and maintenance costs estimated and incorporated into each of the appraisals?
- Describe the impact of assuming the same vehicle fleet mix for all projects of 75% private passenger vehicle and 25% business passenger travel (ie resulting in the weighted travel time value of $29.41). Does this only have a minimal impact on results?
- Describe how the improved incident response benefits were estimated - in particular in terms of the savings rate and estimated hours saved. Ie how were the 'hours saved' estimated and are there case studies to support the savings? How does the Queensland method vary from the 20% reduction in observed incident durations applied by NSW?
- Consider if a benefit ramp up is warranted for managed motorway projects? E.g. the PB report Appendix A indicates one of the US projects saw its benefits achieved over a period of 10 years

possibly suggesting a ramp up is likely

South Australia

Note: these are not particularly major queries so IA may want to consider whether to request responses or not

- Indicate how robust the capital cost estimate is and if applying a 60% contingency is the best practice approach to obtain a P90 P90 estimate. Is any probabilistic modelling planned?
- Describe why the crash rate reduction and incident delay savings were estimates externally to MASTEM? Understanding it may reflect that these are benefits attributed to more than just the hard shouldering, it may assist to provide support why the same proxies (ie 10% crash reduction and incident delay savings from Queensland data on a pro-rata approach) are relevant for the South Eastern Freeway managed motorway plans as for those in Quensland (eg are the same technology investments planned?)
  Consider if a benefit ramp up is warranted for managed motorway projects? E.g. the PB report Appendix A indicates one of the US projects saw its benefits achieved over a period of 10 years possibly suggesting a ramp up is likely

NSW

Note: these are not particularly major queries so IA may want to consider whether to request responses or not

- Indicate the reasoning why the RTA pursued the approach to develop a demand model specifically for the M4 managed motorway project. Could other jurisdictions employ a similar model as NSW have done to avoid applying proxies to base case demand modelling and not modelling the project case? Are you aware what the impact on the M4 managed motorway project may be from applying the proxy approach used by other jurisdictions?
- Describe how the RTA estimated a reduction of 42 accidents per annum to estimate the crash reduction benefit (eg provide case studies, other analysis). Was it not possible to estimate this benefit directly from the Paramics Model?
- Describe why emissions savings were not directly estimated from Paramics? Or is this planned following RTA's development of emissions values by vehicle type? Why were speeds in excess of 70kmph excluded?
- Describe the origin/reason/supporting information behind the assumed 20% reduction in observed incident durations
- Describe how the reliability benefit and related parameters to estimate this benefit (in particular the reliability ratio), are considered applicable to Australia/NSW/the M4, given it appears to be based on UK parameters. Where the following also estimated from UK parameters, or how were they derived from the Paramics model: (i) standard deviation of journey time and (ii) value of standard deviation of travel time?
- Consider if a benefit ramp up is warranted for managed motorway projects? E.g the PB report Appendix A indicates one of the US projects saw its benefits achieved over a period of 10 years possibly suggesting a ramp up is likely

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	1. Reported information (lift text directly if possible)	2. Supporting information provided (list key documents, not content)	3. Extra information required / requested / received	4. Benchmark / Questions / Things to look for	5. Assessment of variance or methodological weaknesses	6. Notes re: degree of variation to BCR (any calculation / reasoning)	7. One line summary of argument / rating	8. Rating
Guidance	"Cut and paste" text from proforma if possible	List supporting materials not included in proformas but included with bids (formally and informally)	List all information requested by IA: please note which materials were, and were not provided by jurisdictions. Also list areas to follow up / potential questions	See below	Insert the explanation of any differences or issues with theory, methodology or data used by the jurisdiction	Use this column, if required, to explain any reasoning for making an assessment of the scale of impact on the BCR, using figures if possible	Please insert one sentence summary of argument and conclusion reached	Significantly overstated; slightly overstated; broadly neutral; slightly understated; significantly understated.
Robustness of demand forecast								
1. Has demand been modelled in a robust and 'bottom-up' manner?	NSW, SA and Queensland use traffic models for the base case based on each State's demographic information			• Has demand been modelled by a reputable transport modelling organisation? • Evidence of use of a city wide travel model which adds the proposal as a new option & measures diversions • How close to capacity is the service in the high AM peak hour • Have different fare levels & elasticity been evaluated & will service offer customer VFM against alternatives?				Broadly neutral See overall summary for more comments
2. Are the underpinning residential, employment and economic growth figures robust?				• Are current State or ABS projections used? • Are central growth forecasts used? • Are the transport demand forecasts directly linked to this data?				Broadly neutral
3. Achievability of the demand forecast?				• Is the forecast justified by an in-depth analytical paper? • Is the forecast endorsed by independent Expert Peer Review? • Does forecast feature a gradual ramp-up (i.e. >4yrs)? • What % of patronage is induced demand (should typically be <20%) • Forecast patronage has been benchmarked to be broadly consistent with outcomes achieved on similar services? • Has the proponent factored the costs of greenhouse gas emissions into their economic planning, including obligations under the Carbon Pollution Reduction Scheme?	•			Broadly neutral
4. Sensitivity of BCR to demand				• Does a 30% drop in demand significantly alter the BCR?				High sensitivity as it drives all benefits
5. Is the base case realistic and fundable?				• What is Base Case patronage growth – is it in line with historical trends? • From the available information, is the base case capex and patronage a likely scenario, or is it overly loaded or light?				Broadly neutral

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6. Does hourly patronage profile match conventional AM & PM peak flows				• Is the model scaled up to full year in a justifiable manner (e.g. annual patronage is normally 250-300 times AM high peak hour)?				
Robustness of cost base								
7. Robustness of capex forecasts	Some are P90, some not			• Is the capex estimate supported by significant in depth work? • Was it produced by a reputable independent organisation?				Some projects are not P90 so capex is understated
8. Robustness of opex forecasts				• Is the opex estimate supported by significant in depth work? • Was it produced by a reputable independent organisation?				Queensland projects do not provide a description of how this was estimated
9. Consequential costs				• Are consequential costs to other parts of the network or other stakeholders taken into account? • E.g. land acquisition, higher costs due to the need to maintain service continuity & / or constructing around live traffic				
10. Revenue treatment				• Is the treatment according to ATC guidelines and in line with best practice?				Not included
11. Construction cost inflation				• Is the construction cost inflated by a margin above CPI (e.g. construction cost CPI)?				Not included in economic appraisals
Key methodological questions								
12. Inflation rate				• What inflation rate is assumed and are any costs or benefits escalated by a different rate? • Do values reflect realistic real wages growth (e.g. 1.5% per year)?				
13. Time period used				• Is the period of assessment valid given the lifespan of the project assets?				NSW, SA and Queensland appraisal periods appear in line with ATC
14. Residual value				• Are residual values given when appropriate? • Are the values used justified?				NSW, SA and Queensland do not estimate given the asset life

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15. Start and end timing, and phasing				• Does benefit stream period start at the commencement of operation and cost stream at first expenditure? • Are construction costs ramped up in according with standard construction timetables?				May warrant ramp up in line with case studies – slighty overstated
16. Benefits allocation	PB's 2011 Appendix A provides case studies showing speed increases of 16-35%, travel time reductions of 15-50%, and crash reduction of 23% (pages 6-7)			• Is the rule of half correctly applied (e.g. to benefits from existing PT users who change modes)? • Are all significant benefits identified? • Are all beneficiaries identified (e.g. benefits of roads to non road users?)				See summary comments by jurisdiction below for discussion by benefit
17. Sensitivity analysis – risks? (Capital costs – Construction duration – Operating costs – Discount rate at 10% - changes in oil price)				• Do the reported sensitivity tests, for instance to the price of oil, suggest significant risks surrounding the central case? • How significant are +/-20% construction cost variations? • Does economic viability become negative at a 10% discount rate?				
18. Other methodological issues?				• Any there any other issues regarding the accuracy of methodology used that may significantly impact on the comparability of the BCR?				
Values benchmarking								
19. Value of time savings: business, non business, freight; and Vehicle operating costs				• Are the values used recommended by the ATC? • Are these constant real through analysis period or do they factor in real growth (i.e. caution if real growth is >2%)				Queensland and SA use same parameters from Austroads. NSW uses RTA parameters – not significantly dissimilar
20. Value of carbon emissions				• Is there a nexus with the patronage forecast? • Are the values used recommended by the ATC? • Has the proponent calculated the direct emissions of their proposal? (i.e. include all carbon emissions from the construction or operation of the structure • Has the proponent calculated indirect emissions of their proposal?				From Austroads/documented sources
21. Death/injury/crash costs, physical fitness and health impacts.				• Are the values used recommended by the ATC?				From Austroads/documented sources
22. Noise, particle emissions and other environmental pollutants (NOX, NMVOCs, SOX, CH4, N2O) Noise impacts				• Are the values used recommended by the ATC?				From Austroads/documented sources