Peer Review

Cross River Rail Economic Assessment

For Building Queensland

Review by DOUGLAS ECONOMICS

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Summary

Douglas Economics was engaged by Building Queensland to peer review the Cross River Rail (CRR) Project Economic Assessment undertaken by KPMG-Nine Squared.

KPMG-NS estimated the CRR to produce a Net Present Value (NPV) of $1.88 billion with benefits and costs discounted at 7% per year and expressed in 2015 prices. Project benefits were $6.48 billion compared to costs of $4.6 billion which produced a benefit cost ratio (BCR) of 1.41.

KPMG-NS followed an 'industry standard' Cost Benefit Approach which conforms to Australian Transport Assessment and Planning (ATAP) Guidelines and Infrastructure Australia (IA) Cost Benefit framework.

A 7% rate was used to discount future costs and benefits over the construction period and 30 year operational period. In consideration, the 7% rate is high when compared with 3-4% rates used in England, Germany, Sweden and the Netherlands. It is also higher than in NZ where the rate, which has traditionally been higher than in Australia, is now 6%. Had a lower discount rate of 4% been used, together with a longer operational period of 50 years more appropriate for major rail investments like CRR, a higher NPV and BCR would have resulted.

The evaluation results necessarily depend on the capital and operating cost estimates, transport demand forecasts and travel time and cost modelling inputs. These aspects of the evaluation have been subject to separate independent peer reviews. This peer review of the project economics has been concerned with how the cost and benefit inputs were used by KPMG-NS in their economic evaluation.

The cost estimates were produced to a P50 level which effectively adds a cost contingency of 18%. The estimates were appropriately escalated by KPMG-NS in line with expected real wage inflation.

By providing additional rail capacity, CRR is forecast to provide economic net benefit to public transport and road users in the medium to longer term. Clearly, the economic results depend on the forecasting ability of the transport model. Although this aspect has not been reviewed as part of the economics peer review, the method by which benefits to road users was calculated has been assessed by inspecting example calculations provided by the transport modelling consultants. The calculations were done correctly. As is common in transport modelling however, only 'first round effects' stemming from traffic diversion to rail were assessed. A final 'equilibrium solution' was not determined which if it had could have led to have a lower overall estimate of benefit due to some 're-filling of road space'.

There are also some concerns about the inclusion of capital costs in the ATAP guidelines Vehicle Operating Cost (VOC) formula which may have overestimated cost savings to cars and commercial vehicles. This is a 'national guidelines' issue however and an issue publicly aired by IA in their assessment framework released June 2017. In preparing their assessment KPMG-NS did test an alternative VOC formula taken from Transport for NSW's Guidelines which lowered the BCR to 1.11.

In terms of the benefit to rail and bus users, the evaluation can be considered conservative in that the benefits from reliability, amenity and resilience were evaluated outside the transport demand model and by doing so, overall PT patronage, highway benefits, accident and externality savings and revenue were probably underestimated.

In their 2016 evaluation, KPMG-NS estimated the Wider Economic Benefits (WEBs) from CRR as an augmentation to the 'conventional' Cost Benefit Appraisal. WEBs were estimated at $1.2 billion and if they were included alongside 'conventional' transport benefits, NPV would increase to $3.16 billion and the BCR to 1.67. On this basis, WEBs would account for 16% of total benefits which is a relatively low share when compared against other evaluations.

Overall, the economic evaluation undertaken by KPMG-NS is considered 'fit for purpose' and conservative in the way that the cost and benefit inputs were incorporated.

Point by Point Review

1 Douglas Economics was engaged by Building Queensland to peer review the economic analysis of the Cross River Rail Project undertaken by KPMG-Nine Squared.

2 CRR was estimated to produce a Net Present Value (NPV) of $1.88 billion with benefits and costs discounted at 7% per year and expressed in 2015 prices. Project benefits were $6.48 billion compared to costs of $4.6 billion which produced a benefit cost ratio (BCR) of 1.41.

3 The Cost Benefit results compare with an NPV of $1 billion and BCR of 1.21 when evaluated in June 2016. The increase in net worth of the CRR resulted from higher demand side benefits from adopting Queensland Treasury demographic forecasts and taking account of the demand effects of the restructuring of public transport fares ('Fairer Fares') in December 2016.

4 The evaluation also took account of the funding for new generation signaling through the European Train Control System (ETCS) in both the Base Case and CRR investment case.

5 KPMG and Nine Squared (KPMG-NS) used a conventional Cost Benefit Appraisal framework which is considered to have been appropriately applied.

6 The evaluation results depend on the CRR capital and operating cost estimates and the patronage, travel time and vehicle operating cost outputs of the transport model. These aspects of the Business Case have been separately reviewed.

7 CRR, by providing additional peak rail capacity to Brisbane CBD is forecast to reduce train crowding and highway congestion. The transport model forecasts the benefit to public transport users and remaining road users for 2026 and 2036. KPMG-NS interpolated the forecasts for intermediate years. Ideally, a forecast for 2046 should have been produced and in its absence, KPMG-NS linearly extrapolated the 2036 forecast to 2050. The forecast was then 'capped' until the end of the 30 year evaluation period in 2054. The KPMG-NS approach to benefit extrapolation and capping is reasonable.

8 Although the traffic model has not been reviewed in detail, the method used to calculate the decongestion time savings and Vehicle Operating costs benefits to remaining road users is correct based on the example flows provided.

9 By adopting a 30 year operational period for evaluation purposes, KPMG-NS can be considered to have been conservative. A 50 year evaluation period, as recommended in the Australian Transport and Planning (ATAP) Guidelines for major rail projects, would have been more appropriate. Given that project benefits net of operating and maintenance costs were strongly positive, extending the project evaluation period to 50 years would have increased project net worth. The sensitivity test undertaken by KPMG-NS NPV reflected this with NPV increasing to $3.37 billion and the BCR to 1.71.

10 The discount rate of 7% as stipulated by Infrastructure Australia (IA) is high by international standards and it understood that IA is currently reviewing the rate. By comparison, New Zealand has reduced the discount rate to 6% for transport projects. England, Germany, Sweden and the Netherlands use noticeably lower rates 3- 4%. Had a discount rate of 4% rate be used, the BCR for CRR would have been increased to 2.22.

11 If a discount rate of 4% and a longer evaluation period had both been adopted (which would be more in line with UK practice), project net worth of the CRR would have been even higher.

12 KPMG-NS used reasonable an expansion factor of 280 based on NGTSM 2006 Guidelines. A higher factor of 300 days as has been adopted in some recent Australian CBAs would have increased the BCR to 1.5.

13 The average car occupancy of 1.36 (implied from the driver and passenger volumes) used to calculate road traffic benefits sits reasonably well with observed occupancies (1.46 Sydney and 1.2 Melbourne). It is also lower than the ATAP guideline figures of 1.6 urban (1.7 non urban); occupancies rates which have been identified as an appraisal issue (inflating benefits) by Infrastructure Australia.

14 The evaluation used 'P50' level capital costs which is a probability level supported by NGTSM and which in the case of CRR effectively means a cost contingency of 18%.

15 The evaluation did not include any disruption cost during construction on transport users, residents and businesses. By being mostly underground disruption costs should be less than surface construction. It is also understood that construction costs incorporated possession costs and costs to mitigate disruption.

16 It is understood that travel time was valued at 40% of average hourly earnings as recommended by Austroads. The base value of was increased, in real terms, through the evaluation period at 1.5% per year. The basis for the escalation was recent 2004-14 trends in nominal wages and inflation in Queensland. Given, the historical basis, the KPMG-NS assumption is reasonable. Had no increase in real wages been adopted instead, the BCR would have reduced to 1.17.

17 A small amenity benefit was included for the new CRR stations. The 'rating' approach used is reported in TfNSW's 'Principles and Guidelines' and has been used in several Sydney rail station evaluations.

18 In forecasting diversion from car, only the travel time effects were taken into account by the transport model. Crowding, reliability, amenity and resilience benefits were not taken into account which would have resulted in an underestimate of highway, accident, externality and revenue benefits.

19 Although the evaluation framework set out in the KPMG-NS Business Case is theoretically correct, its application in the transport model was not fully implemented in that equilibrium in public transport/private (road) demand was not determined. If this had been attempted (which is atypical for large infrastructure project modelling) some 'refilling' of road space would have likely resulted in reduced road user travel time and vehicle operating cost saving.

20 The effect of traffic diversion to rail on bus travel times and operating costs was not considered by transport model, so in this regard, highway benefits are likely to be underestimated.

21 KPMG-NS did not include a 'resource cost correction' to account for an under perception of car costs. This correction, supported by ATAP Guidelines, would have increased project benefit. Tax issues (e.g. fuel excise) would tend to work in the opposite direction however so the simpler KPMG-NS approach is reasonable.

22 The evaluation used NGTSM and other Guideline figures to forecast accident and externality savings. As commonly assumed, the accident and externality 'per kilometer' rates were held constant over the evaluation period. There is therefore no change in the cost rates from improvements in vehicle technology (such as electric vehicles) or from average vehicle speeds).

23 The proposed new Gabba station was not included in the demand forecasts or economic evaluation in terms of the benefits it may provide for cricket games and other special events.

24 KPMG-NS separately forecast the Wider Economic Benefits (WEBs) of CRR. WEBs were estimated at $1.2 billion. If included, NPV would have increased to $3.16 billion and the BCR to 1.67. WEBs therefore accounted for 16% of 'conventional' transport benefits. This is low compared to other comparable studies where the WEB share is typically 25% or greater. It is understood that the WEBs analysis has not been updated. Given the increase in demand side benefits, the WEB uplift, by using the 2016 estimate is likely underestimated at this point in time.

25 Given the strength of the economic results (NPV of 1.88 billion and BCR of 1.41) the project can be considered 'non marginal' and, in accordance with the IA assessment framework, the timing of the CRR construction is acceptable.

26 Overall, the economic evaluation undertaken by KPMG-NS is considered 'fit for purpose' and conservative in the way that the cost and benefit inputs were incorporated.