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International Comparison of Transport Appraisal Practice

Annex 6 NSW Australia Country Report

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INTERNATIONAL COMPARISON OF TRANSPORT APPRAISAL PRACTICE

THE NSW AUSTRALIA COUNTRY REPORT

Foreword: ITS Leeds University commissioned Neil Douglas of Douglas Economics to review project appraisal practices in New South Wales Australia.

Tim Brooker provided assistance on transport planning in NSW. We would like to acknowledge the help of Julieta Legaspi of Transport for NSW in helping describe the new evaluation procedures in TfNSW and helping compile the comparative evaluation table (provided in the appendix); Peter Bannister (state government economist in NSW, Victoria and Western Australia now retired) for history; George Karpouzis chief economist at RailCorp (1992-2010) who provided information on rail economic appraisal, Don Wignall for advice on Austroads and Professor David Hensher who commented on toll roads and on recent research in transport evaluation in NSW.

We would like to stress that the views expressed in this paper are those of the authors and do not reflect any official view that the NSW or Australian government may have.

Overview:

This paper summarises the development of transport project appraisal in Australia using NSW as an example. The emphasis of the paper is on the guidelines and procedures and how Cost Benefit Analysis has been used in selecting and evaluating projects.

Section 1 sets the scene by providing a short description of New South Wales and Australia. Section 2 provides a brief history of the development of transport appraisal in Australia and NSW leading up to the current situation. Section 3 looks at how transport is funded in NSW to provide a basis for understanding how the appraisal of funding submissions works at the State and Federal levels. Section 4 looks at the transport planning process and how goals, targets and actions influence the selection of transport projects. Section 5 then looks at the guidelines, handbooks and manuals that have been developed to evaluate transport investments. Section 6 discusses some of the developments in project appraisal. Finally in section 7, the key points of the review are listed.

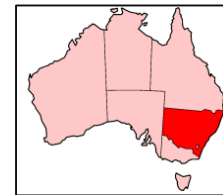
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1. Introduction

Australia is a federal country with national and state government. The Australian Constitution allocates certain powers and responsibilities to the federal government with remaining responsibilities retained by the six states of Australia which have their own individual constitutions.¹ The third tier is local (shire, town or city) government of elected councils. All three tiers have some influence on the planning, regulation and provision of transport. However, in terms of the appraisal of land transport projects, the subject of this review, State government has the biggest role.

New South Wales (NSW) is the most populous and oldest established state government legislature in Australia. The state covers 800,000 square kilometers, one tenth of the Australian landmass but six times larger than England. The total road length is estimated at 182,000 kms of which 50% is tar sealed or concrete paved.



The estimated resident population of NSW in 2012 is 7.3 million people, around under one third of Australia's total population of 22.9 million. 4.4 million (60%) are residents of the Greater Sydney Metropolitan Region, which includes both the urban areas of Sydney and a substantial rural hinterland extending approximately 100 km outside the City urban areas. The next biggest cities in NSW are Newcastle (540,000) and Wollongong (290,000).

Over the period 1992-2012, the population of NSW grew by 1% a year and catering for this growth has been a major focus for transport planning.

Economically, NSW contributes 30% of Australia Gross Domestic Product with an average Gross State Product (GSP) per capita of \$60,000 in 2012 which is relatively average when compared to Australia as a whole. In terms of economic growth, GSP increased at an average rate of 3.3% per year over the twenty year period 1992-2012. However over the last decade, NSW has performed relatively poorly in comparison to the mineral rich states of Western Australia and Queensland in terms of income growth.²

¹ Australia also has several 'territories', three of which are self-governing: the Australian Capital Territory (ACT), the Northern Territory (NT) and Norfolk Island with delegated powers but with the Commonwealth Parliament retaining the power to override territorial legislation.

² Infrastructure NSW Twenty Year Infrastructure Strategy issued in 2012 wrote that "in the past decade, the NSW economy had the slowest growth in Australia and grew 25% more slowly than the Australian average" Sliding productivity is the most significant public policy issue challenging NSW.

2. A History of Transport Appraisal Practice in Australia / NSW

The appraisal of the Sydney Harbour Bridge, Australia's most iconic transport structure was mentioned in Jack Lang's *"I Remember"*.³ Bradfield supplied Lang, the then NSW Treasurer with personal briefings in which alternative plans and costs were discussed with some consideration of toll charges and forecast revenue.⁴



The first formal applications of economic Cost Benefit Analysis in Australia were in the early 1960s by the Commonwealth Bureau of Agricultural Economics to evaluate some larger irrigation and water development projects using methods first developed and applied in the USA.⁵

The first evaluation guide *"Investment Analysis"* was issued in 1966 by the Commonwealth Government as a supplement to the Commonwealth Treasury Information Bulletin. In 1967, an Occasional Publication of the Economic Society of Australia and New Zealand *"An Introduction to Cost Benefit Analysis"* was released citing an array of articles and textbooks but no specific transport appraisal advice was provided.⁶

The 1970s was as high point for the application of economic appraisal in Australia largely because the Vernon Royal Commission of Inquiry into the economy after the 1961 Credit Squeeze crisis, had recommended its application to the Australian government.

In 1972, the Whitlam government enacted the States Grants (Urban Public Transport) Act in which Canberra gave a two thirds capital grants to all States' projects which had completed cost benefit studies to a standard prescribed by the (then) Bureau of Transport Economics. Thus funding assistance was provided in return for studies in areas the Commonwealth government approved. Moreover, there was a States Grants (Transport Planning and Research) Act 1973 to assist States and pay for consultants to gather background information to do the necessary studies. Reports on all the assisted projects were published by the BTE in the 1970s.

³ *"I Remember"* Autobiography of J T Lang, by the amalgamation of a series of weekly articles in the Truth newspaper during the 1950s as its chapters, Invincible Press, Sydney 1956. Given that motor traffic was minor in the early 1920s, the bridge was essentially a railway bridge and a key component of the simultaneously proposed City Underground line's operation. Because public finances were strained by the Depression and then WW II, its third component, the Eastern Suburbs Railway, was to wait till the 1970s to be reconsidered.

⁴ The Harbour Bridge has been nearly universally supported by experts and the public alike. However one recent and brief critique by a British celebrity motoring expert Jeremy Clarkson said it was *"a bit over-engineered"*. March 9th 2013.

⁵ Discount rates of 5-6% were used *"Investment Analysis"* Commonwealth Treasury, 1966.

⁶ In an extensive bibliography prepared for the booklet by NWF Fisher of the Commonwealth Bureau of Roads and including Ireson and Grant : *"Principles of Engineering Economy"* NY, 1930 and the UK *"Introduction to Engineering Economics"*, Institution of Civil Engineers, London, 1947. These early works are cited by Stewart Joy in his paper on how to evaluate the Melbourne Underground Railway and its associated proposals in the 1985 Transport Plan for Melbourne.

Also during this period, an appraisal system was developed by the Commonwealth Bureau of Roads to assess Commonwealth grants to individual States following the breaking of “*the nexus*” between fuel tax receipts and federal grants for road projects.

It is insightful to discuss the method and results of the 1972 BTE review of public transport investment proposals in a little detail to provide a contrast with current practice.⁷ The BTE study looked at 24 projects in the larger capital cities covering rail track amplification, rail electrification, new rail lines, busways, bus/car interchanges, bus and train fleet renewal, a tram route proposal and a ferry proposal. Over the 24 projects, the BCR averaged 2.2 ranging from 0.8 for a tram route to 7 for a Busway. New rail lines averaged 2.1 and amplified rail lines 4.7.

In terms of method, benefits to existing PT users were distinguished from benefits to new PT users. Two categories of new PT were defined: Trips ‘converted’ from car and totally new or ‘generated’ users. For existing and generated users, benefits from time savings were valued at 60cents per hour. When converted to 2012 dollars using the consumer price index, the time savings was worth \$5.67/hr which is around half the RailCorp value (\$11.62/hr).⁸ The benefit to generated users was calculated at half this rate. For converted car users, the benefit was calculated as the generalised cost of using car minus PT (with the same value of time used for car as for PT users).

The benefit to remaining road users was calculated as the avoided cost of providing additional road capacity. No externality cost savings were included because of the lack of suitable parameters.

Patronage response was forecast using a simple formula $P = (0.3r + 0.15)T$ where P was the percentage change in PT patronage, r was the ratio of car to public transport trips and T was the percentage reduction in PT time.

Petrol taxes were removed and the evaluation was undertaken in resource costs. Benefits and costs were estimated over 20 years with a residual value (based on the net benefit stream over years 20 to 50 entered in the final year) and discounted at 7% per year.

Table 1 shows the results of amplifying and electrifying a section of rail track on a southern Sydney corridor. At 4.9, the benefit cost ratio was higher than a similar project would achieve in 2012 (where a BCR of between 1 and 2 would be more likely) despite the omission of revenue, accident savings and externality benefits.

Three major reasons for the higher BCR are the lower capital costs, the benefits to converted road users and the method used to calculate residual value.

⁷“*Economic Evaluation of Capital Investment in Urban Public Transport*” Bureau of Transport Economics, 1972

⁸ The 60c per hour value related to in-vehicle time. Walk and waiting time were valued at double this rate.

Table 1: Cost Benefit Analysis of Illawarra Track Amplification & Electrification

All costs and benefits in 1972 prices discounted at 7%

Benefit / Cost	\$million	Percent
Operational Cost Savings	5.4	13%
User Benefit - Existing Rail Users	13.5	33%
User Benefit - Generated	0.3	1%
User Benefit - Converted Road User	7.7	19%
Remaining Road User Benefit	3.4	8%
Residual Benefit	10.7	26%
Total Benefit	41.0	100%
Total Cost	8.3	
Benefit Cost Ratio	4.94	

For road appraisal, the methods of engineering economy were the basis of each state's submission. The National Association of State Road Authorities and ARRB began to promote the development of the technique in national conferences and research publications but State Treasury involvement remained relatively minor.⁹

In NSW, the Water Resources Commission and Electricity Commissions were the first agencies to undertake economic appraisals and develop appraisal manuals in the 1970-80s.¹⁰

In 1988, the Capital Works Committee of the NSW Cabinet (CWC) decreed that the economic and financial evaluation of new capital works was mandatory for projects costing over \$5 million.

Premier's Department & NSW Treasury Requirements 1988	
< \$0.5m	No formal evaluation required, but internal assessment procedures evaluated every 5 years.
\$0.5- \$5m	Full economic evaluation required but only a summary submitted to the CWC.
Over \$5m	A full economic evaluation required with submissions to the CWC including a copy of the evaluation.

In the same year, the NSW Government circulated "*Guidelines on Economic Appraisal of Assets*" which described cost benefit analysis and cost-effectiveness in a general way.¹¹ The only stipulation was to use a discount rate of 7% (based on the social opportunity cost of capital) to discount future cost and benefit streams with 4% and 10% used as sensitivity tests. These rates have remained in force as at March 2013. To promote good practice, NSW Treasury instigated workshops and established an accredited list of agencies and consultants able to perform evaluations (subsequently discontinued). Government agencies were encouraged to develop economic evaluations.

⁹ Apart from overseas texts such as Meyer, Kain and Wohl's "*The Urban Transport Problem*" Wiley 1966, and the UK Road Research Laboratory's "*Economic Assessment of Road Improvement Schemes*" Technical Paper No 97 of 1968, the earliest contribution from an Australian state Treasury seems to be E. C. Brownbill's 1970 Technical Report No 10, "*Economic Evaluation Techniques for the 1985 Transportation Plan*".

¹⁰ The Water Resources Commission undertook CBA of building / refurbishing dams and weirs for irrigation in rural NSW Evaluations. Evaluations were also performed to address environmental issues of water flow to the health of the ecosystem e.g. "*the Macquarie Marshes*" assessment.

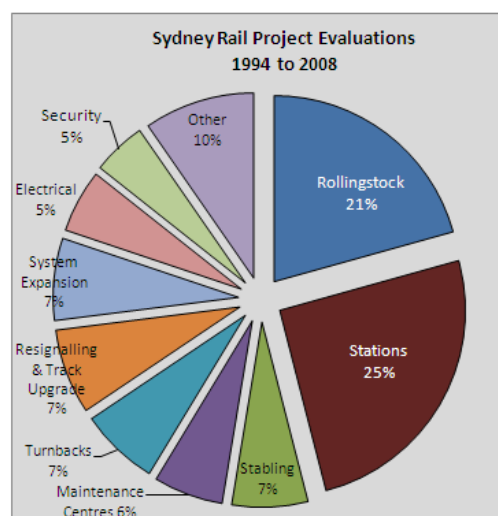
¹¹ The first version has since been renamed following a review by NSW Treasury and the Premier's Department in 1990, 1995 and 2006 to the edition created in 2007 and applied today known as the *Guidelines for Economic Appraisal* (NSW Treasury Position Paper 07-05).

In the early 1990s, NSW Treasury & the Department of Public Works introduced the Total Asset Management Process (TAM). The process required departments and agencies to undertake a set of studies for capital projects greater than \$1m. Studies included a Value Management (VM) study (a structured approach to sifting through options) a demand management assessment, an economic & financial evaluation, a risk management and a post-completion review. For rail, most effort was devoted to VM studies and the CBA evaluation. Risk management studies, and demand management assessments tended to be short statements incorporated into the CBA report. Few if any post-completion reviews were undertaken.

Individual NSW Government agencies were encouraged to develop their own evaluation manuals. Manuals were first developed for the Water and Health portfolios then in 1990 the Roads and Traffic Authority (RTA) became the first transport agency to develop a manual.¹² The RTA was able to utilise the parameters and engineering design practices set out in Austroads user cost reports.¹³ The RTA manual focussed on Cost Benefit Analysis since “it is the most common appraisal method for road and bridge investments” (page 1-1). Sections on cost effectiveness analysis and Multiple Criteria Analysis (MCA) were also provided.

In 1993, the State Rail Authority (SRA) of NSW produced an evaluation manual for rail capital projects. In 2004, when the State Rail Authority (operator) was merged with the Rail Infrastructure Corporation (track) to create RailCorp, the manual became the RailCorp manual.

Typically, SRA/RailCorp evaluated around 25 projects per year totaling 363 over the period 1994-2008 of which two thirds were done in-house and one third by consultants. The capital value of the projects ranged from small projects costing around \$1 million to large scale projects costing over a billion dollars. The typical benefit cost ratio was around 1.6 (which compares with an average 2.2 for the 24 projects in the 1972 BTE capital cities study).



Just under one half of projects were projects that did affect patronage in a significant way; a further 20% of projects were rolling stock evaluations that looked at design, refurbishment or replacement options and 25% were station evaluations (layout, easy access (mainly lifts) and refurbishment). Only 7% of projects were system expansion studies that looked at new lines or amplification of existing lines but for these projects, the capital costs were much higher.

¹² Now the Roads and Maritime Services (RMS) agency under the TfNSW portfolio.

¹³ The first RTA Economic Appraisal manual was issued in 1990 with a second version issued in 1999 (with sections subsequently updated).

The evaluation process in NSW has worked largely unchanged through the 1990s until 2004 when the Gateway Process was introduced. The Gateway process (described in Treasury Circular 10/13) was an adaptation of the UK Treasury process and sought to provide a level of assurance regarding whether the proposed investment was warranted, the strategic options were appropriate, and whether the agency had the capability and capacity to manage and deliver the project. Gateway Reviews have been mandatory for Strategic and Business case stages for all construction procurement if the following thresholds were met. The key phase has involved a rapid consideration by a tribunal of experts of project readiness. A review of the status and findings of the required economic and financial appraisals is one consideration.

In terms of rail Gateway reviews, the experience of George Karpouzis (RailCorp chief economist up to 2010) was that the emphasis was on engineering issues with cost/benefit questioning usually surrounding recurrent costs. By contrast, there was much less scrutiny of the scope and measurement of benefits and a general misunderstanding about the difference between financial and economic evaluations.

Nationally, Austroads published its first Cost Benefit Appraisal 'manual' to evaluate road investments in 1996 (see section 5.4). It was by today's standards, a short manual (57 pages). The stated aim was to provide guidelines for performing benefit cost analysis (BCA) that could be used by all Australasian road transport and traffic authorities at all levels of government. In so doing, the manual aimed to provide "*clear and comprehensive guidelines for nationally consistent BCA*". The manual did not include detailed speed-flow engineering formulae or list parameter values such as vehicle operating costs, values of travel time and accident costs but instead referenced publications produced by Austroads and other agencies.

During the 2000s, national transport evaluation guidelines have been developed by the Civil Aviation Safety Authority (see section 5.6) and the Australian Transport Council (section 5.5).

In 2008, Infrastructure Australia (IA) was created. IA was established as a statutory body and headed by Chairman Sir Rod Eddington. IA Australia reports to the Council of Australian Governments through the Federal Minister of the Department for Infrastructure and Transport (DoIT).¹⁴ IA advises DoIT on projects and has developed a framework for States to submit proposals for federal funding (see section 5.7).

A similarly named but unrelated agency was created in 2011 called Infrastructure NSW (INSW). This agency was charged with preparing five and twenty year infrastructure plans to review and evaluate proposed major infrastructure projects by government agencies or the private sector (see section 4.4).

¹⁴ Infrastructure Australia is a statutory body, established under the Infrastructure Australia Act 2008 which came into effect on 9 April 2008.

3. Funding of Transport in NSW

In theory, finance (upfront capital payment) and funding (ongoing repayment) may be separable from evaluation (whether a project is good or bad) but in practical terms it is very difficult to divorce the evaluation process from the spending decision and the opportunity costs such decisions entail.¹⁵ Further complicating the transport investment decision making process in Australia is the Commonwealth and State dimensions.

3.1 NSW Transport Spend

In 2011/12, \$13.1 billion was spent on transport in NSW of which two thirds was provided by State and Commonwealth governmental contributions and public transport fares and other user charges contributing one quarter (Table 3.1).

Table 3.1: NSW Transport Funding

Source of Transport Funding in 2012/13	\$ Billion	Percent
NSW Government Contributions	6.6	50%
Australian Government contributions	2.05	16%
Farebox revenue, sale of goods and services and other revenue	1.78	14%
Taxes and levies	1.62	12%
Lease and investment revenues	0.63	5%
Borrowings	0.38	3%
Asset sales	0.04	0%
Total	13.1	100%

Source: 2012 NSW Long Term Transport Master Plan

3.2 State & Federal Funding of NSW Transport

Roughly the same amount is spent on recurrent expenditure (operating costs and maintenance) and capital spend (investment in new or upgraded infrastructure) based on the Transport for NSW (TfNSW) four year projection for 2011/12 - 2015/16. A total of \$7.1 billion (53%) on capital and \$6.3 billion (47%) on recurrent expenditure is forecast.

NSW transport spending is predominately intra state (88%) with only 12% federally funded largely through the Nation Building Program (see section 5.4) with virtually no federal funding of recurrent NSW transport expenditure (e.g. public transport subsidies).

¹⁵ Irving Fisher's 'Separation Theorem' postulated in "*Theory of Interest*" 1930 argued that an investment decision can be made independent of the finance decision and that investment opportunities that maximise present value can be made independently of the best way of financing.

Table 3.2: NSW Transport Funding 2010/11- 2014/2015

	Annual \$ billion			Percent		
	NSW	Federal	Total	NSW	Federal	Total
Recurrent	6.2	0.1	6.3	98%	2%	100%
Capital	5.6	1.4	7.1	80%	20%	100%
Total	11.8	1.6	13.4	88%	12%	100%

Source: 2012 NSW Long Term Transport Master Plan

3.3 Road Funding

Road funding is a mixture of federal, state and local. The Australian Government contributes funding for key inter-capital corridors and provides funds to the 152 local councils of NSW who manage local roads and TfNSW provides annual funding support to councils for the management of regional roads.

In 2010/11, \$4.7 billion was spent operating, maintaining and investing in the NSW road network. Road users paid around 70% of the costs through a combination of road user charges, motor vehicle taxation (MVT) and tolls on State-owned motorways. The other 30% was funded via local councils, NSW State Government and the Commonwealth Government.

NSW pays far more in fuel excise duty to the Commonwealth Government than it receives back in transport grants. In 2011/12, the Australian Government collected \$13.2 billion from excise duty on petrol and diesel (revenue primarily related to road use) but returned only \$4.3 billion back to the States in road infrastructure funding. Of this total, NSW received \$1.3 billion compared to excise tax share of \$4.3 billion calculated on a population basis.¹⁶

Combining capital and maintenance spending on roads over the four years 2010/11 to 2014/15, the NSW Government estimates that the annual expenditure on roads would be around \$4.6 billion with the Commonwealth providing \$1.3 billion in grant funding.

Looking into the future, the concern expressed by TfNSW in the Long Term Transport Master Plan (LTTMP) is that the current level of road funding will not be sufficient to upgrade and maintain the road network. Also, unless a proportion of federal funding is more bulk funded on say a per capita basis, NSW will need to continue to compete with other states to get Commonwealth grants, and this competition will continue to influence the submissions it and other states make to agencies such as Infrastructure Australia.

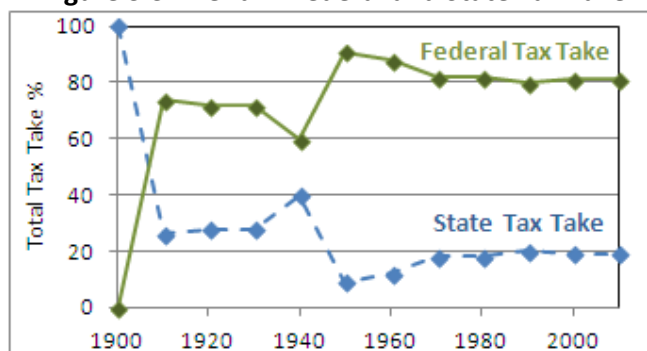
The imbalance in fuel excise and commonwealth grants is part of a wider 'vertical fiscal imbalance' debate.¹⁷ Over time, as can be seen from Figure 3.3, Australian states have lost tax 'independence'. In 1900, before Federation in 1901, the Australian states collected all tax

¹⁶ For the purposes of project evaluation, then imbalance introduces the question of 'perspective'. That is, whether the evaluation is being done on behalf of NSW or on behalf of Australia as a whole.

¹⁷ NSW Government Submission to the 2011 Tax Forum.

revenues but with Federation the take fell to 28% by 1910 and in 2010 was just under 20%.¹⁸ Today, the states argue that the federal government has access to the largest and most efficient taxes leaving the states with only small and inefficient taxes.¹⁹

Figure 3.3: Trend in Federal and State Tax Take



Sources: 1900-70 Mathews and Jay 1997, 1970-95 Mathews and Grewal (1997) Subsequent years ABS 5506.0

3.4 Public Transport Funding & Fares Determination

There is no Commonwealth Government operating subsidy support for public transport. Three-quarters of public transport revenue support is paid by the NSW Government with one quarter of the operating costs of bus, rail and ferry service paid through fares.

The operating cost ratio is lower for rail at 22% than for bus and compares relatively poorly with other Australian states (25% to 45%) and internationally (60% to 80%) based on figures in the TfNSW LTTMP. For 2009/10 the public subsidy for rail amounted to \$2.1 billion which equates to \$780 for every household in NSW.

Transport fares for rail, bus and ferry services are regulated by the Independent Pricing and Regulatory Tribunal (IPART) of NSW. Each year, a submission is made to increase fares, generally at the rate of inflation. IPART reviews the submission and makes a recommendation to the Expenditure Review Committee (ERC) of the NSW Cabinet.²⁰

¹⁸ In 1942, the Commonwealth used its power to withhold state grants to ensure the repeal of state income taxes which produces the sharp dip in the state tax take in Figure 3.3.

¹⁹ A recent example, Goods and Services Tax (GST) which was introduced in 2000 at a rate of 10% on most things (including public transport fares) is a federal tax.

A review of tax efficiency by Henry estimated the excess burden for NSW tax at 26% compared to 14% for Commonwealth tax. Comparative analysis has also shown VFI to be higher in Australia than Canada, Switzerland and Germany.

²⁰ The ERC is generally the only committee of Cabinet that can recommend any new spending or revenue proposals to Cabinet. All spending, revenue or tax expenditure proposals by Ministers must be considered by ERC prior to final Cabinet approval unless otherwise agreed by the Premier, Deputy Premier and Treasurer.

3.5 Increasing Rail Subsidy

Operating costs especially for rail have increased faster than inflation over recent years. As a result, the gap between operating costs and revenue has widened requiring greater annual subsidy support. In 2008, IPART commissioned Charles River and Associates (CRA) to undertake a research study to determine the optimal subsidy level for Sydney passenger rail services.²¹ Their study took an economic cost – benefit approach including consumer surplus; road congestion; rail capital and operating costs; and other externalities. CRA concluded that an optimal welfare outcome would require a 21% increase in the average fare prevailing in 2005/06 with the fare increase reducing patronage by 7% but also reducing the government operating subsidy by 11%. This study provided IPART with an economic justification for seeking rail fare increases above the rate of inflation.

In 2011, with the creation of TfNSW, the responsibility for setting fares and timetables moved from RailCorp to TfNSW. On the cost side, TfNSW has assessed franchising ferries and reforming train operations in a bid to slow the increase in operating costs.

²¹ *“Value of CityRail Externalities and Optimal Government Subsidy”* Final Report by CRA International to IPART Dated 2nd June 2008.

4. Current Transport Planning & Decision Making in NSW & Australia

This section looks at the current planning and decision making process in NSW and Australia as it affects transport evaluation. Section 4.1 summarises the current organisational set-up which has seen transport planning centralised under one agency. Section 4.2 then provides an overview of planning in NSW and the limited role that Cost Benefit Analysis plays in overall scheme appraisal with sections 4.3, 4.4 and 4.6 describing in turn the State, Infrastructure and Transport plans respectively.

4.1 Transport for NSW (TfNSW)

Planning of passenger transport in NSW was centralised in 2011 with the creation of a '*super ministry*', Transport for NSW (TfNSW). Under the changes, higher order planning functions for passenger rail (heavy and light rail), State Transit (bus), ferry and road management were transferred to TfNSW. As well as transport planning, TfNSW now has responsibility for transport coordination; transport policy; transport services; transport infrastructure; freight and marine pollution response.

The public road network in NSW is managed by several government agencies. The 152 councils across NSW are the designated road authorities for local roads. The Roads and Maritime Services (RMS) which is within the TfNSW cluster exercises the power of a road authority on state roads and freeways and is responsible for improving road safety, vehicle registration and driver licensing, assessing network conditions and planning future operations.

RailCorp owns and maintains the metropolitan rail network and operates rail services in metropolitan Sydney (CityRail) and the longer distance services (CountryLink). Light rail is operated by Metro Transport Sydney but with the assets purchased by the State Government in 2012.²²

The State Transit Authority is responsible for operating Sydney Buses, Newcastle Buses & Ferries and Western Sydney Buses (Liverpool Parramatta Transitway). Since July 2012, Sydney ferries have been privately operated under contract but with vessel ownership, fares and timetables remaining with the NSW Government.

The three main ports of NSW: Port Botany, Newcastle, Port Kembla are owned and operated by the NSW Government. Airports are either privately owned eg Kingsford Smith Sydney or

²² The LRT and monorail were owned by Metro Transport Sydney. A main reason for the Government to purchase the company for \$19.8 in March 2012 was to enable it to close the monorail which operates a short above ground loop around the CBD.

owned by local councils (eg Newcastle). NSW regulation applies only to route-operator allocation and does not cover air safety/security which is federally regulated.²³

The Australian Rail Track Corporation (ARTC) a Commonwealth government owned corporation manages the national interstate rail network and is responsible for ensuring efficient rail freight transport across Australia. In NSW, ARTC manages the Hunter Valley (largely coal operations) and Interstate freight rail network under lease from the NSW Government and provides network access to privately owned freight train operators.

4.2 An Overview of the NSW Transport Planning Process

In NSW, transport projects including both public and privately funded projects have been initiated by government transport and planning authorities.

The transport ministry and planning ministry in NSW have produced a series of strategic planning documents over the past 20 years. These strategic planning documents identify the conceptual details and likely alignments of future road and rail “corridor” transport projects. Further details of the specific route alignments, preliminary financial and economic feasibility studies and preliminary environmental appraisals (which may include multi criteria and triple bottom line type planning assessments) are then undertaken. These documents which are frequently known as “options reports” are primarily undertaken on a technical expert basis and rarely include public consultations, and many of these studies remain confidential government documents.

The preliminary appraisal process is largely internal within government whereby important matters such as agreement in principle within the NSW Treasury for the funding of the capital works cost and any land acquisition costs of projects is agreed, generally over a 5, or up to 10 year future timeframe in some cases.

With agreement in principle for the NSW Treasury funding, the government transport planning authority can proceed to apply for environmental approval for construction of the project. This process is controlled by the NSW Planning Ministry (Department of planning and Infrastructure) where the Director General is responsible for specifying the scope in the Director General’s Requirements (DGR’s) for the Environmental Assessment Report which is required for the project. Normally a major planning or engineering consultancy firm is commissioned to prepare this report which will include concept designs of the project route with sufficient engineering detail for the project environmental and property acquisition impacts to be clearly identified.

These Environmental Assessment reports, which are usually publicly exhibited for 28 to 40 days, represent the main opportunity for public consultation to occur as all public submissions are required to be considered in the planning assessment report which ultimately forms the basis of the approval for the project. Many community and public interest groups are critical of this aspect of the public consultation process as the public

²³ Only air services with passengers volumes less than 50,000 (13% of intrastate passengers) and linked to Sydney Kingsford Smith Airport are regulated.

input is considered by many to be taking place after all the critical details of the route alignment (and station locations for rail projects) have been determined.

The planning approvals process in NSW was formalised under the EP & A Act in 1979. This Act provided for major projects deemed to be of State significance to have their planning approval (including conditions) personally authorised by the Minister for Planning.

In 2005, the role of the Minister for Planning in approving major projects was formalised as a new Part 3A of the Act. This had the effect of widening the range and type of development projects that could be personally approved by the Minister for Planning. At the time, many persons and organisations were critical of the increased levels of power being concentrated in the “hands” of the Minister for Planning. The increased public concern led to Part 3A of the act being repealed in 2011, following a change in the NSW Government. The 3A provisions of the act were replaced by a new assessment category of State Significant Infrastructure (SSI) to permit the NSW government to continue to approve projects yet undetermined under the Part 3A process, without undue delay.

Under Part 3A of the act, several major transport projects around Sydney, including the South West Rail Link (SWRL) and the North West Rail Link (NWRL), (two rail extensions to serve existing and new urban areas in south western and north western Sydney) were classified as critical infrastructure and were able to be assessed and approved in concept form, in August 2007 and May 2008 respectively.

The concept form “*Environmental Assessment Reports*” for both these major transport projects included a reduced level of detail of the route alignment and also excluded any formal economic “*Cost Benefit Analysis*”. For both these projects, the project need and justification was based on a broad range of socio economic and public interest benefits and criteria. These were most clearly articulated in the NWRL report as: servicing a growing population in the new urban areas; meeting employment needs in the new urban areas; providing public transport services to the new urban areas; and reducing transport congestion and travel times.

Both the SWRL and NRWL projects were considered to have no feasible alternative capable of meeting these needs and also in reducing car dependence, which would otherwise have adverse social, environmental and economic impacts in the new urban areas.

After a public exhibition, a more detailed environmental assessment report and construction plans for these projects, the SWRL and NWRL projects had their respective major civil construction works approved in 2010 and 2012 respectively.

The ability for persons to object to a major project under a “merit” review, with each party to bear its own costs, was repealed under Part 3A leaving only a more expensive option of

“judicial review”. Also under Part 3A, third party appeal rights to concept plan approvals were removed.²⁴

The potential for the NSW government to undertake a Public Inquiry (a Commission of Enquiry) of a proposed major transport project in NSW exists but the facility has only been activated once in July 1990 for a proposed NSW Government Castlereagh Freeway (F2) motorway project in North Western Sydney. The Commission of Enquiry rejected the project although it was later constructed in a modified form as a privately funded M2 Motorway between 1995-7. No further commissions of enquiry have since been undertaken.

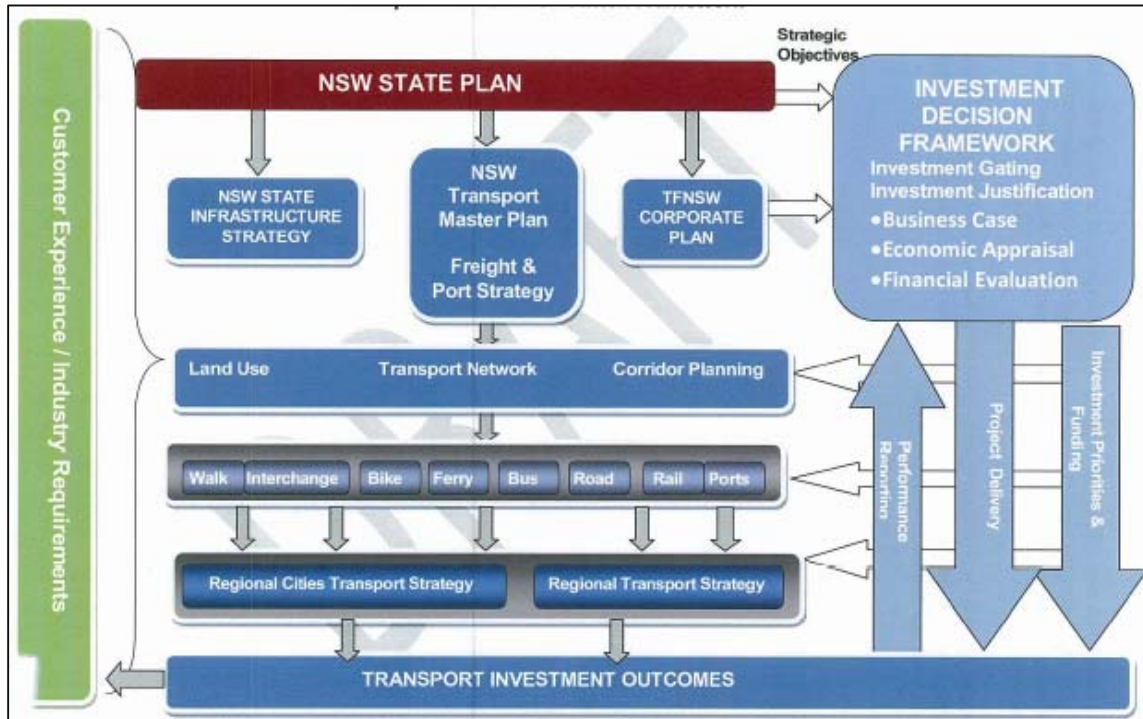
Since 1990, NSW governments have been reluctant to commit public funds to any Commission of Enquiry as that is effectively seen as an “own goal” both in terms of undermining their own project and also exposing evidence of weakness and indecision. Another result of the 1990 F2 Commission of Enquiry was to shift EIS preparation from being done “in house” to external consultants.

The main form of government support for critical reviews of major transport projects in NSW in 2013 is the “Environmental Defenders Office” which is partly funded by the NSW Government. The NSW Government has recently tried to stop this funding, which has the ability to launch and support legal challenges in NSW to both government and privately proposed “major projects” on environmental grounds.

In late 2012, the NSW government prepared a white paper detailing proposed reforms to NSW Planning to streamline and reduce delays associated with the planning approvals for State Significant Infrastructure (SSI) projects. The current planning framework for transport in NSW as at March 2013, in which the investment and appraisal process for transport sits, is shown in Figure 4.2.

²⁴ “*Building Australia’s Future - A review of Approval Processes for Major Infrastructure*”, Australian Government, Infrastructure Australia, June 2009.

Figure 4.2: NSW Transport Planning & Investment Decision Framework



Source: "Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives"

4.3 NSW 2021 State Plan

Sitting at the top, is the NSW State Plan.²⁵ The current plan 'NSW 2021 – A Plan to Make NSW Number One' was released in September 2011 and covers the ten year period 2011-2021. The plan aims to "guide policy and budget decision making and, in conjunction with the NSW Budget, to deliver on community priorities". Long-term goals and measurable targets are set and actions are outlined to help achieve the stated goals.



The plan has five strategies: 1 rebuild the economy to establish NSW as the 'first place in Australia to do business'; 2 return quality services to 'provide the best transport health, education, policing, justice and family services with a focus on the customer'; 3 renovate infrastructure that 'makes a difference to our economy and people's lives', 4 strengthen our local environment and communities by 'protecting national environments and building a strong sense of community' and 5 restore accountability to the government by 'returning planning powers to the community and giving people a say on decisions that affect them'. The plan then lists 32 goals and details targets and areas of priority action to achieve them.

²⁵ "NSW 2021" replaces the State Plan as the NSW Government's strategic business plan, setting priorities for action and guiding resource allocation.

Six of the 32 goals were transport related:

Reduce travel times by making the road network more efficient at peak times and improving public transport service frequency to minimise waiting times.

Grow public transport (PT) and walk/cycle usage by making it more attractive. Specific targets are set for 2016 including a 28% PT share for metropolitan Sydney; an 80% PT share for Sydney CBD; a doubling in cycling share and a 25% overall walk share. To achieve the PT targets, the plan commits to building proposed new heavy and light rail lines, improving the coordination, quality and frequency of existing services and introducing integrated ticketing.

Improve the customer experience through reliability improvements and integrated ticketing and monitor progress by developing a transport-wide customer satisfaction measure.

Improve road safety to reduce fatalities to 4.3 per 100,000 population by 2016.

Invest in critical infrastructure with targets of improving road smoothness for 93% of roads up to national standards, doubling the rail share of port traffic, increasing the share of Commonwealth funding for infrastructure and deliverance of 'promised' strategic infrastructure such as the North West and South West Rail Links.

Build liveable cities: by encouraging job growth in centres close to where people live and by providing access to public transport.

Amongst the other goals, rebuilding state finances could impact on public transport fares and service levels by pressuring an increase in the operating cost ratio for public transport which is currently around 20% for rail. It could also emphasise financial factors in investment appraisal. The three specified targets under rebuilding state finances are: (i) effective balance sheet management to maintain NSW's AAA credit rating; (ii) improve financial management and controls by reviewing budget processes and systems to support sound, sustainable and effective financial decision making and resource allocation; and (iii) improve efficiency and effectiveness of expenditure by subjecting all capital projects to benefit cost ratio assessment and develop legislation to shift the focus from process to performance.

4.4 State Infrastructure Strategy

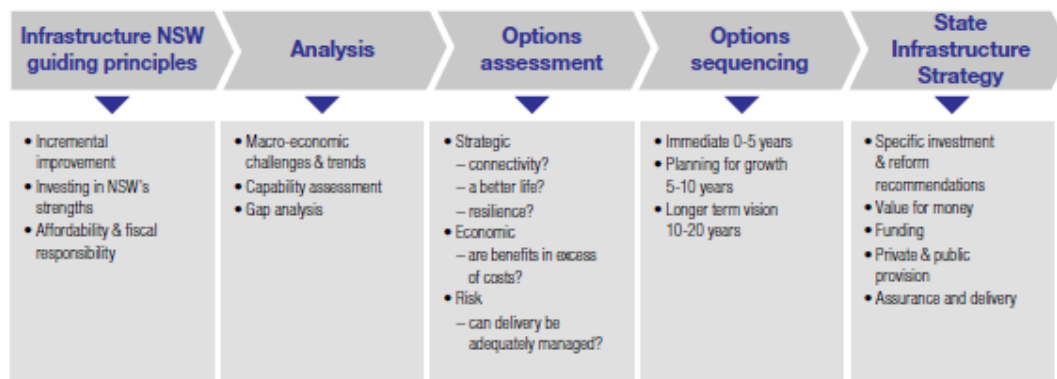
Somewhat unique to NSW, is the statutory requirement for two government agencies to produce 20 year master plans covering transport infrastructure. The two agencies are Infrastructure NSW (INSW) and TfNSW.

INSW was created in 2010 with Nick Greiner (Liberal NSW Premier 1988-92) as chairman (resigned May 2013).²⁶ Although it has a similar name to Infrastructure Australia it is not related. INSW has the statutory objective to "*secure the efficient, effective, economic and timely planning of infrastructure that is required for the economic and social well-being of the community*" (p2) and is charged with (i) the task of preparing five and twenty year infrastructure plans to review and (ii) the evaluation of proposed major infrastructure projects by either NSW government agencies or by the private sector.²⁷

²⁶ INSW does not employ staff (seconding them from other government agencies on as needs basis or commission work by consultants).

²⁷ Page 2 <http://www.legislation.nsw.gov.au/sessionalview/sessional/act/2011-23.pdf>

INSW presented its first 20 year State Infrastructure Strategy in September 2012. The strategy included 70 investment proposals covering transport health, water, energy and social infrastructure. The methodological approach is set out below.



In practice, the assessment was largely qualitative without any formal cost- benefit analysis of individual options undertaken. Deloitte’s was engaged to model the benefits of the overall strategy using Computable General Equilibrium modelling; they forecast a 2.4% increase in the size of the NSW economy equivalent to 100,000 extra jobs by 2032.

4.5 State Government Transport Strategy

Three months after the INSW master plan was released, TfNSW released its Long Term Transport Master Plan (LTTMP) in December 2012. It is a lengthy 420 page document that presents an overall framework to guide detailed transport plans, policy decisions, reforms and funding decisions over a twenty year period.

The plan was drawn up based on a review of evidence, expert opinion and public consultation. Eight objectives were developed to be used *“as a guide to assessing the best available options for building a world-class transport system for NSW over the next two decades”*. The eight objectives are listed in Figure 4.5.²⁸

Section 11 of the Plan sets out five assessment criteria for initiatives: (i) customer benefits; (ii) capacity of the system to meet growing demand and changing expectations; (iii) reliability and resilience of the system; (iv) efficiency taking into account the initial investment cost and whole-of-life costs and (v) achievability of the plan, taking into account risk and impacts.

The Plan states that decisions will be based on *“solid evidence beginning with analysis of land use, objective assessment techniques and close monitoring of the effectiveness of initiatives”* with assessment techniques improved by:

²⁸ The six ‘transport’ goals in the NSW State Plan are listed in a box on page 385 with the comment *“The Master Plan framework incorporates the NSW 2021 goals and targets (in which TfNSW is the lead agency)”*.

- (i) ensuring investment priorities are determined based on strategic fit with the objectives and priorities of the LTTMP, including triple bottom line assessments of benefits and costs as well as sound data;
- (ii) working with NSW Treasury to improve the assessment to reflect the full benefits of investing in public transport, cycling and walking infrastructure including health & social capital;
- (iii) further developing existing skills and capabilities in economic assessment to better understand and assess the increasing complexity of multi-modal projects and programs, including undertaking further work around wider economic impacts;
- (iv) requiring benefit cost analysis as a minimum for all projects and programs costing more than \$100 million;²⁹ and,
- (v) commissioning peer reviews by local and international experts.

Figure 4.5: Eight objectives of the Long Term Transport Master Plan



²⁹ Treasury guidelines stipulate a \$10 million dollar threshold – the \$100 million in the TfNSW Plan is probably a typographical mistake.

5. Project Evaluation for Funding Applications

5.1 Overview of Agencies & Evaluation Guidelines

Most of the main agencies involved in land transport project evaluation in NSW were described in section 4. Table 5.1 provides a summary of the types of transport proposals assessed; the objectives, the reporting requirements that guide their appraisal process and the underlying strategic priorities and the guidelines and manuals they have developed.

Distinctions can be made between (i) internal and external evaluations, (ii) capital and recurrent expenditure and (iii) small and large projects/initiatives. It is more likely that an evaluation will be required if 'external' funding is sought for a significant sum. NSW Treasury requires that economic appraisals (normally including a Cost Benefit Appraisal) need to be submitted to the NSW Cabinet for projects costing more than \$5 million as part of a Business Case submission. In general this process is followed but there have been very large projects such as the \$10 billion WestConnex motorway that have got Government approval before detailed evaluation has been undertaken or completed.

At the national level, the Commonwealth Department of Infrastructure and Transport (DoIT) administers most funding. For larger projects over \$100 million, Infrastructure Australia (IA) may provide advice to the DoIT. Projects may be developed nationally or at state level and there are examples of both types of projects being approved for funding. There is also a process whereby States can submit funding proposals to IA. For this purpose, IA has developed evaluation guidelines and an application framework/process.

Since 2008, the DoIT has been responsible for administering the 'National Building' program. The program covers construction and maintenance of the national road and rail network, 'roads to recovery' (local roads), road accident 'black spot' remedial work, heavy vehicle safety and productivity, off-network projects (road, rail and intermodal terminals not in the national network) and boom gates for rail crossings.

Over the four year period 2009/10 to 2013/14, \$37 billion was programmed for transport across the States plus \$1 billion in community infrastructure (including \$41 million in cycle way provision see section 6.8). NSW will receive \$12 billion which is about a third of the total spending which is in line with its population share. Of the \$12 billion, \$2.6 billion (20%) is for rail freight projects (\$1.3 billion via the Australian Rail Track Corporation (ARTC)) and \$9.4 billion (80%) for road projects (\$5 billion on highway investment, \$1.1 billion through local road grants³⁰ and \$2.2 through the Building Australia fund).

In terms of evaluation, only larger schemes submitted to IA that costing over \$100 million require a formal business case evaluation. IA has developed guidelines and an evaluation process (see Section 5.2.5). The Northern Sydney Freight Corridor is an example of a project that has been developed by NSW state agencies and successfully submitted to IA for funding.

³⁰ Since 2010, funding has been transfer to the Department of Regional Australia, Regional Development and Local Government.

Table 5.1: Project Evaluation NSW & Commonwealth Submission Requirements, Project Priorities & Assessment Guidelines for Transport Funding

Attributes	Australian Department of Infrastructure and Transport (DoIT)	Infrastructure Australia (IA)	NSW Treasury/Cabinet	Transport for NSW (TfNSW)	RailCorp (NSW)	Infrastructure NSW (INSW)
Projects and proposals it assesses	<ul style="list-style-type: none"> National Building Program (NB2) which has 4 themes (each with 3 sub components): <ul style="list-style-type: none"> Moving Freight via 'interstate freight', 'local freight' and 'heavy vehicle and rail freight productivity' programs Connecting People via 'connecting cities', 'urban living' and 'pinch points' programs Safety via 'black spot', 'roads to recovery' and road and rail 'network regeneration' programs Innovation via 'smart infrastructure', 'planning and research' and 'evaluation and compliance' programs 	<ul style="list-style-type: none"> Infrastructure Australia reviews and produces a list of priority projects, focusing on projects worth over \$100 million or those of national significance 	<ul style="list-style-type: none"> Capital projects Annual public transport fare submissions through Independent Pricing and Regulatory Tribunal (IPART) Information and Communication Technology (ICT projects) 	<ul style="list-style-type: none"> Capital Projects Maintenance proposals ICT proposals Business cases for all projects, programs or capital purchases in excess of \$1 million 	<ul style="list-style-type: none"> Maintenance proposals (included capital projects until creation of TfNSW) 	<ul style="list-style-type: none"> Has developed its own 20 year infrastructure plan including 70 projects Evaluating submissions by agencies for projects greater than \$100 million Reviewing unsolicited infrastructure proposals from the private sector Assessing public private partnership proposals being considered by agencies Coordinating NSW infrastructure funding submissions to the Commonwealth
Reporting/ submission requirements	<ul style="list-style-type: none"> Submissions for projects over \$100 million assessed by IA & DoIT, smaller projects by DoIT with priority given to projects 'with high BCR's' 	<ul style="list-style-type: none"> Submissions to follow IA template covering: <ul style="list-style-type: none"> Goal Definition Problem Identification Problem Analysis Option Generation Option Assessment & Solution Evaluation 	<ul style="list-style-type: none"> Summaries of economic appraisals are required to be submitted for projects costing between \$1m and \$10m Full reports on economic appraisals are required to be submitted for projects costing in excess of \$10m 	<ul style="list-style-type: none"> Economic appraisals required for projects costing in excess of \$1 million 	<ul style="list-style-type: none"> Value Management analysis of options Economic & Financial Appraisal Report using RailCorp Manual Financial report in nominal dollars for cash flow budgeting 	<ul style="list-style-type: none"> Evaluated its own Master Plan options using Multiple Criteria Analysis: three criteria: <ul style="list-style-type: none"> Strategic - connectivity, a better life, resilience Economic benefit > costs Risk - management of project delivery Used macro economic modelling of portfolio (CGE)
Strategic Priorities	<ul style="list-style-type: none"> To lift Australia's productivity through nationally significant land transport infrastructure demonstrating links to: <ul style="list-style-type: none"> Commonwealth Infrastructure Investment Framework; National Ports Strategy; National Urban Policy Land Freight Strategy 	<ul style="list-style-type: none"> Seven strategic priorities: <ul style="list-style-type: none"> Expanding Australia's productive capacity Increasing Australia's productivity Diversifying Australia's economic capabilities <ul style="list-style-type: none"> Building on Australia's global competitive advantages Developing Australia's cities & regions reducing greenhouse emissions Improving social equity and quality of life in our cities and regions 	<ul style="list-style-type: none"> NSW State Plan. The Plan had four economic goals amongst 32 goals including #2 to rebuild state finances: <ul style="list-style-type: none"> effective balance sheet management to maintain AAA credit rating improve financial management and controls improve efficiency and effectiveness of expenditure by subjective all capital projects to BCR assessment 	<ul style="list-style-type: none"> NSW Corporate Plan 2012-17 and Long Term Transport Master Plan which lists eight criteria: <ul style="list-style-type: none"> improve quality of service improve livability support economic growth & productivity support regional development improve safety and security reduces social disadvantage improve sustainability strengthen transport planning processes 	<ul style="list-style-type: none"> Legislative objectives as per Transport Administration Act 1988(NSW); Section 6(2) of the Protection of the Environment Administration Act 1991 (NSW) and Commonwealth Disability Discrimination Act (1992) <ul style="list-style-type: none"> Safe & reliable railway efficient, effective and financially responsible <ul style="list-style-type: none"> operations subject to ecologically sustainable development take account of requirements under disabled discrimination act 	<ul style="list-style-type: none"> 20 Year State Infrastructure Plan which had three guiding principles: <ul style="list-style-type: none"> Incremental Improvement Investing in NSW's strengths Affordability & fiscal responsibility
Assessment guidelines	<ul style="list-style-type: none"> IA Guidelines for projects > \$100 million Handbook of Cost-Benefit Analysis January 2006 Department of Finance & Administration Commonwealth Government The Financial management guidance series of publications #1-#19 	<ul style="list-style-type: none"> IA's reform and investment framework 2012 Better Infrastructure Decision Making Submission Coversheet and Templates for Stages 1-7 Building Australia Fund criteria Commonwealth Infrastructure Investment Framework 	<ul style="list-style-type: none"> NSW Government Guidelines for Economic Appraisal TPP 07-5 sets out how CBA and cost effectiveness should be conducted. 7% discount rate mandatory stipulation (income growth stipulation not enforced). NSW Premier's Department Business Case Guidelines NSW Treasury Guidelines for Business Cases 	<ul style="list-style-type: none"> Principles and Guidelines for economic Appraisal of Transport Investment and Initiatives Finance business case policy (FPN06) and Guidelines (FPG06) Treasury Guidelines etc 	<ul style="list-style-type: none"> Manual for the Evaluation of Capital Projects 2011, Economic and Financial Analysis Unit, RailCorp TfNSW Treasury Guidelines etc 	<ul style="list-style-type: none"> No guidelines provided on review process

Another rail project, a \$2.6 billion new railway line between Parramatta and Epping (PERL) in Sydney was proposed by Australian Prime Minister Julia Gillard during the election campaign of 2011 rather than being submitted by the NSW State Government. It was also submitted without a business case. The Labour NSW Premier Keneally agreed to the project and IA approved \$2.1 billion in federal funding. Support was withdrawn by the incoming Liberal NSW Government however who requested that the \$2.1 billion be used instead to part fund a preferred rail project (the North West Rail Link).

For smaller projects funded by DoIT there is no formal process or CBA evaluation procedure. General guidelines for Commonwealth agencies for project appraisal are outlined in the CBA Handbook but there is no stipulated discount rate or required specification of benefits and costs such as resource or market prices, length of evaluation period etc. For transport, Austroads and the Australian Transport Council have developed evaluation guidelines for road and public transport and Australian Government Civil Aviation Safety Authority.

In NSW, the RTA (now RMS) has developed a road evaluation manual similar to the Austroads manual but with some differences in parameter values such as accidents. RailCorp NSW has developed an evaluation manual for the evaluation of capital projects.

In March 2013, *"Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives"* (PGEATII) written by the Economic Policy Strategy and Planning of the Finance Directorate of Transport for NSW was approved by the Director General for use in the conduct of economic appraisal of projects, programs or initiatives across the TfNSW transport 'cluster'.

Finally, as section 4.4 described, Infrastructure NSW (INSW) is statutorily required to develop a 20 year infrastructure plan for NSW, review proposals developed by other agencies and coordinate NSW's infrastructure funding submissions to the Commonwealth.

5.2 Evaluation Guidelines and Frameworks

Five 'national' and four NSW appraisal guidelines / frameworks have been reviewed:

1. The Commonwealth Government 2006 *"Handbook of Cost-Benefit Analysis"*
2. Austroads 2011 *"A Guide to Project Evaluation"* prepared by ARRB.
3. Australian Transport Council 2006 *"National Guidelines for Transport System Management in Australia"* (NGTSM)
4. Australian Government Civil Aviation Safety Authority 2007 *"Cost Benefit Analysis Methodology Procedures Manual"*
5. Infrastructure Australia Framework for submissions
6. NSW Treasury *"Guidelines for Economic Appraisal issued 2003"*
7. RTA Road Evaluation Manual issues 2004
8. RailCorp NSW Evaluation of Capital Projects issued December 2011
9. TfNSW Guidelines and Principles issued March 2013

5.3 Commonwealth Handbook of Cost-Benefit Analysis

The 2006 Commonwealth Government's *"Handbook of Cost-Benefit Analysis"* provides guidance on economic cost-benefit analysis, financial evaluation and cost effectiveness analysis for evaluation and decision-making for Australian government agencies.³¹ It is a general handbook with no specific section on transport but with some transport examples included to demonstrate points or issues. As the title would suggest, the Handbook recommends CBA for option evaluation over Cost Effectiveness and Multiple Criteria Analysis.

In terms of the distribution of benefits and costs, the Handbook considers that the *"aggregating character of the cost-benefit process can be obscuring"* and that constructing a *distributional incidence table would be useful in presenting the nature and size of the gains and losses"*. However, the Handbook is less convinced by assigning differential weights to income changes by group considering that *"judgments entailed in the approach are almost always most appropriately made by government at the political level"*.

In terms of discount rate, the Handbook recommends that it should generally reflect the opportunity cost of capital (SOC) rather than a time preference or consumer rate of discount. It does not recommend an actual discount rate because *"the appropriate discount rate may vary from one year to the next, and is under continuous review. Nor is it possible to be prescriptive about project-specific discount rates because they will vary not only from one year to the next but also from project to project"*(p68). This view contrasts with the rate in the NSW Treasury Guidelines that has been 7% real since 1989.

5.4 Austroads "A Guide to Project Evaluation"

Austroads has published a CBA manual from 1996. Over the years the manual has been developed to include parameter values. The current 2011 'guide' has eight volumes. Volume 1 presents an overview of the guide. In volume 2, a three-stage evaluation process is recommended:

- (1) Strategic alignment: Assessment against broader strategies, policies and plans.
- (2) Rapid Assessment: Investigate and analyse project options (solutions) that pass the strategic fit; and preliminary comparative analysis of cost effectiveness based on preliminary modelling and concept level cost estimates, and an initial assessment against project purpose and other assessment criteria. This part of the process yields one or several preferred options.
- (3) Detailed Business Case: Detailed modelling and evaluation based on risk adjusted benefits and costs and detailed assessment of other potential project impacts.

³¹*"Handbook of Cost-Benefit Analysis"*, January 2006 Department of Finance and Administration Financial Management Group Commonwealth of Australia 2006 ISBN 0 644 149159. Reference is also made to the Department of Finance and Administration's *"Introduction to Cost-Benefit Analysis"* and *"Alternative Evaluation Methodologies"* dated January 2006 (Financial Management Reference No. 5).

Cost benefit analysis (CBA), which is recommended for option evaluation, is described in volume 3. Externality cost parameters mostly expressed on a per vehicle km are provided in vol. 4. Computable general equilibrium (CGE) modelling to assess national and regional economic effects is reviewed in volume 5 although CBA is recommended. Part 6 considers distributional effects, Part 7 describes post completion evaluation procedures and Part 8 presents some worked examples linked to spreadsheets.

An influential Austroads study was a 1997 value of travel time savings (VTTs) study in which VTTs values were agreed based on a literature review followed by a workshop of expert opinion. For paid travel time and business travel, VTTs was set at 100% of average hourly earnings including all overhead costs but excluding payroll tax.³² For private travel (all purposes) by private car, motorcycle, bicycle and pedestrian travel; waiting time and public transit and tourist passenger travel, the agreed value was 40% of the average hourly earnings of the employed population. For freight, the value of business travel time was agreed as an upper limit for freight delay. The review also recommended that no threshold limit be set for small travel time savings and that the same values should be used for rural and urban conditions.

5.5 ATC NGTSM Guidelines

National Guidelines for Transport System Management (NGTSM) was produced for the Australia Transport Council (ATC) by the Guidelines Assessment Methodology Working Group with the first edition released in 2003 covering road, rail and intermodal transport. The second edition, released three years later in 2006, extends to 5 volumes including a volume on urban transport and presents an eight stage evaluation framework.



A 3-level appraisal process with corresponding business case development is recommended:

- (1) Strategic Merit Test (Strategic Business Case) in which all proposed initiatives are evaluated
- (2) Rapid appraisal (Outline or Preliminary Business Case) of a filtered list of options
- (3) Detailed Appraisal (Full Business Case) of short-listed options to determine the best initiative(s)

³² Average Full Time Weekly Earnings divided by 38 hours per week. Overhead or 'on costs' are included based on Australian Bureau of Statistics figures of employer superannuation contribution, workers compensation level and leave loadings obtained from the Australian Chamber of Commerce.

The ATC guidelines cover demand and cost estimation techniques as well as evaluation. A set of recommended cost, benefit and externality parameters are included. The values have been based largely on a review of Australasian and overseas literature. For user benefit, the values of time, time multipliers and quality values reflect the averaging of 'Willingness to Pay' Stated Preference surveys. The Guidelines have been endorsed by all Australian jurisdictions.

In 2012, a project to update the Australian Transport Council (ATC) National Guidelines for Transport System Management in Australia (NGTSM) commenced. Amongst other aims, the study seeks to enhance the multi-model perspective, provide guidance on WEBS, incorporate the Austroads *"Guide to Project Evaluation"* and *"Guide to Road Transport Planning"* and increase the 'harmonisation' with other guidelines including Infrastructure Australia's submission framework.³³

5.6 Commonwealth Civil Aviation Cost Benefit Analysis Manual

The Commonwealth Civil Aviation Safety Authority produced a Cost Benefit Analysis manual in 2007. As the title would suggest CBA is described but with Value Management (VM) included as an effecting complementary tool *"addressing the technical and functional dimension"* of an initiative. The manual makes some recommendations to contrast with land transport CBA.

The manual recommends using resource costs to value inputs (i.e. exclusive of indirect taxes) based on Willingness to Pay and for projecting the value of travel time (VoTT), the Manual recommends a relationship with real GDP per person:

Forecast growth in VoTT = Elasticity of the average VoTT with respect to Gross Domestic Product (GDP) x (Real GDP Growth percentage per annum – Population growth percentage per annum)

An elasticity value of 0.8 is recommended for non-working time and 1 for working time.

A similar basis for updating the value of accident cost savings is recommended and notes that the values of statistical life in Australia are based on the Human Capital approach which *"provides a conservative minimum estimate"* and that a WTP basis would be preferable.

The Manual recommends treating residual value as a 'negative cost' rather than a benefit which is contrary to the other manuals reviewed.

For option value, (considered in terms of re-opening of an abandoned air route) the manual argues that *"while there is a general agreement with the concept, it is not suggested that this element be used"* largely because of the *"paucity of data and agreement on the methods for calculating option values"*.

³³ *"Updating the ATC National Guidelines for Transport System Management in Australia Stage 1 – Scoping Issues paper"*
GHD December 2012.

5.7 Infrastructure Australia “Reform & Investment Framework” 2012

As part of its advice to governments, Infrastructure Australia (IA) assesses submissions from the private and public sector for inclusion on its Infrastructure Priority List. Submissions can be reform or investment initiatives. To assess submissions, IA has developed a ‘reform and investment framework’ which sets out the information expectations and assessment process.³⁴ Submissions are required to be succinct not exceeding 30 pages in length (excluding the economic appraisal).

The framework, presented in Table 5.7, allows for projects at different stages of development to be considered: (1) early stage; (2) real potential; (3) threshold proposals and (4) ‘ready to proceed’.

The framework has three criteria: (1) *Strategic alignment* goals aligned with state plans and support IA’s strategic priorities; (2) *Problem definition* –well understood problem that is demonstrated to constrain goal achievement (3) *Solution development* –comprehensive set of options considered and the preferred option demonstrated to generate economic benefit and can be successfully delivered.

As the proposal moves advances from ‘Early Stage’ to ‘Ready to Proceed’ the focus shifts from strategic alignment and problem evaluation to selecting the right solution. For projects at ‘threshold or ready to proceed’, a detailed cost benefit analysis and deliverability assessment is required to demonstrate (1) that economic benefits exceed costs, as measured by a robust benefit cost ratio (BCR), (2) need for non-government funding has been fully explored for all or part of the investment, including user pays; (3) cost estimates and risk assessments provide assurance that the project can be delivered within budget and risks managed; and (4) specific technical requirements for a project of that nature been considered and the design is optimized.

³⁴ “Infrastructure Australia’s Reform and Investment Framework - Guidelines for making submissions to Infrastructure Australia’s Infrastructure Priority List using the Reform and Investment Framework”, IA dated May 2012.

Table 5.7: Infrastructure Australia’s Reform and Investment Framework

Core element	Stage and Purpose	Early stage	Real potential	Threshold and, if all issues are addressed, Ready to Proceed
<p>Strategic Alignment Proposal supports Infrastructure Australia’s strategic priorities and aligns with state plans</p>	<p>1. Goal Definition - Goals defined to provide the foundation for problems that need to be addressed as priority and drives the development of solutions</p>	<ul style="list-style-type: none"> Goals of the proposal are identified and align with state or regional strategic plans Proposal prioritised within state or regional strategic plans Proposal will make a positive contribution to Infrastructure Australia’s strategic priorities 	<ul style="list-style-type: none"> Proposal’s economic, social and environmental goals quantified. Examples may include: <ul style="list-style-type: none"> Service standards Cost recovery targets Patronage/user targets Demonstrated integration across stakeholders / infrastructure sectors 	<ul style="list-style-type: none"> Confirm benefits delivered by preferred option are aligned with goals (e.g., benefit profiles and a benefits realisation plan)
<p>Problem evaluation Problem being addressed is well understood and constrains achieving intended goals. The costs of the problem and potential benefits are presented and supported by evidence. Understanding causes allows effective and targeted solutions to be created.</p>	<p>2. Problem Identification Identify the problems that may hinder the achievement of goals</p>	<ul style="list-style-type: none"> Current and future problem described. Describe what the problem will become in the future if it’s not addressed. Problem linked back to goals within the state or regional strategy 	<ul style="list-style-type: none"> Scenario analysis completed over reasonable time horizon demonstrating problems will persist or emerge under plausible scenarios 	
	<p>3. Problem Assessment Gather data rich evidence that demonstrates the problem and allows the biggest problems to be prioritised.</p>	<ul style="list-style-type: none"> Economic, social and environmental costs estimated qualitatively. 	<ul style="list-style-type: none"> Quantified economic, social and environmental impacts of the identified problem, supported by data (e.g. surveys, studies, performance against key performance indicators) Analysis presented that demonstrates the root cause. Explanation of why the problem can’t be solved without government intervention 	
	<p>4. Problem Analysis Analyse the extent of problems and the root causes</p>			
<p>Solution selection The developed proposal has considered a comprehensive set of reform and investment option, there is solid evidence that the project will generate economic benefits, and there is confidence that the project can be successfully delivered.</p>	<p>5. Option Generation Develop a full range of possible solutions to address the issue including reform and investment proposals</p>	<ul style="list-style-type: none"> Specific solution options not required in submission 	<ul style="list-style-type: none"> Option evaluation criteria to measure performance against the goals of the proposal Comprehensive list of reform and investment options identified (reduce demand, improve productivity, increase supply) 	
	<p>6. Option Assessment Strategic analysis and cost benefit analysis to assess the viability of the options.</p>	<ul style="list-style-type: none"> Option assessment not required in submission 	<ul style="list-style-type: none"> Rapid Benefit Cost Ratios prepared for shortlisted options Shortlisted options adequately described, including details of key assumptions and risks, demand estimates, impacts and benefits, whole of life costs, funding and financing opportunities Cost estimates for shortlisted options based on consistent framework built up from first principles (bottom-up). Contingency allowance based on risk profiles 	<ul style="list-style-type: none"> Whole of life costs, service delivery outcomes and engineering design optimised during development of the preferred option (e.g., value engineering) Demonstrated integration of the proposed solution across systems and related infrastructure sectors Detailed cost benefit analysis including: <ul style="list-style-type: none"> Funding options to provide maximum cost recovery Financing and delivery/procurement models including PPP Risk assessment Base cost estimate and risk allowance
	<p>7. Solution evaluation Detailed business case for the preferred option including cost benefit analysis, strategic fit and deliverability (including cost, risk and procurement).</p>	<ul style="list-style-type: none"> Solutions not required in submission 	<ul style="list-style-type: none"> Sensitivity analysis of short-listed options to confirm choice of preferred option is robust Sound methodology outlined for project procurement models 	<ul style="list-style-type: none"> Detailed delivery outcomes, including cost recovery target maximised considering all potential revenue streams Benefit Cost Ratio justifies investment decision Independently reviewed risk based cost estimate, risk assessment, demand models and economic appraisal. Sound delivery strategy and governance model defined

Source: Table 1 Infrastructure Australia’s Reform& Investment Framework” dated May 2012. Infrastructure Australia

The framework lists seven national strategic priorities that the proposal must align to:

- (1) Expanding Australia’s productive capacity;
- (2) Increasing Australia’s productivity;
- (3) Diversifying Australia’s economic capabilities;
- (4) Building on Australia’s global competitive advantages;
- (5) Developing Australia’s cities and regions;
- (6) Reducing greenhouse emissions; and
- (7) Improving social equity and quality of life in our cities and regions.

Additionally, the proposal must align with state goals. For early stage proposals, a qualitative assessment of strategic alignment is sufficient but as proposals develop, goals need to be quantified and at the threshold stage a confirmation that benefits are aligned with stated goals is required.

In consideration of options, IA expects a ‘rapid’ CBA to be included to provide confidence that the preferred option is likely to provide the greatest benefits and that those benefits are likely to justify implementation. Then, once a preferred solution has been identified, proponents must complete a detailed CBA and present the results in a standard ‘template 7’ and attach a report detailing the methodology, parameters and values, assumptions and algorithms. IA expects that the following impacts would be monetized in the CBA:

Typical benefit / cost items	
Benefits / Costs to users – Changes in:	Benefits / Costs to non users
<ul style="list-style-type: none"> • External costs e.g. crash costs, noise, air pollution, GHG emissions, visual amenity • In-vehicle time (IVT) • Out-of-vehicle time (OVT) e.g. wait, access and transfer/boarding • Vehicle operating costs (perceived and unperceived) • Crowding (rolling stock and platform) • Amenity (e.g. station, rolling stock) • Health and physical fitness 	<ul style="list-style-type: none"> • Capital costs • Consequential costs during construction (e.g. noise, delay, congestion during, displaced economic activity) • Maintenance and replacement costs • Operating costs • Road network decongestion • Changes in revenues / fare box • Residual value • Decommissioning or rehabilitation costs

The framework specifies key parameters that should be used and notes that where these parameters differ from State or Territory guidelines, outcomes using IA’s parameters will be provided in addition to any recognized alternative approach. Discount rates of 4%, 7% and 10% (real) are specified (the same as in NSW); a 30 year evaluation period should be used with residual value calculated using straight line depreciation; BCR to be the evaluation criteria calculated as the ratio of project benefits over capital plus operating costs. For other parameters, IA encourages the use of ‘best practice and standard parameter values’.

The appraisal allows for non monetized impacts on visual/landscape, social amenity e.g. park lands, social cohesion and heritage/cultural impacts to be appended to the CBA using a seven point scale ranging from highly detrimental to highly beneficial.

Finally, IA does not encourage the use of computable general equilibrium macro econometric models and will not consider “CGE benefits as additive or complimentary to cost benefit analysis benefits”.³⁵

5.8 NSW Treasury “Guidelines for Economic Appraisal”

The latest edition, published as Treasury Position Paper 07-05 (TPP0705) presents a framework for public sector agencies to undertake economic appraisal on a consistent basis noting: *“the purpose of an economic appraisal is not to validate a specific proposal, but to help choose the best means to satisfy a specified objective, and to rank competing proposals when resources are limited”* (page i).

Only two parameters are stipulated in TPP0705: a discount rate of 7% and the rate of real earnings growth. In fact, only the 7% discount rate has been a requirement with 4% and 10% sensitivity tests. Treasury does provide a real earnings growth forecast but only for five years and to date, the Treasury projection has not been used in CBAs.

NSW Treasury has usually accepted parameter values used in undertaking project appraisals such as the values of time developed by RailCorp’s Economics Unit but in recent business cases, the rate and level of contingency, capital cost escalation, contractor profit, treatment of indirect taxation and the deadweight loss of taxation have been debated.

NSW Treasury guidelines specify the level of analysis required for different capital cost thresholds. For larger projects costing over \$10 million, a Value Management (VM) study, Risk Assessment and an Environmental Impact Statement may be requested in addition to a CBA evaluation.

VM studies are undertaken to sift through potential options and draw up a short-list for more detailed, usually CBA evaluation.³⁶ VM is usually undertaken as a workshop in which planners, engineers, operational managers, economists spend a day exploring and evaluating options with the help of VM facilitator. A multiple criteria assessment is usually undertaken to compare options and agree the short-list. The VM facilitator will usually write a summary report of the VM study and findings.

³⁵ This contrasts with INSW which commissioned Deloitte to estimate the economic benefits of the INSW 20 year infrastructure plan using CGE modelling.

³⁶ The results of a Value Management study must be included with submissions to the NSW Budget Committee of Cabinet. Value Management Manual Department of Public Works (PWD) 1990 or Total Asset Management Manual (PWD) 1992.

A Review of Environmental Factors (RFR) is undertaken to determine whether an Environmental Impact Statement (EIS) is required. All projects with significant environmental impacts require Ministerial approval.

Projects costing over \$10 million should undertake a post completion evaluation (PCEv) of traffic levels, costs and benefits. In practice however, post completion evaluations have rarely if ever been undertaken.

For privately funded infrastructure projects, the policies and procedures to be followed are set out in “NSW Government Guidelines for Private Sector Participation in the Provision of Public Infrastructure” dated October 1997.³⁷

5.9 RTA Road Evaluation Manual

The NSW Roads and Traffic Analysis manual is similar to the Austroads manual in content and, like the Austroads manual, utilizes the user cost database and engineering procedures developed by ARRB.³⁸ The Roads and Maritime Services (RMS) agency of TfNSW which superseded the RTA has also issued a manual providing guidance on traffic modeling.³⁹

The evaluation manual provides a general evaluation guide but for specific projects, RMS uses computer software packages and tailored excel spreadsheets. For rural roads, where the road user benefits are usually link based and relatively easy to quantify for the base versus proposal case, RMS has developed the “Rural Evaluation System” based on the NIMPAC (NAASRA Improved Model for Project Assessment and Costing) road planning model developed by Austroads.

In urban areas, network effects predominate and transport network models such as EMME/2 are used to quantify road network benefits. For smaller scale traffic management proposals such as the lengthening of turning bays, widening intersections together with traffic lights configuration, adding extra lanes in sections or road and improvement bus by pass lanes, RMS typically uses PARAMICS a micro-simulation tool and SIDRA (signalised and unsignalised intersection design and research aid) and to use the output of each of these packages for CBA appraisals, RMS has developed excel spreadsheet models.

The economic manual includes a set of economic parameters largely sourced from Austroads. The values include vehicle operating costs, values of time and environmental costs.⁴⁰ For accident costs, there is a noteworthy departure from Austroads values as is discussed in section 6.4. Most of the economic values are expressed on a vehicle, passenger kilometre or ton kilometre basis for cars, motorcycles, buses, light and heavy vehicles. The manual focuses on estimating the benefits to existing road users with little guidance on

³⁷ Examples include the Eastern Distributor, M2, M4 and M5 tollways and the Sydney Harbour Tunnel.

³⁸ Economic Evaluation of Road Investments Proposals, Unit Values for Road User Costs at June 2002 AP-AP-R241.

³⁹ “Traffic Modelling Guidelines” report by the Roads and Maritime Services TfNSW issued February 2013.

⁴⁰ There are some differences in the parameters however most notably in terms of the value of life and accident cost savings.

evaluating induced demand and including patronage and freight diversion to/from rail (ferry) and slow modes (walk/cycle). This is reflected in the lack of accident and externality cost parameters for rail.

A section on toll road evaluation is included in the manual. The manual states that *“calculating the total cost of the project and/or the contribution of the private sector to the project can be omitted in economic evaluations. What is relevant is the community cost to use this infrastructure and the benefits and costs that will follow. The Government input is the relevant cost. The price paid for use of the toll road (toll) is also relevant and normally represents the majority of the community cost of the project.”*

5.10 RailCorp Manual for the Evaluation of Capital Projects 2011

The RailCorp manual has been developed over two decades; the latest version was issued in December 2011. The aim of the manual has been to help RailCorp and the NSW Government evaluate proposals for approval in the Capital Works and Major Periodic Maintenance Program which in 2010/11 was equal to \$1.5 billion. The manual discusses Value Management. The manual is 116 pages long and covers three areas: (i) the difference between economic and financial evaluation; (ii) a description of CBA, Value Management and Cost Effectiveness analysis and (iii) the steps in undertaking an economic evaluation,

The manual does not include any parameter values to calculate operating and maintenance costs, user benefit such as values of time and demand elasticities and estimate externality benefit and costs. RailCorp has estimated a suite of parameter values which are maintained as short notes and spreadsheets and provided on an ‘as needs’ basis.

A distinction with the Australian road appraisal manuals is that the values of time and the weighting of different time components have been estimated through Willingness to Pay Stated Preference Surveys undertaken of Sydney rail passengers. System-wide Stated Preference surveys have been undertaken in 1992/3, 2004 and 2010/11 to estimate passenger values of travel time. A weighted index has been estimated to update the VTT based on the NSW wage index and CPI.⁴¹

Far more emphasis is given in the RailCorp manual to generated demand compared to the RTA manual. Typically, two thirds of benefit has derived from increased revenue and reduced car use, associated decongestion, accidents and reduced pollution. RailCorp has developed a direct demand approach to forecast patronage.

Elasticity studies were also undertaken in the mid 1990s and updated in 2006/8. Large scale surveys were also undertaken to estimate WTP values for service reliability, passenger

⁴¹ Douglas N.J. and Karpouzis G., (2011) *“Tracking the Value of Rail Travel over Time”*, 34th Australian Transport Research Forum, Adelaide 2011.

security, information, 'at station' and 'on train' crowding, train and station quality in 1996 and 2003-5.⁴²

RailCorp has generally undertaken a financial appraisal in addition to an economic appraisal. In fact, two financial evaluations have been undertaken: one in constant real dollars (effectively a subset of the economic appraisal excluding user and externality benefit) and one in nominal dollars to project cash-flows and funding requirements. The nominal evaluation has allowed for general inflation at 3% per year with labour costs typically increasing at 4% per year. A discount rate of 10.21% (1.07×1.03) is used. The nominal financial evaluation results have usually been appended to the economic evaluation report without commentary.

5.11 TfNSW Principles and Guidelines for Economic Appraisal

TfNSW released "*Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives*" (PGEATII) in March 2013. The manual brings together the RTA road evaluation manual and the RailCorp rail evaluation manual (see above).

The aims for PGEATII are to "*provide a consistent evaluation framework*" and "*improve resource allocation by ensuring that the strategic alignment and value for money assessment have been consistently determined across the transport cluster*".

The document discusses general principles and provides guidelines. As an example, alternative ways of dealing with inflation are discussed but a ruling is not made as to whether evaluations should be in nominal or real dollars. The content of PGEATII is listed below:

- Description of Cost Benefit Appraisal
- Description of alternative assessment approaches including Environment Impact Assessment
- Land Use integration in economic appraisal
- Economic analysis of Freight Initiatives including CBA, input-output and computable general equilibrium and hybrid models
- Patronage demand measurement and linking models with economic appraisals
- Case Studies
- Reporting and presentation of economic appraisal results
- Prioritisation of investment based on economic appraisal results
- Post completion evaluations
- Appendices on discount rates, economic parameter values (including values of time), disability values, social exclusion and calculation of user benefit measures (log sum).

⁴² The survey results are summarised in "*Value and Demand Effect of Rail Service Attributes*", Report to RailCorp July 2008 by Douglas Economics.

The manual also includes structured methodologies (embedded Excel spreadsheets) for seven prototype transport projects: strategic bus corridor; High Occupancy Vehicle lanes; bicycle facilities, Variable Message Services (VMS), CCTV and bus acquisition. Some case studies are also included to describe various steps in CBA including a major road upgrade, a rail freight corridor upgrade and intelligent transport system projects.

The manual makes a number of recommendations such as the adoption of a common value of time for rail and road projects (see section 6.2) in NSW; basing evaluations on resource cost rather than market prices and treating road tolls as transfer payments and not as resource costs.

6. Discussion of Recent Developments in Project Appraisal

6.1 Introduction

Drawing from the material presented in previous sections, the most significant recent developments in project appraisal as they affect NSW are considered to be:

- Treasury Gateway Business Cases Reviews
- Centralisation of transport planning
- Two agencies producing Transport Master Plans
- Infrastructure Australia Submission Process

Some comments are made on the recent “spectacular failures” in toll road patronage forecasting that have occurred in Sydney and Brisbane as they relate to evaluation. A section on the evaluation of cycle-ways is also included. Finally, to end on a positive note some areas of research that have been undertaken in NSW are described that have aimed to improve economic appraisal.

6.2 Gateway Reviews

The State Infrastructure Strategy argues that *“a number of major projects that have been selected have either been delayed or cancelled – notably the Sydney metro, a \$400 million bill for taxpayers for nothing at all. The underlying failures leading to these outcomes have been poor planning and project selection rather than an inability to deliver”*.⁴³

The mandatory ‘Gateway’ process for projects costing over \$10 million introduced in 2011 may help stop such massively expensive non-outcomes.

However, there are concerns over the escalating cost, retrospective advocacy and ‘one-way’ directional process of gateway business cases. An example of business case escalation is the North West Rail Link. In 2006, the economic appraisal of six route/mode options by Douglas Economics for the Department of Planning cost \$150,000 (excluding a peer review by Booz Allen Hamilton). By 2012, the business case evaluation of the North West Link by Ernst and Young which was originally budgeted at \$1.4 million had cost \$4.1 million.⁴⁴

In terms of process, Business Cases have not been complete or not even started before Government has announced that the project would happen. The most recent example is WestConnex. This \$10 billion road project was included in the INSW 2012 Infrastructure Strategy (see section 4.6) before any Cost Benefit Analysis was done. It was subsequently included in the TfNSW Long Term Transport Master Plan (LTTMP) with the comment that the *“Sydney Motorways Project Office has been established and planning has commenced on WestConnex”* (p13), and that WestConnex will be *“progressively delivered in a series of*

⁴³ *“State Infrastructure Strategy”*, page 23 Infrastructure NSW.

⁴⁴ *“North West Rail Link costs go off the track”* The Daily Telegraph, February 20, 2013.

stages over the next decade” (p137). However, it was only on January 16th 2013, that a Business Case for WestConnex was announced.

The final concern is the ‘one way’ progression of business cases. Returning to the North West Rail Link (NWRL) example, the 2006 Douglas Economics economic evaluation concluded that a heavy rail costing \$1.9 billion produced the highest BCR of 1.4. A cheaper bus Transitway costing \$600 million and a \$1.4 billion Light Rail option were rejected largely on the grounds that they would force passengers to interchange. Both produced lower BCRs of 1.08 and 0.85 than the through running but more costly heavy rail option. Moving forward to November 2011, the TfNSW submission to Infrastructure Australia saw costs more than quadruple to \$8 billion and the service specification changed to single deck metro rail trains and a forced interchange.⁴⁵ Despite these cost and service changes there was no reconsideration of the previously rejected alternative options. In an article in the Sydney Morning Herald, former RailCorp Planning Manager Dr Dick Day commented that *“the adverse impact on the very large number of passengers forced to interchange makes the minister's decision to support the metro alternative without detailed public discussion truly heroic”*.⁴⁶

It should be said that cost escalation is not unique to the NWRL project. A review by the NSW Auditor General found that infrastructure costs had increased at 5-7% per year⁴⁷ which was more than double the inflation rate (which averaged 2.2% per year over the decade 2002-2012).

6.3 Centralisation of Planning & ‘Harmonisation’ of NSW Parameter Values

The centralisation of the transport planning function in 2011 created a single agency, Transport NSW (TfNSW) responsible for providing road, rail and ferry services. It is too early to tell whether this centralisation will produce better outcomes. On the one hand, centralisation allows road and rail planning to be integrated but on the other it distances planning from ‘grass roots’ operations and maintenance where ideas often originate.

In terms of appraisal, centralisation presents the opportunity to develop and apply a consistent appraisal technique and the release of *“Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives”* (PGEATII) in March 2013 by TfNSW represents a first step in this process with the amalgamation of the rail and road manuals.⁴⁸ PGEATII recommends the adoption of ‘harmonised values of time for road and public transport investment’:

- Value of travel time (private) = \$13.76 per hour (applicable to private car occupants, onboard train time, onboard bus time, ferry travel, cycling time and walking time)

⁴⁵ *“North West Rail Link Submission to Infrastructure Australia”* by TfNSW Australia dated November 2011.

⁴⁶ *“Railroaded? Metro rail alternatives for western Sydney”* Sydney Morning Herald 29th June 2012.

⁴⁷ *“Strategic Infrastructure Plan”* Infrastructure NSW.

⁴⁸ There is a similar aim at the national level to amalgamate the ATC and Austroads guidelines (see section 5.2.3).

- Value of travel time (business) = \$44.03 per hour applicable to all business travels

The private time value is based on the 1997 Austroads 40% Average Wage Rate value but has been calculated using NSW wage statistics rather than Australia as a whole (with 'equity' implications for commonwealth submissions). TfNSW argues that it is a resource cost value because it is referenced to wages.

However unlike the original 1997 Austroads study where the 40% value applied to all time components (e.g. waiting time) TfNSW recommends weighting car access time by 1.2, walking access by 1.5 and waiting time by 1.5. Thus as an example, walking to a rail station would be valued at \$20.64 per hour compared to \$13.76 per hour walking all the way to work.

By contrast, RailCorp has based its values of travel time and service quality on large scale Willingness to Pay surveys of its passengers. The most recent 2010/11 survey estimated a value of \$11.24 per hour (including GST) which is 80% of the 40% Austroads wage rate assumption. The replacement of this value with the 40% wage rate assumption will increase the value of rail time savings for rail projects by 20%.

In terms of forecasting rail patronage response to service level changes, RailCorp method has used WTP values in combination with a set of estimated demand elasticities to forecast patronage response. The higher harmonised value will need to be applied with care to avoid over-estimating patronage response.

Another related issue that has arisen in recent public transport appraisals is the divergence in behavioural parameters between the patronage forecasting model and the economic appraisal. The Bureau of Transport Statistics, which is within the TfNSW portfolio is developing a Public Transport Project Model to forecast demand for major transport projects including Light Rail and the NWRL. The model is a four stage model (generation, distribution, assignment and mode split) but is specified so that the mode choice component is forecast incrementally to the Base Case which is calibrated on observation surveys. The behavioural parameters have been based on a review of the literature with the ATC guidelines being an important source. For the appraisal however, there has been a desire to replace the behavioural parameters with economic parameters which has introduced problems in reconciling the patronage forecasts with the user benefit measure. One suggestion has been to use the log-sum composite cost instead of the rule of one half weighted time saving approach.

6.4 Differences in NSW & Commonwealth Parameter Values

There are some differences in the parameter values in the NSW PGEATII and the compared to the Commonwealth manuals such as Austroads and the ATC Guidelines.

A noteworthy difference is in terms of the value of statistical life (VSL) which is used in calculating accident cost savings from road improvements. Table 6.4 presents a summary of the VOSL estimates.

Table 6.4: Comparison of the Value of Statistical Life

Estimate	Description	Value \$m	Year
Austroads	Human Capital Approach - costs of road accidents estimated by Commonwealth Bureau of Transport Economics in 2000 (1) and updated by Austroads (2) - Estimated cost of a fatality (average urban and rural estimate). The estimate is referenced as a 'default' value in Commonwealth Aviation CBA manual(3) and in the Australian Transport Guidelines (4) and is the most commonly	2.5	2011
Commonwealth	Recommended value of statistical life of Commonwealth Dept of Finance & Deregulation (5) based on an international review by Peter Abelson undertaken in 2007.	3.5	2007
TfNSW	Stated Preference Willingness to Pay survey commissioned by PWC/Hensher Group for NSW Roads & Traffic Authority in 2008. Value (\$5.95 million in 2008) has been updated to 2011/2012 by TfNSW. TfNSW recommends this value to be used in project evaluations(6).	6.4	2011/12

1. Bureau of Transport Economics (2000) Road Crash Costs in Australia, Report 102, BTE, Canberra.

2. Austroads (2011) "A Guide to Project Evaluation" manual produced by Austroads.

3. Civil Aviation Safety Authority Commonwealth Government (2007) "Commonwealth Civil Aviation

4. Australian Transport Council (2006) "National Guidelines for Transport System Management in Australia", 5 volume report by the ATC Australian Commonwealth Government

5. Commonwealth Department of Finance and Deregulation, Office of Best Practice Regulation (2008), Value of Statistical Life, Best Practice Regulation Guidance Note, 2008

6. TfNSW (2013) "Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives" a report by Economic Policy Strategy and Planning of the Finance Directorate of Transport, Transport for NSW, dated March 2013.

The Austroads Manual and ATC Guidelines adopt a value first estimated by the Bureau of Transport Economics (a Commonwealth government agency) in 2000 using a 'Human Capital' approach. The Human Capital approach adds the identifiable costs, such as loss of work income, medical expenses, long term care, insurance cost, vehicle repair, property damage, travel delays and policing. Income and output streams are evaluated over a period of up to 40 years then discounted to present value. From time to time, the BTE value has been updated by Austroads. The 2011 value is \$2.5 million per fatality.

TfNSW recommends a value of \$6.4 million for VSL, a value 2.6 times higher than the Austroads/BTE value. The TfNSW value is a 'Willingness to Pay' estimate determined by a

Stated Preference survey undertaken by the Hensher Group for PWC in a 2008 study commissioned by the RTA. The study estimated a value of \$5.95 million for a road fatality. This value has then been updated to 2011/12 by TfNSW using the consumer price index.

The use of such divergent parameter values will obviously influence the CBA result especially so for those projects that are orientated towards road safety improvements. For NSW, the NSW Treasury *“recommends that analysis be undertaken using both methods for a period to gauge the degree of significance of the change in appraisal results due to two approaches”* (PGEATII, page 42). At a national level, States that use the Austroads/BTE values will produce lower CBA results than NSW using the WTP approach.

6.5 Competitive NSW Transport Planning

Counterbalancing the centralisation of planning and project appraisal within TfNSW has been the creation of Infrastructure NSW (INSW) in 2010. This has created the somewhat unique situation in which two government agencies are statutorily responsible for producing twenty year master plans covering transport infrastructure (INSW and TfNSW).

In late 2012 both INSW and TfNSW released 20 year master plans. In general, the two plans were in broad agreement but there were some noteworthy differences in project recommendations. Of the 52 transport projects and reforms recommended in the INSW strategy, 47 were supported by the NSW Government with five not supported (metro rail for NW Sydney, bus rapid transport for Sydney CBD and investigations for a second Sydney airport within the Sydney basin).

INSW is also statutorily required to review major infrastructure proposals put forward by TfNSW (and other government agencies and the private sector). In theory, this should provide a useful check since TfNSW, as both project proponent and evaluator, is open to the criticism of ‘in-house’ bias. However, as of March 2013 INSW has not articulated in any detail how it proposes to review proposals.

6.6 Infrastructure Australia

Since 2008, funding for major road and rail (costing over \$100 million) has been competitively available through Infrastructure Australia. To date, NSW has been approved \$2.7 billion for upgrading the Pacific Highway, \$840 million for upgrading the rail corridor north of Sydney and \$2.1 billion in funding for a new passenger rail line in Sydney which ironically, the current NSW Government has not supported. Indeed, for this project – a rail link between Paramatta and Epping - the NSW Government cited poor BCR results for declining the Federal Government sponsored proposal.⁴⁹

⁴⁹ Gladys Berejiklian NSW Transport Minister reported a BCR of 0.35 for the proposed \$2.6 billion Epping-to-Parramatta rail link with \$2.1 billion Federally funded based on an updated assessment of the project with costs increased to \$4.38bn. *“Federally preferred rail link ‘not worth its cost’”*, ‘The Australian’ newspaper Nov 23rd 2011.

To avoid 'bloated' business cases, IA requires submissions to be no longer than 30 pages with 'threshold' and 'ready to proceed' submissions (see section 5.2.5) emphasising the CBA component and including a discussion of parameters underlying the evaluation. In actual submissions, the CBA component has not featured prominently. As an example, the TfNSW Pacific Highway Submission which was 49 pages long (excluding appendices) devoted three pages to the economic appraisal.⁵⁰

To avoid bias, IA recommends that standard economic parameter values are to be used. There is no discussion of the extent of different parameter values being adopted by different States and the impact this may have on project prioritisation such as in terms of accident savings (see Table 6.4).

In terms of 'innovative appraisal techniques', IA stipulates that the core evaluation should exclude (i) social capital, health and other benefits of active transport proposals; (ii) wider economic benefits (WEBs) and (iii) urban consolidation benefits and TODs.

With regards WEBs, IA comments that "*quantitative analysis should follow the latest guidance and use well informed assumptions about the most appropriate, proposal specific data. Applying a broad percentage up-lift to the results of the traditional appraisal does not provide any additional or meaningful information for Infrastructure Australia to consider in the decision making process*".

IA notes a 'tendency in submissions to include a percentage up-lift of the traditional appraisal (which has been between 10% and 20%) but notes that "this does not provide any additional or meaningful information for Infrastructure Australia to consider in the decision making process".

As regards urban consolidation (UC) benefits, their inclusion in project appraisal in NSW is not new but has lapsed over the last decade due to the emergence of WEBs. UC benefits were included in some rail economic evaluations in the early 1990s. As an example, the economic evaluation of the Sydney Airport Rail Link by Denis Johnston and Associates in 1994 included UC benefits from physical infrastructure at \$18,500 per household, social infrastructure at \$14,500 and transport infrastructure at \$6,500 from the redevelopment of brown field land in inner Sydney rather than green field land in outer Sydney.

6.7 Toll Roads

A special case subset of road infrastructure projects is the major urban toll way project, for which the two most recent projects in Sydney (Cross City and Lane Cove) and also Brisbane (CLEM 7) have been constructed on the basis of traffic forecasts that have proved highly optimistic causing projects to fail financially within the first year of opening. It is worth noting that the projects were privately financed thus the NSW and Queensland governments

⁵⁰ "Pacific Highway Upgrade Submission to Infrastructure" by TfNSW dated November 2011

have not themselves lost financially. Also the public has benefitted to some extent from their introduction.

The appraisal of these projects has largely been financial, undertaken by private sector agencies independent of Government. They have also been largely confidential appraisals with the behavioural parameters (such as the values of time) governing the diversion from other roads remaining undisclosed.

All three projects have been "short" toll roads, tunnels with one entry and one exit. For longer projects like the M7 in Sydney and the City Link in Melbourne with multiple entry/exit points the traffic forecasts have been much better. Professor David Hensher who was consulted in undertaking this review considers that the shortness of the toll road route and the insufficient allowance for patronage ramp up have been two contributory factors in patronage over forecasting. With regard to length of route, Professor Hensher considers that the time savings were too high because of a failure in the market research Stated Preference studies to recognise that a high percent of time on the so called 'tolled route' was actually on free roads. When the distinction is made in survey design, as has now been done, the value of time saved drops significantly and meaningfully.

6.8 Cycling & Walking

Cycling is has a relatively low use in Australia. A 2009 Infrastructure Australia (IA) background report on cycling estimated that nationally, less than 2% of trips are made by cycle which compares with 10-20% in western countries.⁵¹

Amongst the States, NSW had the lowest cycling share in 2006 for commuting to work of 0.8%, around half the national share of 1.6% with the share halving over the decade 1996 to 2006. However, where dedicated cycle lanes have been put in, there is evidence of strong growth in cycling use over the last five years. On the Sydney Harbour bridge, count data has shown cycling use of the dedicated lane to have doubled from 1,000 to 2,000 per day from 2006 to 2011.⁵²

The IA background report noted that *"one of the barriers to creating better cycling infrastructure, cited by many countries, is that cycling and walking remain marginal in transport policy discussions and that national budgetary allocations usually reflect this status. Australia is no exception in this regard"*.

In the 2009, the Building Australia Program allocated \$41 million to developing cycleways which represented 0.1% of a total package of \$42 billion. By 2013, around 600 kilometres of cycleways had been built however the basis of how individual projects were selected is not known.

⁵¹ IA (2009) "Cycling Infrastructure for Australian Cities", Background Paper, March 2009.

⁵² RTA (2011) "Review of Operations – Transport" 2011 Report by the NSW Roads and Traffic Authority

Specific cycling proposals have also been submitted to Infrastructure Australia for funding. The most expensive submission has been a \$295 million Inner Sydney Strategic Cycle Network proposed by 15 inner city councils of Sydney which would involve 160 kilometres of separated bicycle roads and 70 kilometres of upgrade share path and a 2 kilometre harbourside cycleway.

In terms of evaluating the cycling submissions, IA notes that “further work is required to ensure that the assessment of benefits is sufficiently robust to meet the requirements of Infrastructure Australia’s methodology and the Building Australia Fund criteria”. In this regard, a Brisbane City Council submission “*Investing in Cycleways*” to IA noted that that, “*transport modelling has largely ignored cycling and consequently benefit cost ratio studies do not have a long history of analysing cycling*”.

In NSW in 2012, the RMS published guidelines to help agencies prepare bicycling plans.⁵³ Included in the document is a Cost Benefit Appraisal model for which an embedded Excel tool can be accessed via TfNSW PGEATII (see section 5.11).

The guidelines include parameter values to calculate the net economic benefit of additional cycling trips forecast to result from a new cycleway or cycling initiative (e.g. bike racks). The parameters are expressed in cents per bicycle kilometre and cover aspects such as health benefits and bicycle crash costs for both commuter and recreational cyclists. Table 6.8 presents the parameter estimates.

The guidelines assume that the cycleway will not generate any time savings. This is based on the premise that cycling is slower than driving and public transport and involves a net cost in travel time. There is no benefit to existing cyclists from any improvement in the speed/quality of the cycling trip (vis a vis their existing route). A saving in user cost is included for trips diverted from car of 27 cents. No cost saving from PT diversion is included.

By far the largest benefit is health related at 105 cents per additional kilometre cycled which is offset by 27 cents of increased accident risk (on road) and 54 cents (off-road). Next highest is a decongestion saving for remaining road users (which assumes that no road space is taken up by the cycle-way).

⁵³ RMS (2012) “*How to Prepare a Bike Plan*” report by Roads and Maritime Services NSW.

Table 6.8: Net Benefit of Cycle-way Provision

Parameter	Explanation	Cents per Bicycle km
Travel Time	"Cycling is slow than car driving or public transport which means that cycling involves a net cost in travel time"	Zero
User Cost	Savings in car cost net of small bicycle depreciation & maintenance allowance	27
Parking	only applicable where cycling replaces car trips than involve a parking cost	1.3
Health	Improved health and reduce morbidity based on review of literature	105
Accident Costs	Cycling incurs greater accident costs than car. Figures based on RMS/BTE figures	-27 off-road / -54 on-road
Decongestion	Benefits to remaining road users. Assumes cycleway does not take up road space	29
Air Pollution	Applicable where cycling replaces car trips	2.9
GHG Emissions	as above	2.3
Noise	as above	0.98
Water Pollution	as above (from oil/tyre degradation etc)	0.44
Nature & lanscape	as above site specific comparison of cycleway versus new road space in terms of impact on habitiat, natural vegetation and visual amenity	0.06
Urban separation	as above - site specific - benefit of improved access to commuinty facilities for cyclists	0.67
Roadway Costs	as above - reduced wear and tear on roads plus generic value for lower capital/operating and depreciation costs of cycleways versus roads	4

Source: RMS(2012) "How to Prepare a Bicycle Plan"

In terms of promoting walk trips, TfNSW has established pedestrian facility programs to improve safety, mobility and access, particularly in areas of high pedestrian activity. Typical projects include preparation of Pedestrian Access and Mobility Plans, provision of kerb ramps, new crossings at signalised intersections, and new traffic control signals for pedestrians. In 2011, 65 pedestrian infrastructure projects were delivered on NSW state roads that were funded by the RTA at a cost of \$3.9 million. A further 61 projects were undertaken on regional and local roads in local government areas around the State, with funding matched dollar-for-dollar by local councils to an RTA contribution of \$1.5 million.⁵⁴ In terms of evaluation, there is no equivalent manual/CBA tool for walking trips

6.9 Recent Research in Appraisal Techniques

Rail Corp has undertaken research to develop practical evaluation methods that have been used in many evaluations (see section 2 page 8) and the Institute for Transport Studies and Logistics, Sydney University has also done research for the NSW Government agencies that has innovative evaluation techniques for rail, bus and road.

Through the 2000s, RailCorp has undertaken an upgrade program of its stations and train fleet. For each station and train type, a range of upgrade options has been identified by

⁵⁴ RTA (2011) "Review of Operations – Transport" 2011 Report by the NSW Roads and Traffic Authority

architects and engineers. After undertaking Value Management workshops to shortlist options, economic and financial appraisals have been undertaken. It was found that existing appraisal methods were too coarse to distinguish between upgrade options. To address the problem, a rating based system⁵⁵ was therefore developed in which RailCorp customers were surveyed: firstly, to elicit their rating of different trains and stations and secondly to translate their ratings into 'Willingness to Pay' by estimating a statistical relationship between rating and travel time.⁵⁶ The approach has been used in over thirty station upgrades and in all train refurbishment upgrades since 2005. Moreover, by going back and surveying stations after refurbishment and by repeat surveying of different train types, RailCorp has developed a before/after understanding of the effect of train and station improvements from a passenger perspective and one that is easily understood and applied by architects, engineers and managers.

Overcrowding at stations and on trains has been a continuing problem for peak period Sydney rail services during the 2000s. To estimate the cost of on-train crowding⁵⁷ and station congestion⁵⁸ to passengers, RailCorp undertook Stated Preference surveys of passengers in the mid 2000s and surveys of the willingness of passengers to travel earlier or later in 2009/10.⁵⁹ The crowding SP surveys were used to develop crowding cost functions that have been used to evaluate the benefits of running additional trains in the shoulder peaks and enlarging the platform and circulation areas of Sydney's major CBD stations.⁶⁰ The displacement surveys have been used to evaluate pricing strategies to encourage passengers outside the peak hour with INSW commissioning an 'expert' report as part of the development of its 2012 State Infrastructure Plan.⁶¹

A third research area in which RailCorp has developed a practical economic appraisal approach is in passenger lifts at rail stations. Around 300 lifts have been installed at over 100 out of the 307 stations. A typical lift costs around \$500,000 to install and installation can be disruptive. RailCorp has developed a methodology to assess the economic and financial net benefit of lifts. On the passenger side, benefits have been estimated by questionnaire methods and by observation surveys undertaken at stations with and without lifts.⁶² On the cost side, the evaluation has taken account of maintenance cost including vandalism, energy use in addition to capital and disruption costs during installation. The methodology has been

⁵⁵ The approach is similar to that used by Transport for London but uses passenger ratings rather than ratings derived from a mystery shopper.

⁵⁶ "Estimating Rail Service Attributes through Rating Surveys", Douglas N.J. and Karpouzis G., paper presented at the 29th Australasian Transport Research Forum, Gold Coast, September 2006

⁵⁷ "Estimating the Passenger Cost of Station Crowding", Douglas N.J. and Karpouzis G., paper presented at the 28th ATRF, Sydney, Sept 2005.

⁵⁸ "Estimating the Passenger Cost of Train Crowding", Douglas N.J. and Karpouzis G., paper presented at the 29th Australasian Transport Research Forum, Gold Coast, September 2006.

⁵⁹ "Forecasting the Effect of Fare Changes on Train Loads using Rooftops", Douglas N.J., Henn L. and Sloan K., Paper presented at the 34th Australasian Transport Research Forum, Adelaide, 2011.

⁶⁰ The station crowding values were used to monetize pedestrian simulation modeling outputs in the evaluation of Town Hall upgrade options by Arup in 2006/7.

⁶¹ http://www.infrastructure.nsw.gov.au/media/16691/douglas_economics_insw_modelling_fares.pdf

⁶² "Forecasting the Use of Passengers Lifts at Rail Stations", Douglas N.J., Karpouzis G. And Rahman A. Paper presented at the 33rd Australasian Transport Research Forum, Canberra, September 2010 and "Forecasting the User Benefit of Rail Station Lifts", Douglas N.J., Paper presented at the 34th Australasian Transport Research Forum, Adelaide, 2011.

combined with the station rating approach to value over thirty station upgrade programs and was also used to evaluate a tender bid for the provision of 80 lifts of different types.

Sydney University Institute for Transport and Logistic Studies (ITLS) has also done research for the NSW Government agencies that has covered a range of evaluation issues. In 2010, ITLS looked at the spatial impact of projects in terms of winners and losers using the North West Rail Link (NWRL) as an example.⁶³

ITLS has undertaken research into Wider Economic Benefits (WEBs) using the NWRL in one case study.⁶⁴ They found that for Sydney the productivity elasticities were relatively elastic compared to the UK but less elastic than for New Zealand. With the help of UK researcher Danny Graham, ITLS has developed an integrated model system known as TRESIS-SGEM. The Transport Environmental Strategy Impact Simulator (TRESIS) has a detailed behavioural system at the transport sectoral level that accounts for the interrelationship between transport and location choices of individuals and households. The Sydney General Economic Model (SGEM) is a spatial computable general equilibrium model for the Sydney metropolitan area which can identify a number of economy wide impacts of specific transport policies and strategies. The model when applied to the NWRL (op cit) estimated WEBs from employment redistribution agglomeration productivity gains were worth 17.6% of traditional user benefits.

Together with Monash University, ITLS has undertaken research to value additional trip making associated with lowering the barriers of social exclusion (reduced participation in society) through improved public transport.⁶⁵ The study undertook a face-face survey of 443 adults in Melbourne in 2009 backed up existing household travel survey data. Different geographic areas (inner and outer metropolitan areas), different accessibilities (people living in areas within walking distance to public transport and outside such distance), different age distributions, income groups and risks of social exclusion were covered. The data was used within an econometric model which estimated a 'willingness to pay' of \$19.30 for an additional trip to engage more activities and overcome social exclusion.

⁶³ *"The North West Rail Link: Winners and losers in the locality of the North West area"* by Geoffrey T. Clifton, Corinne Mulley and David A. Hensher ATRF 2012.

⁶⁴ *"Assessing the Wider Economy Impacts of transport infrastructure investment with an illustrative application to the North-West rail Link project in Sydney"* Hensher, DA, Truong, TP, Mulley, C and Ellison, R (2012), Australia, Institute of Transport and Logistics Studies, the University of Sydney, February 2012.

⁶⁵ *"Social Exclusion and the Value of Mobility"* by John Stanley, David A. Hensher, Janet Stanley, Graham Currie, William H. Greene, and Dianne Vella-Brodrick, *Journal of Transport Economics and Policy*, Volume 45, Part 2, May 2011, pp. 197–222.

Finally, we end where we started on the Sydney Harbour Bridge which has been used to demonstrate the life cycle carbon footprint of infrastructure using a computer package designed by an Australia company called Etool. They have calculated that the bridge paid off its full embodied carbon construction impacts by 1955 through the reduction in road carbon emissions and by the end of its projected future in 300 years time, it will have paid itself off a further 235 times.⁶⁶



7. Summary

Transport project appraisal centred on Cost Benefit Analysis has a history that dates back over forty years in Australia. From tentative beginnings in the 1960's and 70s, through a period of relative stability in the 1980s and 90s, the basic approach has largely remained unchanged to the present day. Where change has occurred, it has been in how the decision making process has included CBA: from standalone documents, to chapters of Environmental Impact Statements to sections in Business Case submissions.

To assist practioners, evaluation guidelines, frameworks and manuals have been developed. The review looked at five 'national' and four NSW appraisal guidelines / frameworks. Of available approaches, cost benefit appraisal is recommended for option evaluation and investment submissions although within a broader multiple criteria type planning framework. Some differences in parameter values, treatment of taxation and generated demand were observed. The basis and valuation of travel time and accident costs are particularly noteworthy. The funding of transport in NSW has a major determinant on the appraisal process. The NSW Government funds around 88% of recurrent and capital expenditure with the federal government providing 12%. Around 50% of expenditure is recurrent and 50% capital. Formalised, economic appraisal processes tend only to be used for larger capital projects. At the federal level, although an expenditure listing by type and project is provided for each State, an appraisal basis is only provided for larger projects of over \$100 million funded via Infrastructure Australia through a submission process.

At the State level, the NSW Treasury has developed a mandatory Gateway / Business Case review process for projects costing of \$10 million to provide a level of assurance as to whether investment is warranted, strategic options are appropriate and whether the agency has capability and capacity to manage and deliver the project. An economic CBA has been a required part of this process. For recurrent expenditure, there is no formalised economic appraisal system in place.

Public transport fare increases are subject to review by the Independent Pricing and Regulatory Tribunal (IPART) and concern regarding the low operating cost recovery ratio of passenger rail (around 20%) stimulated IPART to commission a 'one-off' economic appraisal

⁶⁶ <http://etool.net.au/eblog/projects/quantifying-the-benefits-of-the-sydney-harbour-bridge/>

of the optimal fare level for rail which recommended through a economic CBA approach a 20% fare increase.

CBA has been the favoured evaluation technique for road and rail projects and has been at its most useful in assessing medium sized projects when combined with Value Management to evaluate short-listed options, indentify where changes in scope are worthwhile and make recommendations to executive management regarding the merit or otherwise of proposals.

There have been some changes in technique, parameters and benefit scope, but the basic CBA approach has remained largely unchanged. One of the key parameters, the discount rate at which future benefits and costs are expressed in present day terms has not changed from 7% over the last forty years (1972-2012).

For road appraisal, the changes have reflected engineering and technical refinements developed by national organisations such as ARRB and State agencies such as the RTA and latterly RMS in NSW. For most road appraisals it has been reasonable to assume that the level of traffic demand will not be affected by the projects. Consequently, issues surrounding the treatment of generated demand such as differences in values of time, relative accident savings and externality values have not been as important as in public transport and rail evaluations.

For travel time savings, road and rail agencies have adopted different valuation approaches. Since the late 1990s, road has adopted a 40% average wage rate assumption whereas in NSW, rail evaluations from the mid 1990s onwards have been based on system-wide Willingness to Pay surveys of rail passengers.

In terms of scope, large scale rail evaluations have tended to widen the scope which probably reflects the difficulty in getting sufficiently high BCRs with only 'conventional' benefits included. The 1990s saw the addition of urban consolidation benefits into NSW rail evaluations predicated on transit orientated development around stations, brown field redevelopment and increases in urban density as opposed to green field peripheral development in the Base Case.

From the 2008 onwards, a different approach has been adopted for larger NSW rail projects whereby conventional benefits (time savings, road decongestion and externalities) have been factored upwards by between 10%-20% to allow for Wider Economic Benefits (WEBs) usually on the basis of UK evidence. Infrastructure Australia, the only agency that has developed a detailed framework for funding submissions, has been unhappy with this type of approach and has required the omission of WEBs and other benefits forecast by 'innovative appraisal techniques' from the core economic appraisal and only presented as an augmented appraisal.

Attempting to keep track and report appraisal developments are the Manuals and Guidelines produced by statutory and non statutory government agencies. This review has looked at nine such Manuals. What the manuals share is support for CBA appraisal within a

Multiple Criteria Analysis type higher level decision making framework. Where they differ which is usually not marked, is in some of the recommendations regarding the basis of evaluation, assumptions and parameters.

New transport projects to accommodate population growth continue to be identified in NSW and reported by government in a series of state plans and infrastructure strategy reports. In 2011, the consolidation of planning the major road and rail transport agencies within a single organisation (TfNSW) presents the opportunity to introduce common methodologies, appraisal techniques and parameters to be applied to both road and rail transport projects. However, this should be tempered by the movement away from the values transport users actually place on travel time and service quality and the vertical separation of project evaluators from the 'grass-roots' operators who often generate the ideas and know what will work in practice.

Somewhat unique to NSW is a parallel stream of Infrastructure Planning and project review created in 2010 through the establishment of an adjunct agency of government, Infrastructure NSW. The respective status and funding priorities of the alternative infrastructure strategies for NSW do not appear yet to be fully resolved.

Economic appraisal has only had a minor role in developing either the INSW or TfNSW long term plans. Unlike the State Master Plan which includes getting State finances back on track as a key goal, the TfNSW Long Term Transport Master Plan did not include affordability or cost as one of its eight criteria by which projects and initiatives were evaluated.

Moreover, projects included in the TfNSW and INSW Plans have been announced as 'happening' by State Government before business cases have been completed or started. As a consequence for these projects, economic appraisal can become to be seen by the public as retrospective justification.

In terms of the general planning approval process of infrastructure in NSW, CBA has been a component but not a core component. Planning approval has primarily involved the middle tier of government and for road and rail projects, public consultation has been the norm rather than a public enquiry system as in the UK. Traditionally, economic appraisal has been included as a significant criterion but in recent years, broader socio economic criteria have become more prominent.

Finally, although there has been no state or national sponsored program specifically aimed at developing transport economic appraisal, research has been done in NSW that has had practical and consequence. Over the last 10-15 years, Rail Corp has undertaken research based on surveys of passengers to develop simple to use and easy to understand methods for valuing train and station quality improvements, crowding cost functions for trains and stations and passenger benefits for station lifts. The Institute for Transport Studies and Logistics, Sydney University has also completed research for the NSW Government agencies that has led to locally based estimates for WEBs, social exclusion and bus and train crowding.

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